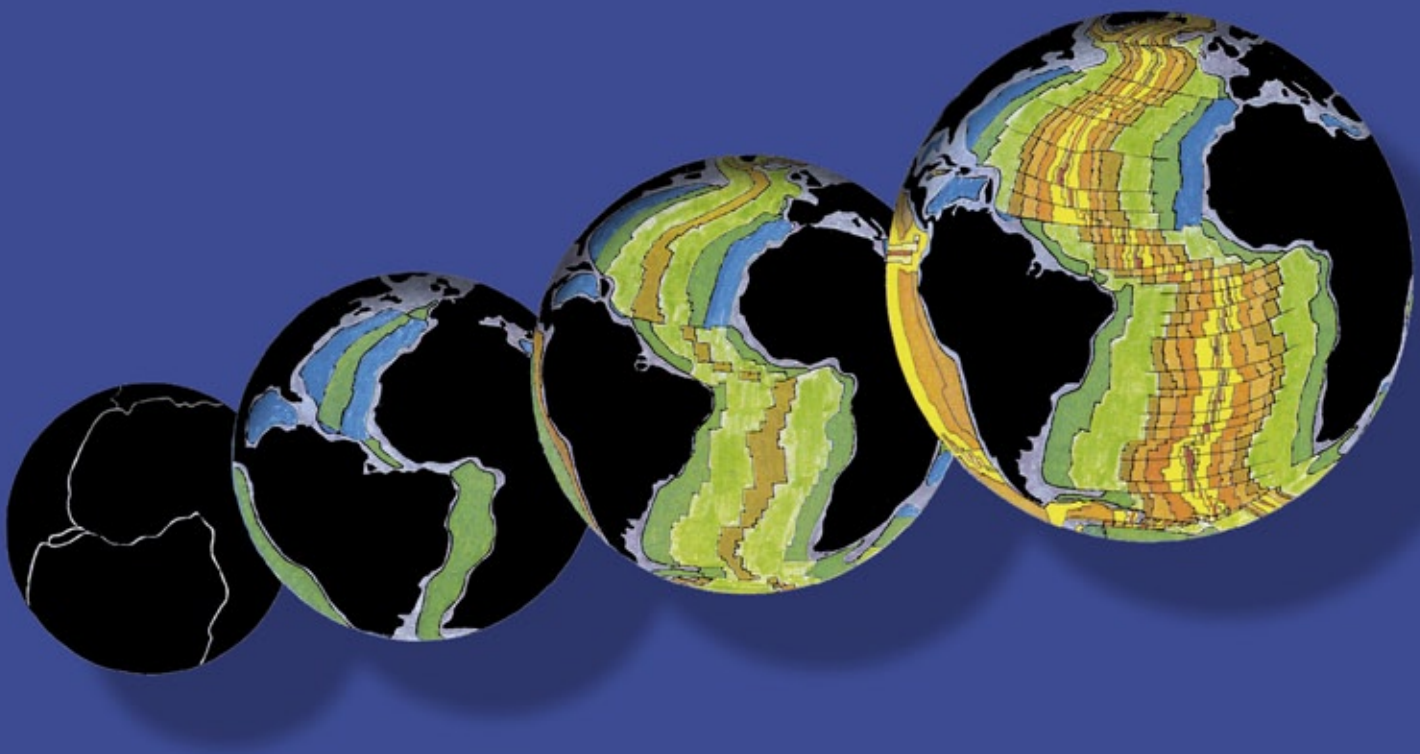
Jan Koziar

GEOLOGICAL PROOFS OF SIGNIFICANT EXPANSION OF THE EARTH

and its broader scientific context



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This book is dedicated to the late Professor Józef Oberc on the 100th anniversary of his birth and the 10th anniversary of his death. Professor Oberc was a distinguished supporter and promoter of the expanding Earth theory.

Professor Józef Oberc

1918 – 2008

The photo was taken at the international conference "Problems of the expanding Earth", Wrocław – Sosnówka 1994 (Poland), attended by Professor Samuel Warren Carey

Introduction

by the Board of the Association of Geologist Alumni of Wrocław University (AGAWU)

Professor Józef Oberc as a supporter and promoter of the theory of the Expanding Earth in Wrocław

Professor Józef Oberc is one of the postwar founders of Wrocław geology who became its icon with time. No one like he knew the geology of Sudetes Mt. and its foreland to which he sacrificed almost his whole professional life. His outstanding book ***Sudetes and adjacent areas*** (Oberc, 1972) in the series ***Geological structure of Poland***, describes overall geology of this region, not misshapen yet by concepts of subduction and terranes. Up to today this book is an irreplaceable handbook for everyone who wants to gain the basic knowledge of geology of the whole northern border of the Bohemian Massif.

He was an excellent teacher. Wrocław students of geology became geologists long before graduation but after passing his examination on physical geology.

He played a significant role in development of the theory of expanding Earth in Wrocław. Without his openness, resolute support and participation, this development would have been very difficult.

His engagement in this radical (though not new) theory started at the beginning of 1971, when Jan Koziar – an assistant at the Department of Physical Geology, run by the Professor – showed him his own draft of the theory after analysis of a paper by a Hungarian expansionist Laszlo Egyed (Egyed, 1956). Professor Oberc was very interested in the draft and supported its author in further work on this topic. Already in 1974 Professor presided over eight internal sessions of his Department when lectures demonstrating preliminary results were given. Among them was the first in the world attempt to quantify the growth of the Earth's radius – based on measurements of global increments of the lithosphere and expressed by a mathematical formula.

In 1976, on Professor Oberc's initiative, the main results were presented on two sessions of the parent Institute of Geological Sciences. Not long after that he introduced in the Institute a new research program ***Global Tectonic Processes***. The term "expansion of the Earth" was not used in this name in order "not to upset" geologists from other geological centers. However, everyone knew well what was going on. Professor Oberc himself became an official supervisor of the new program and so research into the expanding Earth in Wrocław obtained a solid institutional support.

In 1980, on Oberc's initiative, together with that of a physicist Professor Kazimierz Wojciechowski, the expanding Earth was lectured at a session of the Wrocław Scientific Society. At the subsequent session the connection of the theory with eruptive cosmology of an Armenian astrophysicists Victor Ambartsumian was lectured on. In this way the theory of the expanding Earth went out from the Institute to a wider forum of the Wrocław scientific community and from the field of geology into the interdisciplinary area. Professor Oberc personally looked after the elaboration of the report from the first lecture and thanks to him, the mathematically expressed function of the growth of the Earth radius was published as the first one in world literature (see: www.wrocgeolab.pl/floor.pdf).

Professor Oberc insisted that Koziar take a Ph.D. degree in some expanding Earth subject. At the beginning of the 1980s a tensional development of fold belts and island arcs was selected as the subject. Unfortunately the introduction of martial law in Poland prevented continuation of research on this project. Koziar found himself in hiding, wanted by the communist police, for resistant activity. However the topic was not completely blocked. In 1985 the XIIIth International Congress of Carpatho – Balkan Geological Association was organized in Cracow. A lecture on tension – gravitational development of the Carpathians was proposed for the Congress with coauthority of Leszek Jamrozik – another researcher at the Department of Physical Geology and a participant of the program ***Global Tectonic Processes***. Presentation would be done by Jamrozik who earlier was politically interned, but released before the Congress and so could participate in it. Preparation of the presentation and a short paper had a conspiratorial course. Jamrozik got Koziar's raw materials from the Department of Physical Geology and brought them to a meeting at a wood on the Odra River beyond Wrocław. There, sitting on fallen trunks, Professor Oberc, Koziar and Jamrozik decided what to say and write. In this way the paper on tensional devel-

opment of the Carpathians was published in the proceedings of the Congress (see: www.wrocgeolab.pl/Carpathians.pdf).

Professor and Jamrozik often accompanied Koziar on all-day secret forest excursions which served to maintain his health in hiding conditions. During these walks the expanding Earth was always present. Professor also invited Koziar to his home, where they discussed Earth expansion (amongst current political topics).

Professor Oberc contributed to the expanding Earth also with lectures and papers. In 1986 he delivered a lecture ***The Earth – mobilism and expansion*** on inauguration of the academic year at Wrocław University. The lecture was published in the journal "Problemy"(No 10, 1986). The following year he published a paper ***The role of mobile lithospheric blocks in pre-molassa development of the Variscides on the rim of the Bohemian Massif***. He analyzed the area in the frame of expanding Earth.

After the collapse of communism in Poland and re-establishing of J. Koziar at Wrocław University, the Professor did much to facilitate his further research on issues of the expanding Earth, despite the lack of a doctor title. The title became almost unavailable because Koziar preferred to work on such fundamental scientific topics rather than cope with hopeless discussions with referees.

In the 1990s numerous visits of expansionists from different parts of the world started. Professor Oberc always played a role of the main host. He welcomed Klaus Vogel from Germany (several times), Yurij Chudinov and Evgienij Milanovski from Russia, Giancarlo Scalera from Italy, Samuel Warren Carrey, James Maxlow and Cliff Ollier from Australia.

In March 1994 Professor Oberc supported publication of Yurij Chudinov's book ***Global Eduction Tectonics of the Expanding Earth*** by the Dutch-Japanese publishing house VSP, positively reviewing its text.

In autumn 1994 Koziar, together with Stefan Cwojdziński, organized an international conference ***Problems of the Expanding Earth.*** S.W. Carey participated in this event. Professor Oberc became a chairman of both the conference and the grant received for it. On the public session, in Aula Leopoldina of Wrocław University, Professor Oberc delivered a lecture: ***An outline of the main problems of the contemporary geotectonics – Wrocław's contribution to the record of the Earth expansion.***

In 1997 he became a supervisor of the three-year grant ***Expanding Earth.*** This grant significantly supported the research on the expansion of our globe carried out in Wrocław.

Professor Oberc finished his famous lectures on physical geology in 1996. For many years he explained the expanding Earth to students. In the first half of the 1990s Koziar was invited several times to present the expanding Earth topics during Oberc's course. In the academic year 2001/2 Koziar himself began to deliver course lectures – ***Expanding Earth with basic geotectonics*** – based mainly on his own scientific findings. The Professor, although he knew the topic well from Koziar's numerous public lectures, attended the whole first course. It testified to his great standing as a scientist. The science counted for him much more than hierarchic and ambitious matters.

Koziar's lecture courses lasted up to his retirement at the end of 2008. That year Professor Oberc left the Wrocław scientific community forever.

In times of uncritical acceptance of the dominant theory of plate tectonics, without Oberc's deep understanding of basis of geotectonics and without his support for research on expanding Earth, conducting such research in Wrocław on a larger scale became impossible.

In 2009 retired Koziar established the Wrocław Geotectonic Laboratory. His papers, dispersed in several secondary journals, appeared in large quantity, and in English versions, on the Internet. His first books in English also appeared. These publications aroused large interest. The number of reads on Koziar's website "Expanding Earth" (www.wrocgeolab.pl) has exceeded 4000 and 1000 on the ResearchGate program (the latter from February this year).

The Board of the AGAWU considers that the present publication, may be the most important of Koziar's books, ***Geological proofs of significant expansion of the Earth and its broader scientific context***, which is dedicated to Professor Józef Oberc, will be a worthy celebration of the 10th anniversary of Professor's death as well as the 100th anniversary of his birth.

The Board of the Association
of Geologist Alumni of Wrocław University
December 2018

Family tomb of Professor Józef Oberc in Wrocław
in the cemetery of St. Laurence Parish on Bujwida 51 street

Preface

The theory of an expanding Earth is based not on some assumptions but on the proofs of a significant increase in the volume of our globe.

The theory appeared at the end of the 19th century (Jarkowski, 1888, 1889; Mantovani, 1889) and was brought to scientific level in the interwar years by Lindemann (1927) and Hilgenberg (1933). However, its first geological proofs were formulated only in 1958 by Carey and there were three of them. Today as many as seven such proofs can be enumerated. They appeared at different times, were formulated by different authors and were published in different papers, mostly unknown today.

The goal of the present book is to bring together all these proofs with clear and expanded demonstrations.

The theory of the expanding Earth had been pushed to the very margin of geology in the 1960s so that many geologists have not even heard about it. However, this was not the state of affairs at the time when the basics of plate tectonics were first formulated. At this time Carey's works and name (as a restorer of mobilism) were well known. What is more, Carey's conclusions on the expanding Earth were quoted by the creators of the new theory which forced geotectonics back to old Wegener's framework.

This bizarre situation came from the strange scientific approach of both the first and the second generation of the founding fathers of plate tectonics.

The first generation – Dietz (1961) and Hess (1962) – preferred causal explanation (hypothetical mantle convection currents) of their neo-Wegener scheme, neglecting to prove their concept by geological facts. Because empirical proofs of their scheme was not an essential scientific procedure for them they also neglected Carey's proofs of the opposite scheme. It must be stressed that Carey proved expansion of the Earth as a fact based on geological facts, not on speculation on its causes.

The second generation of founding fathers of plate tectonics (McKenzie and Parker,1967; Morgan,1968; Le Pichon, 1968) likewise did not care much for geological proofs of their developed concept. Neither did they discuss Carey's proofs. They simply **assumed** the constancy of the Earth's

size and they and their followers built several models on this unproved assumption. These models are treated now as geological reality and serve as "confirmations" of plate tectonics and its basic assumption. So the whole theory has the structure of circular arguments –see my paper ***Plate tectonics: A theory founded on circular arguments*** (Koziar, 2017) and my book ***Falsification of the Eulerian motions of lithospheric plates: Circularity of the plate tectonics theory*** (Koziar, 2018). This approach results from a defective Kuhn-Popper cognitive philosophy, which assumes that no theory is true and so no proofs of their truth exist.

These flaws in scientific properties of plate tectonics will be explained in more detail in the Introduction to this book.

This book was initiated in 2009 by the late professor Ryszard Kryza, then the co-editor of the journal *Geologia Sudetica*, on the first anniversary of the death of Professor Józef Oberc. In an editorial remark to the first version of the present work Ryszard Kryza wrote:

> ***From the Editors:***
>
> ***Prof. Józef Oberc was among dedicated supporters of the Expanding Earth theory. He always encouraged the scientific efforts of the "Wrocław Team of Expansionists" under the leadership of Jan Koziar.***
>
> ***This paper provides the basics of the expanding Earth theory, being a real alternative to the recently "ruling" global plate tectonics.***

The first, much smaller version of this text was positively reviewed but it was not finished for many reasons. These were: conferences, publishing other books and papers and elaboration of my website on the Expanding Earth. Thus the work is finished only now, but as a book and on the 10th anniversary of the death of Professor Józef Oberc and the 100th anniversary of his birth. Fortunately it has now a much better published background (especially in the form of my Expanding Earth website) than it would have in 2009.

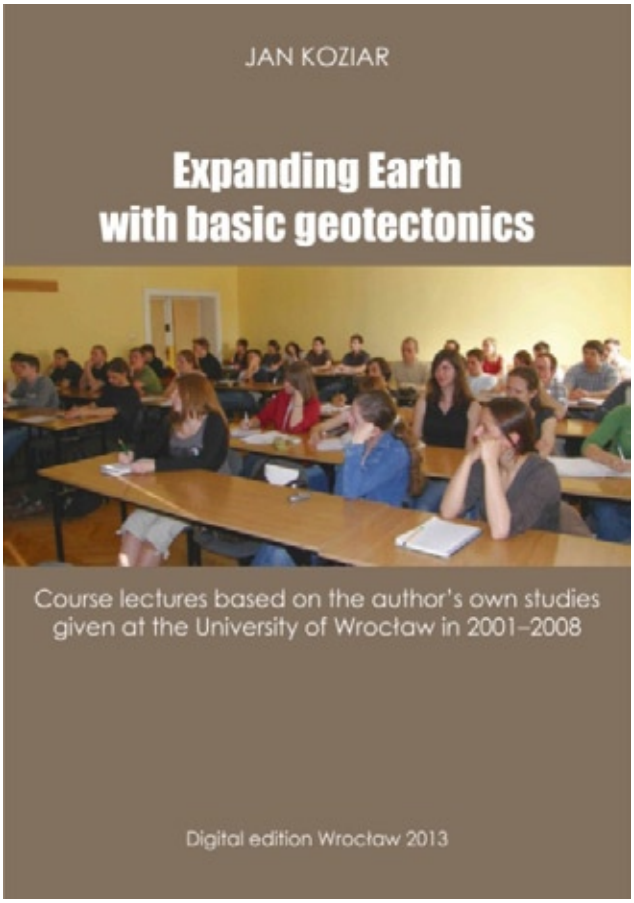
Many years of lecturing on various topics of the expanding Earth taught me that some listeners, being unable to oppose these topics directly, escape to other issues which they believed negate the expansion. So in the succeeding discussions their questions had little to do with the topic of the given lecture.

To avoid this bizarre situation, before each specific lecture I enumerated the problems that were already solved. I then asked listeners to discuss first

the topic presented at the lecture. However this did not help much, proving that the tendency to escape from direct understanding and discussion of presented topic is extremely strong.

It was clear that this tendency would also occur in reading the present text on geological proofs of significant expansion of the Earth. Facing up this trend I decided to complete the basic text (now Part One) with Part Two entitled: ***Broader scientific context of significant expansion of the Earth.*** In this part the main topics that may cause doubts about expansion of the Earth considered by readers as the ones not seen or understood by the author, are presented. I hope that this will help in the "escape problem". Part Two shows that there is no room to escape from proofs demonstrated in Part One of this book.

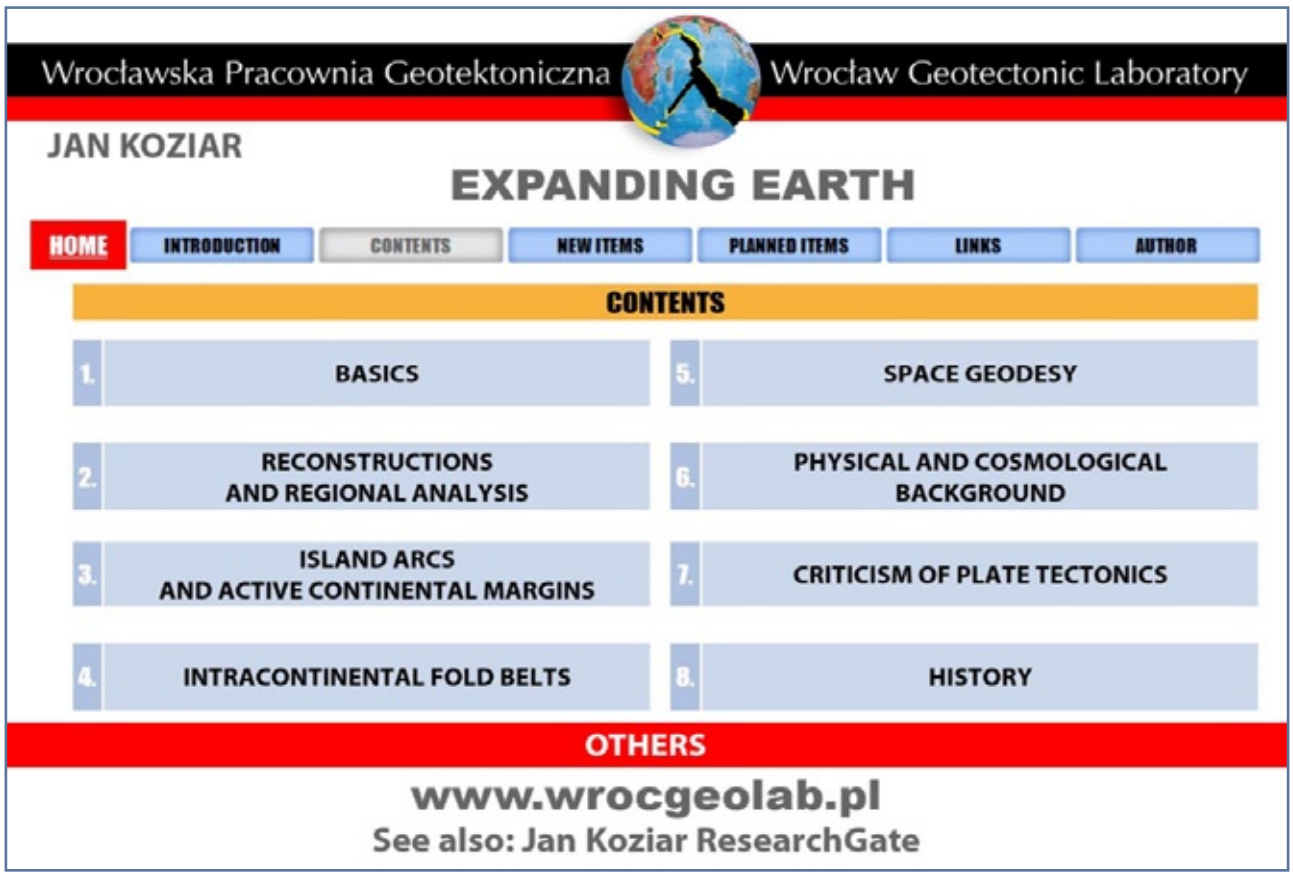
A useful coverage of already solved issues may be also found in the following brochures:



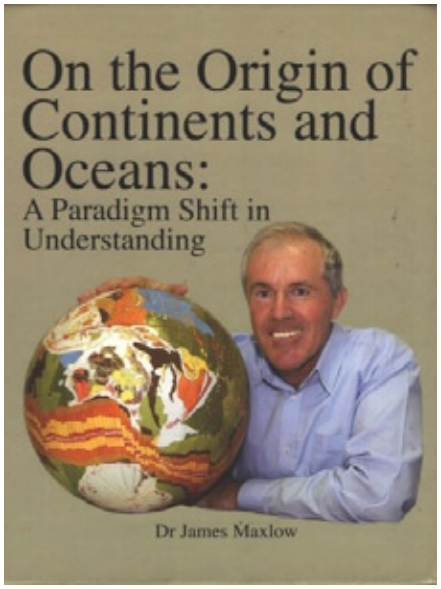
www.wrocgeolab.pl/lectures.pdf

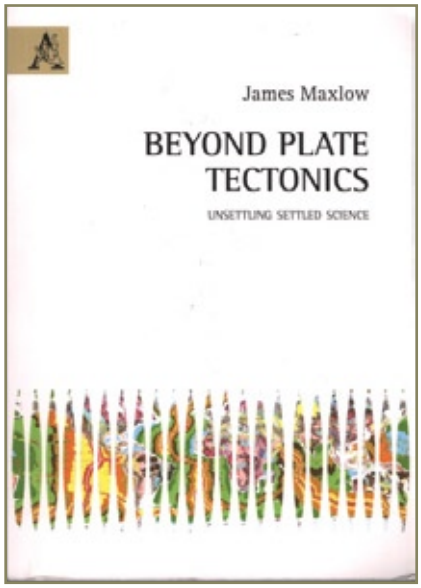
www.wrocgeolab.pl/papers.pdf

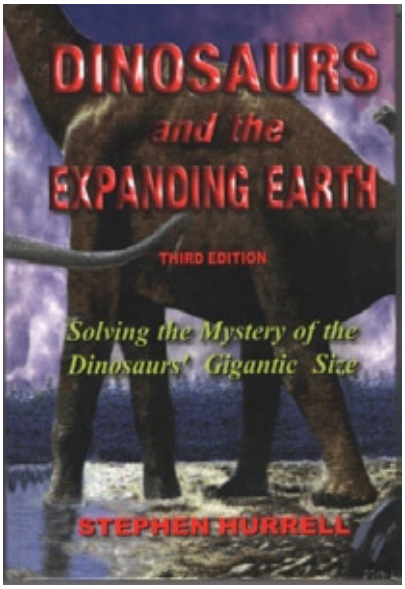
More information is available on my website on the Expanding Earth and my books and papers placed on the ResearchGate system.



I would also recommend the books by James Maxlow and Stephen Hurrell:





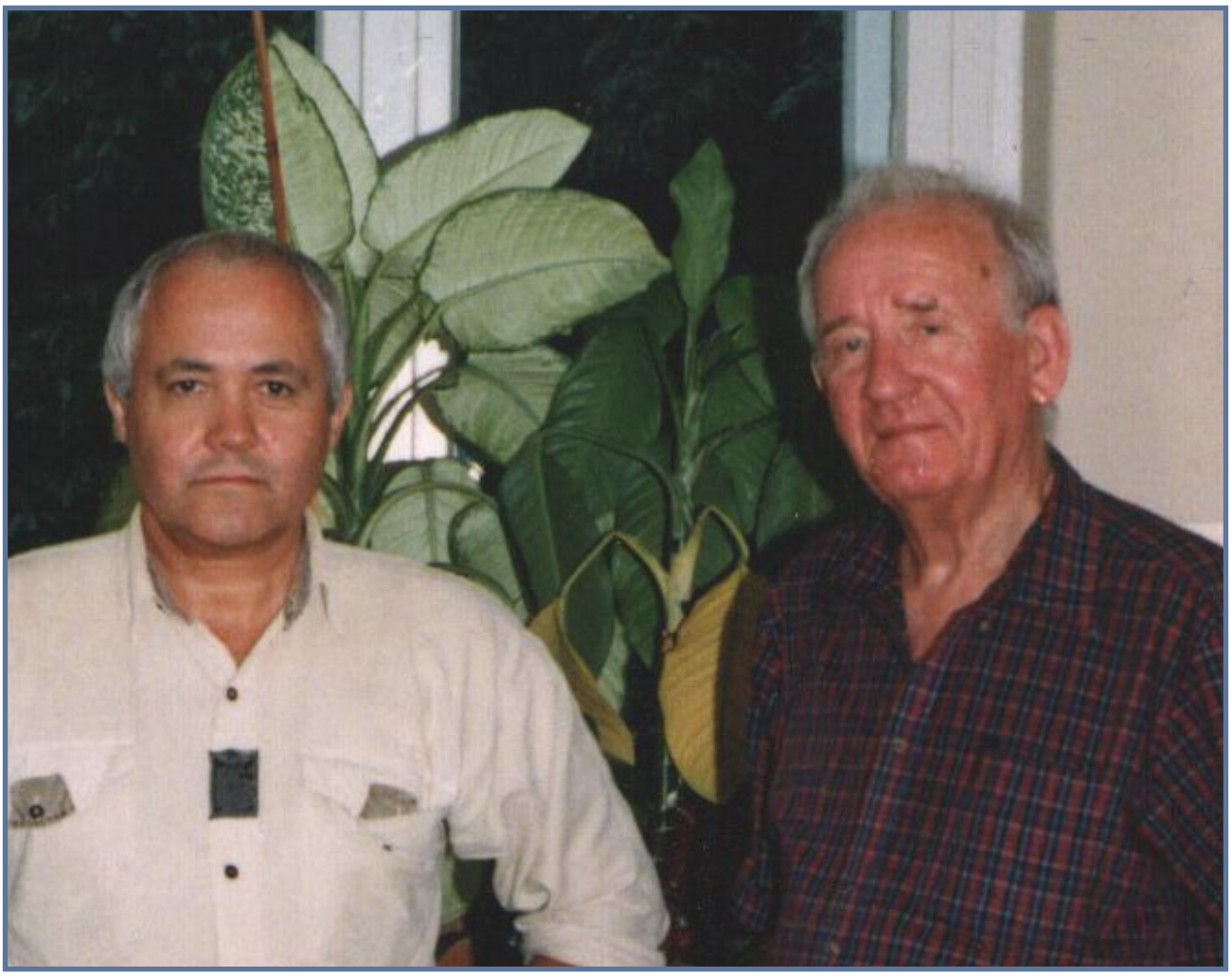


At the end I would like to thank many of my long-standing collaborators on the topic of the expanding Earth theory amongst the Wroclaw's geologists and physicists communities and to the much bigger group of open-minded persons I have contacted during many years of research and teaching on basic geological issues.

Especially I thank my former teacher, then boss and friend, the late Professor Józef Oberc, whose understanding of the topic and firm support for it made possible the long-term work on Expanding Earth theory in Wrocław.

I also thank the Association of Geologist Alumni of Wrocław University for publishing this book and a group of alumni who financed its printing. They are listed at the end of the book.

Jan Koziar
November 2018



Professor Józef Oberc and me (circa 2005)

CONTENTS

Part One

GEOLOGICAL PROOFS OF SIGNIFICANT EXPANSION OF THE EARTH

Part One

Geological proofs of significant expansion of the Earth

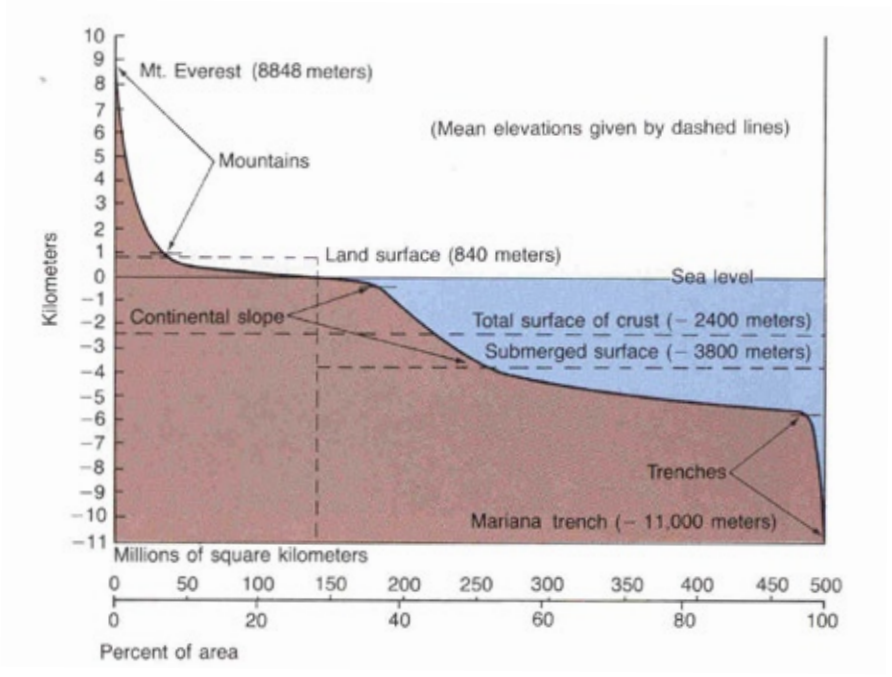
I. INTRODUCTION TO PART ONE

1. Short history and scientific nature of the theory of the expanding Earth

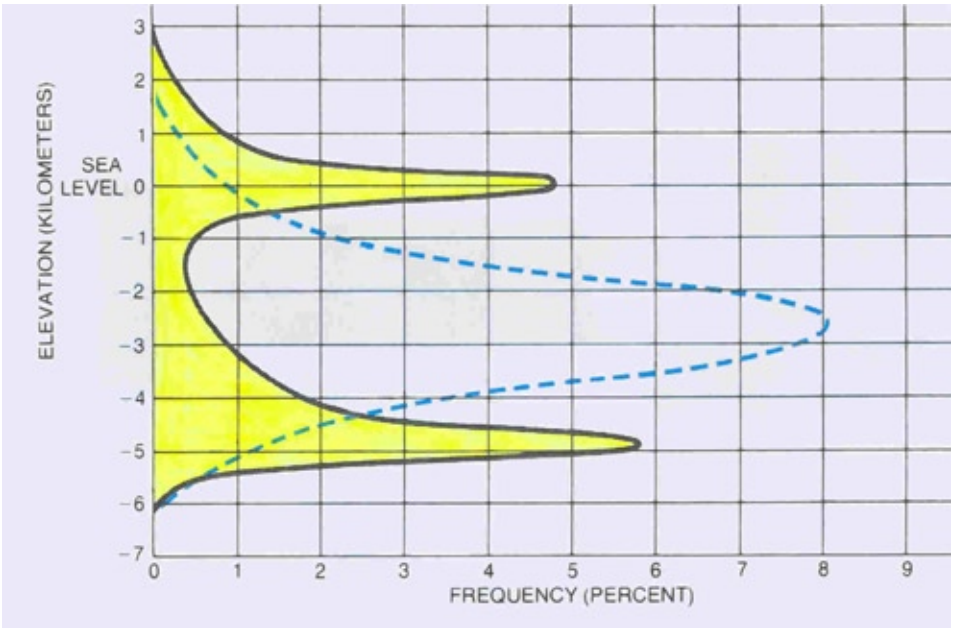
The first authors who wrote about the expansion of the Earth were a Pole, Jan Jarkowski [Yarkovski] (1888, 1889) and an Italian Roberto Mantovani (1889, 1909). Two German scientists: Bruno Lindemann (1927) and Ott Hilgenberg (1933) gave it the rank of a scientific theory, firmly based on geological reality. They drew their conclusions from Wegener's discovery of the moving apart of the continents and applied it also to continents surrounding the Pacific. In doing that they did not ignore (as Wegener did) the rich paleontological and sedimentological data on the non-existence of the Pacific Ocean in pre-Mesozoic time. The data were used earlier by proponents of the land-bridge theory and explained by alleged sinking of continental crust in parts of the present oceans.

In this way Lindeman and Hilgenberg solved globally a contradiction between the land bridge theory and the theory of isostasy which excluded the possibility of such sinking. Instead Wegener solved this discrepancy only locally in relation to the inner oceans of his Pangaea – the Atlantic and Indian oceans – which means that he did not solve it at all. The global solution of the contradiction requires closure of the Pacific Ocean in the past too.

Wegener encountered a similar problem in the explanation of the origin of two main levels of the Earth's surface (continental and oceanic floor) demonstrated by the hypsographic curve (Fig.1A)



A



B

Fig. 1. **A –** *Hypsographic curve,* **B –** *Wegener's frequency curve*

He attached such great significance to the problem that he even elaborated the more distinct version of the curve which is now called "Wegener's frequency curve" (Fig. 1B). However, he again explained it only in relation to the inner oceans of his Pangaea, which means that he did not solve it at all. The origin of the present existence of two main levels of the Earth's surface is generally (globally) explained only when the Pacific is closed in the past too.

Closing of the all oceans is only possible on an Earth of almost half of present radius. This means a significant expansion of our globe.

Hilgenberg made the first reconstruction of the expanding Earth (Fig. 2).

Fig. 2. *Hilgenberg's reconstruction of the expanding Earth*

In the middle of the 1950s, Marie Tharp and Bruce Heezen discovered a rift in the highest part of the oceanic ridges. Carey (1958) interpreted it as a sign of separation of the oceanic lithosphere combined with accretion of

the new oceanic crust resulting from upwelling and cooling of the mantle material below the rift. Heezen (1960) saw the origin of the rift in the same way, so both authors created the foundation of the theory of spreading of the ocean floor. They also recognized the division of the whole lithosphere into huge rigid plates (Carey's polygons). Both authors considered the spreading of the ocean floor as a manifestation of expansion of the Earth. Discoveries of the spreading of the ocean floor and rigid lithospheric plates were a starting point of modern geotectonics .

Carey (1958) expressed the first three simple proofs of expansion which will be presented later in detail in this book. One is based on the growth of the perimeter of the Pacific, the second is based on the elongation of the plate boundaries and the third is based on the artificial "gaping gores" which appear at reconstructions of old lithosphere on a too-big Earth of the present size.

Many other authors wrote about expanding Earth and the striking feature of the first period, which lasted to the end of 1960s, is that many of the authors came to the idea independently.

After 1960s the number of publications (papers and books) grew up, several international conferences were organized. Carey (1976) formulated his fourth proof of the expansion of the Earth – the Arctic Paradox. Then other proofs appeared. In this book seven such proofs are presented.

2. Empirical versus causal explanation

Some authors tried to find a causal (physical) explanation of the expansion of the Earth such as thermal expansion, phase changes, reduction of the gravitational constant (Dirac's concept), creation of matter (Carey, 1976) or absorption of cosmic dark matter by the Earth core and its transformation into atomic one (Ciechanowicz and Koziar, 1994). The first stage of expansion, together with the origin of the Earth, can be also explained by transition from neutron matter to the atomic one (Koziar, 1980 and this book) according to Ambartsumian's Explosive Cosmology. This cosmological theory demonstrates that the whole Solar System originated from a disintegrated (bursting) neutron star (see Part Two of this book).

These attempts are scientifically useful but they have no role in proving the expansion of the Earth as a phenomenon (as a fact). The methodically correct way is proving it as a fact by logical implications from other well recognized facts (the empirical way), not as a physical result of some hypothetical process.

This way was consequently applied in expanding Earth theory by Carey who produced as many as four independent proofs; three mentioned earlier (Carey, 1958) and the fourth (Arctic paradox) presented about twenty years later (Carey, 1976).

It must be emphasized that in the evolution of science we must first be able to accept a new phenomenon as a fact, regardless of how shocking it seems to be. We do it by logical implications of the phenomenon from other firmly recorded phenomena (facts), often without understanding its physical causes. After some time we may be able to find the cause. The cause, when found, usually appears to be another new phenomenon often even more shocking that the first one. Of course, the ultimate condition for the discovery of the second phenomenon is acceptance the first one as a fact, neglecting its physical cause at the beginning.

Let us mention, as an example, that scientists first accepted the Copernicus system as a fact and only later did Newton find its casual explanation. But he found a physical explanation only for revolving of small celestial bodies round a big one. The cause of the Copernicus rotation of celestial bodies around their own axes is still not understood. The acceptance of both kinds of movement of celestial bodies as facts had enormous impact on science.

More recently we had to accept a well proved fact of reversals of the geomagnetic field. The proof of their existence comes from observations, without knowing the cause of the reversals. The scientific profits are enormous – the proving of the hypothesis of the spreading of the ocean floor, and finding chronologic structure of the floor. There are many more examples.

The poor understanding of the relations between observation and attempts at finding a causal explanation of expansion of the Earth provides an easy but methodically wrong way for supporters of plate tectonics to criticize the expanding Earth theory. They claim that the lack of a mechanism for the expansion suggests that the theory itself is wrong. But this is not true. We can produce several false causal explanations of the real phenomenon, and falsification of each of them is not falsification of the phenomenon itself. It can be falsified only by logical implication from other well recognized phenomena.

But the wrong way of reasoning described above has a long established position in geology. Wegener's theory was rejected because of false causal explanation of moving continents aside (so called Polfluht and Westdrift). But the moving continents aside itself is now a firmly proved phenomenon.

Unfortunately this lesson has had little impact on fundamental geological thinking.

It must be emphasized that almost the whole critique of the expanding Earth theory comes down to the lack of causal explanation of the expansion. Not one of the proofs of the theory showing that expansion is a real process has been disproved. The proofs are ignored, not even discussed.

Summing up – the scientific basis of the theory of expanding Earth are its proofs based on logical implications from well established observed phenomena (facts). Causal explanation of expansion is not taken into account in this procedure. If we are able to prove the expansion of the Earth as a fact then this fact must have some physical cause (probably unknown to contemporary physics). To accept the fact of Earth expansion we do not need to know this cause.

3. Expanding Earth and Dietz-Hess' initial plate tectonics, founded on causal explanation

At the beginning of the 1960s, Wegener's scheme of mobilism was revived, in spite of good support for the expansion of the Earth by the facts (see three first proofs mentioned above and described later). The deviation from Carey - Heezen's way was performed by Dietz (1961) and Hess (1962).

Dietz connected Carey's and Heezen's discoveries with Holmes' (1944) hypothesis of mantle convection currents developed in order to drive continents in Wegener's continental drift theory. In Holmes' scheme the descending branch of the convection cell was located at a continental margin (being an early concept of subduction). The ascending branch was less precisely located by Holmes, but Dietz located it beneath rift on oceanic ridges discovered by Maria Tharp and interpreted as a spreading center by Carey (1958) and Heezen (1960).

Dietz called his whole conception (together with hypothetical convection currents) a "spreading sea floor theory" which was not justified because the term "spreading" can be here (as it later would be) applied only to the growth of the oceanic lithosphere at oceanic ridges. No hypothetical driving mechanism is needed here and no global conception. The term "theory" was unsuitable too, because Dietz did not provide any scientific argument for his concept opposite to Carey's proofs of expansion of the Earth, though their theory is mentioned by him:

> *...recently, geologists have been impressed by tensional structures, especially on the ocean floor. To account for sea floor rifting, Heezen, for example, has advocated an expanding Earth, a doubling of the diameter. Carey's tectonic analysis has resulted in the need for a twenty-fold increase in volume of the Earth.* (Dietz, 1961, p. 856)

Dietz' only argument against expanding Earth is that:

> *spreading of the sea floor offers the less-radical answer that the Earth's volume has remained constant.* (p. 856)

Of course, the appraisal ***"less-radical"*** cannot be accepted as a scientific argument.

Dietz demonstrated in his approach, that most important for him was to have a causal hypothetical explanation of some hypothesis by another hypothesis and not its justification by scientific data and arguments. In this way he tried to "prove" one hypothesis by another one. Such a whole suggestive structure can have not much common with the real world.

The same approach was demonstrated by Hess (1962) who followed Dietz' concept and wrote:

> *Both Heezen and Carey require an expansion of the Earth since late Paleozoic time (...) such that the surface area has doubled. Both postulate that this expansion is largely confined to the ocean floor rather than to the continents (...).*
>
> *With this greatly expanded ocean floor one could account for the present apparent deficiency of sediments, volcanoes, and old mid-ocean ridges upon it. While this would remove three of my most serious difficulties in dealing with the evolution of ocean basins, I hesitate to accept this easy way out.*
>
> ***First of all, it is philosophically rather unsatisfying, in much the same way as were the older hypotheses of continental drift, in that there is no apparent mechanism within the Earth to cause a sudden (and exponential according to Carey) increase in the radius of the Earth.*** (p. 32) [bold by J.K.].

Hess, in the same way as Dietz, did not discuss Carey's proofs of Earth's expansion. What is more, he pointed out facts recorded by himself, confirming the expansion. But the crucial thing for him was again a causal explanation.

Dietz-Hess' way was followed by almost all neo-mobilists of the 1960s and this approach led directly to plate tectonics.

This strange situation indicates faults in contemporary geological thinking about fundamental problems of geology (and science). As was mentioned before, scientists first accepted Copernicus theory as a fact and only later Newton found a casual explanation. If the casual explanation had been a condition of the acceptance of the Heliocentric System we would have not had both. If Dietz-Hess' cognitive approach were applied in the past, the Ptolemaic theory would rule up to our days because it was causally explained by angels rotating the celestial spheres around the Earth, whereas Copernicus theory had nothing like that.

In the 1960s some support for Dietz-Hess' concept came from paleomagnetic investigations. But the results were very controversial and in fact they confirmed the expansion of the Earth, as explained in Part Two of this book.

4. Expanding Earth and later plate tectonics

In 1968 Dietz-Hess' early plate tectonics was supplemented by hypothesis of Eulerian rotation of lithospheric plates. That is according to Euler's theorem that every movement on a sphere is a rotation around an axis passing through the center of the sphere (of course of constant size). The first attempt of use of this theorem in geotectonics was made by Bullard *at al.* (1965). But the decisive step was made by so called "founding fathers" of plate tectonics, in their three basic papers – McKenzie and Parker (1967), Morgan (1968), Le Pichon (1968). The priority belongs to Jason Morgan who lectured the principles of rotating plates at the conference at Woods Hole in spring 1967.

This extension of Dietz-Hess' concept flourished despite another cognitive fault described below.

a. Hypothesis of a non-expanding Earth as a basis of plate tectonics

The starting point of plate tectonics is the well-proved spreading of the ocean lithosphere and ***a priori*** **assumption that the Earth is not expanding**.

This fundamental approach is well articulated by Le Pichon (Le Pichon, 1968):

> *In this paper we try (...) to test whether the more uniformly distributed data on sea-floor spreading now available are compatible with a non-expanding earth.* (p. 3661)
>
> *If we assume that the earth is spherical and that the length of its radius does not change with time, we can then proceed to the complete determination of the movements of the major crustal blocks relative to each other.* (p. 3674).

and:

> *If the earth is not expanding, there should be other boundaries of crustal blocks along which surface crust is shortened or destroyed.* (p. 3673).

The non-expanding Earth assumption is also the starting point for the authors of the plate tectonic model of subduction (Isacks, Oliver and Sykes, 1968). They wrote:

> *If crustal material is to descend into mantle, the island arcs are suspect as sites of the sinks.* (p. 5866).

Descent of the lithosphere into the mantle is necessary if the sea-floor spreads and the Earth is to retain a constant size. The reliability of this assumption is no problem for the authors. The only problem for them is the location of the subduction sites.

As was shown above, **the assumption of non-expanding Earth** is basic and crucial for plate tectonics. It is also specific to it in relation to expanding Earth. Spreading of the ocean floor and the existence of lithospheric plates are not, because they are also part of the theory of expanding Earth and what is more, they were recognized first by expansionists Carey and Heezen.

If the name of a thing (in this case a theory) should be taken from its specific feature and not from feature which is shared with other things, then '*plate* tectonics' should be called '***non-expanding Earth tectonics***'.

As was shown in general, the discovery of spreading of ocean-floor in the late 1950s by Carey and Heezen, led in a natural way to the expanding Earth. In the 1960s the expanding Earth theory was replaced by contemporary plate tectonics by rejection, based more on personal preference than by scientific facts. The non-expanding-Earth assumption became a very important but weak foundation of plate tectonics. These circumstances are very important for understanding contemporary geotectonics bearing in mind that majority of present followers of plate tectonics did not even hear about theory of expanding Earth.

Disclosure of the basic and specific assumption of plate tectonics reveals a weakness of this theory which is demonstrated in my satiric cartoon below (Fig. 3).

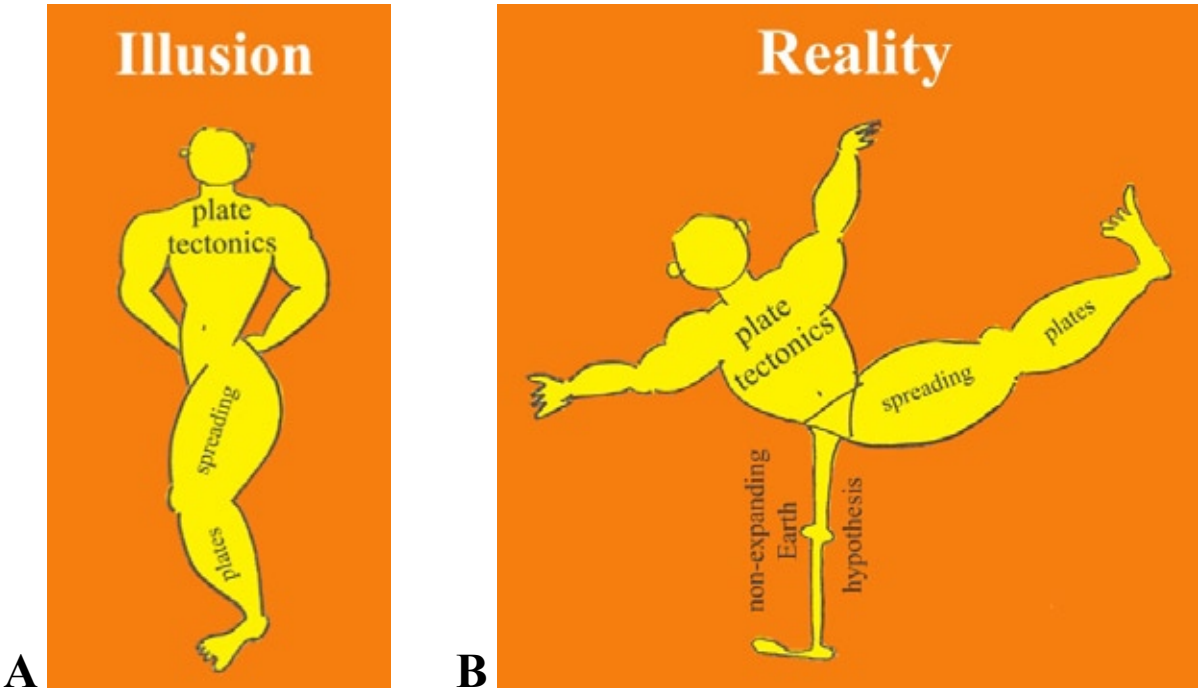


Fig. 3. **A** *– Plate tectonics claims that its specific features are spreading of the ocean floor and the existence of lithospheric plates. But both phenomena are shared by the expanding Earth theory and were even discovered by expansionists.*
B *– In fact the only specific fundamental idea of plate tectonics is the unproved assumption of a non-expanding Earth*

b. Attempts at proving of the hypothesis of the non-expanding Earth

In the 1960's some results of paleomagnetic investigations seemed to support the non-expanding Earth, but in fact they confirmed the expansion of the Earth. Details are presented in the Part Two of this book.

It is interesting that no "founding father" of plate tectonics referred to these paleomagnetic results. What is more, no one except Le Pichon, even mentioned the theory of expanding Earth in his basic paper. McKenzie (1969), only two years after his fundamental for plate tectonics paper (McKenzie and Parker, 1967) took an attitude to the expanding Earth and it was very bizarre. He wrote:

> *The remarkable success of the ideas concerning sea floor creation required either expansion of the Earth or destruction of the ocean floor away from the ridges. The immediate difficulty all expansion hypotheses face is the rate required. The sea floor spreading velocities are an order of magnitude greater than had been expected, and therefore*

require catastrophic expansion starting in the Jurassic. This suggestion seems geologically unreasonable, and therefore oceanic crust and upper mantle must be destroyed somewhere. (p. 1).

The pejorative expression "unreasonability" of large and fast expansion cannot be treated as a scientific argument but is merely a personal preference. McKenzie's approach, performed at the level of Dietz and Hess, is not a sufficient scientific base for subduction and plate tectonics.

The mysterious phrase: *The sea floor spreading velocities are an order of magnitude greater than had been expected* means that they are greater than some numbers predicted by some hypothetical causes of the expansion. So, according to McKenzie, when the real rate of expansion indicated by measured spreading rates is in discrepancy with some speculations, *i.e.* predictions made on some hypothetical cause the expansion, it is the expansion that must be rejected. Thus speculations are here treated more seriously than empirical knowledge.

The most serious approach to the fundamental problems of geotectonic was presented by Le Pichon whose paper differs significantly from those of the remaining "founding fathers" of plate tectonics. Le Pichon not only mentioned the expanding Earth and exposed the non-expanding Earth hypothesis as a foundation of plate tectonics but also tried to prove the reality of this foundation. However, the detailed analysis of his proofs leads to confirmation of an expanding Earth, as will be shown in the Part Two of this book.

c. Plate tectonics as a system of circular arguments built on the hypothesis of non-expanding Earth

The very nature of plate tectonics is its deductive origin from the unproved assumption of a non-expanding Earth. Several models were built in this way. They are now treated as parts of the real world and then used as confirmations of the initial assumption. So, the whole theory is made from circular arguments. (Fig.4).

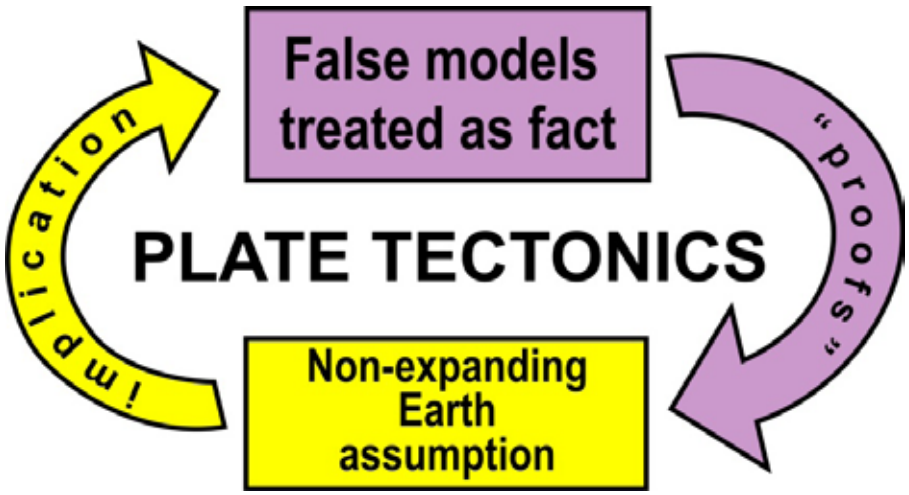
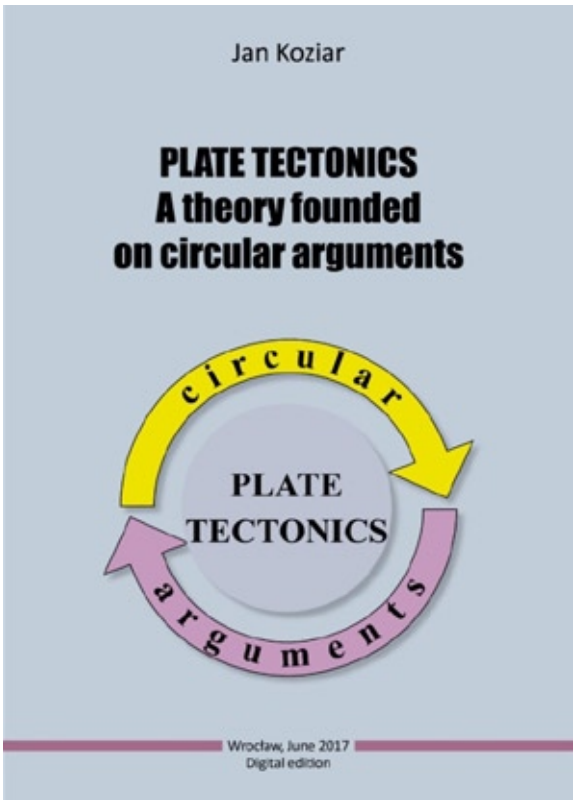
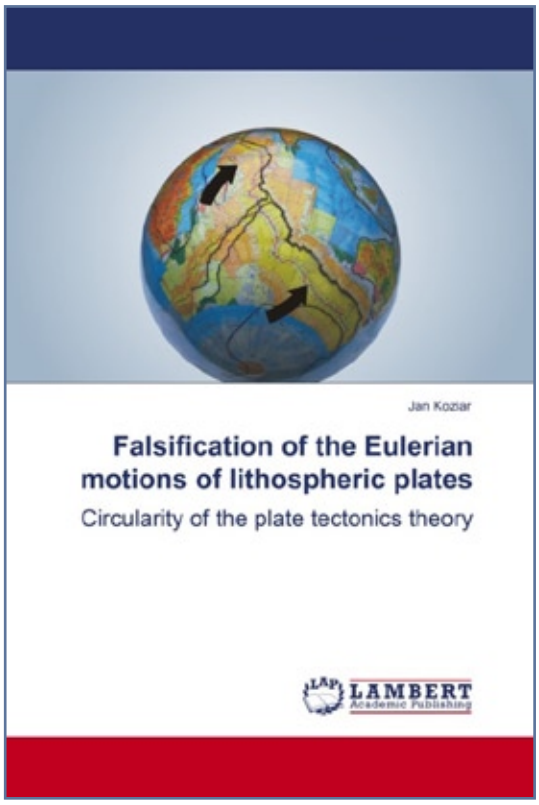


Fig. 4. *Scheme of the plate tectonics' structure of circular reasoning*

The problem is widely presented in my two following papers:



www.wrocgeolab.pl/falsification3.pdf



www.wrocgeolab.pl/falsification_LAP.pdf

The most important and damaging results of such a circular reasoning are convergent models of:

1) island arcs and active continental margins
2) intracontinental fold belts
3) intracontinental basin upwelling (inversions).

The falseness of these models is shown in the Part Two of this book.

d. Plate tectonics as a result of the harmful influence of Kuhn- Popper cognitive relativism on geotectonics

Plate tectonics created its assumption-to-model structure, leading to circular arguments, following Kuhn's cognitive concept of "paradigm". Plate tectonics even calls itself a "paradigm".

The concept is good for this kind of theories which try to determine the laws which rule some processes, especially in the micro-world. All versions of quantum mechanics are paradigms. In their cases we start from some assumptions (postulates) then we build some models on them, and then compare the model predictions with measurements.

The quantum mechanics pretentious habit of plate tectonics is evident. It is built on 3 definitions, 2 postulates and 3 theorems (Cox, 1973). But the author did not list the most important postulate of plate tectonics which is an **assumption of constant Earth's radius**. This masks the most important problem of contemporary geotectonics. In fact the axiomatic base of plate tectonics has a 3x3 structure – 3 definitions, 3 postulates and 3 theorems (see the above paper www.wrocgeolab.pl/falsification2.pdf), including the above most fundamental postulate.

In the concept of paradigm no paradigm is true. We can only compare which one is better or worse. The better falsifies and replaces the worse but it never becomes true. In the future it will be replaced by a new better one, and so on *ad infinitum*. Because no paradigm is true there are no proofs of their truth. These circumstances can explain why plate tectonics did not care about proving its basic assumption of non-expanding Earth and ignores all proofs of the expansion of the Earth.

Plate tectonics insists (within the paradigm concept) that its explanation of geologic phenomena is the best. But it never took serious attitude to the alternative explanation by the expanding Earth theory. It never tries to explain the facts behind the proofs of expansion. What is more it usually even does not mention this alternative theory.

We can follow the laborious paradigmatic procedure and compare all solutions of both theories, to show that in fact expansion of the Earth explains geologic phenomena better. But it is unnecessary, because both theories – expanding and non-expanding Earth are not paradigms (forming rules theories). They belong to other kind of theories which predict an existence of some phenomena (foreseeing existences theories) as for example a spherical shape of the Earth, nappes, transform faults, inversions of geomagnetic

fields and spreading of the ocean floor. Such theories can be falsified or proved and transformed to facts forever, beyond the paradigm concept.

So we will follow in this book the ancient Greeks procedure which allowed them to prove the spherical shape of the Earth by a few independent proofs. The proofs are taught in primary schools. In this book we will present as many as seven proofs of expansion of the Earth.

If the expansion of the Earth is proven, then plate tectonics is falsified. In this situation some plate tectonics interpretations cannot be opposed as a crucial, definite argument against expanding Earth but they should be revised.

Not distinguishing between the two types of theory mentioned above and including all theories in the concept of paradigm, is a big flaw of the present cognitive philosophy. Contemporary geotectonics is the best example of destructive influence of this flaw on the science. Because of it we are not able to communicate effectively in basic matter in geotectonics.

The problem was lectured by me and published in Polish in the Internet: www.wrocgeolab.pl/na_styku.pdf. It will be presented soon in English in more elaborated way under the title: ***At the Intersection of Geology and Kuhn-Popper's Defective Philosophy. Problem of cognitive relativism*** (see back cover of this book), at the address: www.wrocgeolab.pl.relativism.pdf

e. Problem of driving mechanism in plate tectonics

As was shown before, early plate tectonics overcame the expanding Earth theory because it claimed to have a causal explanation (hypothetical mantle convection currents). But there was no empirical support for the convection currents. It might be expected that plate tectonics would develop better and prove its hypothetical causal mechanism. But that is not true. The hypothesis became even more problematic than in a time of origin of Dietz and Hess concept and plate tectonics simply distanced from it. This fact is almost unknown among its followers.

> *There are two reasons why plate tectonics does not yet provide a complete theory of global tectonics. The first is that mechanism by which the motions are maintained is still unknown ...*

– wrote McKenzie and Morgan (1969, p. 125)

The origin of the forces that move the plates is by no means clear – wrote McKenzie (1970, p. 323) in the introduction to the paper. And further (p. 354):

> *At present, nothing is known about the circulation in the mantle which moves the plates.* Then at the end of the paper (p. 357*)*: *Little progress has been made in understanding the mass motions in the mantle, which must move the plates.*

Le Pichon *et al.* (1973, p. VII – introduction) wrote:

> *The dynamics of the plates and the origin of the motions are not discussed. There is not yet a satisfactory answer to these problems.*

And further (p. 18):

> *The problem of the mechanism which sustains these plate motions is still poorly understood.*

In 1974 McKenzie and Parker wrote (p. 285):

> *The success of plate tectonics as a framework for understanding the surface motions of the earth has not been accompanied by similar progress in our understanding of either the mechanism by which the motions are maintained, or of the causes of the changes in the direction of motion between plates.*

With time, plate tectonics specialists withdrew from causal explanation, as shown in the following quotation (Tarbuck and Lutgens, 1988, p. 184):

> *The plate tectonics theory describes plate motion and the effects of this motion. Therefore, acceptance does not rely on knowledge of the force or forces moving the plates. This is fortunate, since none of the driving mechanisms yet proposed can account for all of the major facets of plate motion.*

In this situation, putting forward arguments against expanding Earth that it has no causal explanation is bizarre.

But most plate tectonics followers still believe in circulating mantle matter.

At the end of the last century „Time" (29 March, 1999) presented the biggest scientific achievements of the century, among them Wegener's theory. They wrote:

> *Wegener had plenty of evidence, ranging from the jigsaw-like fit of the continents to the discovery of matching fossils on opposite sides of oceans, but he couldn't give a satisfactory explanation of what caused the global breakup.*

For years continental drift was held up to derision – until scientists in the 1960s found a plausible mechanism in the earth's internal motions under the ocean floor. Suddenly, Wegener's disreputable ideas became reputable. Renamed plate tectonics, they gave geology a single unifying theory...

The quotations above document not only that the hypothesis of mantle convection currents was a springboard for plate tectonics but that it was still a „driving force" of popularity of the theory at the end of the 1990s. This and former quotations show that plate tectonics has "two faces" in the matter of casual explanation. This situation is extremely abnormal.

In fact it is not so much that convection currents drive lithospheric plates but the hypothesis of convection currents drives another hypothesis *i.e.* plate tectonics and this process occurs only in the minds of the followers of the latter (Fig. 5).

Fig. 5. *My satiric cartoon illustrating a real causal structure (driving mechanism) of plate tectonics*

Recently new concepts have been developed such as "ridge push force" and "slab pull force".

The first postulates the gravitational sliding a plate from a ridge to an oceanic trench. However, there are glaring discrepancies between the height of the ridges on one hand and spreading rates and distance of displacement of the plate on the other hand.

The second concept postulates pulling the horizontal part of plate by its sinking part. However, there is glaring discrepancy between the huge size

of the horizontal part and the small size of assumed sinking part. Apart from that the sinking part should be immediately torn away because of low resistance against tearing forces.

More recently linguistic operations are performed by limitation the term "convection" only to an ascending motion of the mantle matter. However, this simply means diapirism, *i.e.* the process inseparably connected with expansion of the Earth.

Diapirism has little to do with circulating convection cells which launched plate tectonics and which still operate in minds of majority of its followers.

f. Problem of absolute reference frame in plate tectonics

Plate tectonics is not only unable to connect the movement of the plates with the mantle (through some driving mechanism), but it is unable to connect them with the mantle as a reference frame. Plate tectonics admitted this from the very beginnings and all its three fundamental papers (McKenzie and Parker, 1967; Morgan, 1968 and Le Pichon, 1968) dealt only with mutually relative movement of the plates.

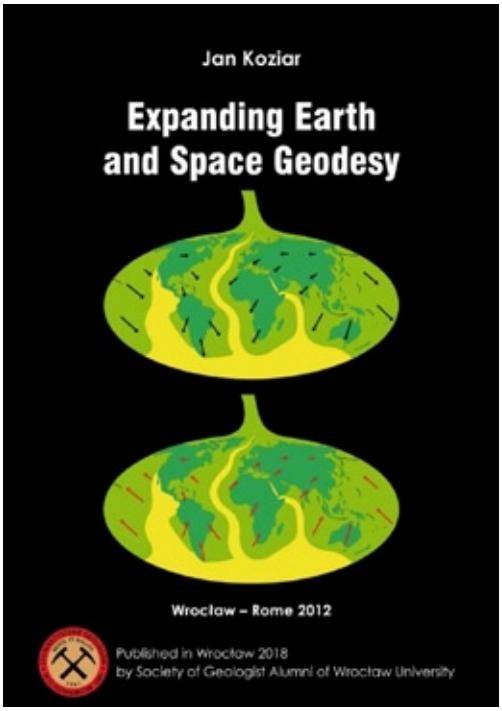
The problem of absolute reference frame is well illustrated in a quotation from the book "Plate tectonics" (Le Pichon *et al*., 1973, pp. 128-129):

> *A major confusion has appeared in the literature concerning the definition of a reference frame in which to measure the plate motions. For example, Irving and Robertson (1969) believed that, even though the plates do not define an "absolute" reference frame, the plate boundaries do. Franchetau and Sclater (1970) have demonstrated, that, if one uses Le Pichon (1968) six-plate model, neither the system of all the ridges nor that of all the trenches form a reference frame, since the ridges and trenches are all in relative motions.*
>
> *It is worth emphasizing that the plate-tectonics model does not provide any "absolute" reference frame and the plate motions will be different depending upon the frame of reference chosen. No special reference frame is therefore favored by the observations.*

However, absolute reference frames were sought and created by plate tectonics which shows some internal contradiction in the hypothesis. Burke and Wilson (1972) for instance assumed that the African plate is such an absolute reference frame. Jordan (1975) assumed that the tiny Caribbean plate is such a reference frame as "anchored in the mantle by two subducted" plates.

Recently two kinds of absolute reference frame have been accepted in plate tectonics. One is based on hot spots at simultaneous assumption that they are instable relative to the mantle and even mutually to themselves. It excludes the absolute character of such a reference frame. However, it is correct on the expanding Earth, as will be demonstrated in discussion of the 4th and 5th proofs.

The second type is based on so-called " Tisserand's condition" and is derived only from the movement of the plates without any reference to their basement. It is called the "No Net Rotation" reference frame (NNR). Satellite geodesy uses it exclusively. Both these types give rough results, but are sufficient for independent proving of the expansion of the Earth (see proof 5th). The problem is more widely presented in my book ***Expanding Earth and Space Geodesy*** (Koziar, 2018).



www.wrocgeolab.pl/geodesy2.pdf

The sublithospheric mantle of the expanding Earth is stretched in all directions. It delivers not only a simple driving mechanism for rigid plates lying on it, but also a simple absolute reference frame for their movement.

In the next chapter I demonstrate physical and geometrical (mathematical) model of lithospheric plates on the expanding Earth (Koziar, 1980, 1985, 1994) which precisely expresses both above relations. The model is useful for finding a correct absolute reference frame for space geodesy. In this paper it will be used to better illustrate some of the proofs of the expansion of the Earth.

* * *

This comprehensive introduction was necessary in order to explain the fundamental problems of contemporary geotectonics. They can be well understood only having knowledge about historic interaction of plate tectonics with expanding Earth theory. Many contemporary geotectonicists think that knowledge of the basic axioms of plate tectonics is all they need to know about the fundamentals of geotectonics. However, they usually know nothing at all about the expanding Earth. Thus, they not only do not know the fundamentals of contemporary geotectonics, they do not know the fundamentals of their own accepted theory – plate tectonics.

II. LITHOSPHERIC PLATES ON THE EXPANDING EARTH

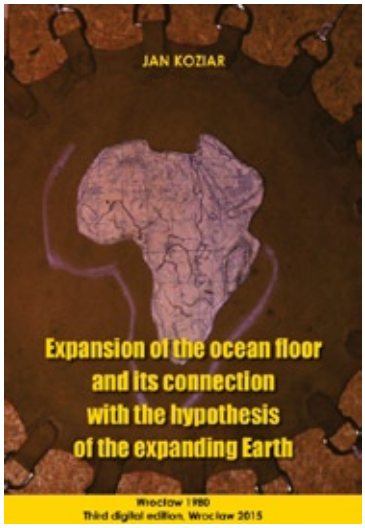
1. Principles

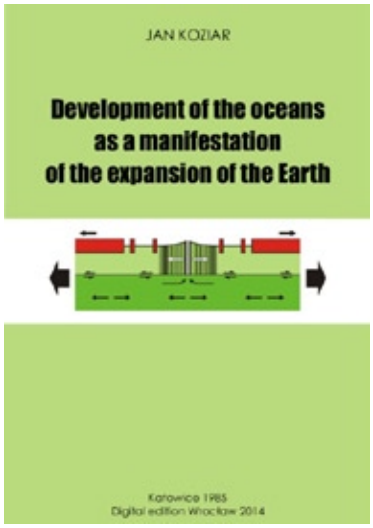
Le Pichon (1968, p. 3673) wrote:

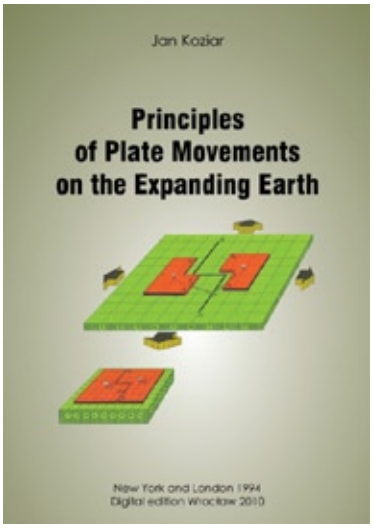
> *However, if the earth is not expanding, what is the mechanism which results in this pattern of movements?*

This sentence suggests that expanding Earth offers a better driving mechanism for lithospheric plates than plate tectonics. And indeed it does.

During expansion of the Earth, the radially stretched sublithospheric mantle (the basement of the plates) tears and draws apart the plates lying on it. It can be demonstrated on the simple physical and geometrical models elaborated by me – see below (Koziar, 1980, 1985 and 1994).

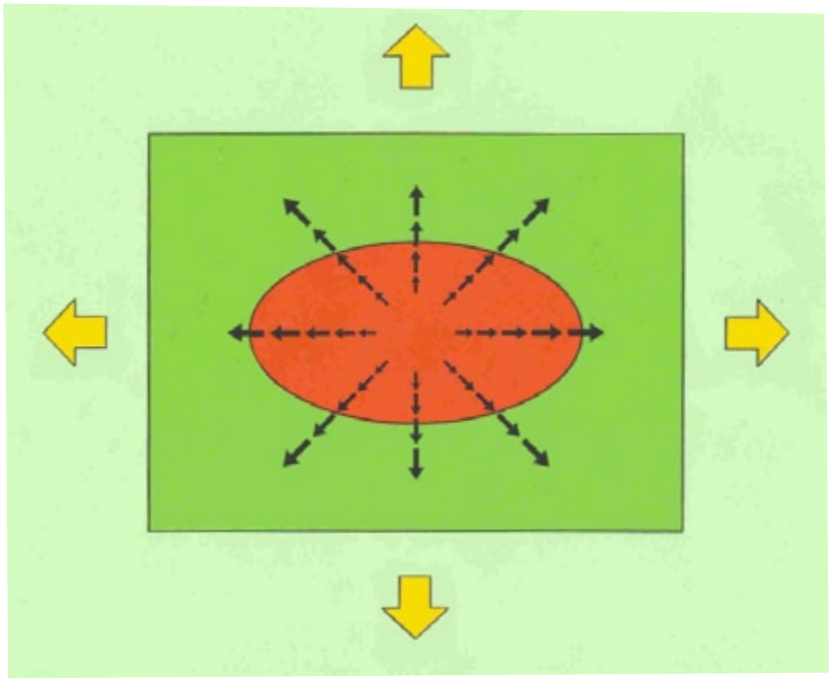




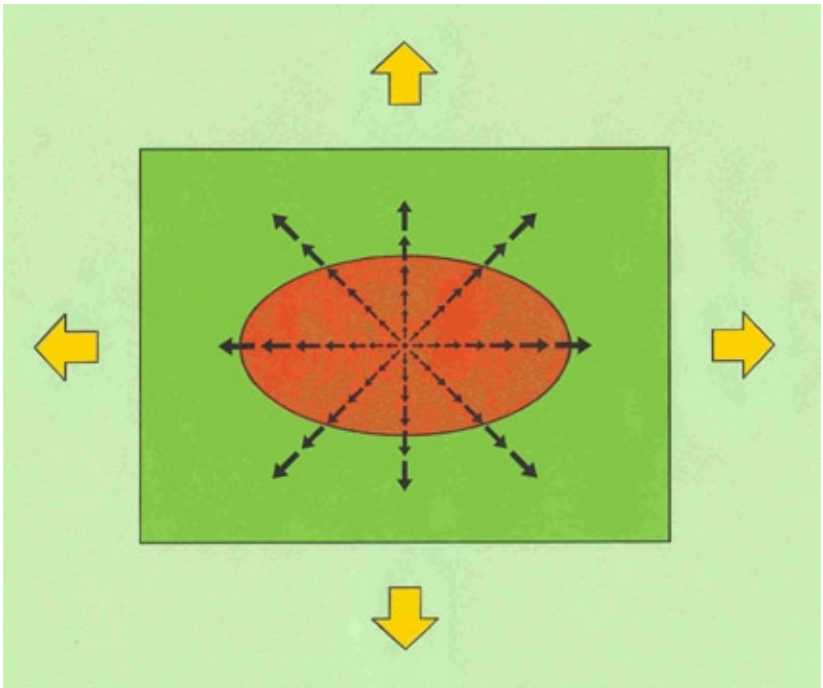


www.wrocgeolab.pl/floor.pdf ▪ www.wrocgeolab.pl/oceans.pdf ▪ www.wrocgeolab.pl/plates.pdf

Only the force of friction operates between plates and their basement which delivers very simple physical conditions for the whole mechanism. During radially stretching of the basement almost all points of the basement move away from the plate (Fig. 6A). This indicates that only one point at the centre of the plate does not move (Fig. 6B). The further a given point on the basement lies from this central point, the faster it moves. This is analogous to the expanding Universe (but only an analogy). When we draw on the basement a grid of coordinates (Fig. 6C) then all points of the plate change their coordinates relative to this grid during expansion, except of this central point. Thus it can be called “a stable point of transformation”.



A



B

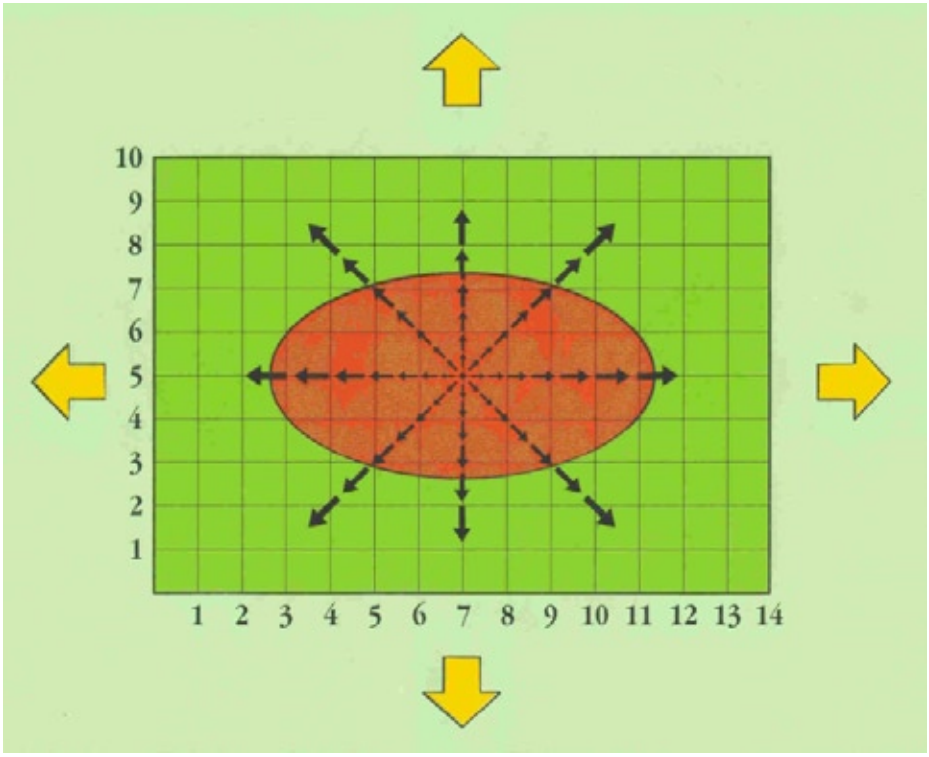
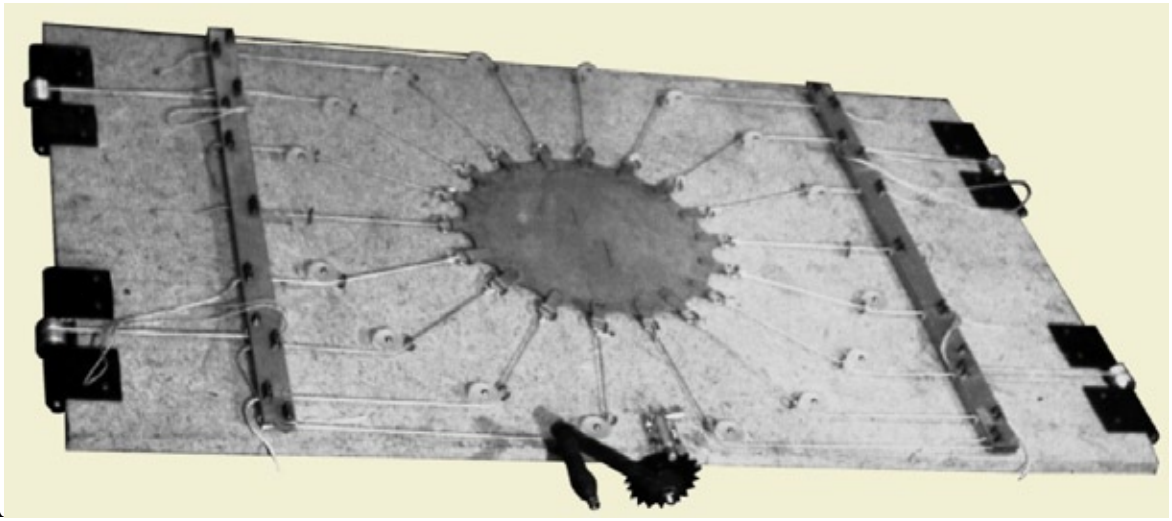
C 

Fig. 6. *Stable point of transformation of a rigid plate lying on the radially stretched basement (explanation in text)*

It can be demonstrated that for any shape of a flat plate its stable point of transformation coincides with its barycentre (Koziar, 1994).

2. Physical modelling

The essential part of the physical model described here is a device (Fig.7) with a round sheet of rubber or silicon stretched radially (isotropically) by the rotation of the visible handle. The rubber imitates the Earth's sublithospheric mantle. One can put on the rubber various configurations of rigid plates which imitate lithospheric plates. These, transformed on the device, create the full model of a specific tectonic structure.

A 

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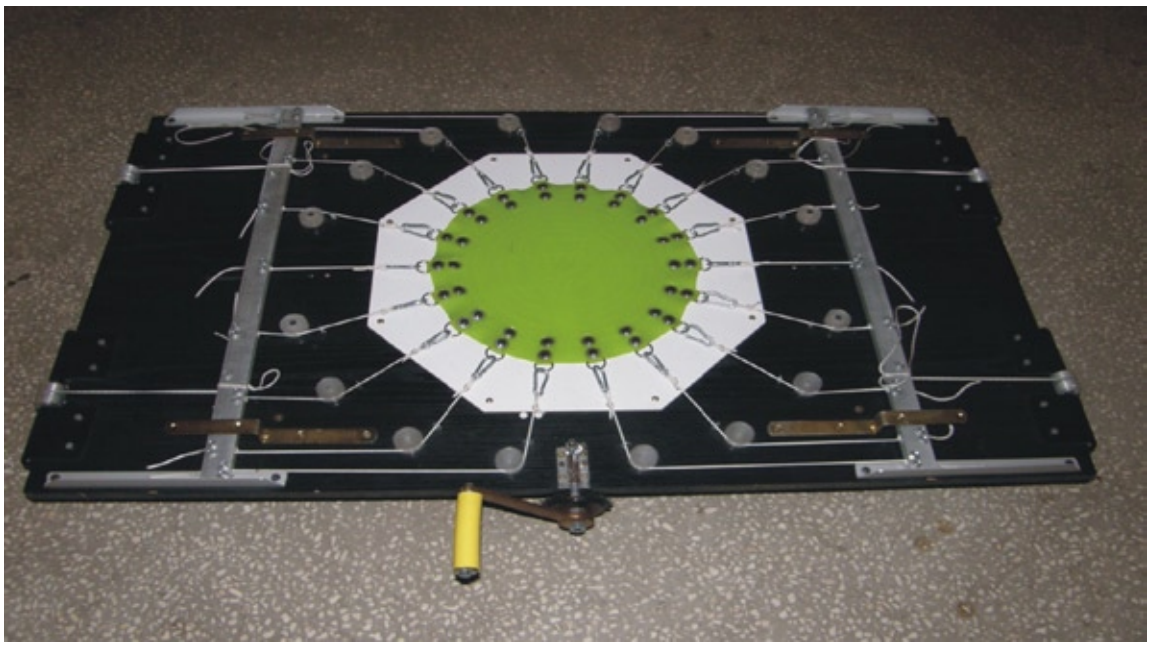


Fig. 7. *Device for the modelling of movements of plates on the radially stretched basement:* **A** *– original version from 1970s,*
B *– new version from 1990s (explanation in text)*

We can model in this physical way, for instance, the development of the triple junction of oceanic ridges, for instance in the Indian Ocean (Fig. 8).

Fig. 8. *Indian Ocean triple junction digitally sculptured along the 20 Ma isochron.*

The modelling of the structure is as follows (Fig. 9).

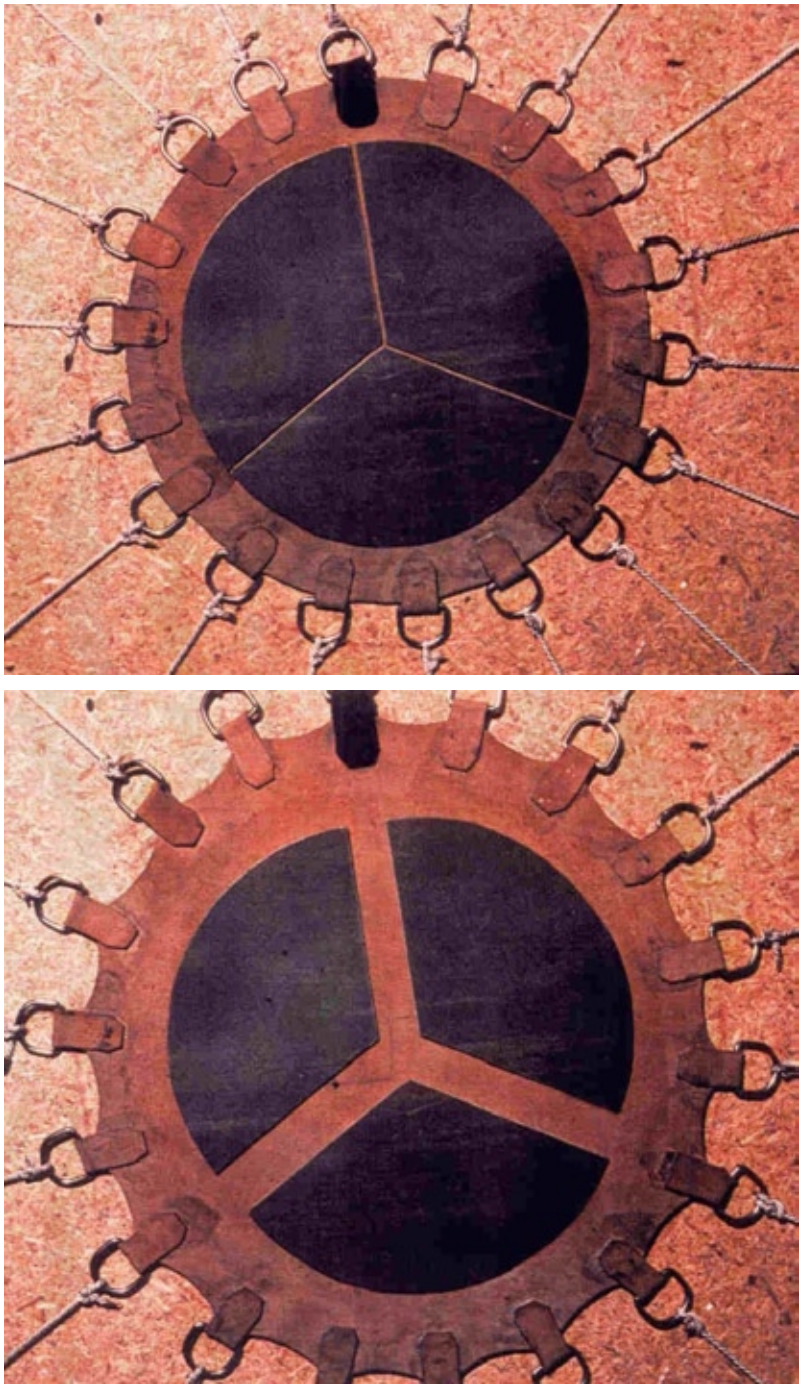


Fig. 9. *Physical modelling of the development of the triple junction of the ridges in the Indian Ocean.*

Plate tectonics cannot cope with the problem of triple junctions on a constant size Earth (*e.g.* Gordon, 1991).

Of course the rubber (basement) between plates in Fig. 9 does not imitate the ocean floor, but only a sublithosheric mantle. The oceanic lithosphere heals (fills) the gaps between plates. It can be proved (Koziar, 1994) that this process does not change the position of the stable point of transformation of such a growing plate.

The mechanism of healing and its relation to the stretched basement is explained in the following section.

3. Filling tensional gapes between plates by oceanic lithosphere

When a continental lithospheric plate cracks along a rift and begins to reveal a sublithospheric mantle (Fig. 10A) the latter cannot stay at its previous level because of the isostatic force. So the growing rift sucks the matter of the sublithospheric mantle up and it consolidates and accretes to the receding margins of both plates. Thus the spreading process begins (Fig. 10B). The intruded (sucked) matter can be also in the plastic (not liquid) state and in such a form passes the Curie point. This process was already foreseen by Carey (1986, p. 125-126) and is now known as a cold production of seafloor, that is simply a "cold spreading" (Science News, 2018).

Both plates are "fastened" to the stretched mantle by their stable points of transformation (illustrated by screws) and the grid of coordinates in the mantle is growing, *i.e.* the distances between the lines of coordinates are increasing. In contrast to the oceanic lithosphere the mantle below is old – older than the overlying lithosphere. The relative movements of the sublithospheric mantle and the oceanic lithosphere are in opposite directions (see asterisk in Fig. 10). The age contrast between the both geospheres is growing towards the rift and is biggest in its vicinity (Fig. 10B,C). The whole suboceanic mantle was once a subcontinental one. Thus it sometimes happens that in the ocean the old mantle matter can have a continental isotopic signature. This motivates some researchers to reject the spreading process and return to the idea of fixism. This is because they did not understand the difference between spreading of the ocean floor on the expanding Earth and the spreading of the ocean floor within the plate tectonics paradigm. Of course the oceanic spreading described here has nothing to do with supposed mantle convection current or with push-pull-slab concepts of plate tectonics.

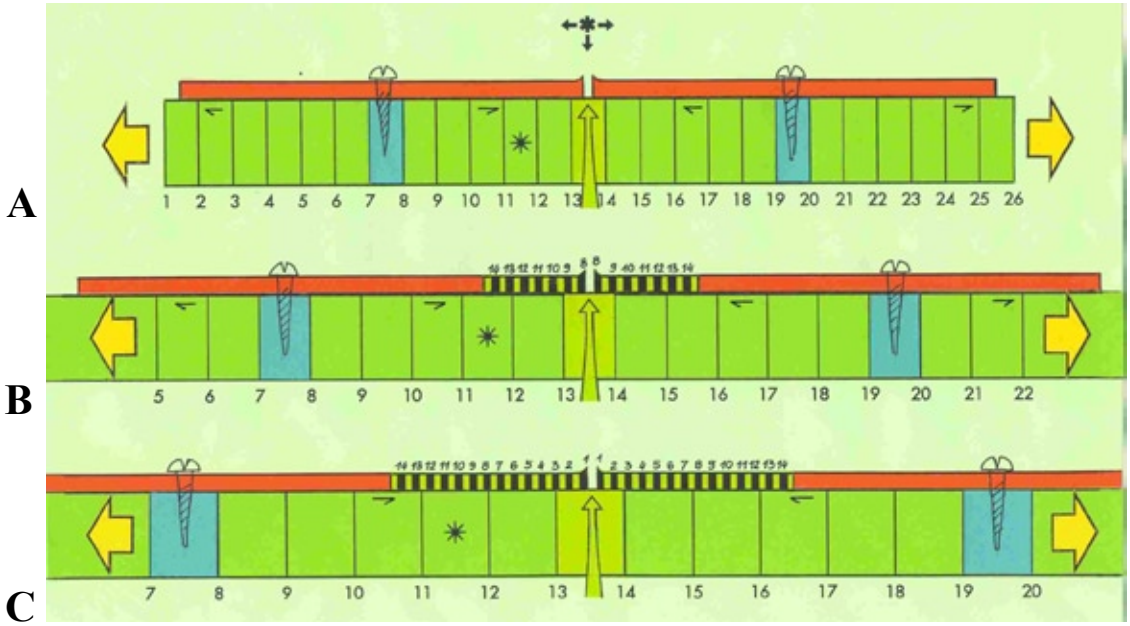


Fig. 10. *Filling of space between the receding plates by oceanic lithosphere, on the expanding Earth (explanation in text)*

In the modelling (both physical or geometrical) of development of the lithosphere on the expanding Earth, parts of the oceanic lithosphere or its whole are omitted and empty space means the sublithospheric mantle (Fig. 11).

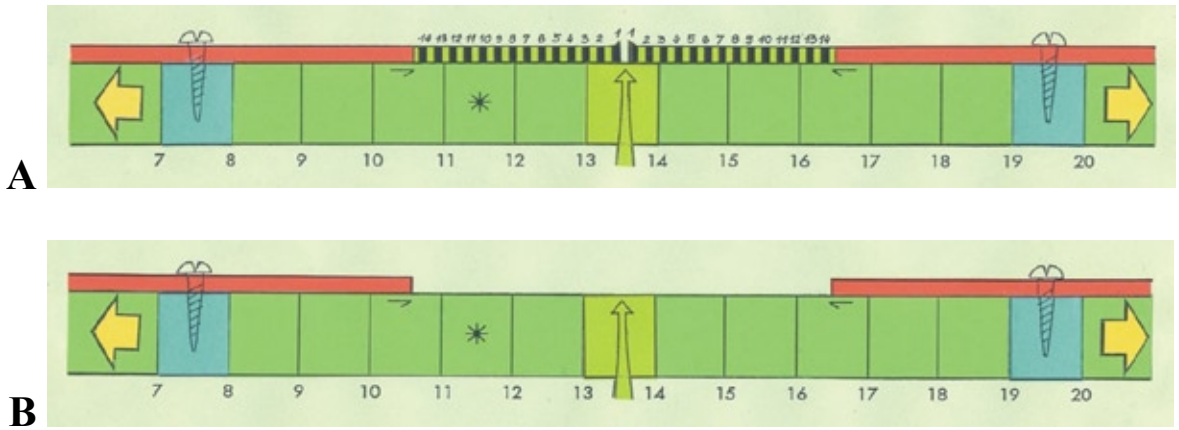


Fig. 11. *The difference between the real situation (***A***) and simplified situation (***B***) applied at modelling of various big tectonic structures as these modelled in this chapter.*

4. Geometrical (mathematical) modelling

a. General modelling of a cracking plate

In Fig. 12A a single plate is lying on its stretched basement. Its stable point of transformation has coordinates (5;5). Because of stretching the plate begins to crack and thus two new plates appear (Fig. 12B) with their own stable points of transformation (5;3) and (5;7).

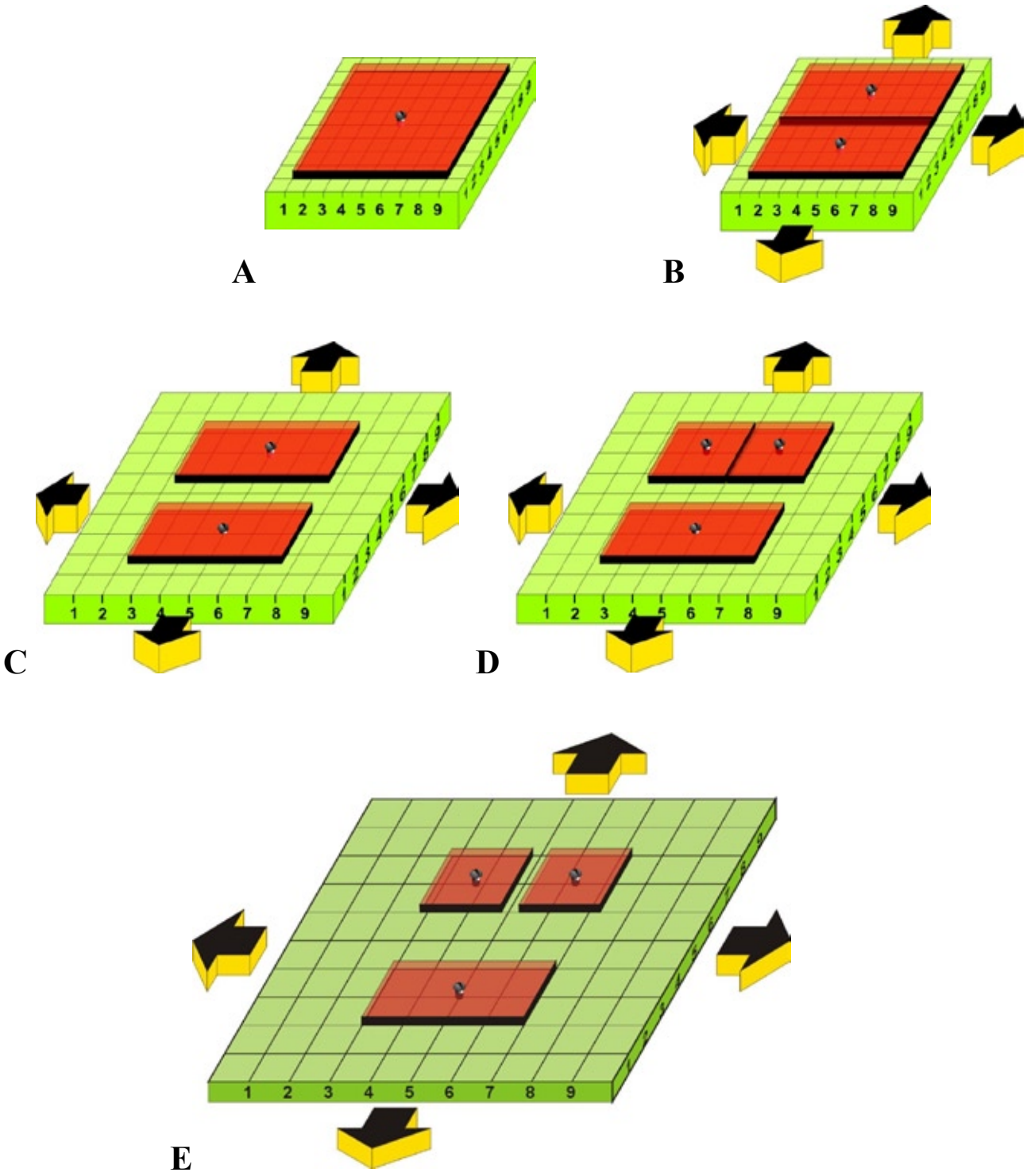


Fig. 12. *General modelling of a cracking plate (explanation in text)*

After some interval of stretching both new plates move away from each other, seemingly "driven" by their stable points of transformation (Fig. 12C). Then the upper plate cracks (Fig. 12D) and two other stable points of transformation appear (3.7; 7) and (6.3; 7). Then after succeeding interval of stretching all the plates move away from each other seemingly "driven" by their stable points of transformation (Fig. 12E).

b. Geometrical modelling of development of a triple junction

Now we can explain, in a geometrical way, the development of triple junctions of the oceanic ridges (Fig. 13).

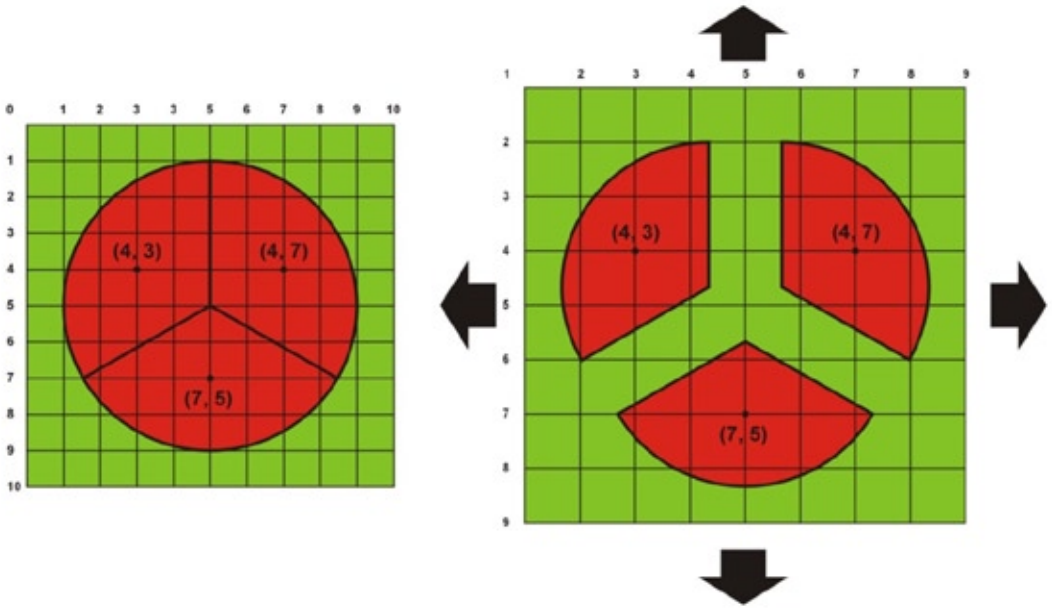


Fig. 13. *Development of a triple junction of ridges on the radially stretched basement. Stable points of transformations of plates marked by black dots and coordinates (4,3), (4,7) and (7,5) seemingly "draw" the plates aside.*

c. Geometrical model of development of the South Atlantic

Another structure which can be modelled is the South Atlantic (Fig. 14)

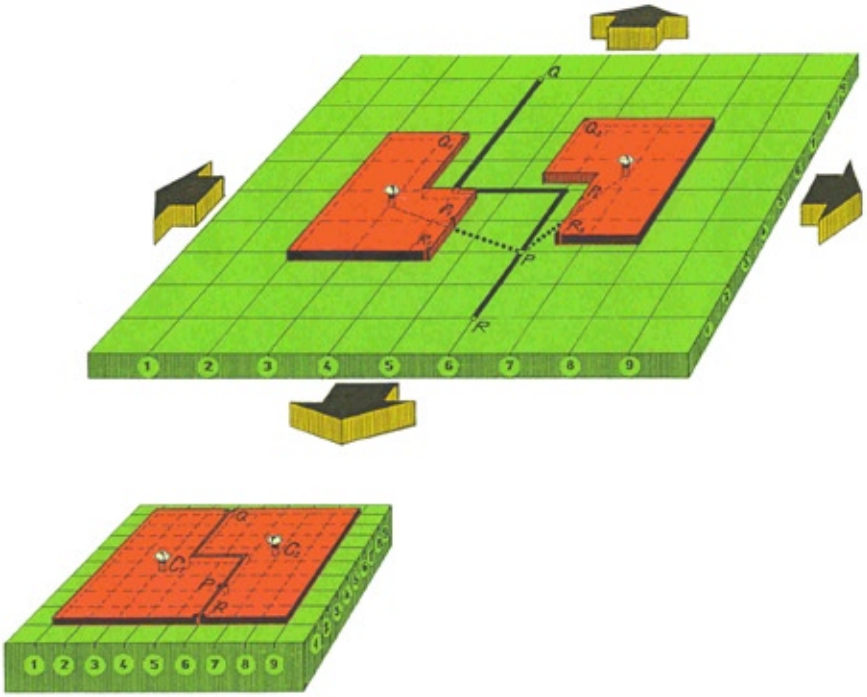


Fig. 14. *Geometrical modelling of development of South Atlantic on the expanding Earth (explanation in text)*

The two plates are simplified models of South America and Africa. In the lower part of the figure they are close together before the opening of the Atlantic Ocean. Both are "fastened" to their basement by their stable points of transformation – for South Africa (3; 4.5) and for Africa (7; 5.5). After stretching of the basement (upper part) the South Atlantic is open, the mid-Atlantic Ridge is elongated relative to its parent continental margins and the point P (Tristan da Cunha hot spot) forms the V-shape structure of Rio Grande and Walvis Ridges. The whole set of phenomena is explained by the single and simple process of stretching of the sublithospheric mantle.

The process of development of the South Atlantic modelled here graphically is also modelled physically in "The Fourth Proof " (Fig. 62) on a wider geotectonic background.

* * *

Only a few examples of modeling of big tectonic structures on the expanding Earth are presented here. The reader can find other examples in my quoted papers and also in this book. In all cases the driving mechanism is very simple and the absolute reference frame is well defined. Both results are unavailable in the frame of plate tectonics.

III. PRESENTATION OF SEVEN INDEPENDENT GEOLOGICAL PROOFS OF SIGNIFICANT EXPANSION OF THE EARTH

Seven proofs of the huge expansion of the Earth will be presented below in roughly chronological order of the time of their formulation.

1. THE FIRST PROOF
Growth of the Pacific
(Carey's test or Carey's Pacific Paradox)

a. Carey's basic test

Carey (1958) proved that the Pacific is expanding by proving that its perimeter is growing.

Let us consider two expanding sets of pieces – first flat (Fig. 14) and then on a sphere (Fig. 15).

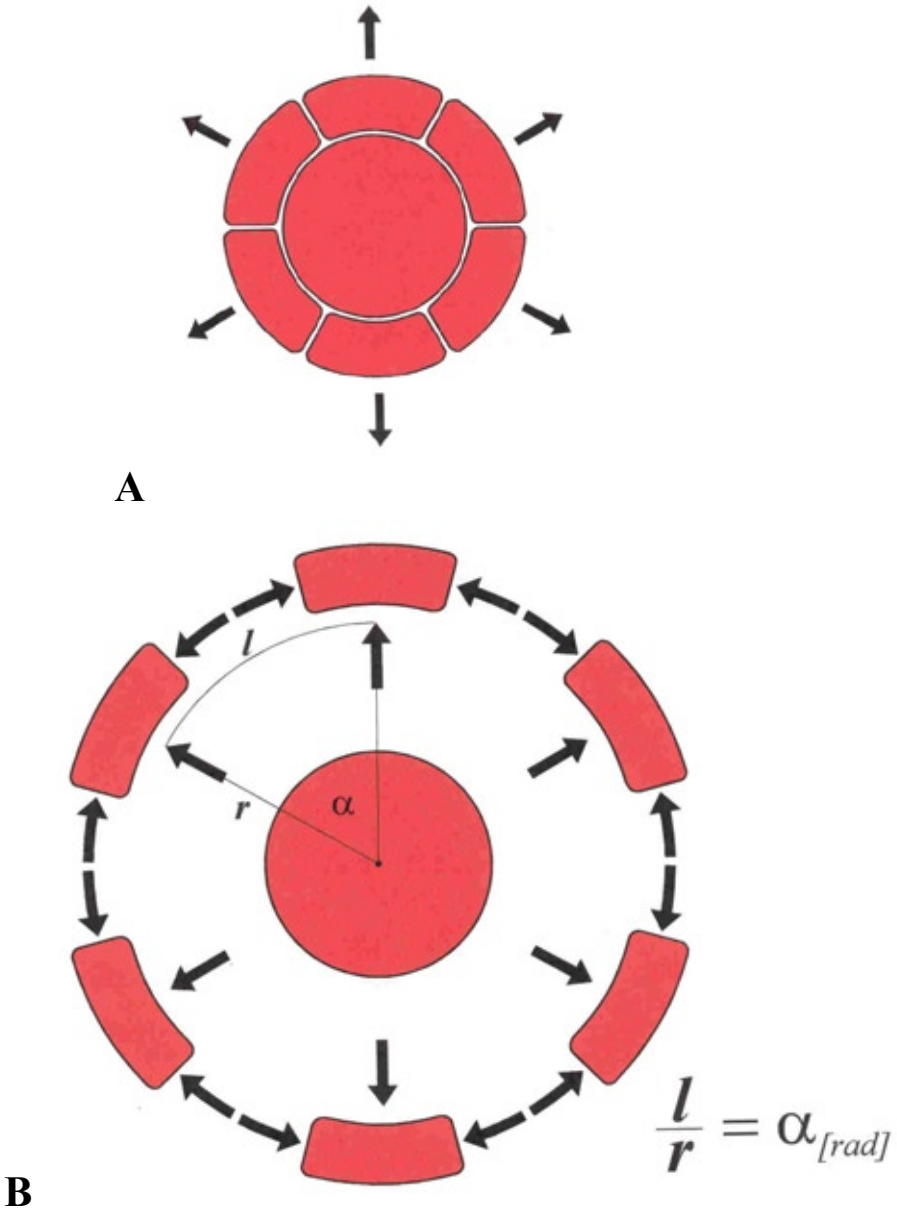


Fig. 14. *Flat set of expanding pieces,*
A *– initial moment of expansion,* **B** *– advanced stage of expansion*

Circumferential distances between pieces are proportional to their distance from the center of expansion and so the circumference of the set is growing all the time.

In the second case (Fig. 15) the situation is different. At the beginning the circumferential distances are growing too (Fig. 15A and B) but at the decreasing rate, and after crossing the great circle perpendicular to the center of expansion the distances are decreasing (Fig. 15C).

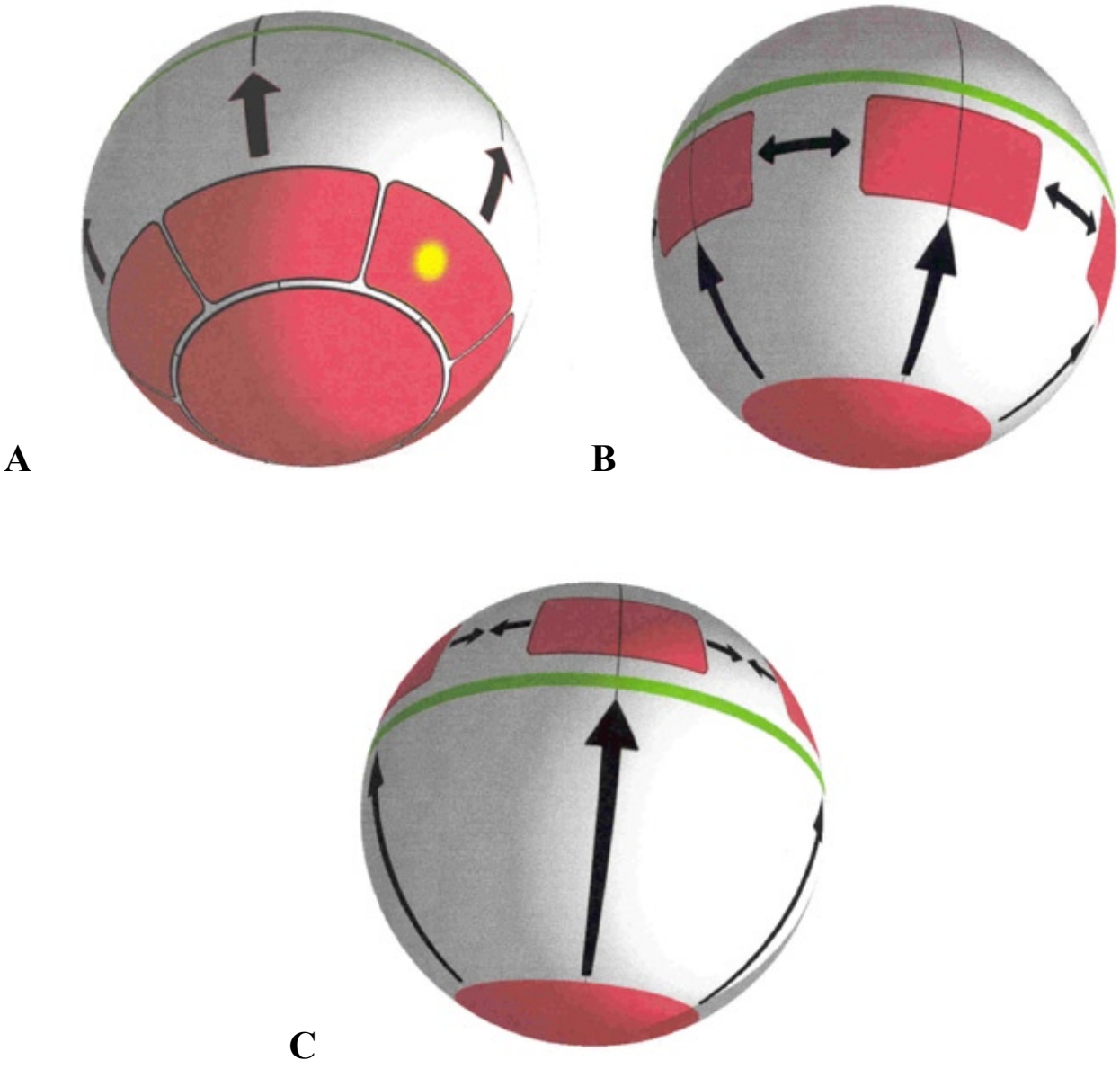


Fig. 15. *Spherical set of expanding pieces,* **A** *– initial moment of expansion,* **B** *– near great circle stage of expansion with divergent movement of the pieces,* **C** *– beyond great circle of expansion with convergent movement of the pieces*

This situation is the case of Wegener's Pangaea in the frame of Wegener's theory.

The circumference of the expanding Wegener's Pangaea (Fig. 16A), which is also the circumference of the old Pacific (Panthalassa), has crossed Earth's great circle (Fig. 16B). So the continents situated along the circumference, which were moving away from one another before reaching the great circle, should now be coming closer together.

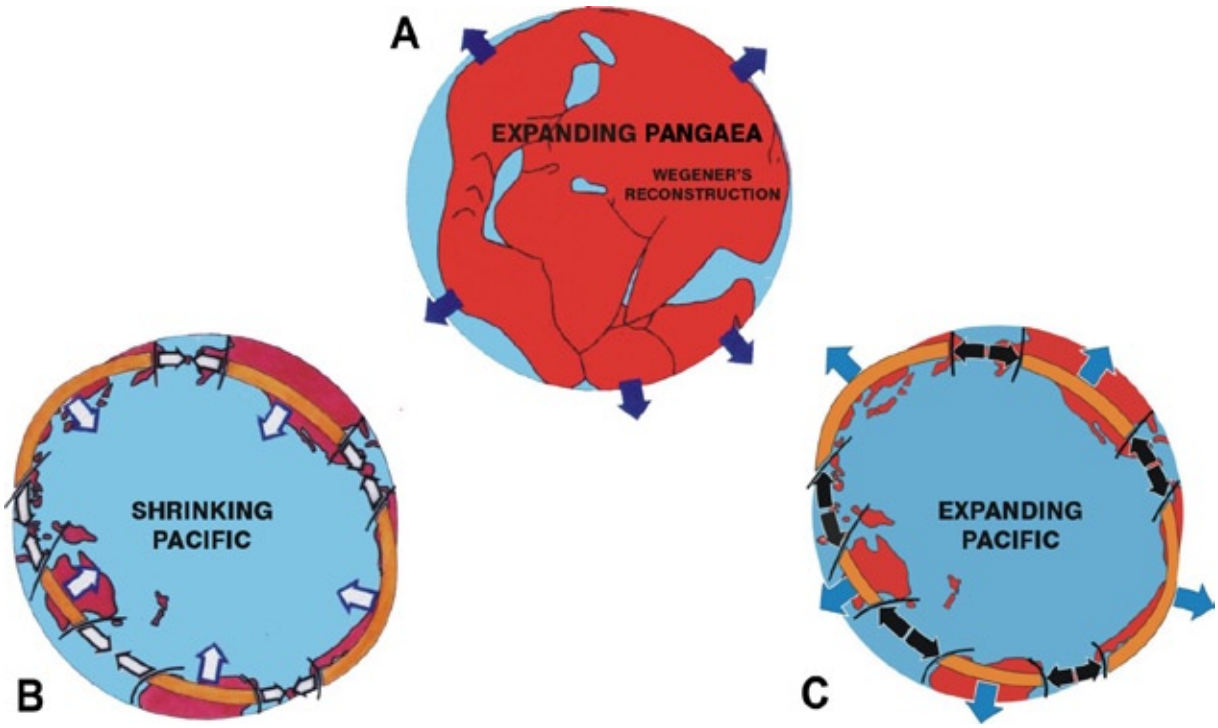


Fig. 16. *Illustration of Carey's test (Carey's Pacific Paradox). After Koziar (1993), explanation in text*

Carey (1958) decided to check the dependence by analyzing five gaps between the continents surrounding the Pacific (Carey's test). The gaps are as follows (Fig. 16 B and C) in counterclockwise order:

1. Australian – Antarctic gap
2. South American – Antarctic gap
3. Central American gap
4. Arctic gap
5. Asiatic – Australian gap.

Carey found that all the gaps are growing (Fig. 16C) instead of decreasing. This records the growth of the Pacific circumference, and therefore the growth of the surface area of this ocean. If Pangaea is growing together with the complementary area of the Pacific, the whole surface of the Earth is expanding and so its volume.

The reasoning is independent of all that happens inside the Pacific, and it does not matter whether the hypothetical subduction occurs or not. The growth of the gaps proves expansion of the Earth quite independently of this problem. What is more, the hypothetical subduction itself, as founded on the assumption that expansion does not exist (see former quotations), loses its basis.

Carey called later the structure of his proof of the expansion of the Earth based on expanding Pacific a "Pacific paradox" (Carey, 1976). The paradox is, that according to our conventional opinion expansion of Wegener's Pangaea should be connected with contraction of the Pacific. But the Pacific is expanding too.

Contemporary plate tectonics assumes shrinking of the Asia-Australian gap in spite of evident tearing away of all the islands of the Malayan Archipelago from Asia (Fig. 17 and Fig. 122).

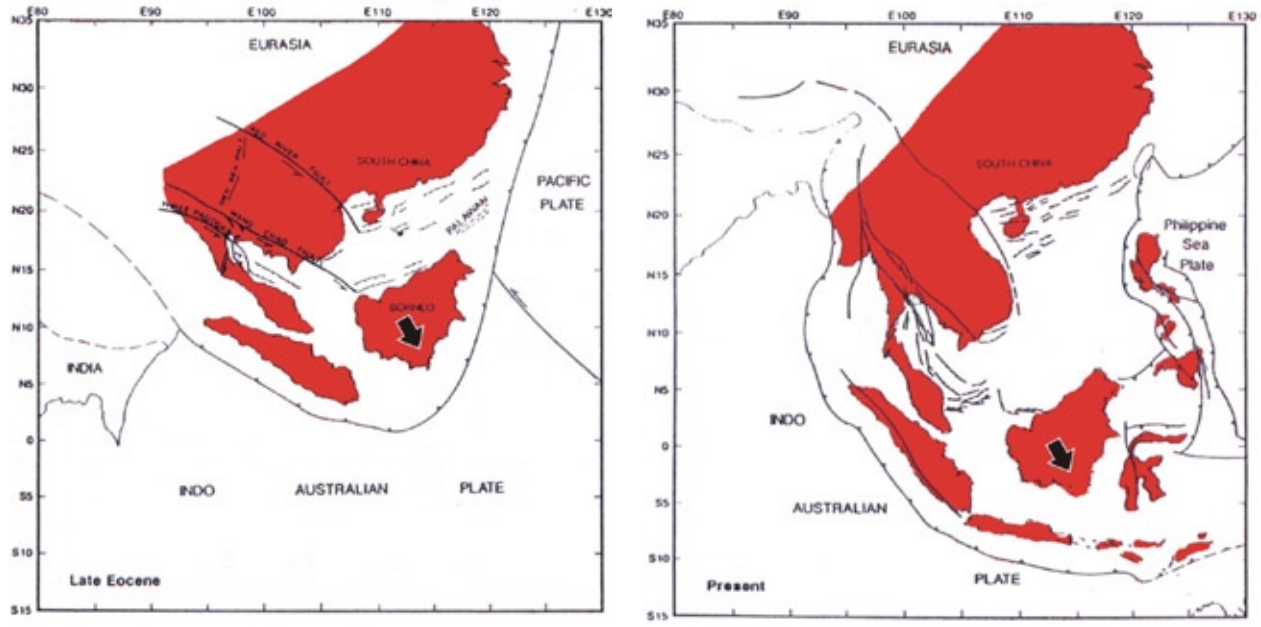


Fig. 17. *Tectonic development of Indonesian Archipelago (on the basis of Brias et al., 1993)*

The process seen in this and former figures is well proved and generally accepted.

However, plate tectonics assumes that Australia moves north in the opposite direction to the clearly visible southeast movement of the whole of Southeast Asia. But it is not true since a straight line can be found which links Australia and East Asia and does not cross any zone of supposed convergence (oceanic trenches). So Asia and Australia do not converge for sure, but they can move away. It is enough to falsify the plate tectonic paradigm. The line connects Arnhem Land in Australia with the vicinity of Ochotsk town in Asia (Fig. 18).

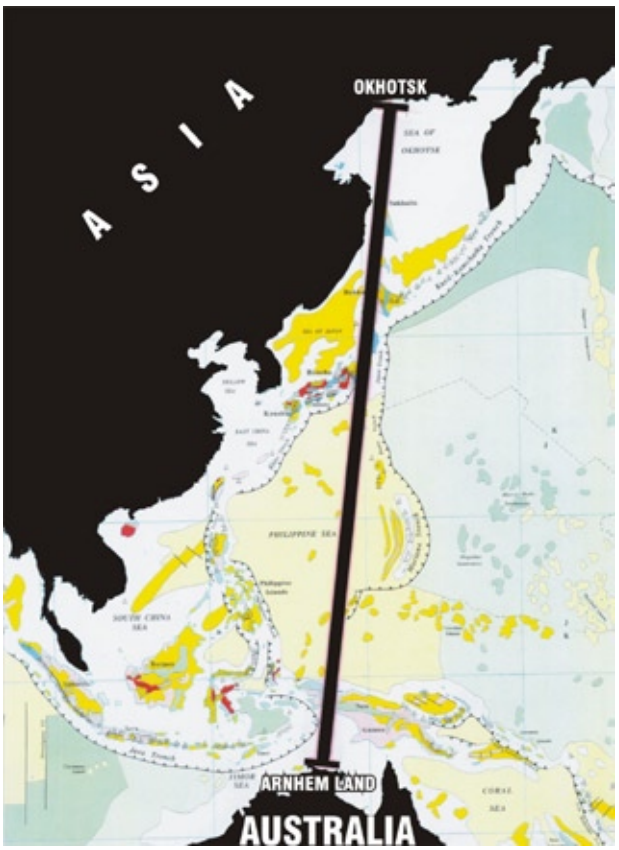


Fig. 18. *Straight line (a bar) connecting Asia with Australia avoiding any supposed subduction zone. This bar "does not allow" the two continents to move closer*

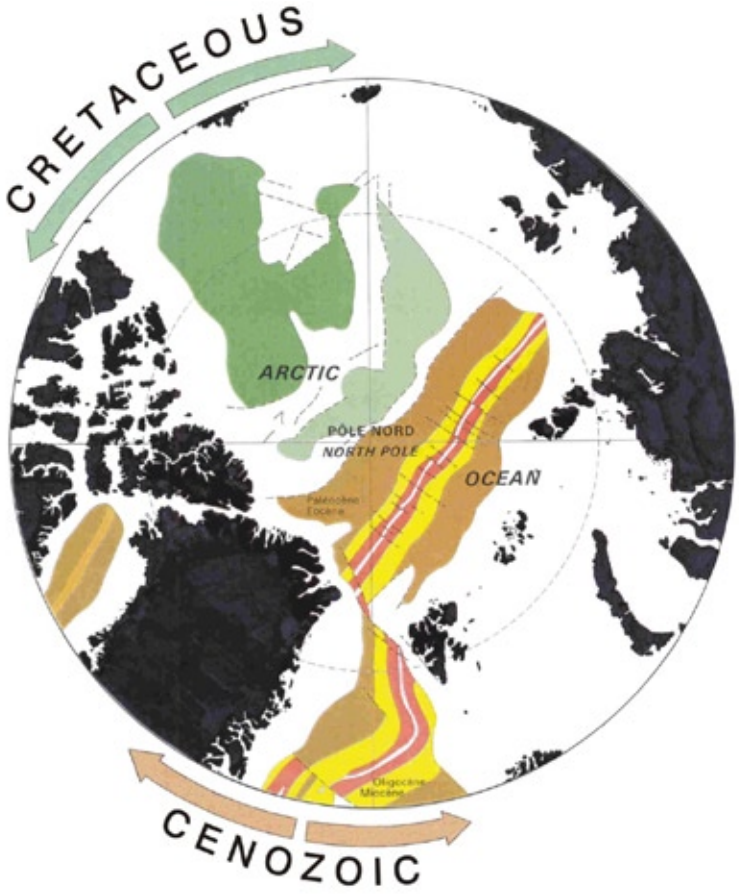


Fig. 19. *Divergent movement of Asia and North America (explanation in text)*

Similarly, plate tectonics necessitates shrinking of the Arctic gap. However, all the Arctic Ocean basins are extensional without any signs of alleged subduction. Formation of the basins occurs in two main tectonics stages (Fig. 19) – by tearing of North America from Europe mainly in late Cretaceous – Cenozoic period and tearing of North America from East Asia mainly in late Jurassic – Lower Cretaceous period.

b. Strengthened Carey's test

To avoid the discussion over the Indonesian and Arctic gaps, the growth of the Pacific can be deduced from the enlargements of only the first three gaps (Fig. 20) listed above. This time the three enlargements are accepted in plate tectonics.

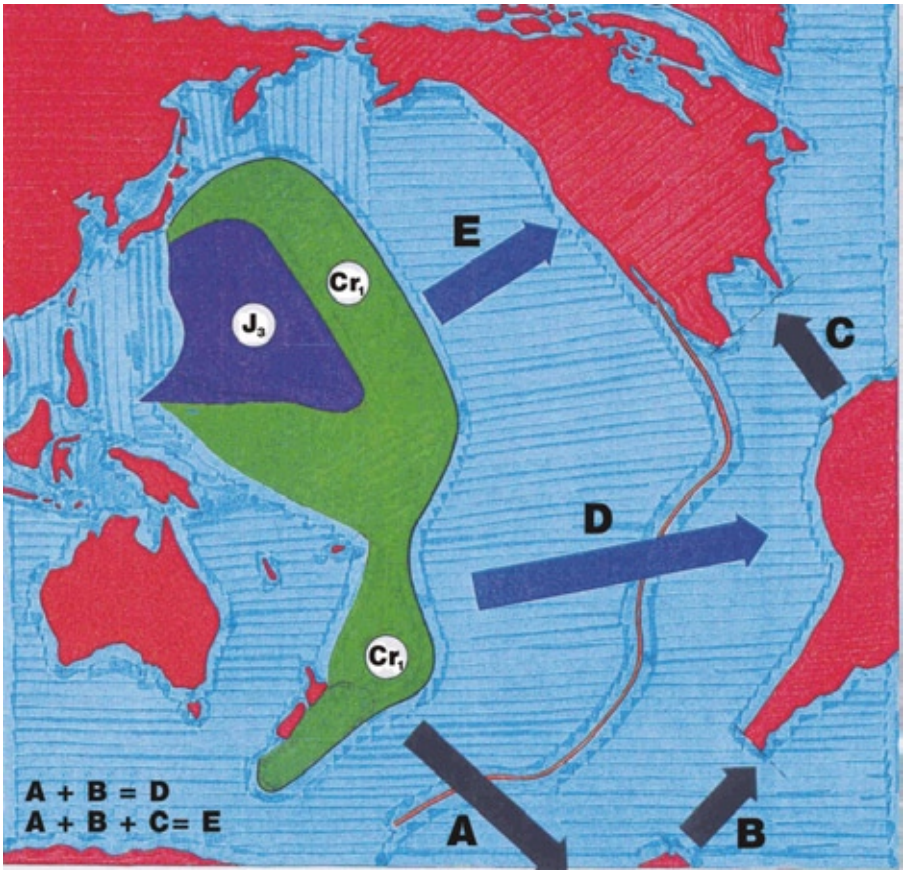


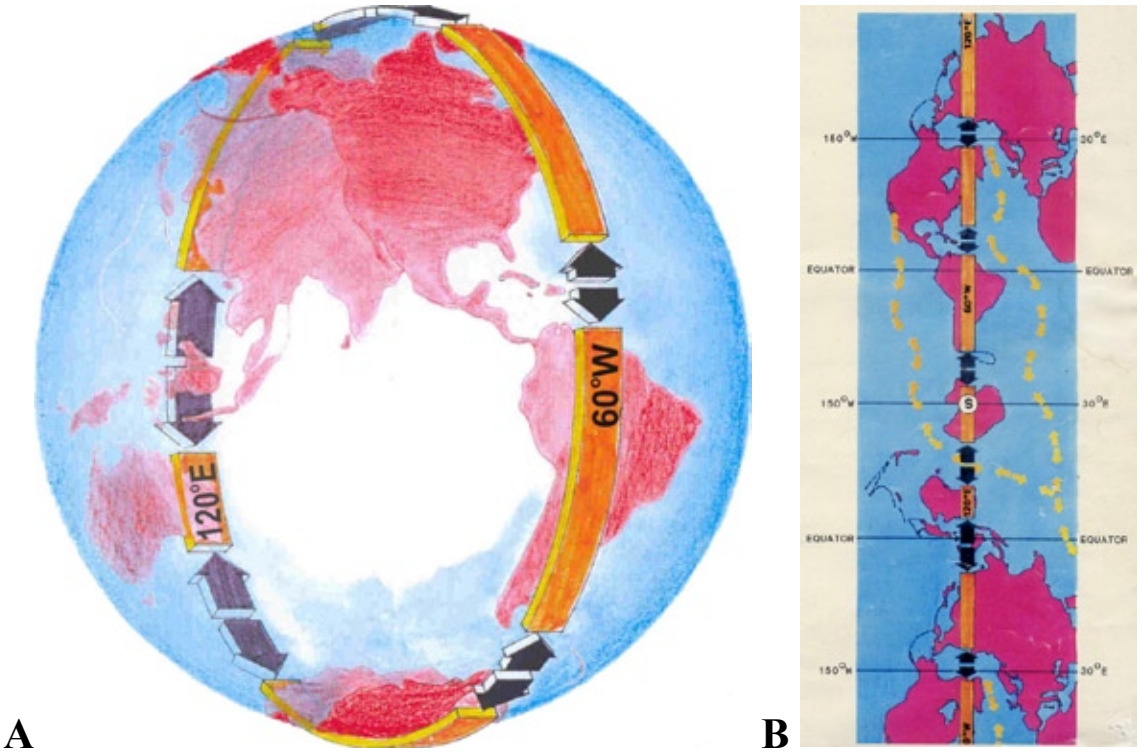
Fig. 20. *Strengthened Carey's test. After Koziar (1993), explanation in text*

The sum of the sliding vectors **A** and **B** is the sliding vector **D** which means an opening of the South Pacific. The sum of the sliding vectors **A**, **B** and **C** or **D** and **C** is the sliding vector **E** which means an opening of the North Pacific.

Because the three divergences A, B and C are accepted by plate tectonics, but at the same time the theory assumes shrinking of the Pacific, the plate tectonics theory contradicts itself.

c. Simplified Carey's test

The perimeter of the Pacific in Fig. 16C can be shifted more outwards, into the intercontinental gaps, until it reaches the great circle formed by the meridians of 60°W and 120°E (Fig. 21).



A **B**

Fig. 21. *Carey's great circle:* **A** *– spherical illustration,* **B** *– in Mercator longitudinal cartographic grid developed just along Carey's great circle. After Koziar (1993), explanation in text*

Thus, the conclusion about positive sum of the changes in the surface areas of the Pangaea and the Pacific Ocean is reduced to the simple conclusion about the increase in the perimeter of the Earth.

d. Meservey's objection against dispersion of continents on non-expanding Earth

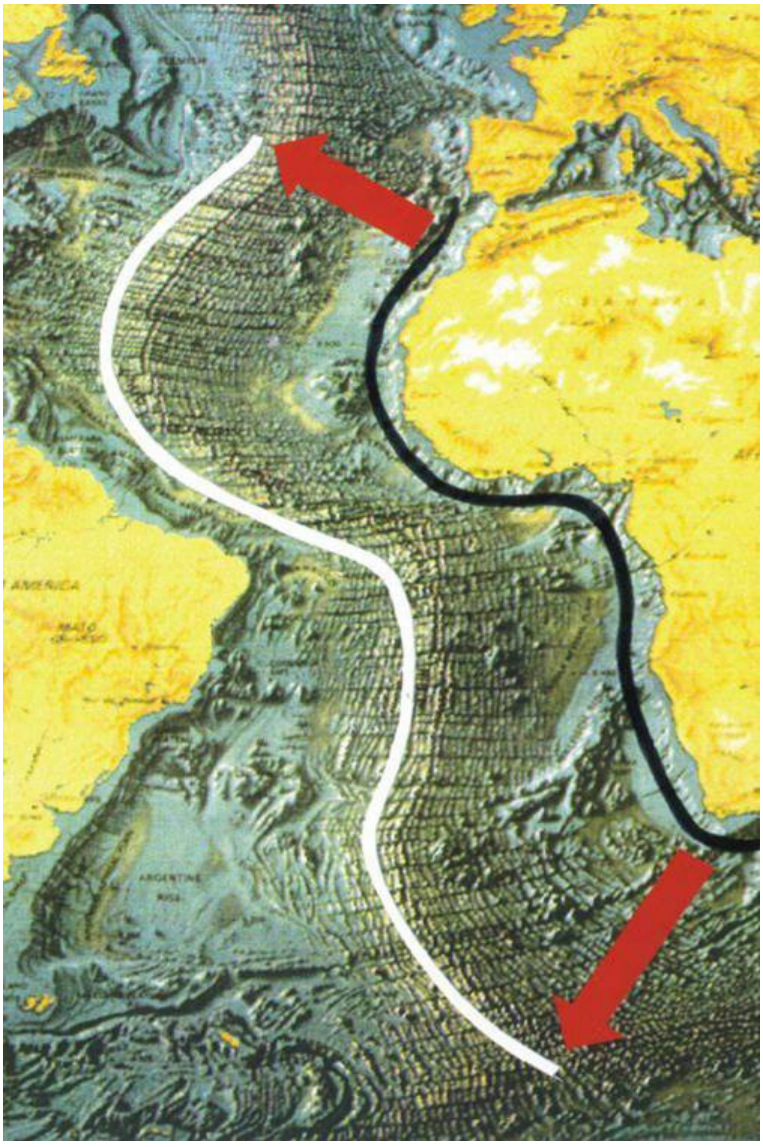
Let us notice that when the expanding set in Fig. 15A covers the whole hemisphere any further expansion is impossible, as it will be blocked by tightening of its perimeter. That is the case of Wegener's Pangaea which covers almost exactly one hemisphere (Fig. 16A). This problem of drifting continents on non-expanding Earth was pointed out by Meservey (1969).

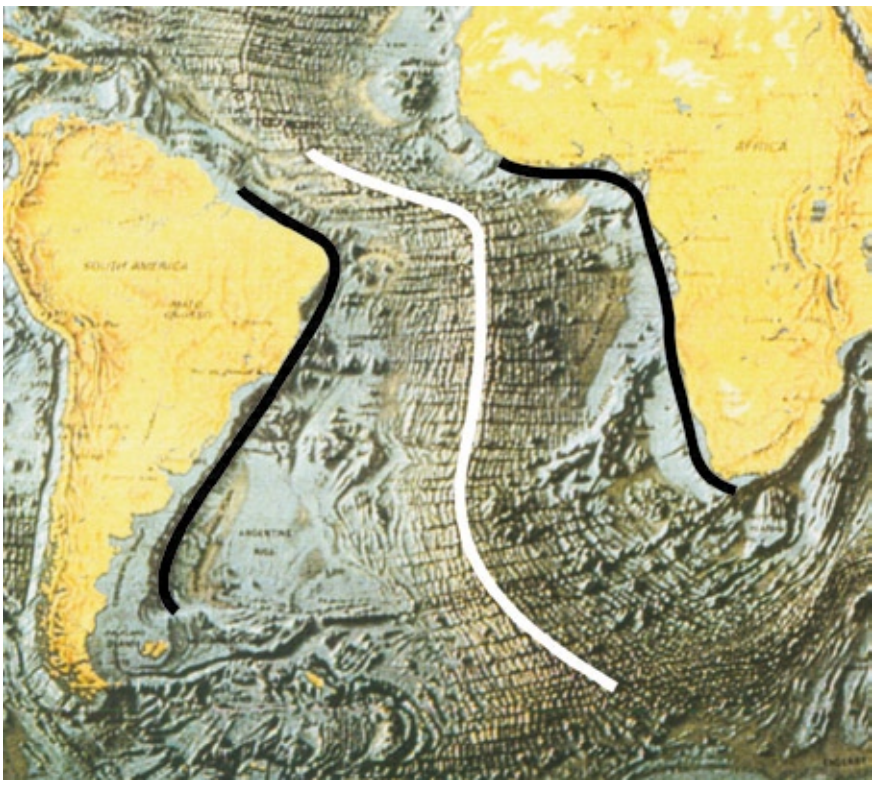
How Wegener was able to expand his Pangaea in spite of that will be explained in the discussion of the "Proof 3".

2. THE SECOND PROOF
Elongation of plate boundaries and radial growth of plates

a. Essence of the proof

Carey (1958) drew attention to the fact that oceanic ridges reflect, on larger scale, the outlines of the neighboring continents. It is a major morphological feature of our globe. The feature means the oceanic ridges grow in length (or strictly speaking – grow plate boundaries which consists of segments of spreading centers and active transform faults) because they initially were close to the borders of the neighboring continents. It is best seen in the western neighborhood of Africa (Fig. 22A). On the opposite side of Atlantic Ocean the relations are evident too – relative to the coast of South America (Fig. 22B) and North America (Fig. 22C).

A 



B

C

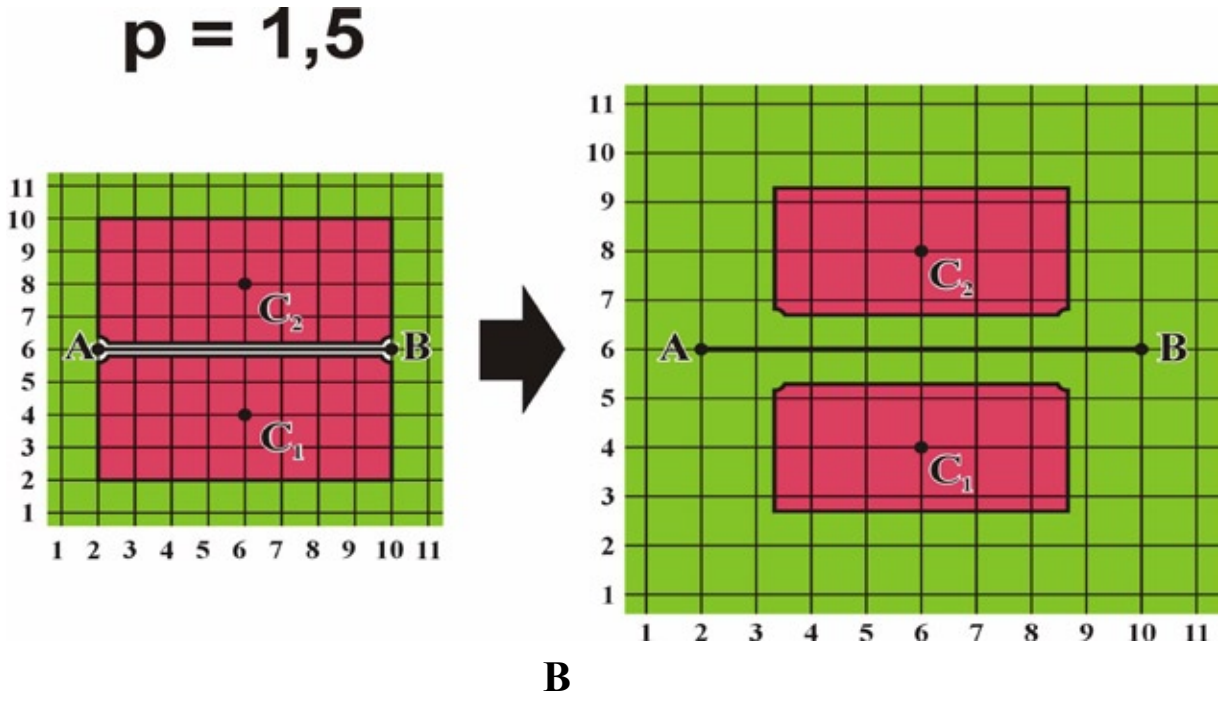
Fig. 22. *Elongation of the Mid-Atlantic Ridge (present Atlantic plate borders – white lines) relative to:* **A** *– African,* **B** *– South American and African and* **C** *– North American continental borders (initial plate borders – black lines)*

The spreading of the oceanic lithosphere perpendicular to the ridges together with the lengthwise growing of the ridges (plate boundaries) means growth of the lithosphere in all directions. It therefore proves the expansion of the Earth.

It must be stressed that geotectonic significance of elongation of the oceanic ridges is totally ignored by plate tectonics. Plate tectonics has no mechanism for their lengthening.

b. Geometrical model of elongation of oceanic ridges

The origin of the relations visible in Fig. 22 can be demonstrated on my geometrical model (Fig. 23).



A **B**

Fig. 23. *Model of elongation of oceanic ridges (explanation in the text).*

Fig. 23A presents an initial model of cracking of a plate in two equal parts which immediately gain their own stable points of transformation (C_1 and C_2). In the crack an initial ridge appears which has the same length (AB) as the neighboring borders of the new plates. As a result of stretching of the basement (in the figure the ratio is 1.5) the plates mutually moved away "fixed" to the basement in their SPTs (Fig. 23B). Notice, that coordinates of this two points $C_1(6,4)$ and $C_2(6,8)$ remain the same. The ridge as a structure connected with the basement (a trace of initial cracking) is stretched together with it, so it is enlarged relative to its parent plate borders. Notice, that the coordinates of the ending points of the ridge A(2,6) and B(10,6) remain the same too.

The mantle diapiric basement of the ridge grows regularly but its lithospheric superstructure does not. This will be explained later.

c. Tensional fractures perpendicular to oceanic ridges

Lengthwise stretching of the oceanic ridges is visible in the dense system of tensional fissures perpendicular to them (Solovieva, 1981). Many of them are simultaneously transform faults but many are not (Fig. 24) so their tensional genesis is clear. Longitudinal and perpendicular (spreading) stretching of oceanic ridges means radial tension in the lithosphere and its deep underground. This, in turn, means the expansion of the Earth.

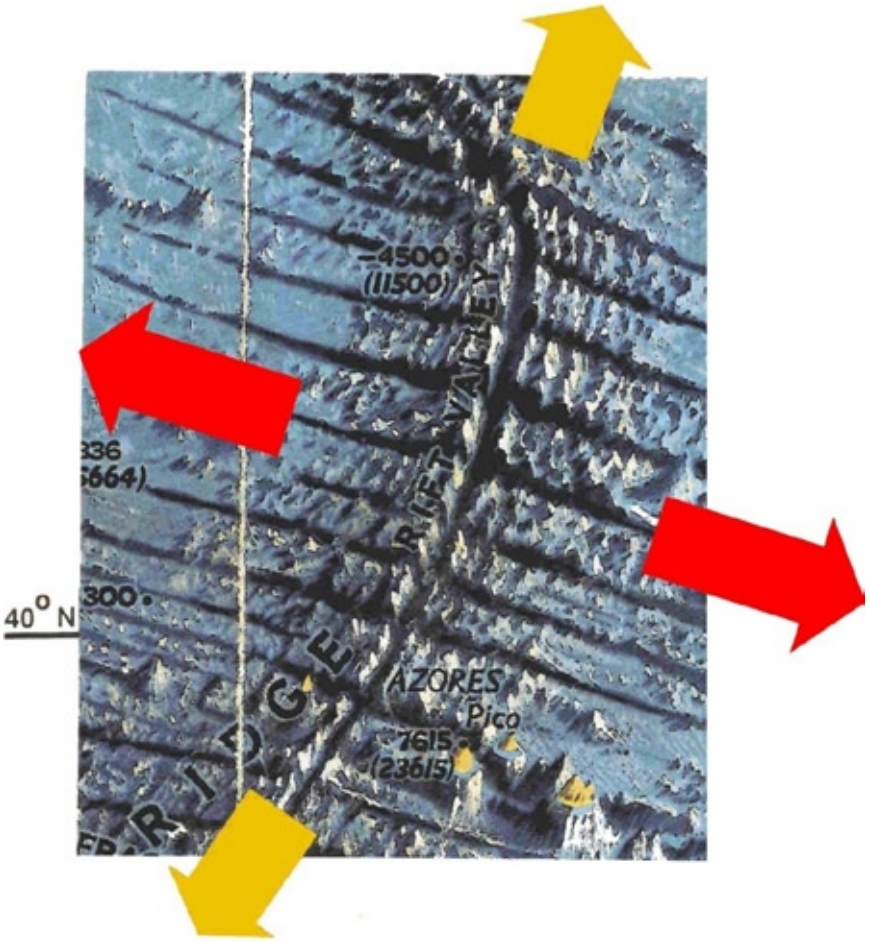


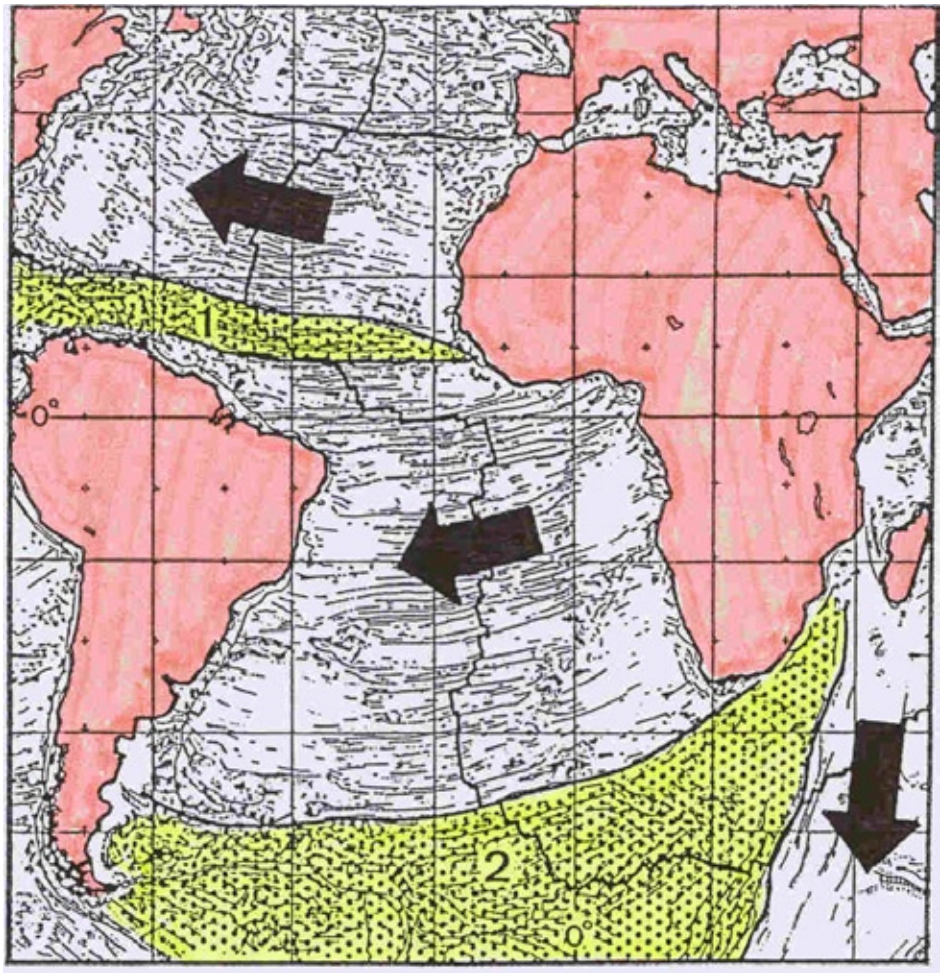
Fig. 24. *Longitudinal (yellow arrows) and perpendicular (red arrows) stretching of oceanic ridges (Atlantic Ridge about 40^0 N)*

In the extreme cases of action of lengthwise tension serpentinized material of upper mantle is pressed upward. Example are the Islands of St. Peter and Paul in the equatorial Atlantic. In the most extreme cases another ridge appears forming the so called "triple junction" of the ridges.

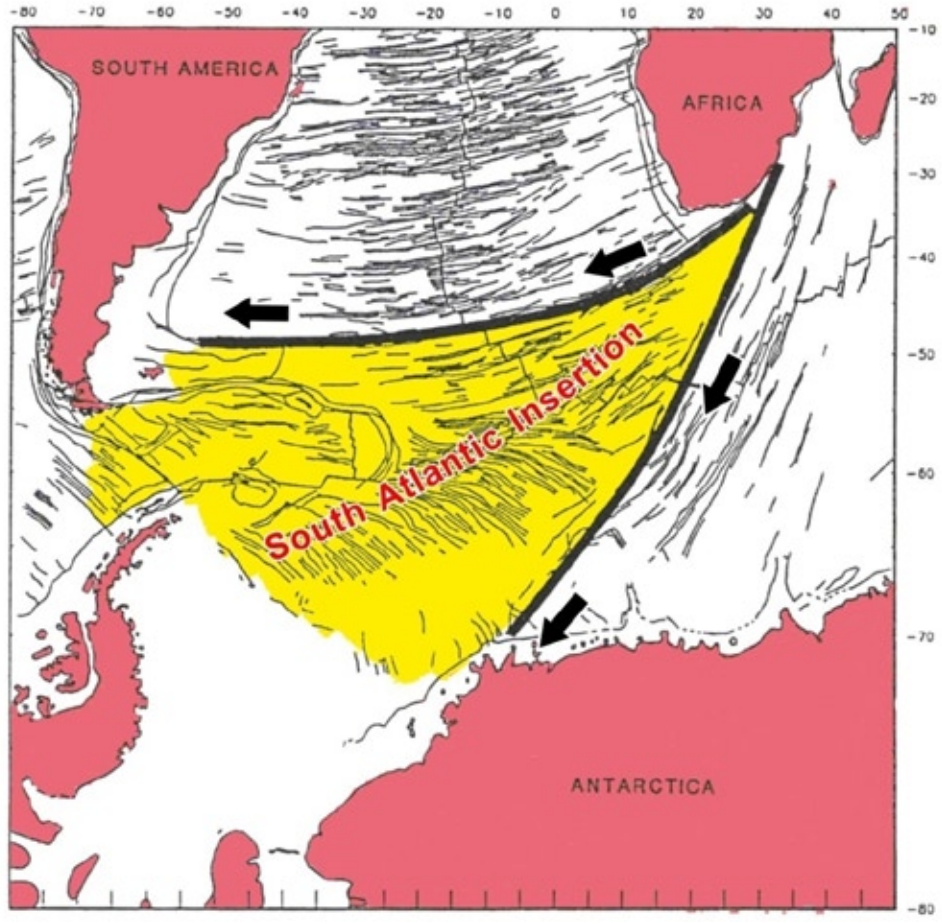
d. Pavoni's lithospheric insertions

More significant increment in the length of the oceanic ridges is realized in the very important wedge-shaped structures noticed by Pavoni (1992, Fig. 25A). Pavoni called them "insertions" but the full name should be "Pavoni's lithospheric insertions".

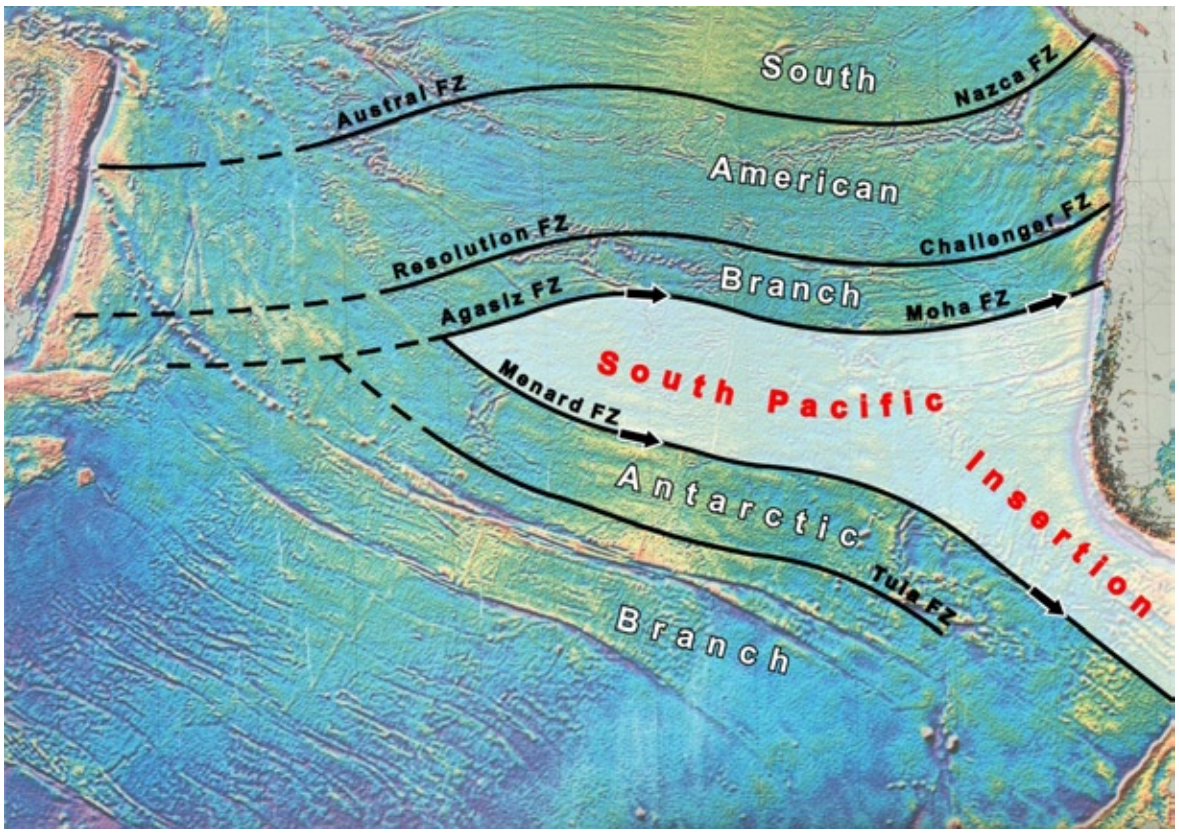
A


1
0°
2
0°

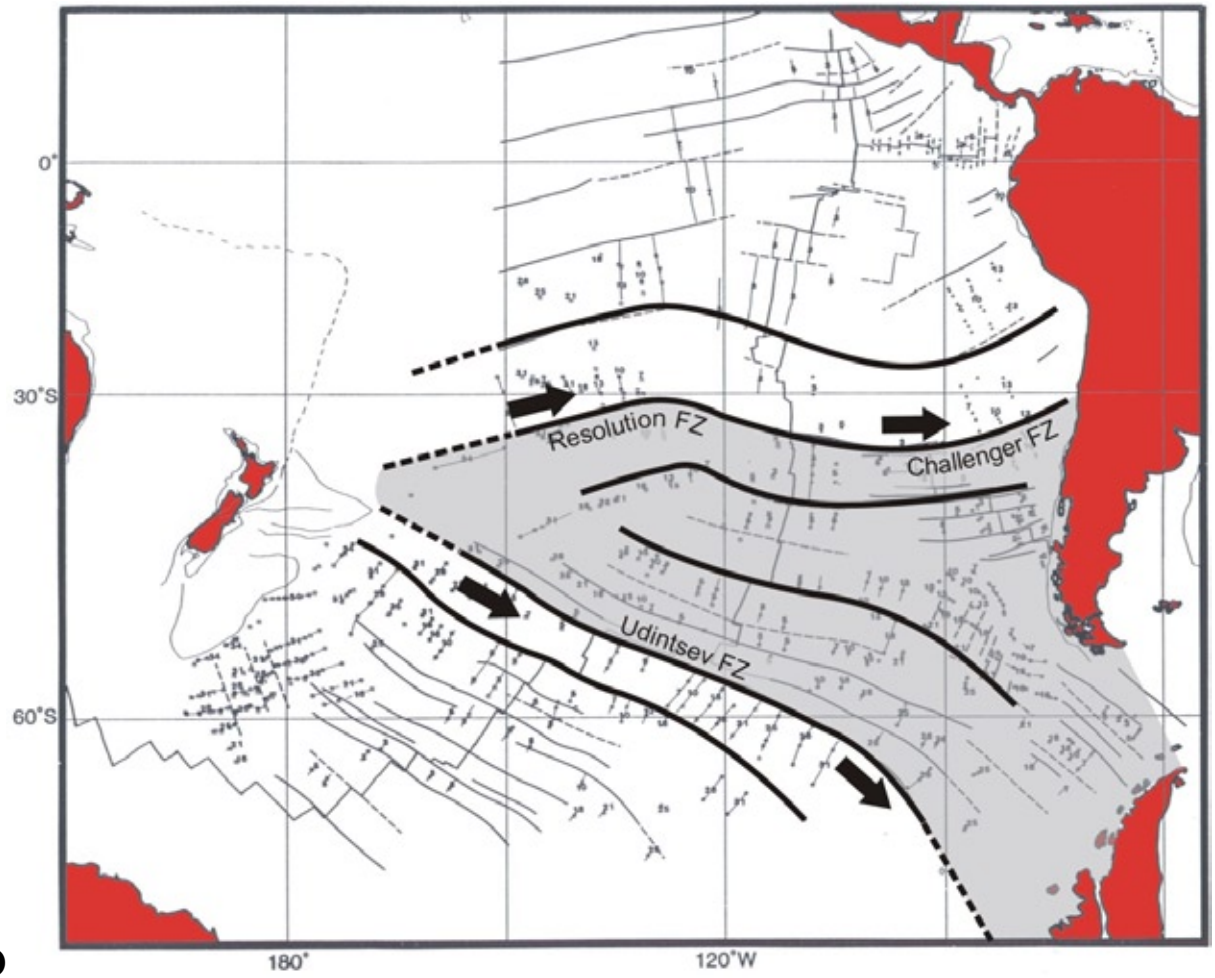
B

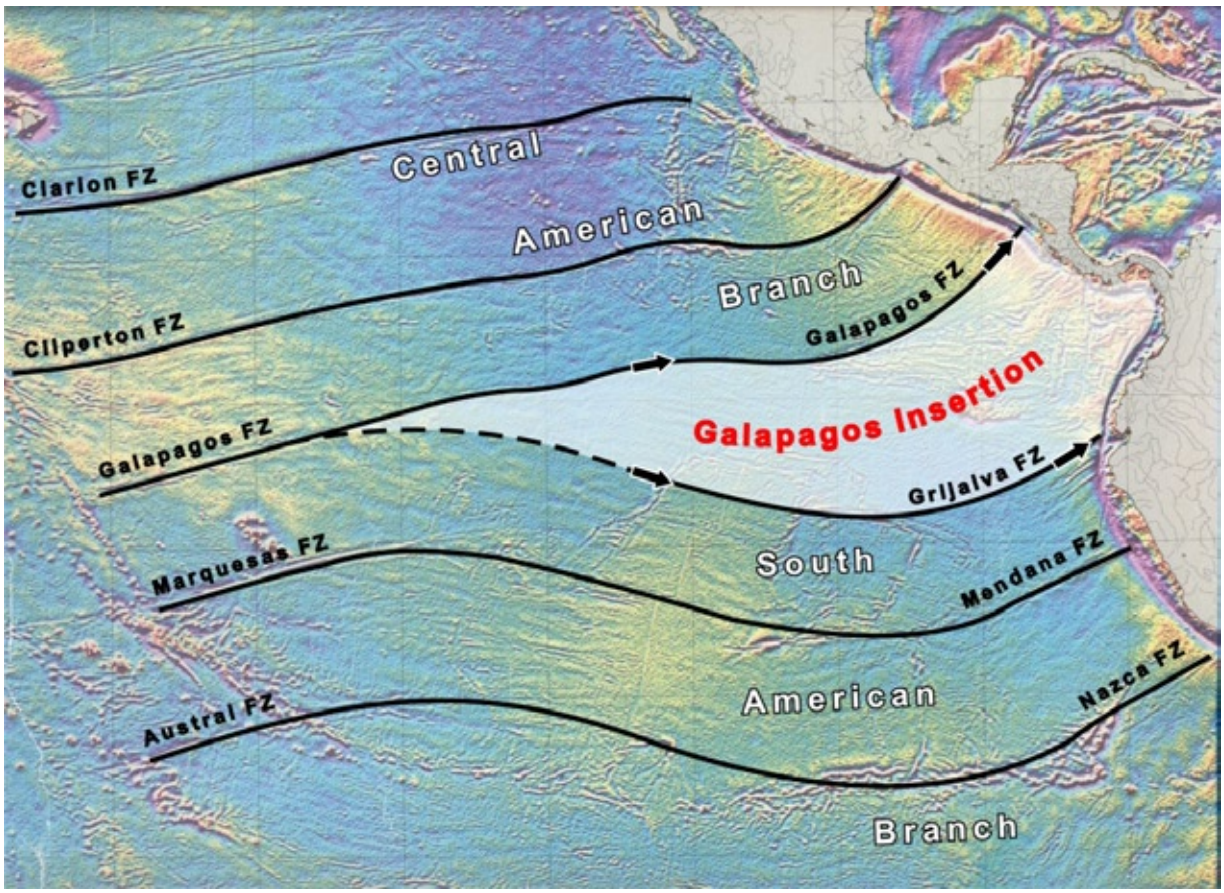

-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50
SOUTH AMERICA
AFRICA
South Atlantic Insertion
ANTARCTICA
-10 -20 -30 -40 -50 -60 -70 -80

C


South
American
Branch
Antarctic
Branch
Austral FZ
Nazca FZ
Resolution FZ
Challenger FZ
Agassiz FZ
Moha FZ
Menard FZ
Tula FZ
South Pacific
Insertion

D


0°
30°S
60°S
180°
120°W
Resolution FZ
Challenger FZ
Udintsev FZ



E

Fig. 25. *Pavoni's lithospheric insertions:* **A** *– Equatorial (1) and South Atlantic (2) insertions (according Pavoni, 1992) – black arrows - JK,* **B** *– full view of South Atlantic Insertion,* **C** *– South Pacific Insertion (my interpretation),* **D** *– possible larger size of South Pacific Insertion (my interpretation),* **E** *– Galapagos Insertion (my interpretation). Black arrows indicate the directions of growth of the lithospheric insertions. Further explanations in text*

The insertions are outlined by divergent set of fracture zones (flow lines) opened toward tensional gaps between continents. The fractures zones outside insertions are generally parallel and can be called "branches". The parallelism is supported by rigid lithospheric ends of corridors between neighboring fractures zones. Because of this parallelism almost all elongation of oceanic ridges is realized just inside the insertions.

Pavoni showed only two insertions:

1. Equatorial Atlantic (no. 1 in Fig 25A) between Sierra Leone and Fifteen Twenty fracture zones.
2. South Atlantic (no. 2 in Fig. 25A) between Agulhas and Du Toit fracture zones.

The latter is better visible on the map by Cunningham (1993) – Fig. 25B.

In the Atlantic the insertions simply mark in oceanic lithosphere the longitudinal dispersion of North America, South America and Antarctica, *i.e.* dispersion of continents along the western part of Carey's great circle (60^0W, see Fig. 21). The dependency shows that longitudinal dispersion of these continents and longitudinal stretching of the Mid-Atlantic Ridge are compatible and together mark the growth of Carey's perimeter.

A fact of great importance is the existence of analogous insertions on the Pacific side of these three longitudinally dispersed continents. These are:

3. South Pacific (Fig. 25C) between Agassiz and Menard fracture zones. Perhaps the insertion has a larger size and is between Resolution and Udintsev fracture zones (Fig. 25D).

4. Galapagos (Fig. 25E) between Galapagos and Grijalva fractures zones.

The South Pacific Insertion is equivalent to the South Atlantic one. In turn the Galapagos Insertion is equivalent to the Equatorial Atlantic one.

The two Pacific insertions indicate that the three continents are moving radially outwards from the center of Pacific as they move radially outwards from Africa (Fig. 25A), which is the centre of Wegener's Pangaea. That is an independent confirmation of the situation presented in Fig. 16C and equivalent to the expansion of the Earth.

Pavoni insertions help us to understand better the tectonic development of a given region and make its reconstruction possible. For instance the Galapagos Insertion is the key to the reconstruction of the Central Pacific and Central America, and the South Pacific insertion is the key to reconstruction of the South Pacific and the gap between South America and Antarctica.

e. Divergent flow lines areas

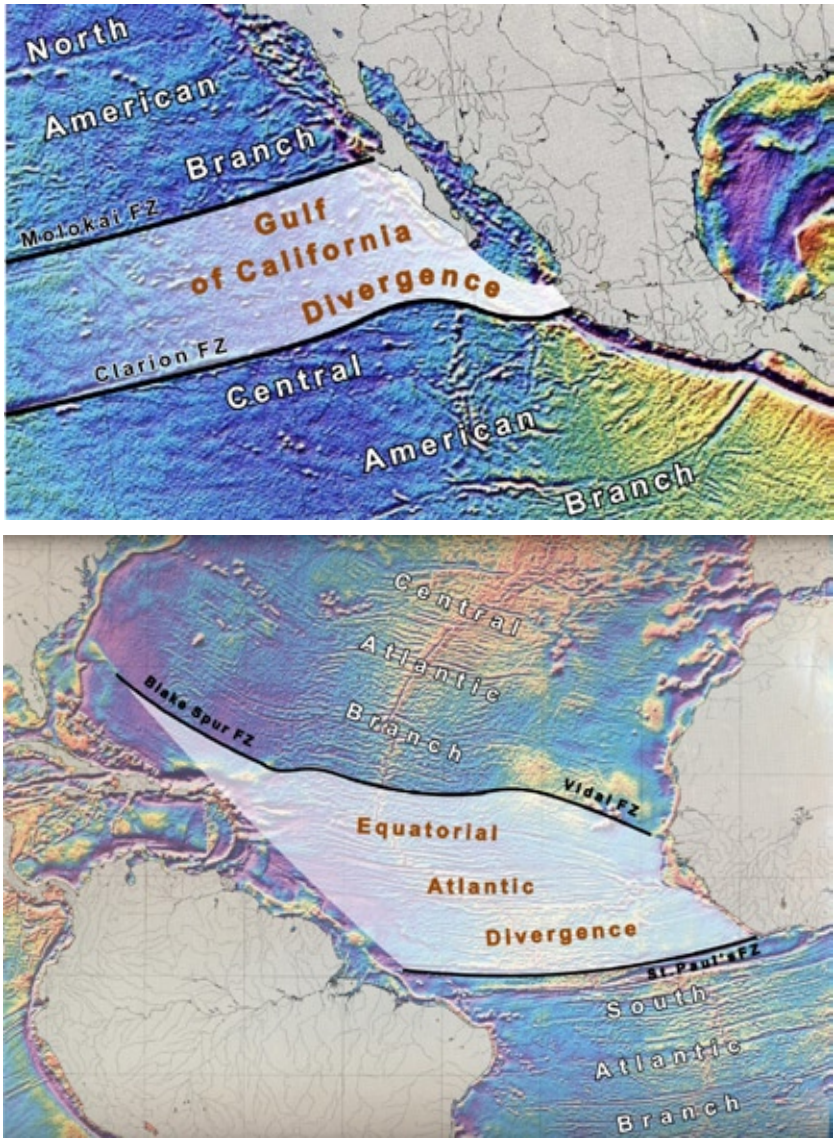
Pavoni's insertions are only special cases of more general structures which can be called "divergent flow lines areas" or shorter "divergences" (my term). They comprise a wider group of divergent areas in which not all lithosphere is in the form of insertion. That means that diverging flow lines do not start from a common point (as in the case of the insertions) creating a triangular structure.

The area of this kind is the "Gulf of California Divergence" (Fig. 26A). It

is connected with the elongation of the western coast line of North America manifesting itself in opening of the Gulf of California. It is evident that the elongation of the continental margin can draw aside flow lines only when the continent is moving away from the interior of the ocean which is expanding. In this case the ocean is the Pacific.

The Equatorial Atlantic Insertion is included in the broader Equatorial Atlantic Divergence (Fig. 26B). This divergence together with the Galapagos Insertion and the Gulf of California Divergence indicate a huge moving apart of the North and South Americas (Fig. 27A). At the end of the Paleozoic era both Americas were tightly connected (Fig. 27B).

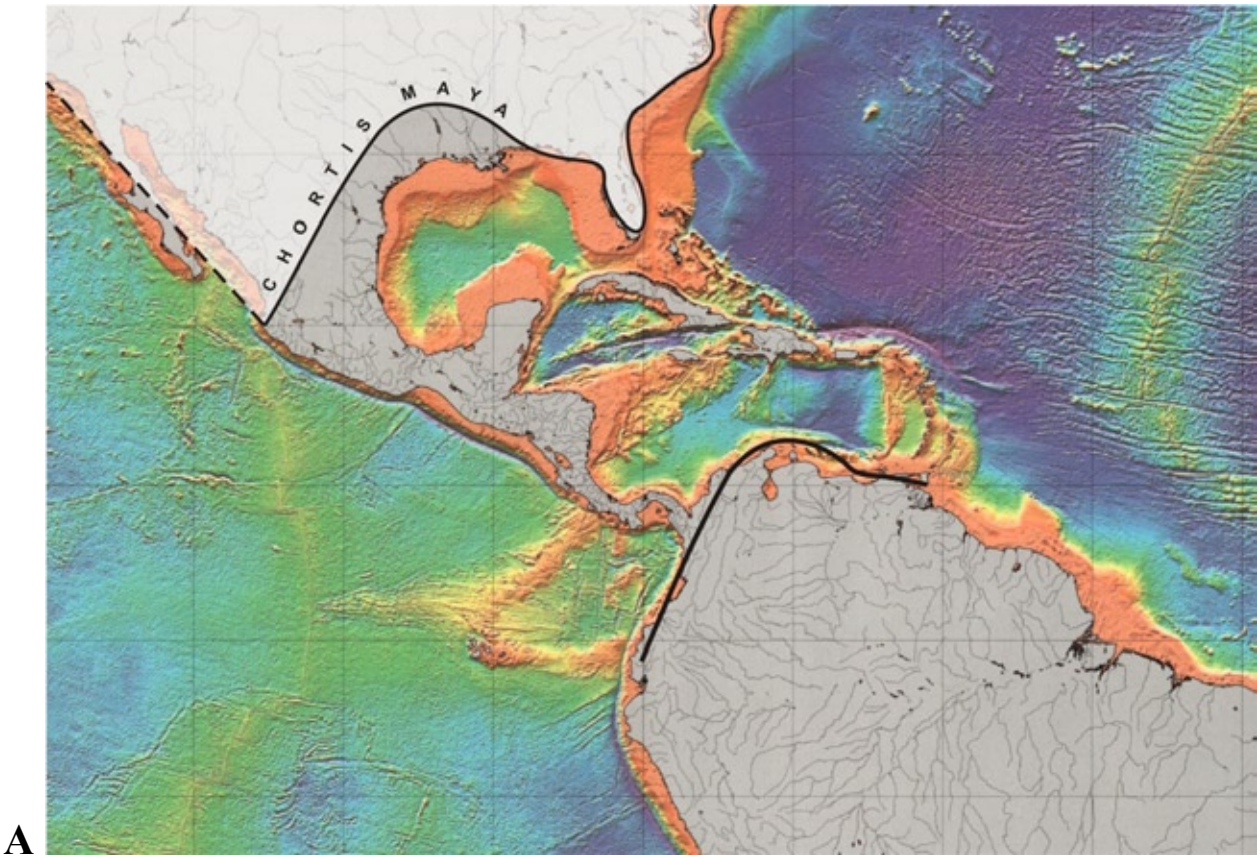
The very important structure is the "Newfoundland Divergence" in North Atlantic, between Gibs and Pico – Gloria fracture zones (Fig. 28). It works in opposite direction than those noticed by Pavoni (Fig. 25A).



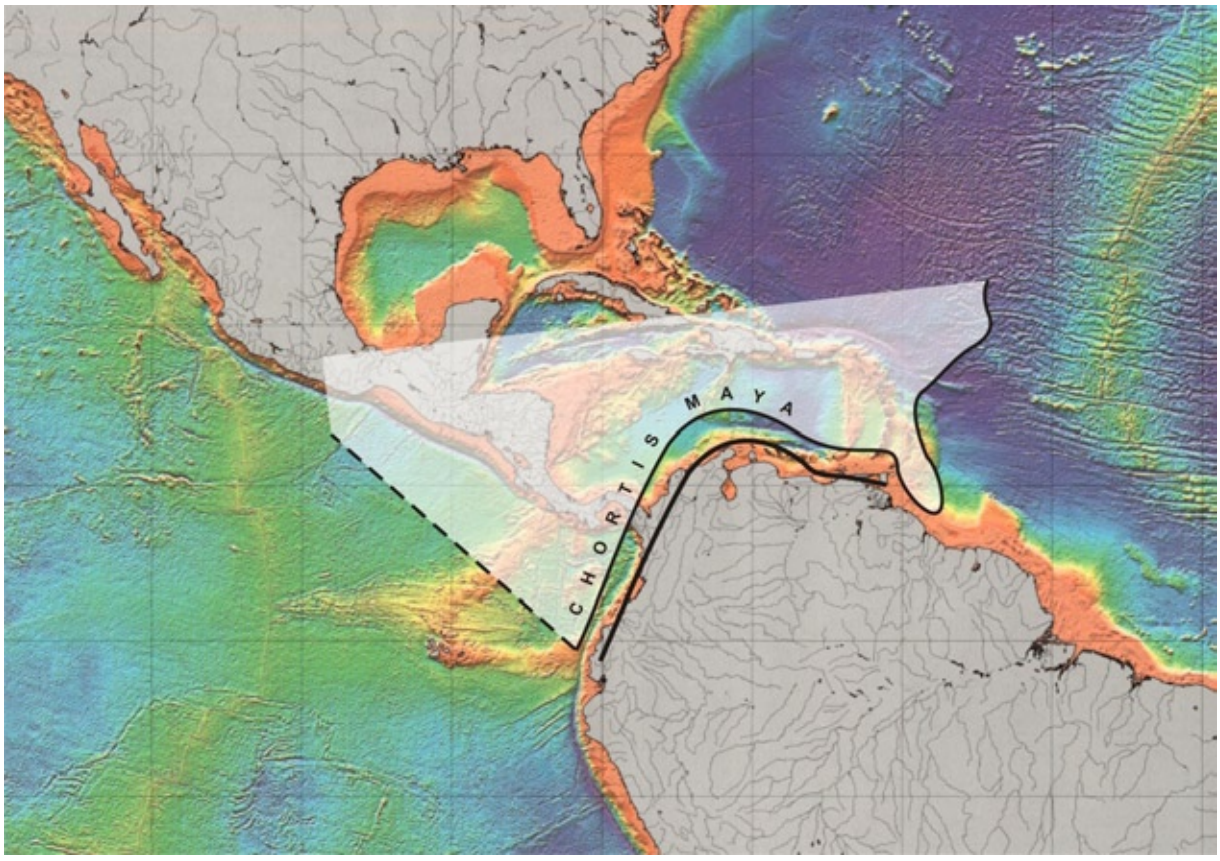
A

B

Fig. 26. *Divergent flow areas:* **A** *– Gulf of California Divergence,* **B** *– Equatorial Atlantic Divergence (explanation in text)*



A



B

Fig. 27 **A –** *Minimal distance (between the two black lines) of divergence between North and South Americas,*
B *– Reconstruction of former connection of North and South Americas*

The Newfoundland Divergence contributes to the elongation of the section of the Mid Atlantic Ridge presented in Fig. 22C (northern part of it). But the most important feature is that it documents the increasing distance between Europe and Africa, which falsifies the plate tectonics interpretation. The growth of the distance manifests itself directly by the opening of Biscay Bay and Alboran Sea.

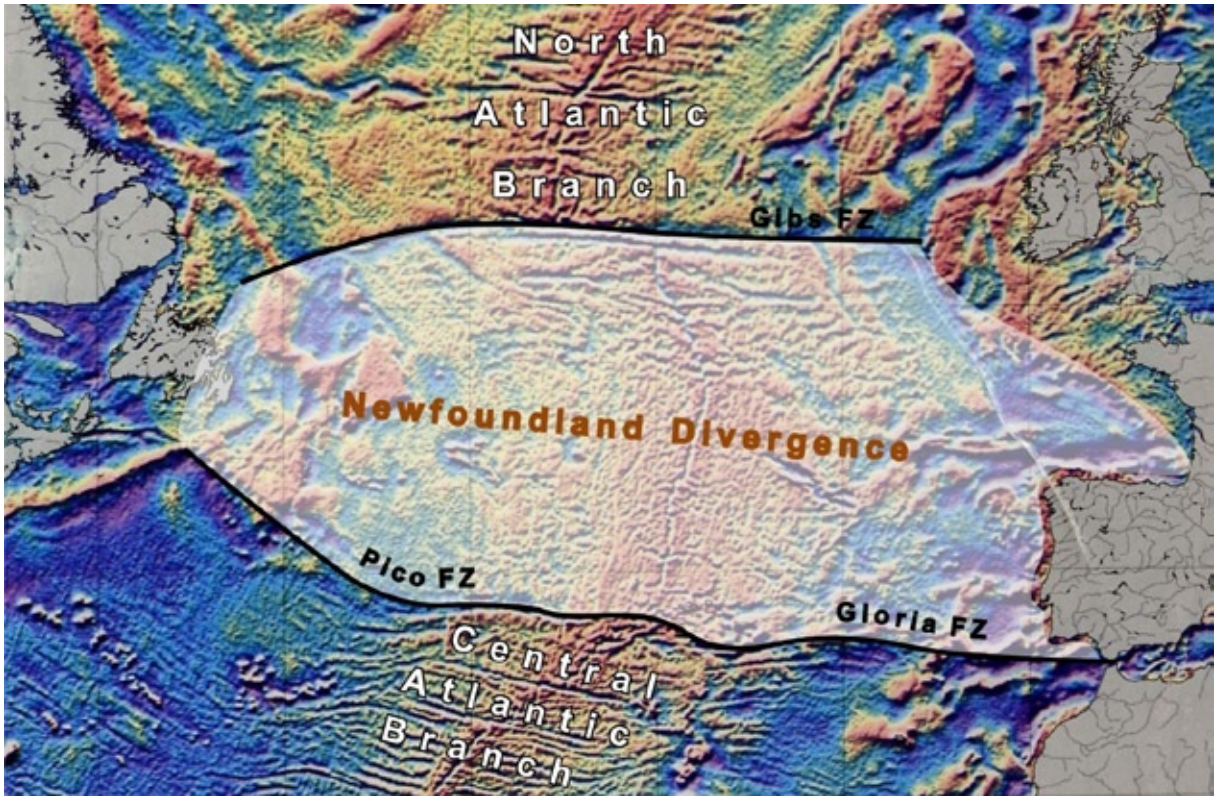


Fig. 28. *Newfoundland Divergence (explanation in text)*

Opening of the Bay of Biscay contributes most to the longitudinal elongation of the West Mediterranean Region. It was opened in the Upper Cretaceous at the beginning of the opening of the North Atlantic. Thus the divergence of the flow lines must be, and in fact is, limited to the short distance near Newfoundland. We can reason in opposite direction – since the divergence is only near Newfoundland, the opening of the Bay of Biscay should happen at the beginning of the opening of the Northern Atlantic Ocean. And it is confirmed by the age of the floor of the Biscay Bay.

The moving apart of the Europe and Africa is also indicated by the geological development of the whole western part of the Tethys zone which documents the opening of the Mediterranean and Black seas (see "The Third Proof" and Fig. 51)[1].

[1] Space geodesy apparent confirmation of false plate tectonics convergent interpretation of development of the Mediterranean zone results from the same (as in

f. Connection between young divergent flow in Eastern Pacific and young tectonics of the western part of both American continents

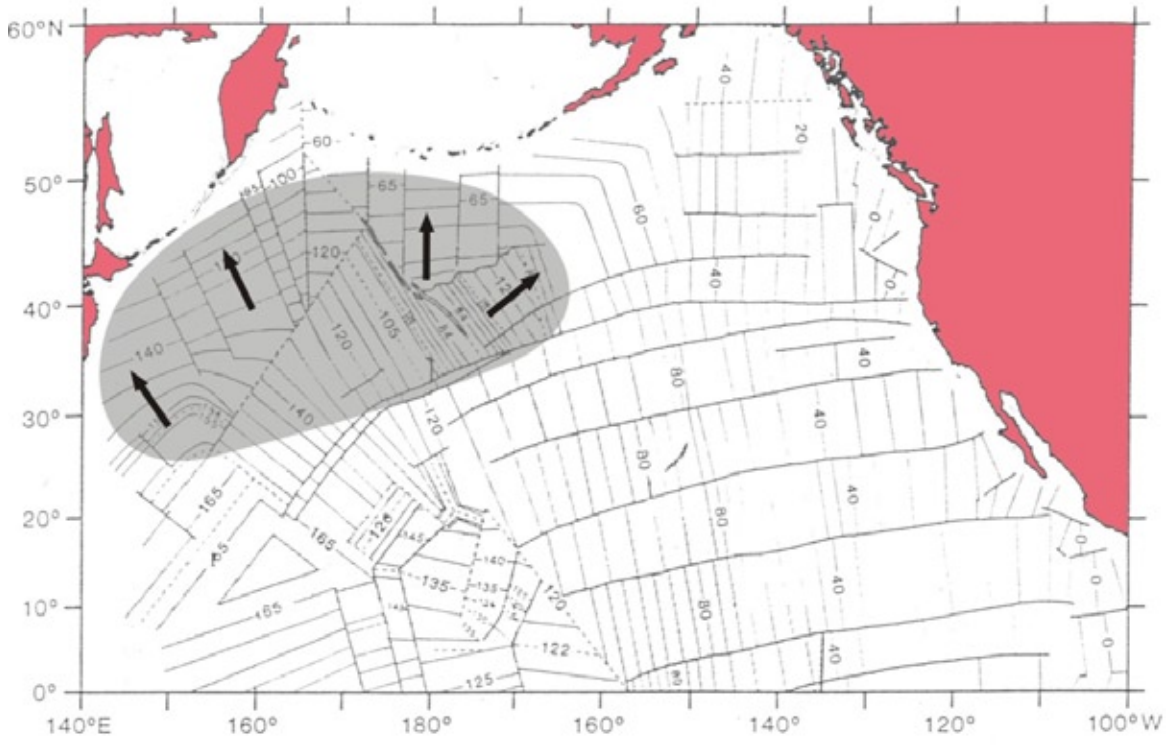
Divergent flows at western borders of both Americas are connected with significant elongation of these borders. And so:

- Gulf of California Divergence is connected with elongation of the western part of North and Central Americas border produced by St. Andreas Fault
- Cocos Insertion is connected with elongation of the part of Central America produced by Motagua and Polochic Faults
- South Pacific Insertion is connected with significant elongation of the whole southern promontory of South America

Thus growth of the Pacific Ocean demonstrated by Carey's test is connected not only with the growth of the gaps between surrounding continents but also with elongation of Pacific borders of these continents.

g. Divergent flows in the old part of Pacific plate

General divergent flows also took place in the old Pacific plate (Upper Jurassic – Low Cretaceous). They record growth of circumferential distances between continents then surrounding the embryonic Pacific (Fig. 29).



A

plate tectonics) false assumption that the Earth is not expanding (Koziar, 2018; www.wrocgeolab.pl/geodesy2.pdf , pp. 64-66.

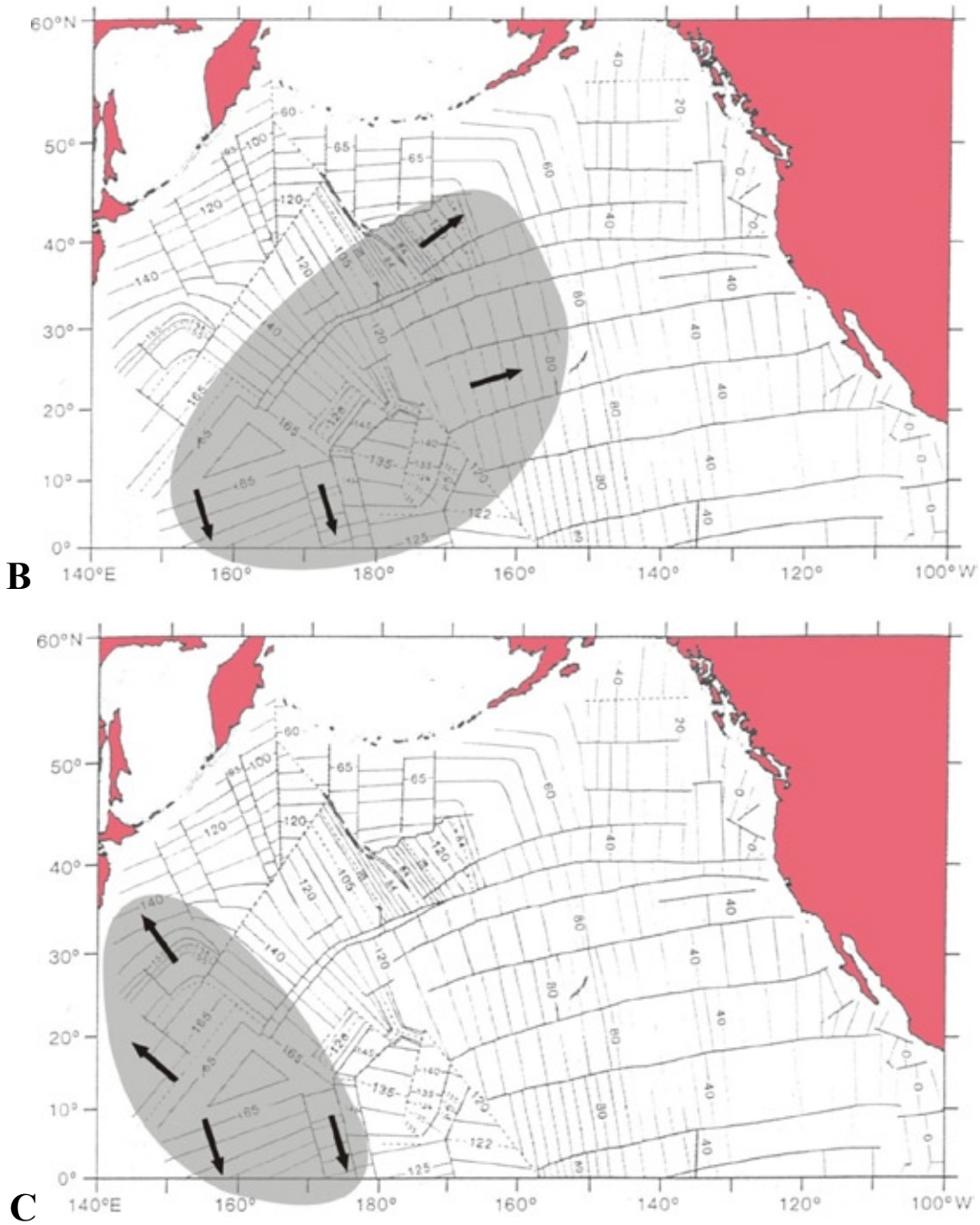


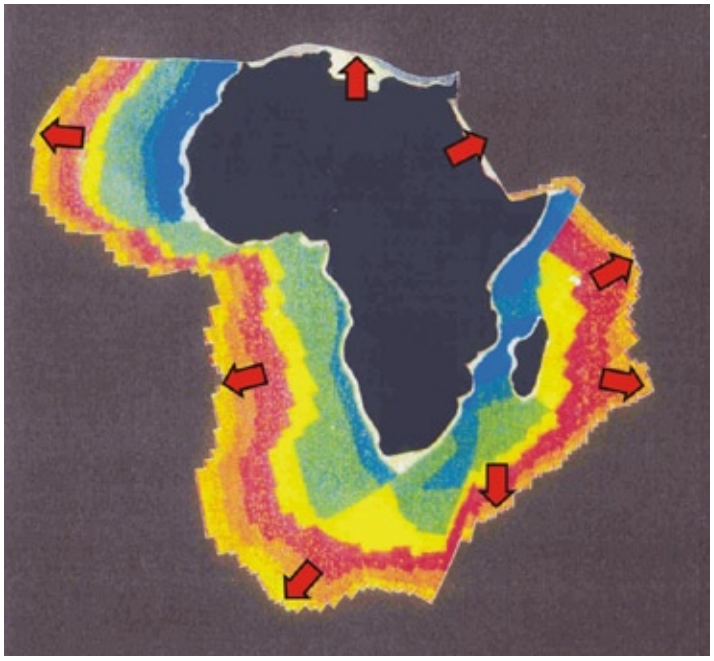
Fig. 29. *Divergent flows in the old part of Pacific plate:* **A** *– northern divergent flow,* **B** *– south- eastern divergent flow,* **C** *– south-western divergent flow (explanation in text)*

Thus, the divergent flow in the north-western part of the plate (Fig. 29A) records moving apart of Siberia and North America in the middle of the Mesozoic. The divergent flow in the south-eastern part of the plate (Fig. 29B) records moving apart of North and South Americas at the same time. The divergent flow in the south-western part of the plate records moving apart of Asia and Australia at the same time. This is another version of Carey's test transferred to the beginnings of the formation of the Pacific Ocean.

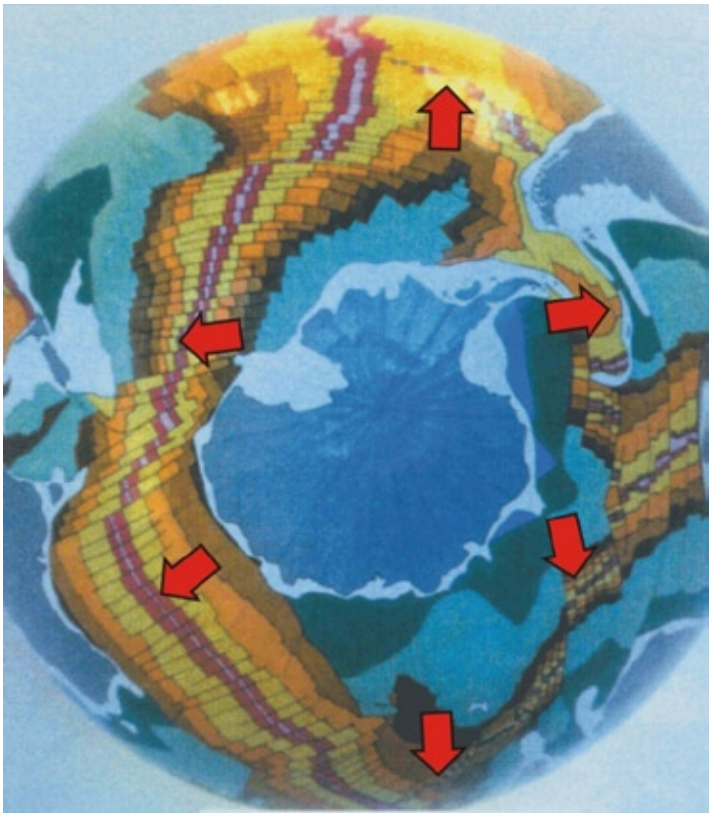
h. Radial growth of plates

Divergent flows gain more general significance when they are considered not only on one side of a plate but also on the opposite one and along the whole peripheral areas of the plate. It simply marks the roughly radial growth of plates which is underlined by roughly radial increments of oceanic lithosphere recorded by magnetic anomalies. The principle is clearly visible in the case of the African plate (Fig. 30A), the Antarctic plate (Fig. 30B) and the Pacific plate (Fig. 30C). The last one is oceanic as a whole and so the divergent flow is visible also in its center (Fig. 30D).

A



B



C

D

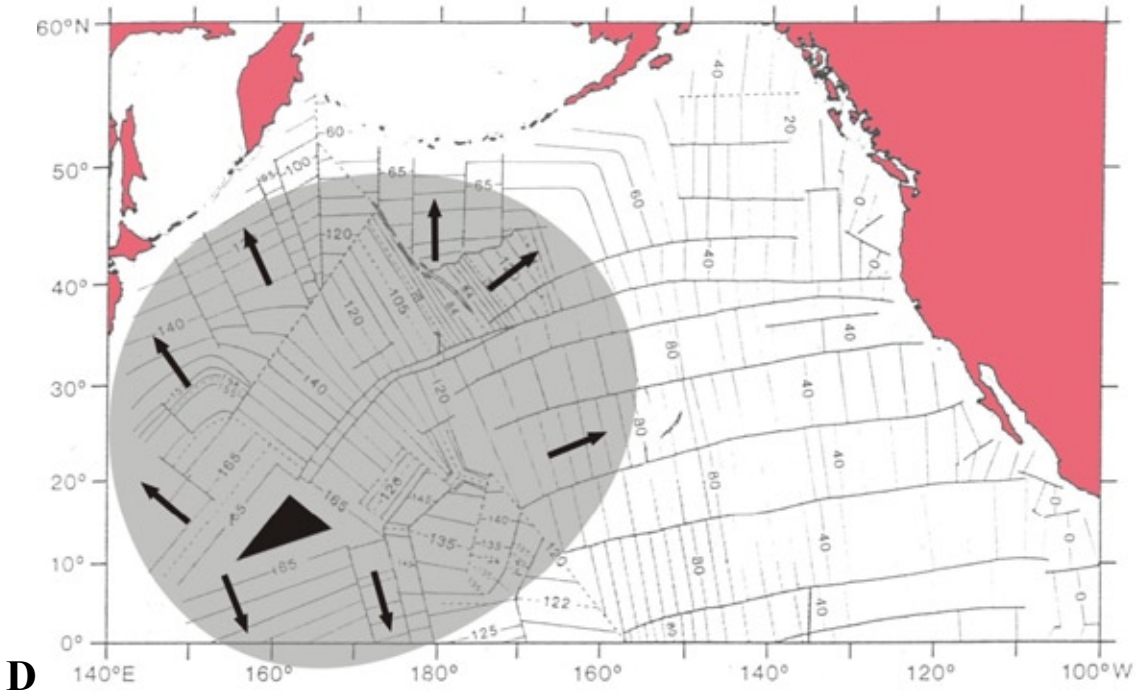


Fig. 30. *Radial growth of plates:* **A** *– radial growth of African plate,* **B** *– radial growth of Antarctic plate,* **C** *– radial growth of Pacific plate,* **D** *– radial growth of the embryonic Pacific plate (explanation in text)*

The rest of the big plates have continental cores, but the radial dispersion of their continental lithosphere is still visible.

i. Physical modelling of elongation of plate boundaries around Africa and Antarctica and radial growth of these plates

The elongation of plate boundaries as the unequivocal result of radial stretching of the sublithospheric mantle is better visible if we consider the whole ridge systems around Africa and Antarctica (Koziar, 1980) – Figs 31 and 32.

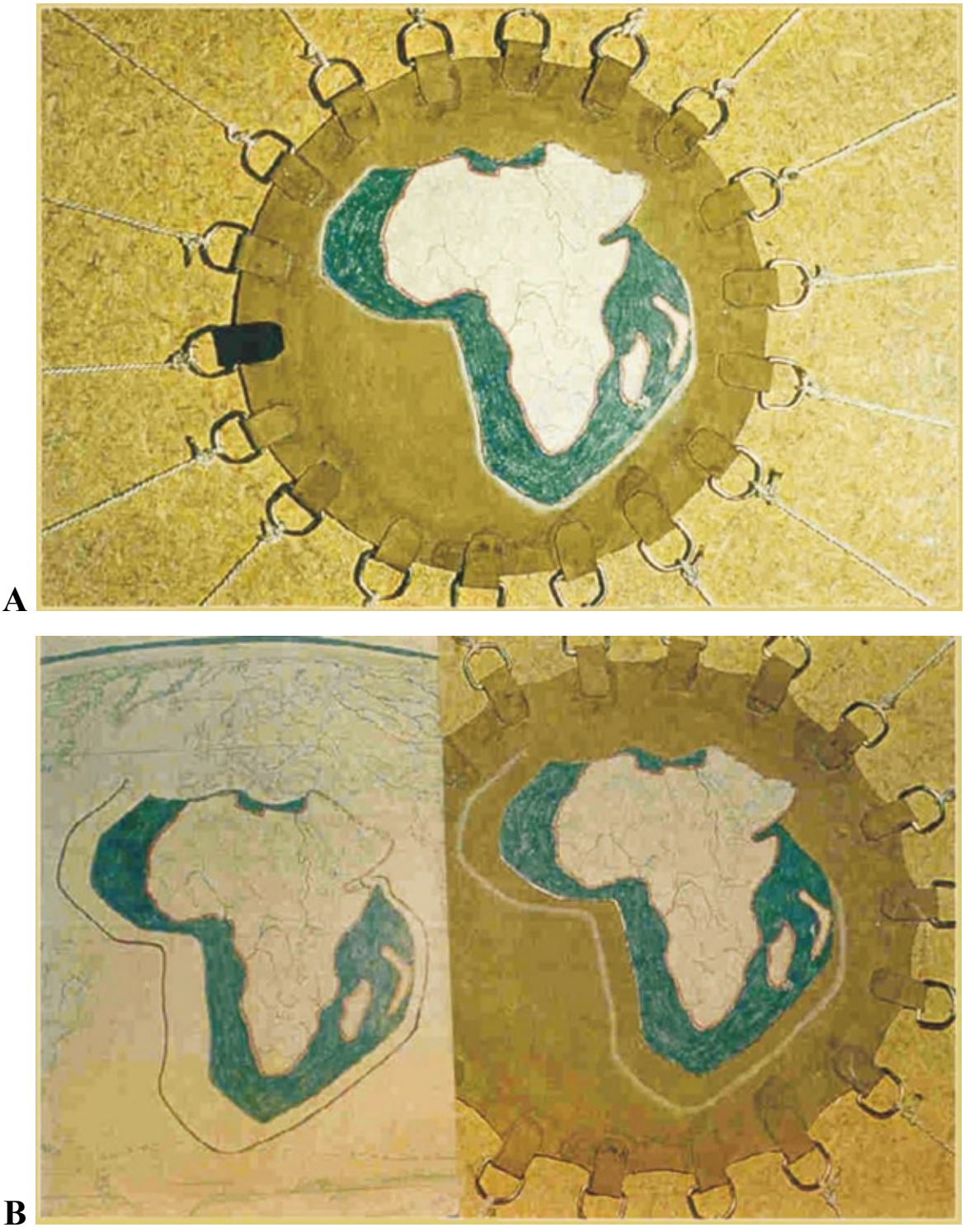


Fig. 31. *Modelling the growth of the plate boundary around Africa (explanation in text)*

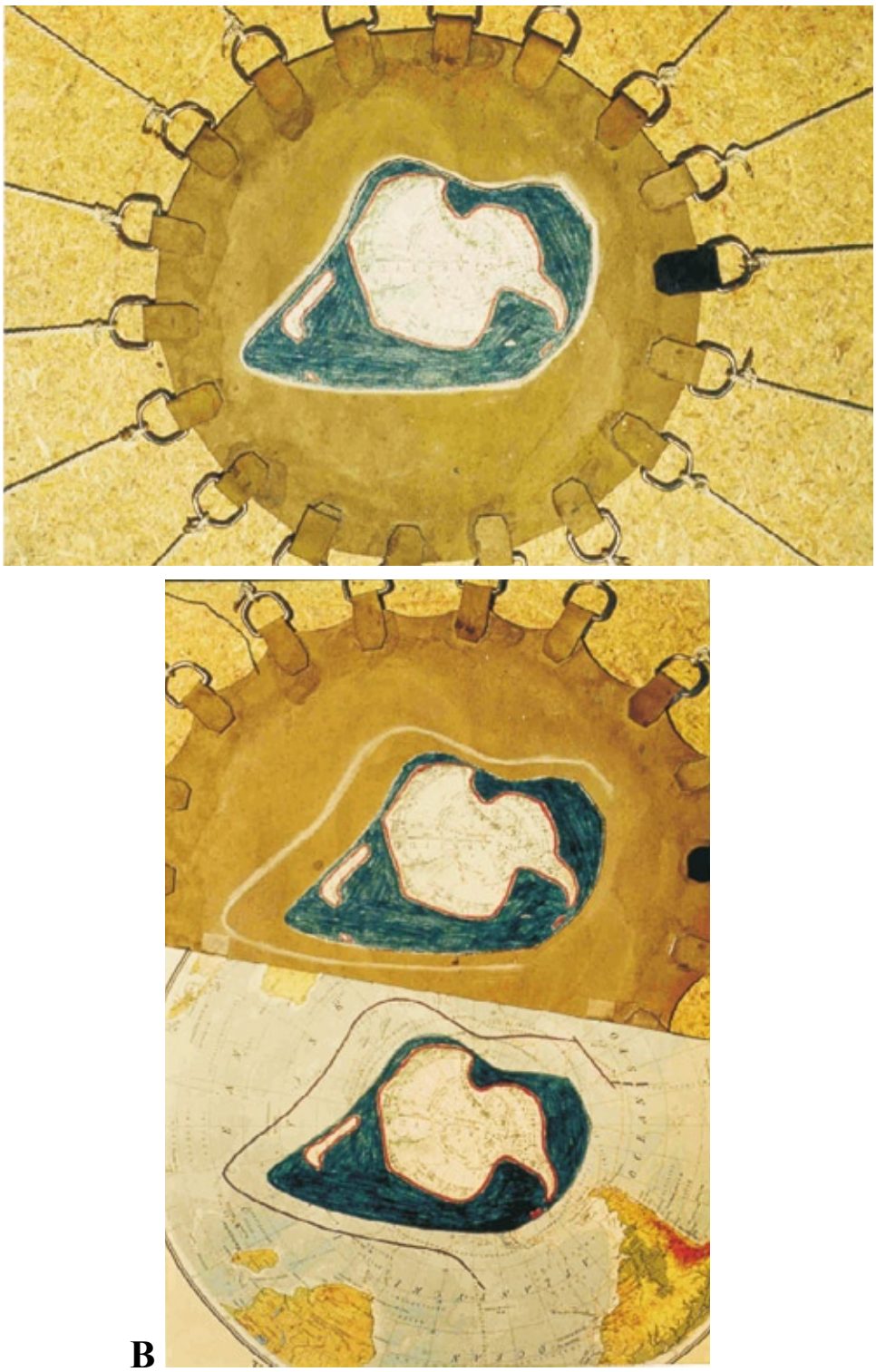


Fig. 32. *Modelling the growth of the plate boundary around Antarctica (explanation in text)*

Let us make a rigid PCV (or other similar material) plate, imitating the African plate of the late Mesozoic age (*i.e.* African continent with surrounding Mesozoic oceanic lithosphere). Then, let us put it on the rubber disc of the device (Fig. 7) and draw its contour on the rubber with a chalk (Fig. 31A) which imitates surrounding oceanic ridges at the end of the Mesozoic. After radial stretching of the rubber the contour (ridges) expands (Fig. 31B-

right). The Fig.31B-left, presents the recent position of the ridges around Africa (map) for comparison with modelled situation in Fig. 31B-right. After stretching the rubber, the plate was somewhat shifted to NE for better fitting with the real situation. Such geometry shows that the African plate was pulled to NE by Eurasia from African stable point of transformation. And this is so because Africa is not fully separated from Eurasia forming together a bigger plate. We will return to this problem in discussion of "Carey's Arctic paradox" ("The Fifth Proof").

The same process of modelling was performed with Antarctica (Fig. 32) without the need for artificially shifting the plate as it is well separated from other plates (see "The Fifth Proof").

j. Physical modelling of elongation of the east and south-east boundary of Pacific plate

The former modelling can be also applied to modelling of the elongation of most of the Pacific plate boundary. The Pacific plate is tied to Asian and Australian continents (see "The Fifth Proof"). From the side of these continents, the growth of its area and border is significantly reduced (see Fig. 31C). Instead its growth is fully developed to NE, E and SE, especially after the Lower Cretaceous. Thus we outline, in general way, the pre-Upper Creataceous Pacific plate together with Australia (Fig. 33 – black line).

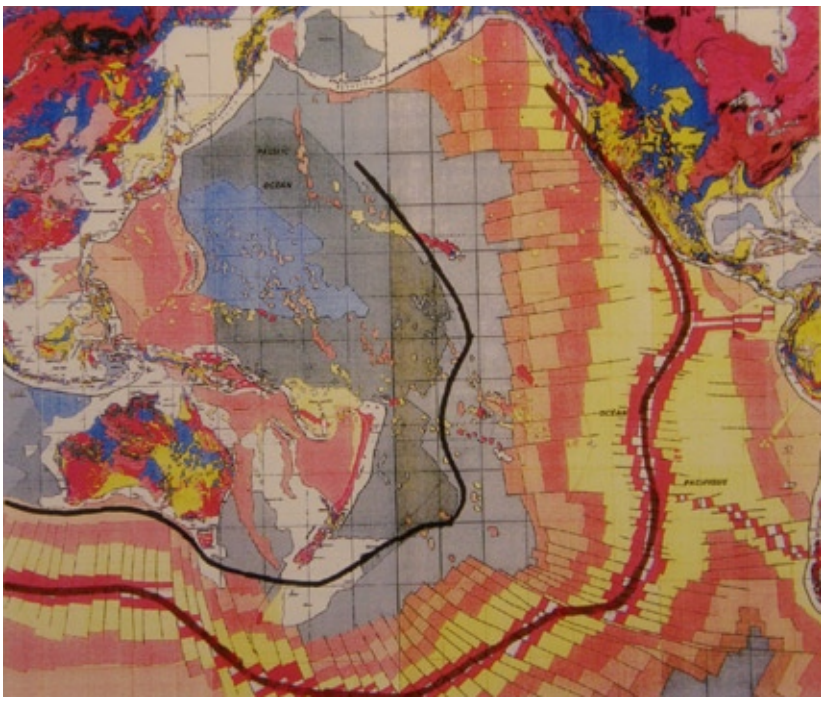
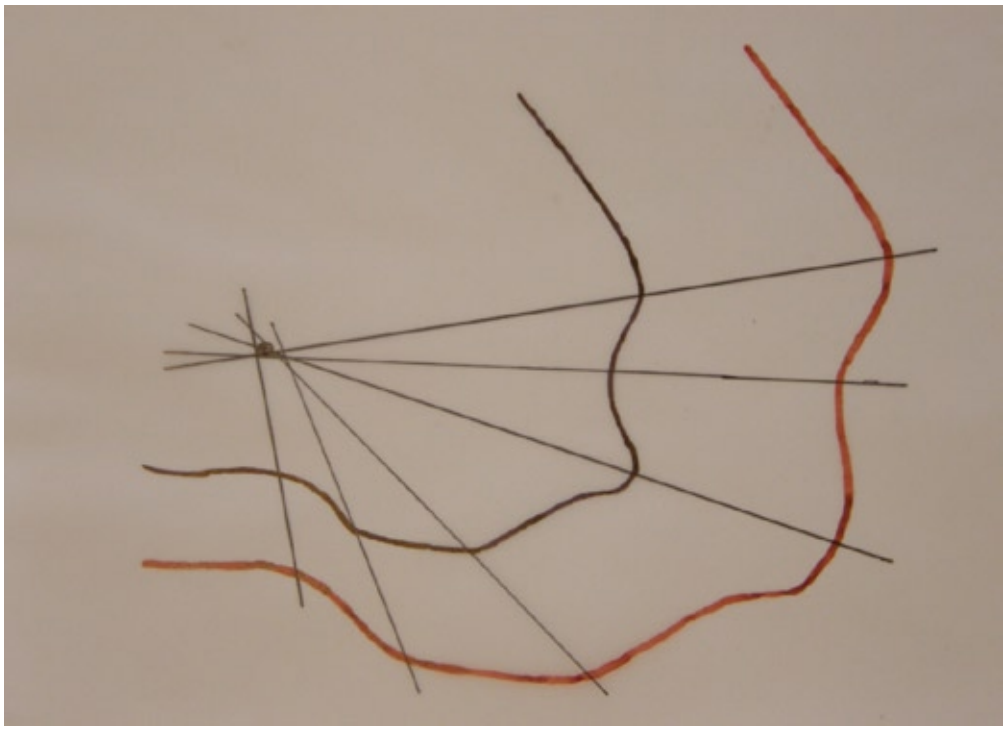
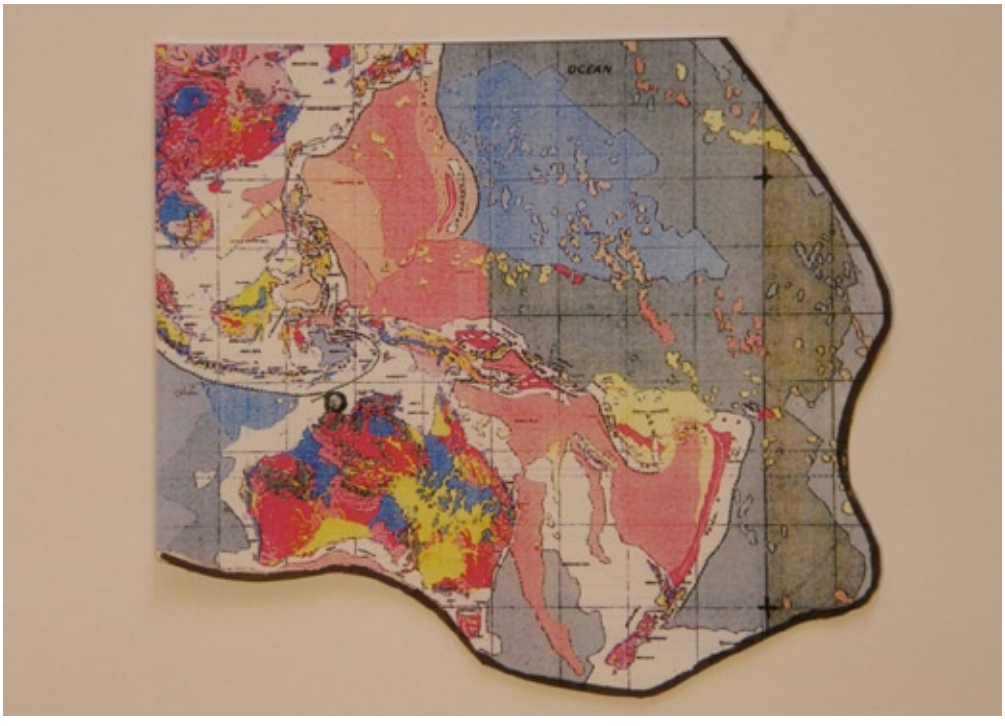


Fig. 33. *Juxtaposition of generalized boundary of the old core of the Pacific plate and the present boundary of the plate, on the Geological Map of World (1990) (explanation in text)*

Then we outline, in generalized way, the present Pacific boundary (Fig. 33 – red line). Both lines have a similar shape and differ only in size. The present Pacific plate boundary is much bigger than the older one. It shows that the old line is transformed to the present one by the expansion of the Earth. In order to model the transformation we must first determine the stable point of the transformation. We do it by connection the analogous points of both lines by straight lines (Fig. 34A). The focus point of these straight lines is the stable point of transformation we were looking for. It lies at Cape Londonderry in Australia (north of Kimberley Territory).



A



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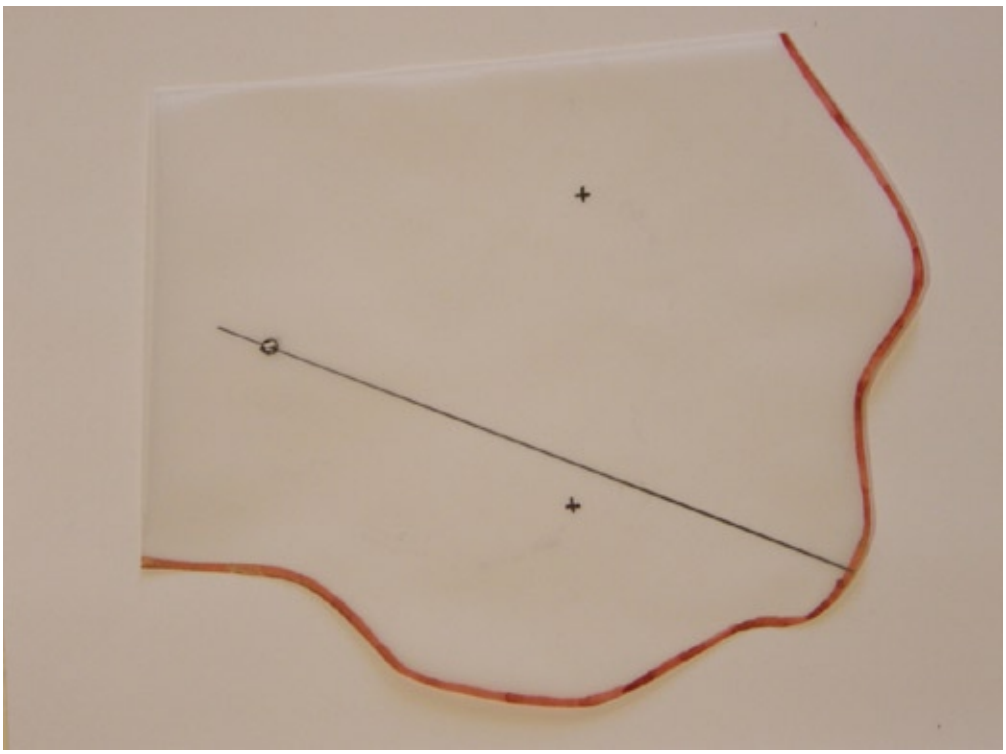

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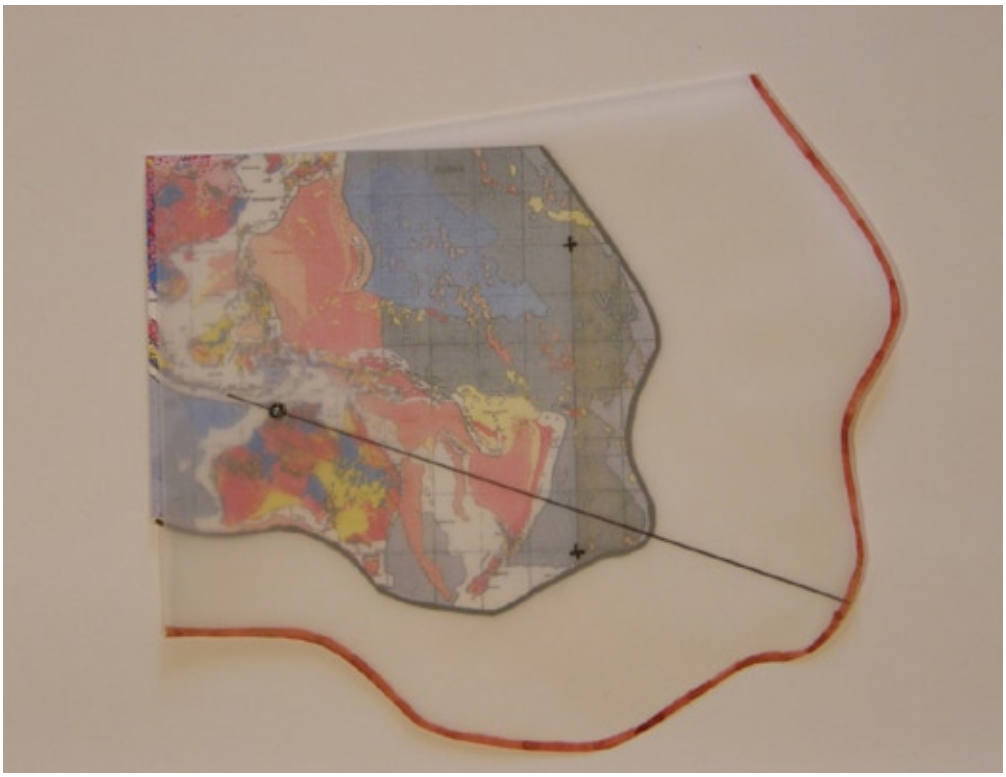


Fig. 34. *Elements of modelling of the elongation of the E and SE Pacific plate boundary (explanation in text)*

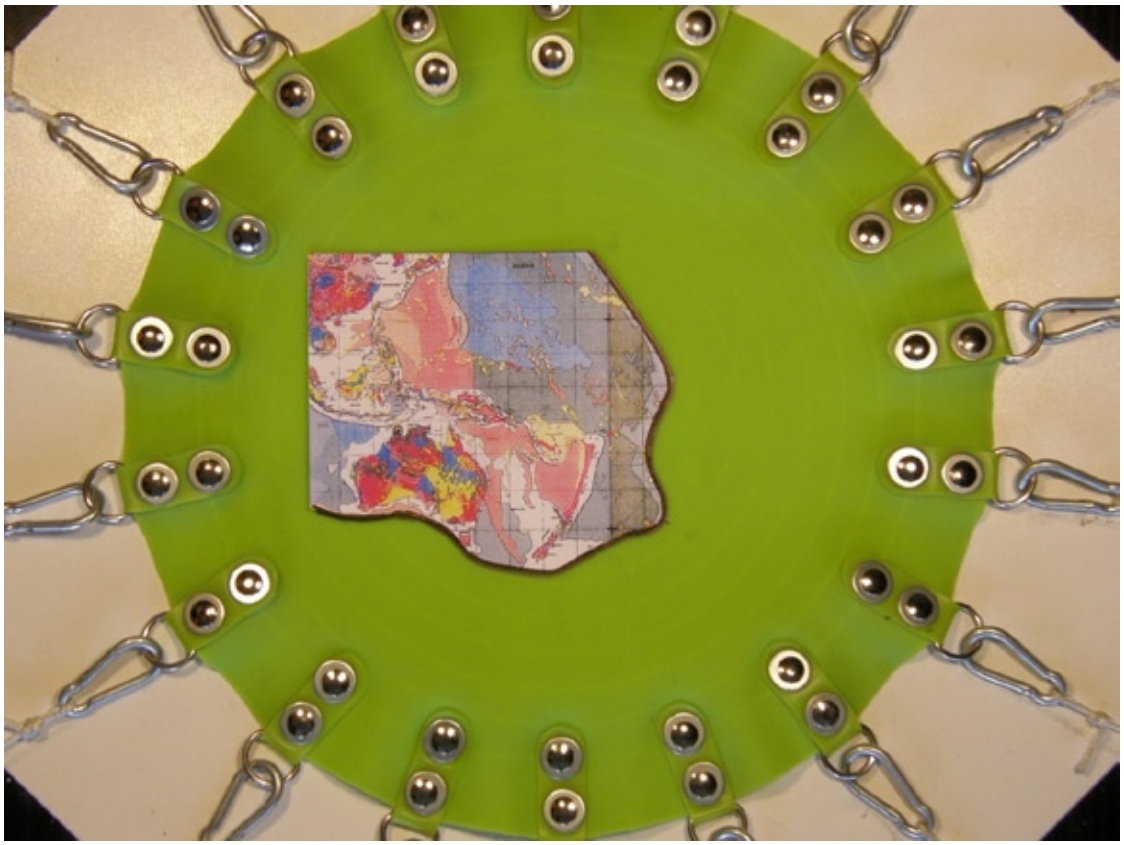
Then we cut out the model of the old plate from the copy of map (Fig. 34B), mark the stable point of transformation on it (small black circle) and two small crosses for correlation with the next element of modeling. This is the overlay (Fig. 34C) cut out from a tracing paper along the generalized present Pacific plate boundary. On the overlay the stable point of transformation is

marked as well as two small crosses for correlation with the former model (Fig. 34D). Additionally one of the straight lines from Fig. 34A is drawn for correlation with the expanding basement (see later). Now we can progress to do the modelling on a stretched silicon disc (Fig. 35).

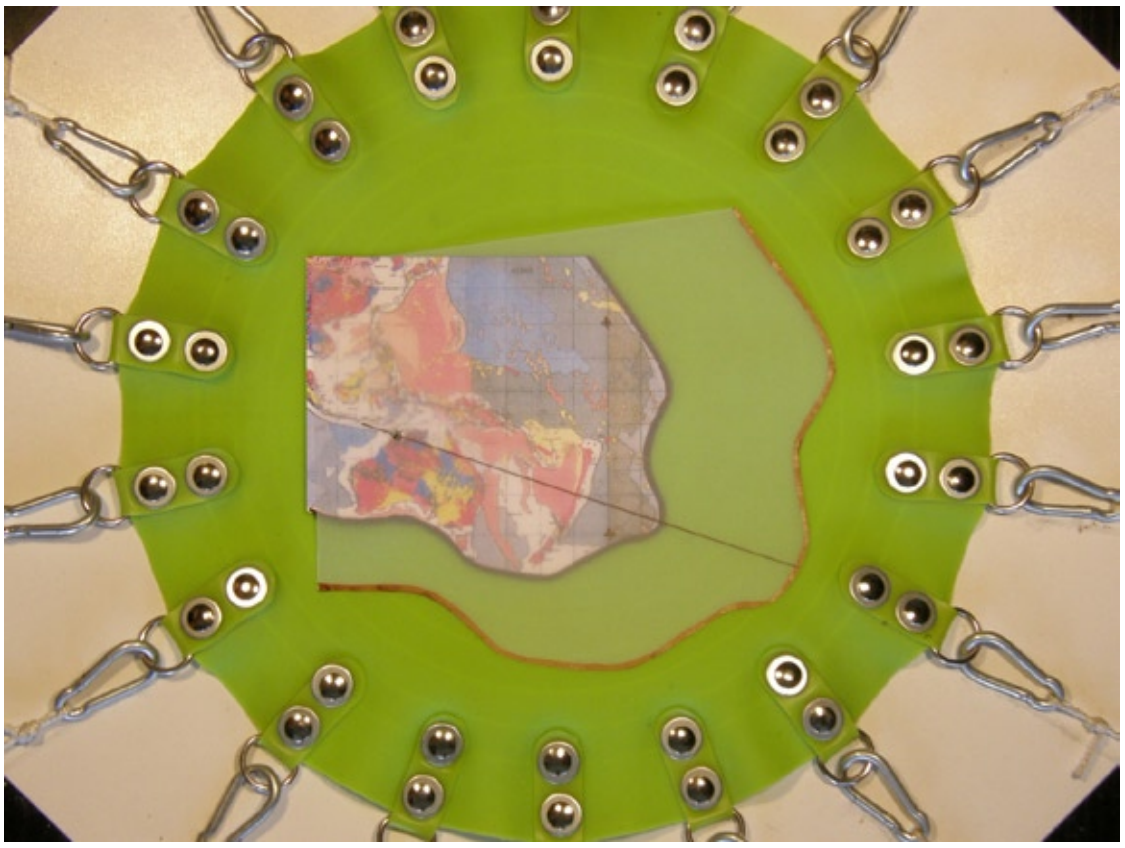
The first step in the modelling is to puncture the silicon disc from below with a pin. The puncture is made at the left side of the disc. Then we puncture the model at its stable point of transformation, put it on the disc and the hole on the protruding pin. In this way the forced stable point of transformation is made. Then we outline the model on the disc with black marker and mark the point which is crossed by straight line from Fig. 34C and D.

The next step is putting the overlay on the model with the hole in place of the stable point of transformation on the protruding pin and align the overlay with the model according to two small crosses (Fig. 35B). The straight line on the overlay crosses the marked point on the silicon. This point must move exactly along the straight line during stretching the disc and it controls random rotation of the model induced by uneven friction forces. Now we gradually stretch radially the silicon disc (Fig. 35C, D, E and F) which imitates the expanding sublithospheric mantle.

A



B



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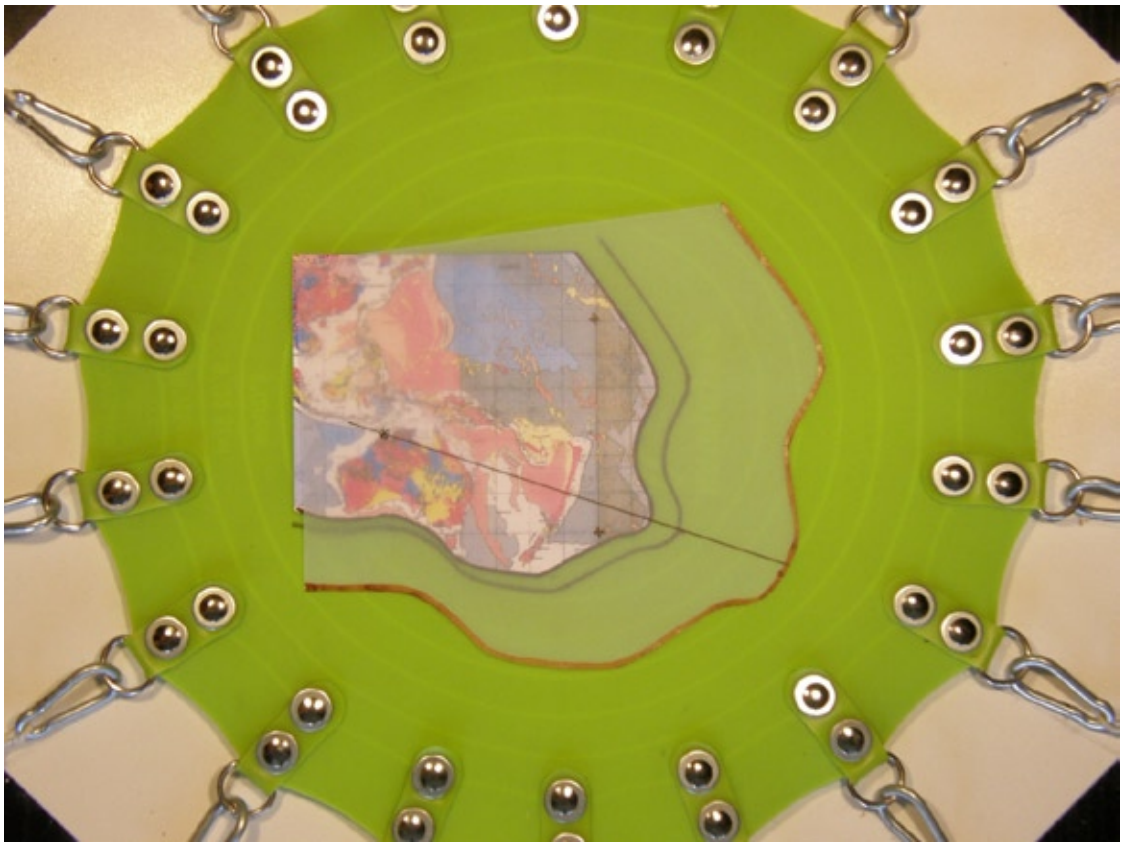
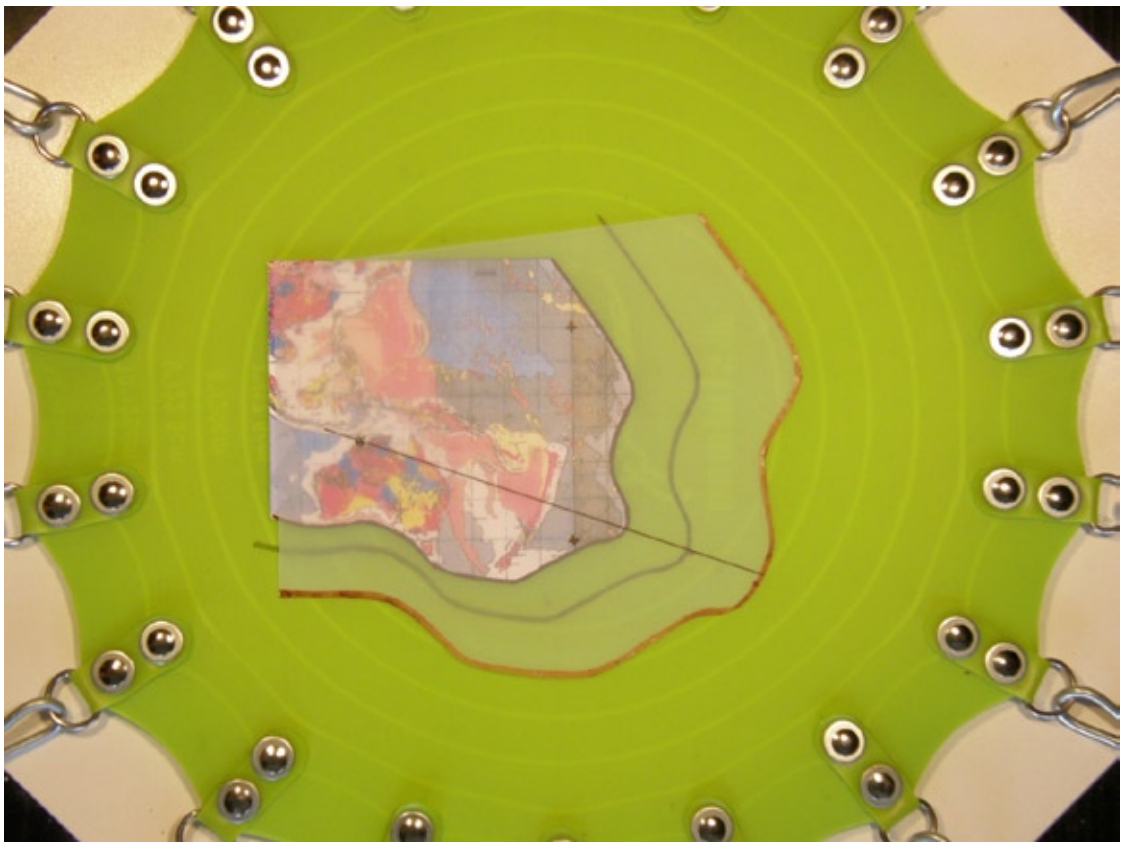


D



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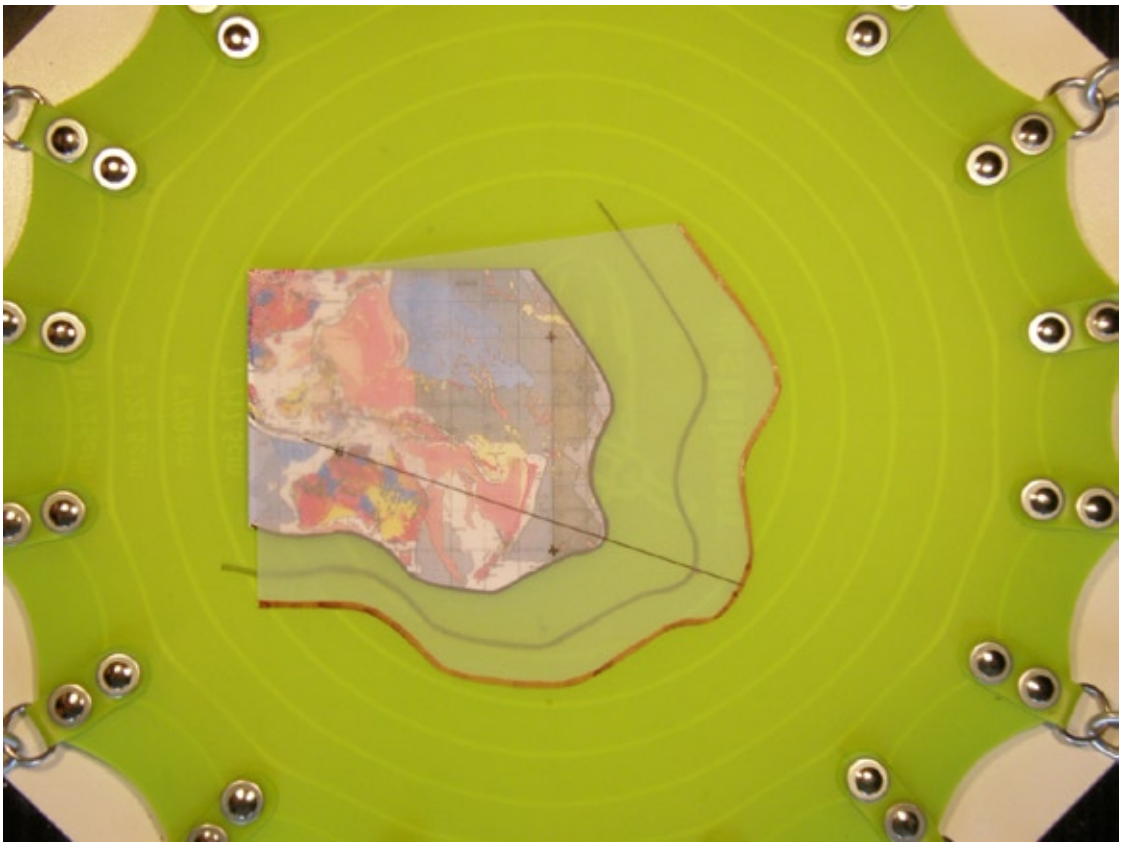


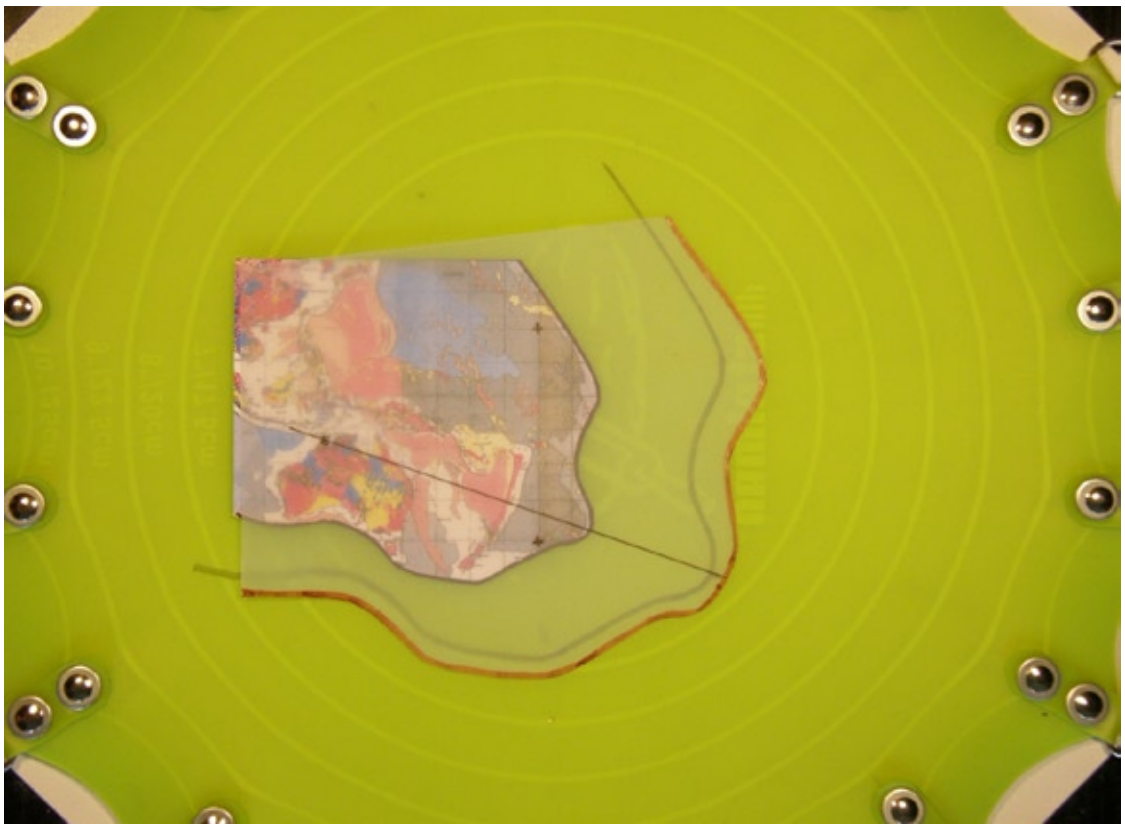
F 

Fig. 35. *Modelling of the elongation of the east and south-east Pacific plate boundary (explanation in text)*

The result of the modelling could be somewhat inaccurate because of the flat projection and irregular development of the Pacific plate – the expanding outline of the model does not follow exactly the earlier boundary of the plate. However the final result (Fig. 35F) clearly shows that expansion of the Earth governs the development of the Pacific plate.

It must be stressed that the older part of the Pacific lithosphere was generated by continental margins of both Americas by one-sided (extremely asymmetrical) spreading which has nothing to do with hypothesis of convection currents.

k. Heezen effect of apparent drift of plates to their centres

At the beginning of the spreading theory the oceanic ridges were considered as stable structures connected to the deep basement. If this was so then the movement of the plates indicated by spreading could be measured relative to them. And in fact on the expanding Earth the situation is like this. But on a non-expanding Earth a problem appears and is well shown in the surroundings of Africa and Antarctica. Sea floor spreading relative to the surrounding ridges must result in shrinking of this continents. The dependence was early noticed by Heezen (1962) who wrote (p. 278-9):

If one considers the drift of Antarctica relative to the Mid-Atlantic, Mid-Indian and Eastern Island portion of the Ridge, one must only conclude that Antarctica has shrunk, for the pattern of the Ridges would indicate that Antarctica must have drifted towards its geographical centre.

Of course the process is apparent and Fig. 32B fully explains the real situation. However, the artificial relation noticed by Heezen is of great importance and it can be called "Heezen effect". Here, the effect is seen only in relation to geotectonic structures. The analogous artificial process is seen in relation to geodetic grid and a central angle of two points lying on a plate. It may be called "Blinov's effect". It plays a crucial role in explaining the geodynamic problems elaborated by space geodesy (see Koziar, 2018; www.wrocgeolab.pl/geodesy2.pdf).

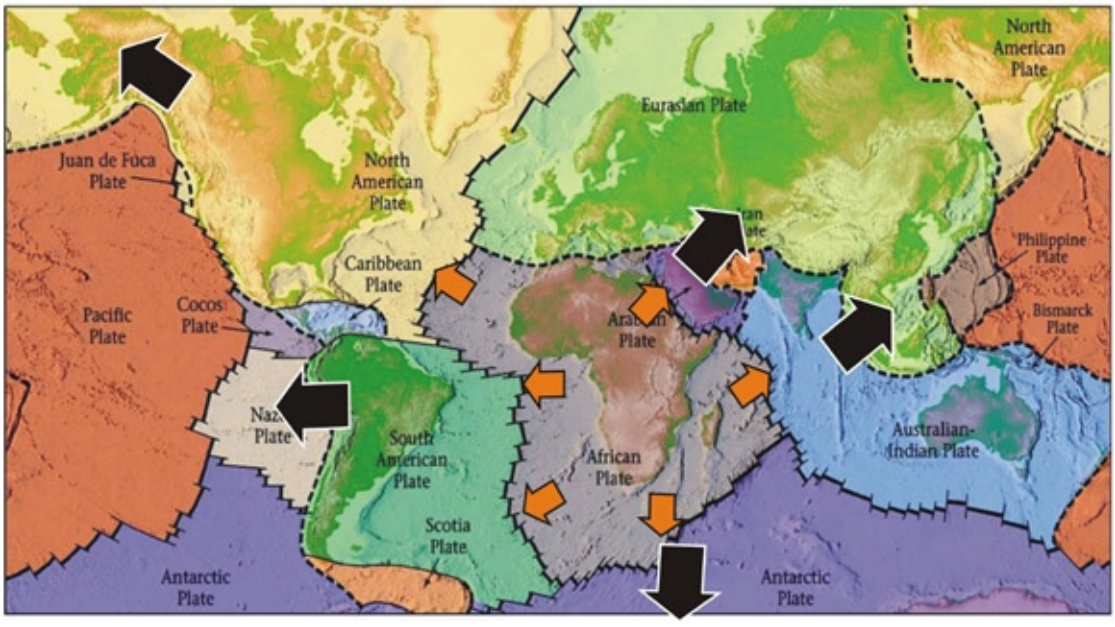
l. Radial dispersion of plates

When a plate grows radially this growth will be connected with radial dispersion of all surrounding plates. It is clearly visible in the neighborhood of the African plate (Fig. 36A) and the Antarctic plate (Fig. 36B).

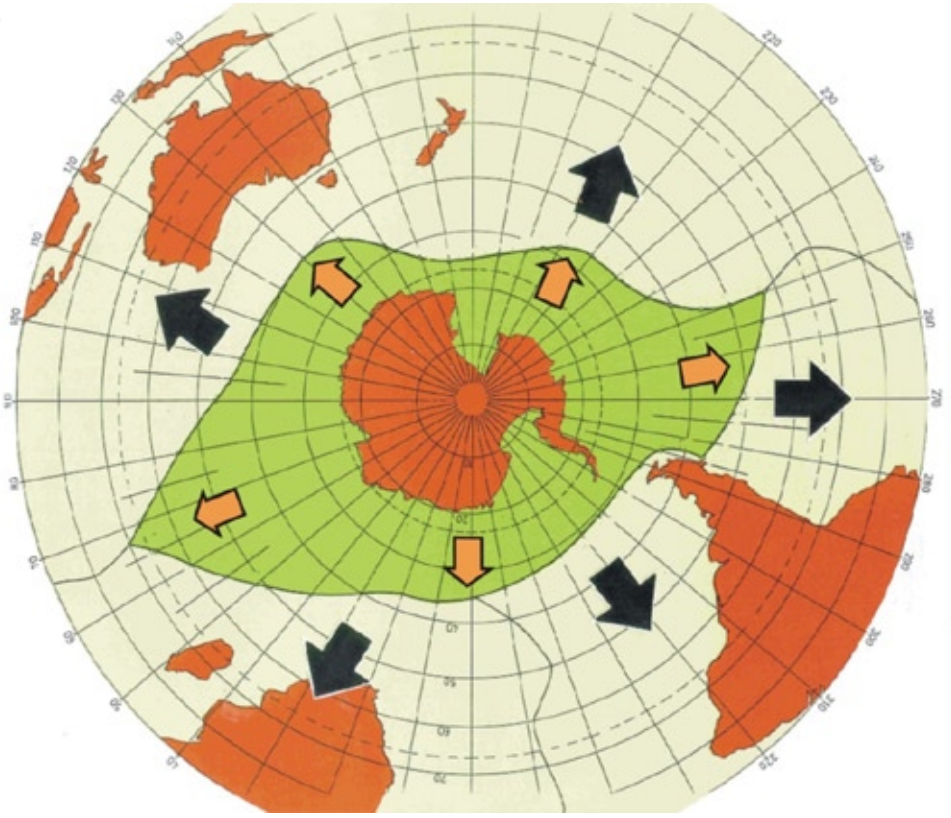
The geotectonic situation seen on the map (Fig. 36B) is the basis of Carey's Arctic Paradox (see Proof 5).

The radial dispersion of plates is visible not only from the centers of plates but also from triple junctions . The best example is the Indian Ocean triple junction (Figs 9 and 13).

When we start at any point on a sphere and always record that the whole surroundings is moving away from us, it means that the whole sphere is expanding. This is the situation on an inflated balloon (Fig. 56).



A



B

C

Fig. 36. *Radial dispersion of plates around: African plate* - **A**, *Antarctic plate* - **B**, *center of the Indian Ocean* - **C**

3. THE THIRD PROOF
Carey "gaping gores"
(artificial reconstructed gaps on a too big Earth)

This topic was already presented in two publications: in a paper ***Falsification of the Eulerian motions of lithospheric plates*** (Koziar, 2016) and in a book ***Falsification of the Eulerian motions of lithospheric plates: Circularity of the plate tectonics theory*** (Koziar, 2018). Here it must be presented again.

a. Essence of the proof

Carey's "gaping gores" are artificial wedge-shaped gaps that appear on reconstructions on the present size Earth and disappear on a smaller Earth. In more formal language they can be called "artificial openings of underestimated curvature". Their appearance is a proof of the expansion of the Earth.

The name of these artifacts was introduced by Carey in 1976 but the problem had already been described by him in 1958 and led him, from strenuous attempts at better assembling Wegener's Pangaea on a non-expanding Earth, to understanding the expansion of the Earth.

b. Van Hilten's "orange peel effect"

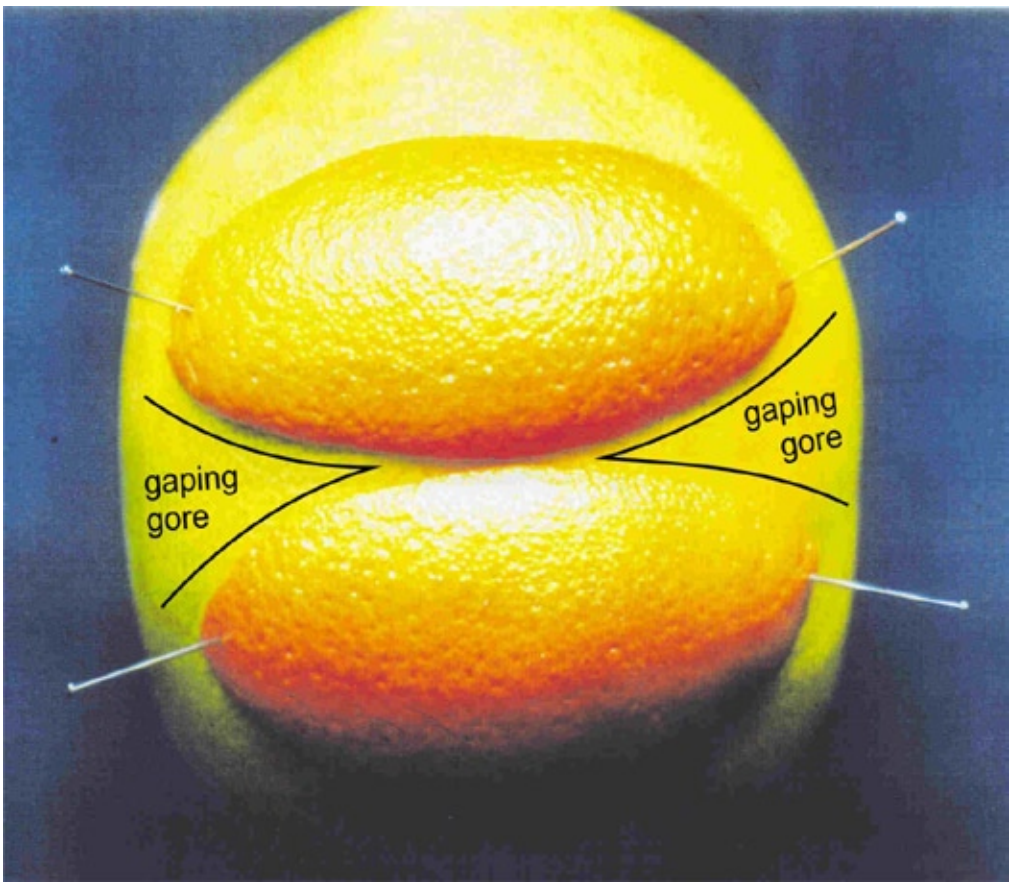
Meanwhile Van Hilten (1963) has introduced a notion "orange peel effect" which very visually presents the problem. The orange peel effect appears, in the literal sense, when someone tries to fit together the peel of an orange onto a sphere of larger radius than the original orange, for example on a grapefruit (Fig. 37A) instead on the peeled orange (Fig. 37B).

The wedge-shaped gaps between the two pieces of peel in Fig. 37A are analogues to Carey's "gaping gores".

The older the Earth being reconstructed, the bigger the gaping gores are. This is because the older Earth, the smaller it was.

Below, several gaping gores are presented. They are illustrated by moving one piece of lithosphere to the present position of another.

A



B

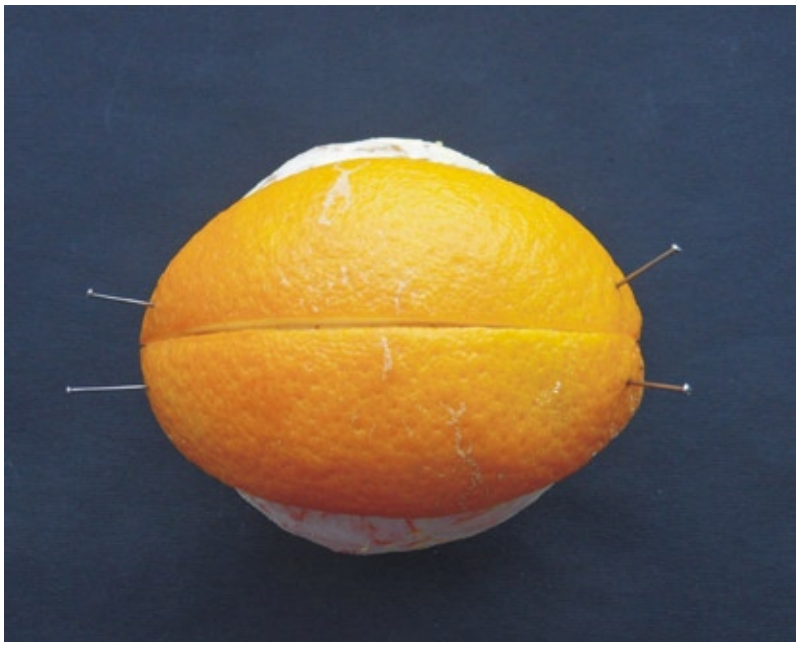


Fig. 37. *Carey's gaping gores as Van Hilten's "orange peel effect"*:
A *– orange peel assembled on a surface of a grapefruit,*
B *– orange peel assembled properly on a peeled orange*

c. Africa – South American gaping gores

A good example of the gaping gores is delivered by the reintegration of South America and Africa on the present size Earth (Fig. 38).

A

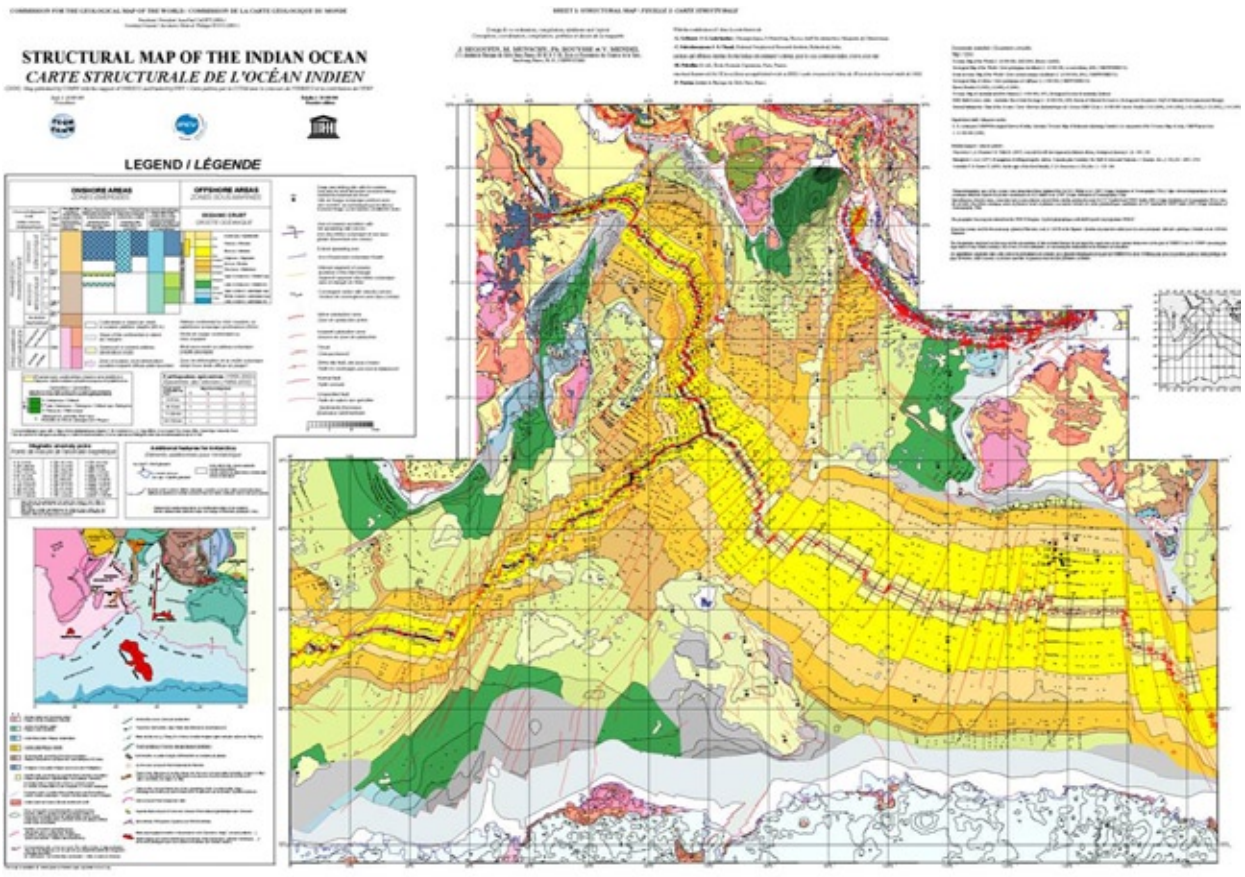
B

Fig. 38. *Africa – South American gaping gores:* **A** *– Cape Basin's gaping gore,* **B** *– Guinea Basins gaping gore*

When we put close together continental margins of both continents along the northern shore of Guinea Bay, a gaping gore appears to the south of it (Fig. 38A) which can be called “Cape gaping gore”. And the opposite, when we put close together continental margins of both continents south from the Guinea Bay, a gaping gore appears to the north of it (Fig. 38B) which can be called “Guinea Bay gaping gore”.

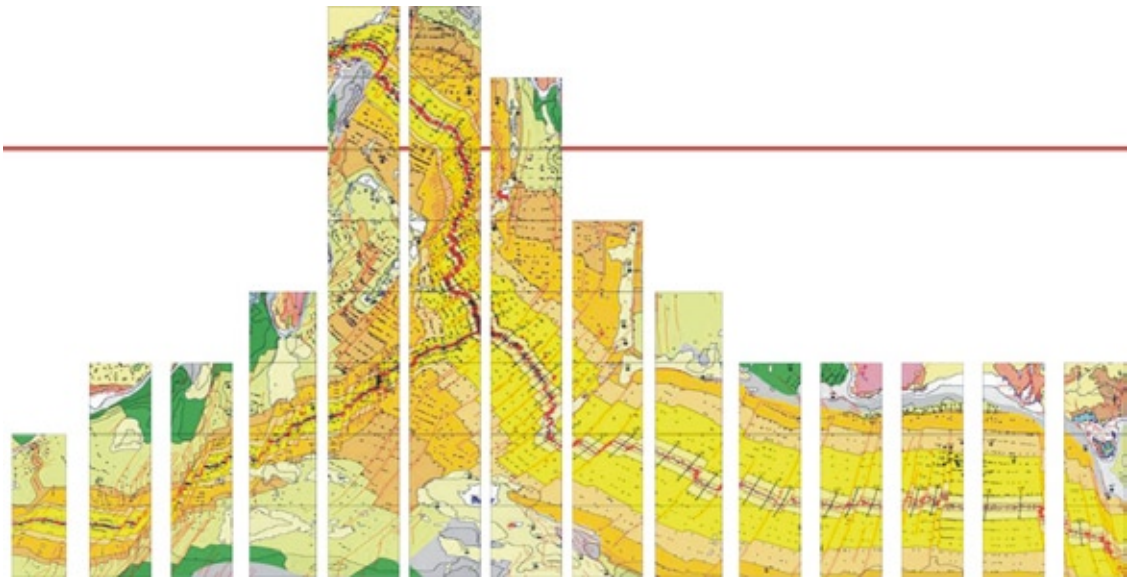
d. Indian Ocean triple junction gaping gores

Indian Ocean triple junction gaping gores appear in young (Neogene) lithosphere of this ocean. To present them we must first put a precise geological map of the Indian Ocean floor on a globe. Such a map was made by Segoufin et al. (2004), Fig. 39A. Digital edition of this map was digitally cut in meridian stripes (Fig. 39B) and shaped to the globe stripes (Fig. 39C). Then the stripes were printed on self-adhesive paper (Fig. 39D) and glued on a globe (Fig 39E). Using the globe (Fig. 39E) three Indian plates were cut from transparent plastic cups of globe’s diameter, along their Paleogene – Neogene borders (Fig. 39F). Only these parts of plates were modelled which fill the Indian Ocean.



A

B



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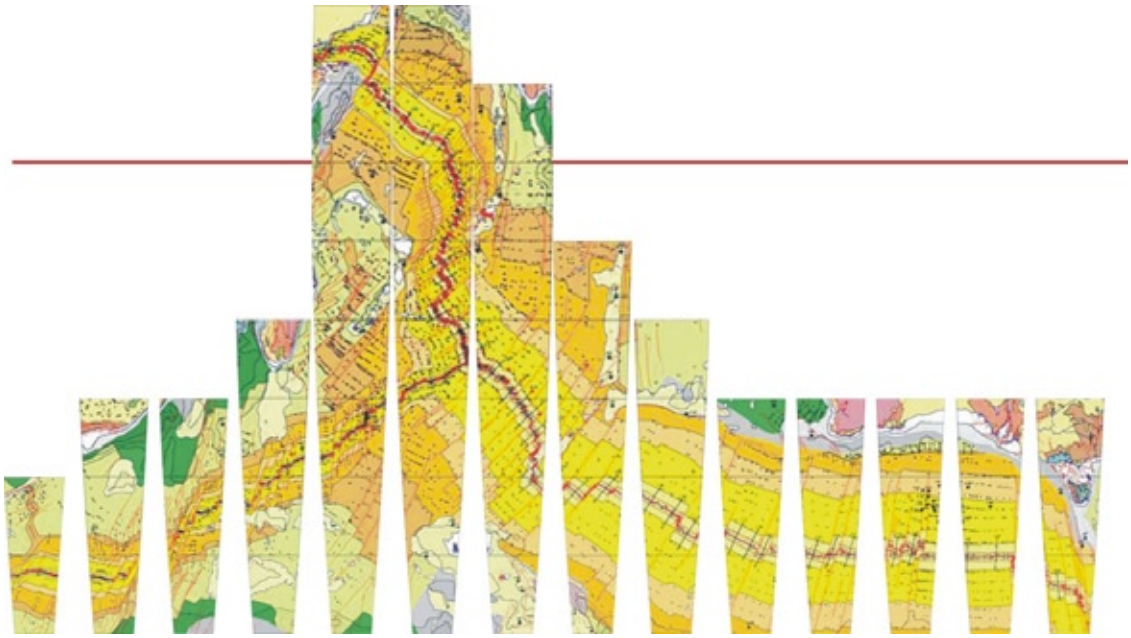

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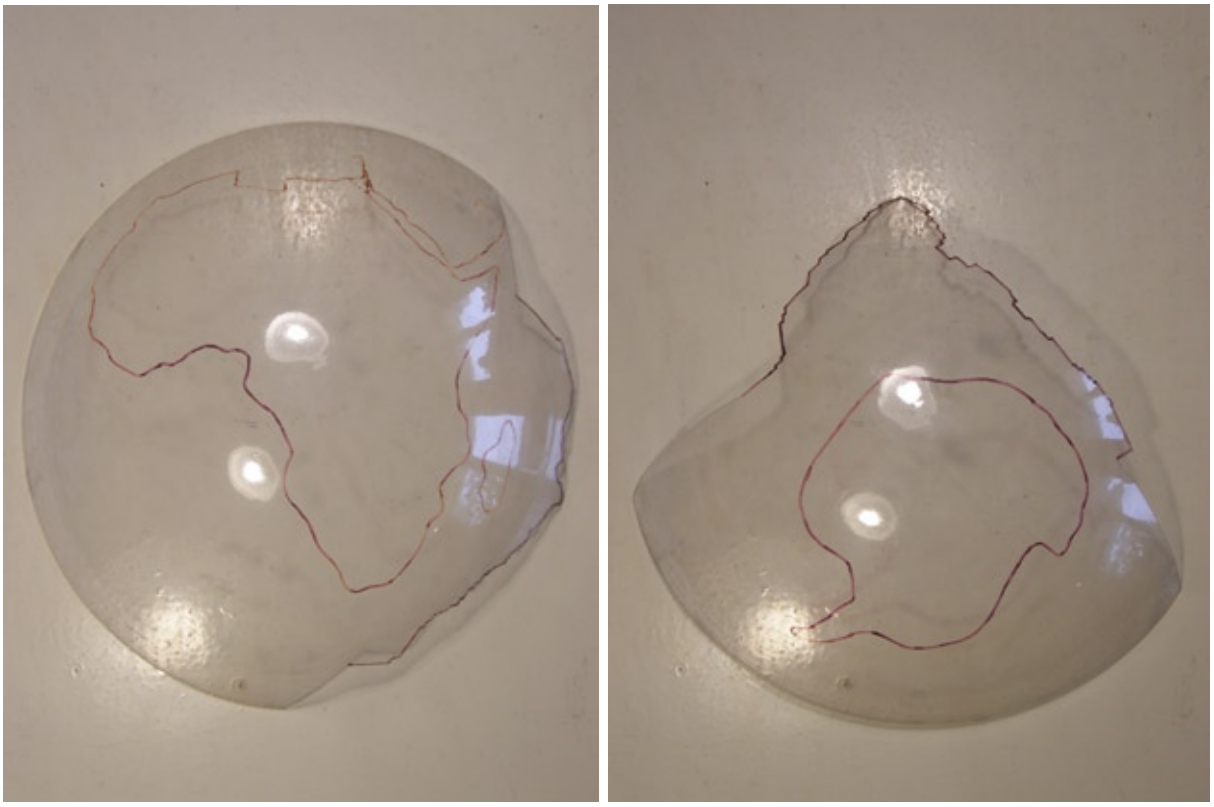


F

F 

Fig. 39. *Material preparation for demonstration of the Indian Ocean triple junction gaping gores (explanation in text)*

After putting the plastic models on the globe in accordance with the superimposed map (Fig. 39E) they mark the old (smaller) Indian plates from before 20 Ma in their present positions (Fig 40).

Fig. 40. *Indian triple junction plates from before 20 Ma (dark contours) in present positions*

According to plate tectonics we can put all these plates together and all younger areas along oceanic ridges should be completely closed. But this does not happen.

When the African and Antarctic plate are connected with Indo-Australian one, the southwest Indian gaping gore appears (Fig. 41A). When the Antarctic and Indo-Australian plates are connected with the African one the southeast Indian gaping gore appears (Fig. 41B). When the African and Indo-Australian plates are connected with the Antarctic one, the northwest Indian gaping gore appears (Fig. 41C).

A

B

C

Fig. 41. *Presentation of the Indian Ocean triple junction gaping gores (explanation in text)*

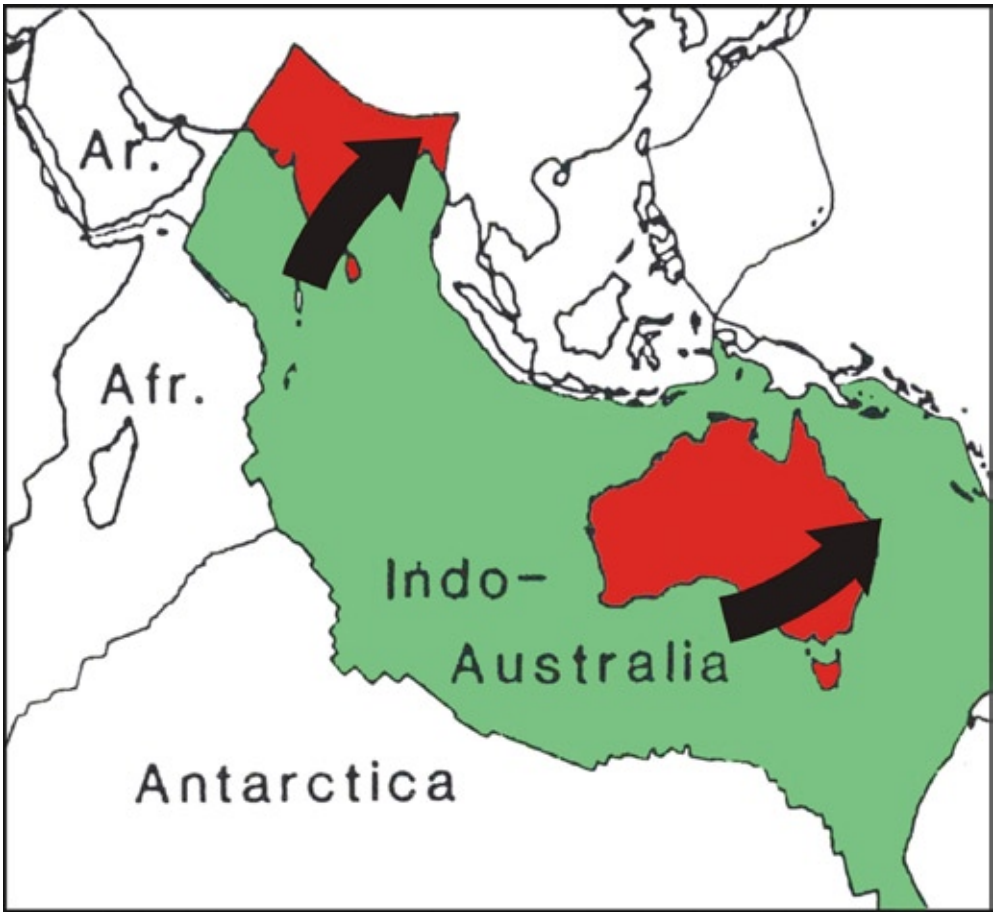
All three gaping gores disappear on a smaller Earth diminished by 20 Ma (post-Paleogen) increment of the oceanic lithosphere. This is accomplished by Maxlow's reconstructions (Fig. 42).

Fig. 42. *Maxlow's reconstruction of the Indian Ocean triple junction on the expanding Earth*

e. Indian Ocean gaping gores falsify Morgan's test of validity of the Eulerian motion of plates

It must be emphasized that the Indian Ocean triple junction was used by Morgan (1968) for testing the validity of adding Euler vectors assigned to two plates (at tacit assumption of constant size Earth). The result was apparently good. Consequently this vector algebra applied to geotectonics became an essence of later plate tectonics and a base of space geodesy for geodynamic calculations and creation of its precise mobile reference frame. However, Morgan's positive result was gained not on vector summing along the Indian Ocean circuit but on a rough arithmetic one. The precise summing based on vector algebra gives non-closure of the circuit which is in contradiction with plate tectonics. The problem was noticed within the framework of this theory in the late 1970's. To solve it the India-Australian plate was separated into two independent plates and clockwise rotation of India relative to Australia was assumed around a so called "diffusive plate boundary" (Fig. 43).

After that the whole series of such speculative operation was undertaken around the Indian Ocean triple junction to achieve its closure. However, the only way to remove the Indian Ocean gaping gores is to diminish the Earth radius.



A

B

Fig. 43. *Ad hoc attempt to avoid convergence between African and Antarctic plates by:* **A** *– assuming bending out of the Indo-Australian plate to its concave side,* **B** *– breaking this single plate into Indian and Australian ones, separated by a 'diffuse boundary' which is to facilitate such bending out (figures after Gordon et al,. 1999, colours and arrows – J.K.)*

It must be stressed out that the above ad hoc speculations of plate tectonics are made not at some marginal part of the theory but in its core part, where its main rule (Eulerian motions) was established. However this circumstance, which should lead to the revision of the whole paradigm, is not even mentioned.

The problem is more extensively presented in my paper ***Falsification of the Eulerian motion of lithospheric plates*** (Koziar, 2016) and in my book ***Falsification of the Eulerian motion of lithospheric plates: Circularity of the plate tectonics theory*** (Koziar, 2018b). The falsification is conducted there only on the base of geophysical measurements (spreading rates based on oceanic magnetic stripes). Falsification of Eulerian motion based only on space geodesy measurements is done in my book ***Expanding Earth and space geodesy*** (Koziar, 2018a).

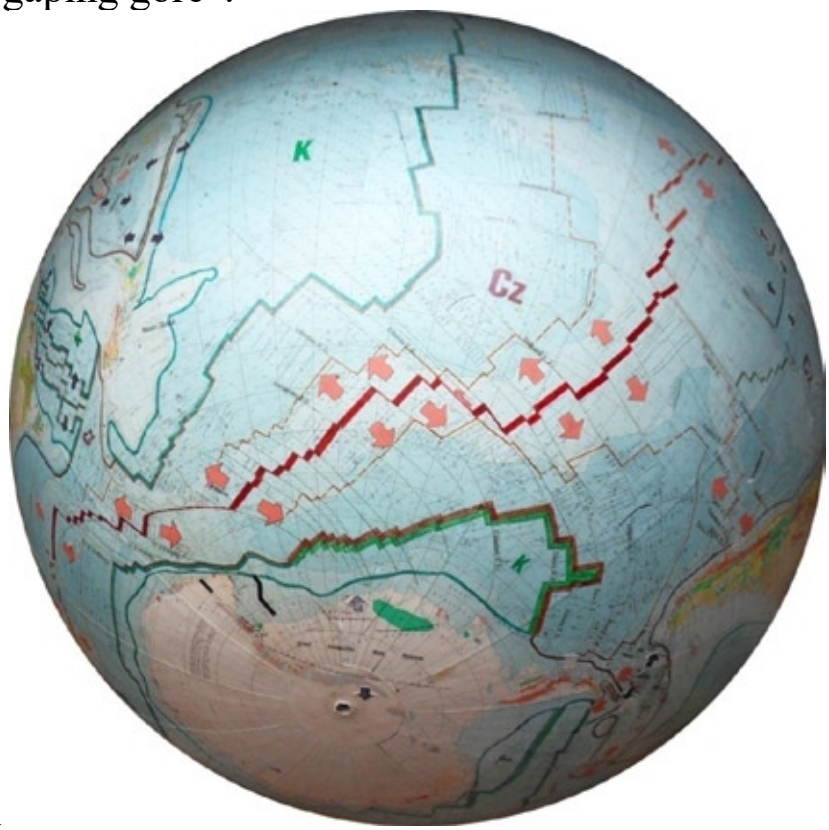
f. South-west Pacific gaping gores

Other examples of gaping gores are those appearing along the southwest Pacific rise. For their demonstration my geotectonic globe of 85 cm diameter (scale 1:15 mln) is used, made from the Russian geological globe stripes and the magnetic linear anomalies superimposed in Wrocław, using data from about 300 papers.

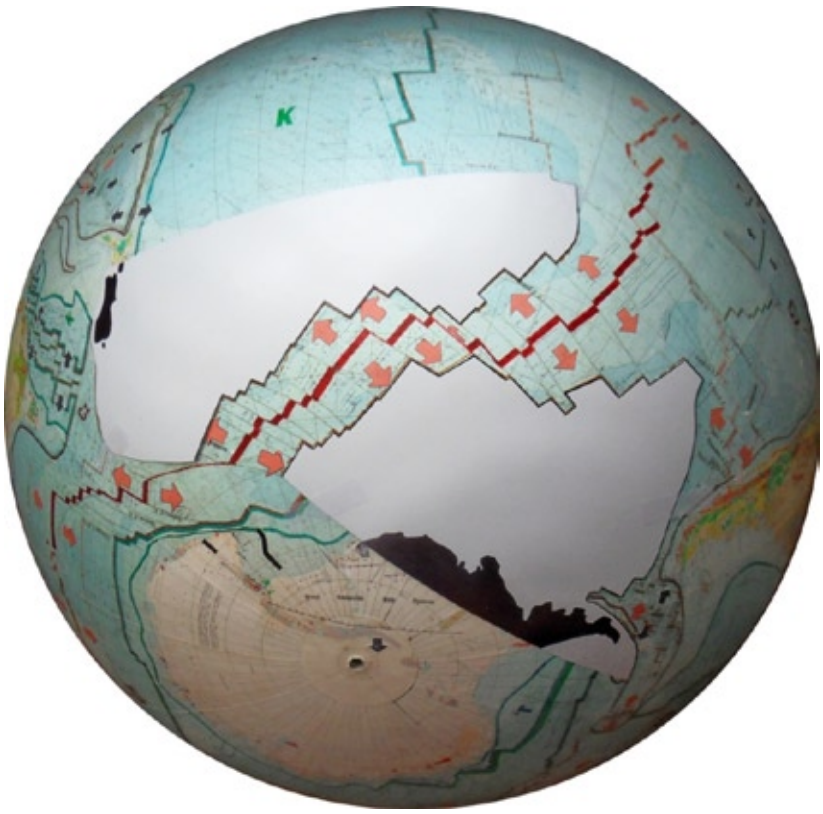
The southwest Pacific rise and its geotectonic vicinity is presented in Fig. 44A. The Paleogene-Neogene borders are marked there by a light-brown line. The adjacent part of the Pacific and Antarctic plates were cut along these borders from opaque plastic bowls. After putting them on the globe in accordance with the present structures, they imitate the old Pacific and Antarctic plate fragments from before 20 Ma in their present positions (Fig. 44B). In the following reconstructions, the Pacific plate will be stationary and only Antarctic plate will be moved.

After connection of the old Antarctic plate with the Pacific one along the northeast part of their common border, a gaping gore appears in their southwest part of the border (Fig. 44C). This artificial gap can be called “Balleny Islands gaping gore”.

Then, after connection of the old Antarctic plate with the Pacific one along the southwest part of their common border, a gaping gore appears in their northeast part of the border (Fig. 44D). This artificial gap can be called “Easter Island gaping gore”.



A



B

C

D

Fig. 44. *South-west Pacific gaping gores (explanation in text)*

Both gaping gores disappear on a smaller Earth diminished by 20 Ma (post-Paleogene) increment of the oceanic lithosphere. This is accomplished by Maxlow's reconstructions (Fig.45).

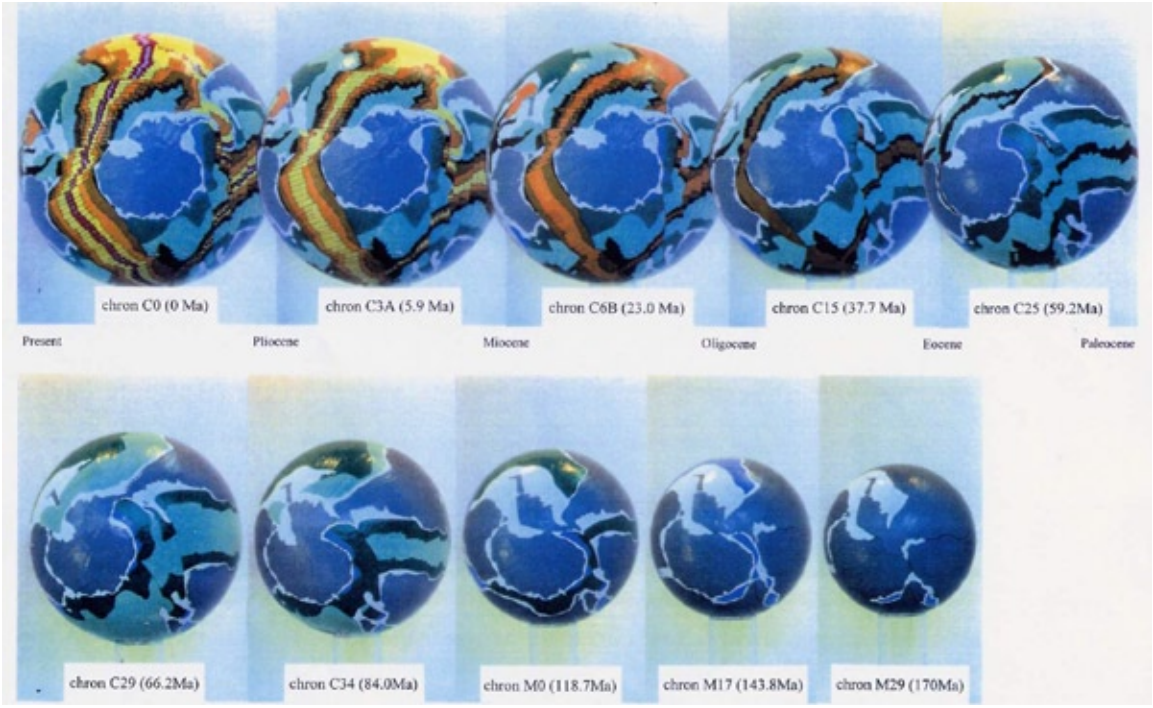


Fig. 45. *Maxlow's reconstructions of the expanding Earth eliminating gaping gores in the southwest Pacific*

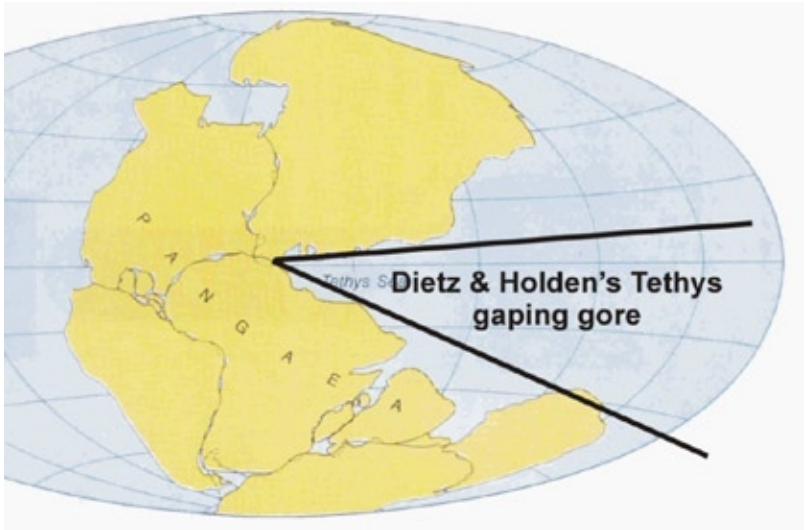
The lack of southern gaping gores in the Indian Ocean is also visible.

g. Extreme gaping gores of Tethys tectonic zone

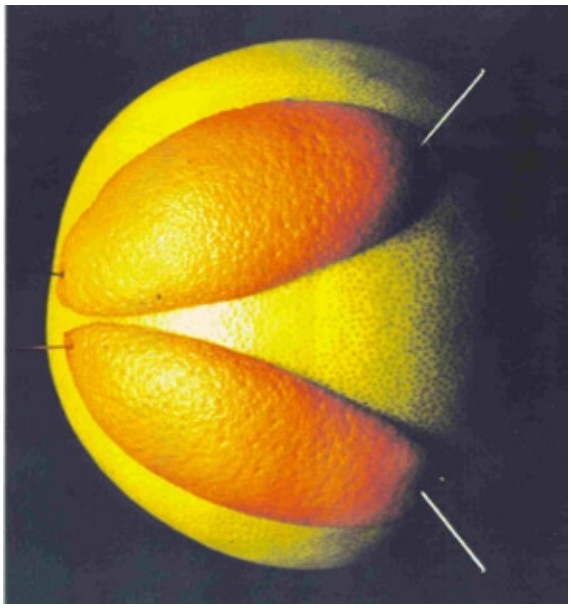
Extreme gaping gores appear in all reconstructions of Pangaea on the present size Earth. They appear in the real Tethys mobile tectonic zone and in plate tectonics are treated as a hypothetical "Tethys Ocean". In reality all versions of the Tethys Ocean are gaping gores and as such are artefacts of the reconstruction used.

In Wegener's first historical Pangaea he avoided the Tethys Ocean by ad hoc application of another artefact. How he did this will be explained later.

The best known "Tethys Ocean" is that of Dietz and Holden (1972) – Fig. 46A. It can be compared to the following arrangement of pieces of orange peel on a grapefruit (Fig. 46B).



A

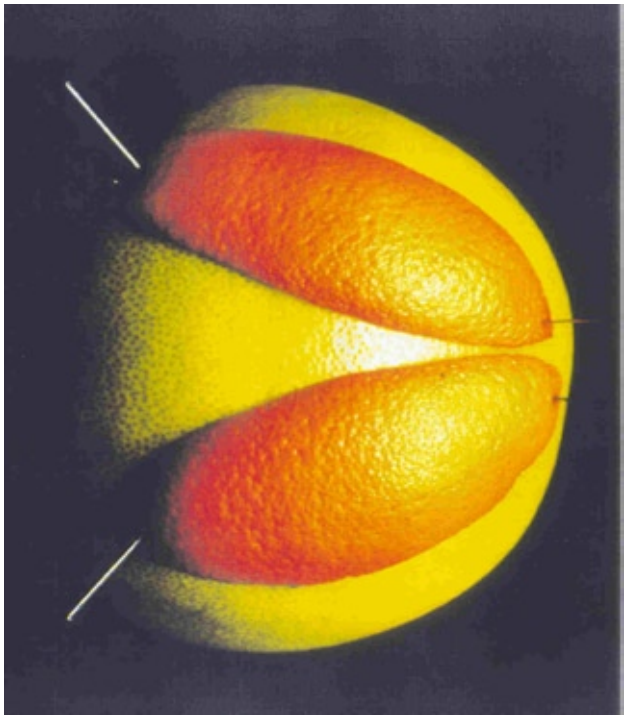


B

Fig. 46, **A –** *East Tethys "Ocean" in Dietz and Holden's Pangaea as an extreme gaping gore,* **B** *– orange peel model of the East Tethys "Ocean" gaping gore*

The orange peel in Fig. 34B can be reunited in the opposite way (Fig. 47A) and in the same way one can reunite Gondwana and Laurasia (Fig. 47B).

A



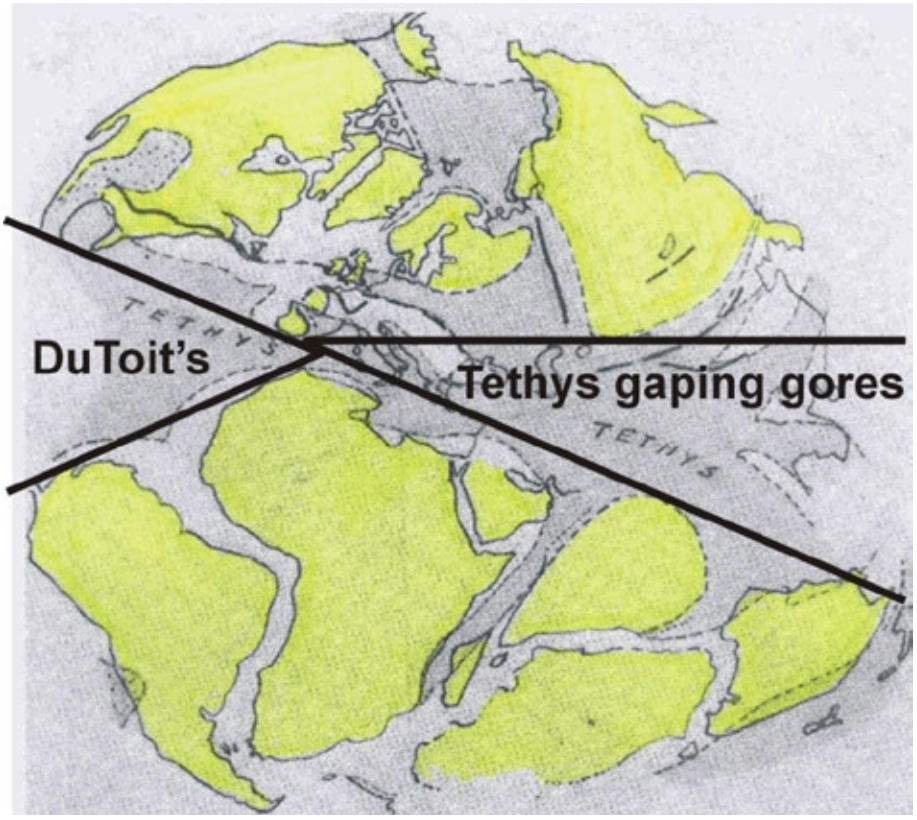
B

Fig. 47. **A** – *Another possible arrangement of orange peel in a style presented in Fig. 46B,* **B** – *extreme West Tethys "Ocean" gaping gore*

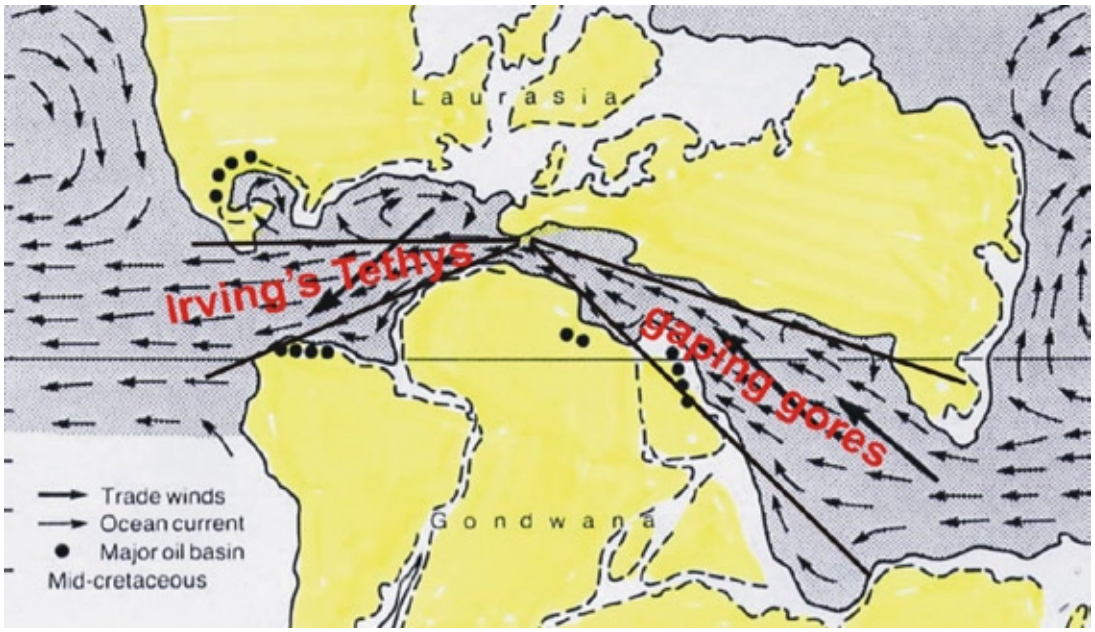
Carey, as an Australian geologist, was better aware of the Paleozoic connection of Australia and East Asia than western geologists. He reported (Carey, 1988, pp. 158-159) that when he tried (in the 1950s) to connect Gondwana with Laurasia in the East, a big gaping gore appeared in the West, just as in Fig. 47B. On the base of this relationship he realised that the Earth must be expanding.

h. Balanced gaping gores of the Tethys tectonic zone

The West Tethys "Ocean" smaller gaping gores are present in more balanced reconstructions of Pangaea. These were made up by Du Toit (1937) – Fig. 48A, and by Irving (1974) – Fig. 48B, (vide Kearey and Vine, 1996).



A



B

Fig. 48. *Orange peel effect in a form of balanced reconstruction of Pangaea (compare with Fig. 37A),* **A** *– West and East Tethys "Oceans" gaping gores of Du Toit's Pangaea,* **B** *– West and East Tethys "Oceans" gaping gores of Irving's Pangaea*

Both are modelled by orange peel on a grapefruit presented in Fig. 37A. But the proper way is to reconstruct the orange peel on the starting orange (Fig. 37B) and, by analogy, to reconstruct the old continental crust on a much smaller Earth without any artificial gaping gores.

i. How Wegener avoided gaping gores?

One can wonder how Wegener was able to make his Pangaea without any gaping gores? He was able to do it by extreme stretching of the peripheral area of his supercontinent. I have transferred Wegener's Pangaea onto an equal-area hemispheric net (Fig. 49).

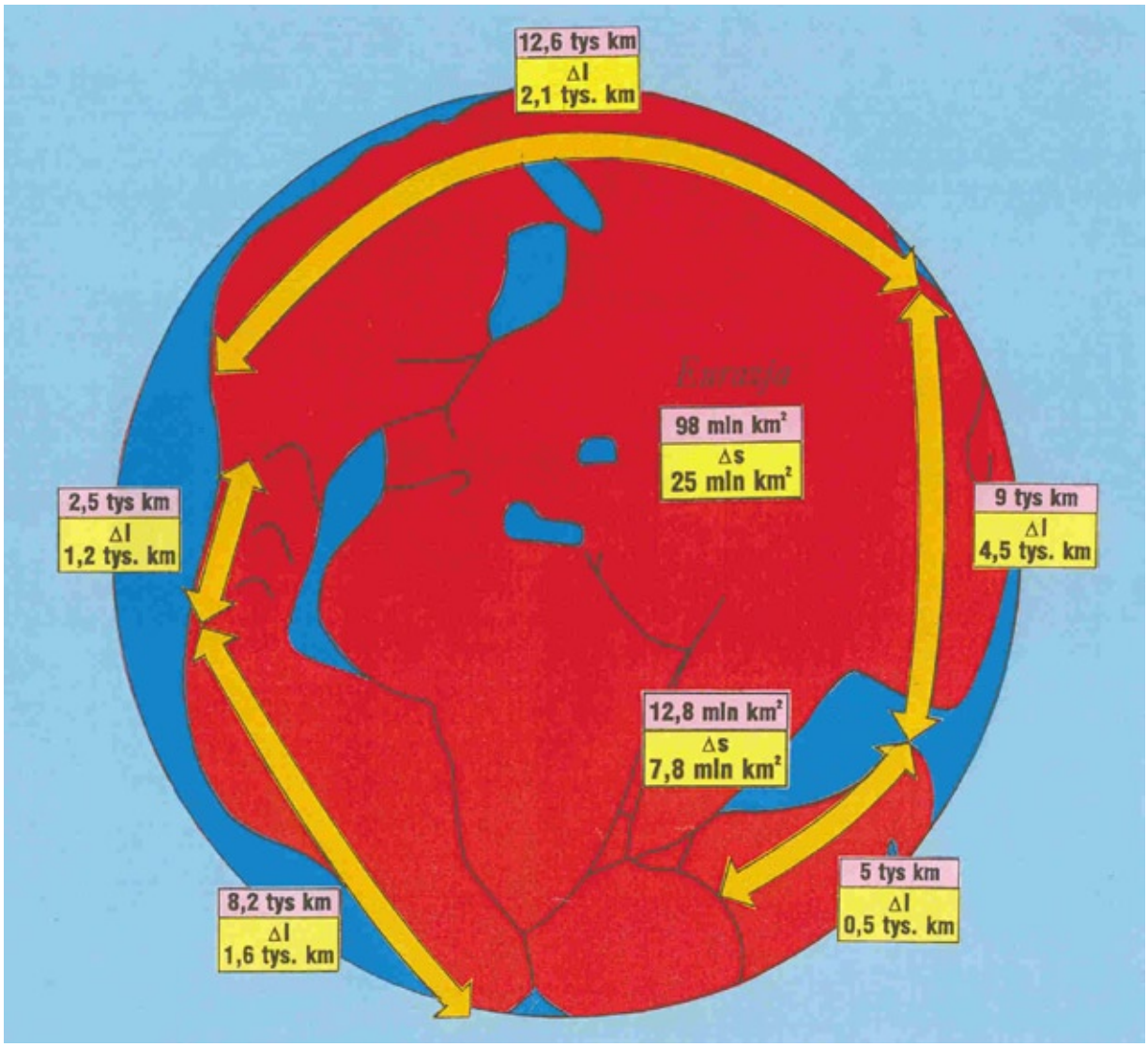


Fig. 49. *Artificial stretching of the peripheral parts of Wegener's Pangaea. In the upper parts of the frames are Wegener's values, in the lower parts are increments above the real values*

The surface areas of the continents were measured by a planimeter. Peripheral distances were measured by transferring their end points on a geo-

graphical globe (using their geographical coordinates) and measuring there the distances by means of a string. The results are given in Fig. 49 and Table I.

Table I. Wegener's increment of peripheral distances in his Pangaea

Section	Distance		Wegener's increment [10^3 km]
	Real [10^3 km]	Wegener's [10^3 km]	
Australia	4.5	5.0	0.5
East Asia	4.5	9.0	4.5
North Laurasia	10.5	12.6	2.1
Central America	1.3	2.5	1.2
South America	6.6	8.2	1.6

As can be seen, all the peripheral distances are stretched – the East Asia and Central America even twice. There is no geological evidence of their later contraction during dispersion of Wegener's Pangaea. The reality is just the opposite, they were stretched during dispersion, especially in Central America.

The same is true with surface areas of Eurasia and India in Wegener's Pangaea as is seen from Fig. 49 and Table II.

Table II. Wegener's increment of areas of Eurasia and India

Region	Area [10^6 km^2]		Wegener's increment [10^6 km^2]
	Real	Wegener's	
Eurasia	73.0	98.0	25.0
India	5.0	12.8	7.8

India is inflated in Wegener's reconstruction by over 2.5 times.

Wegener gradually diminished the artificially inflated peripheral regions of his Pangaea during its dispersion. In this way he was able to disperse them despite Meservey's topological objection (see point III.1.d).

The properties of Wegener's Pangaea demonstrated above can be presented visually on the following model (Fig.50).

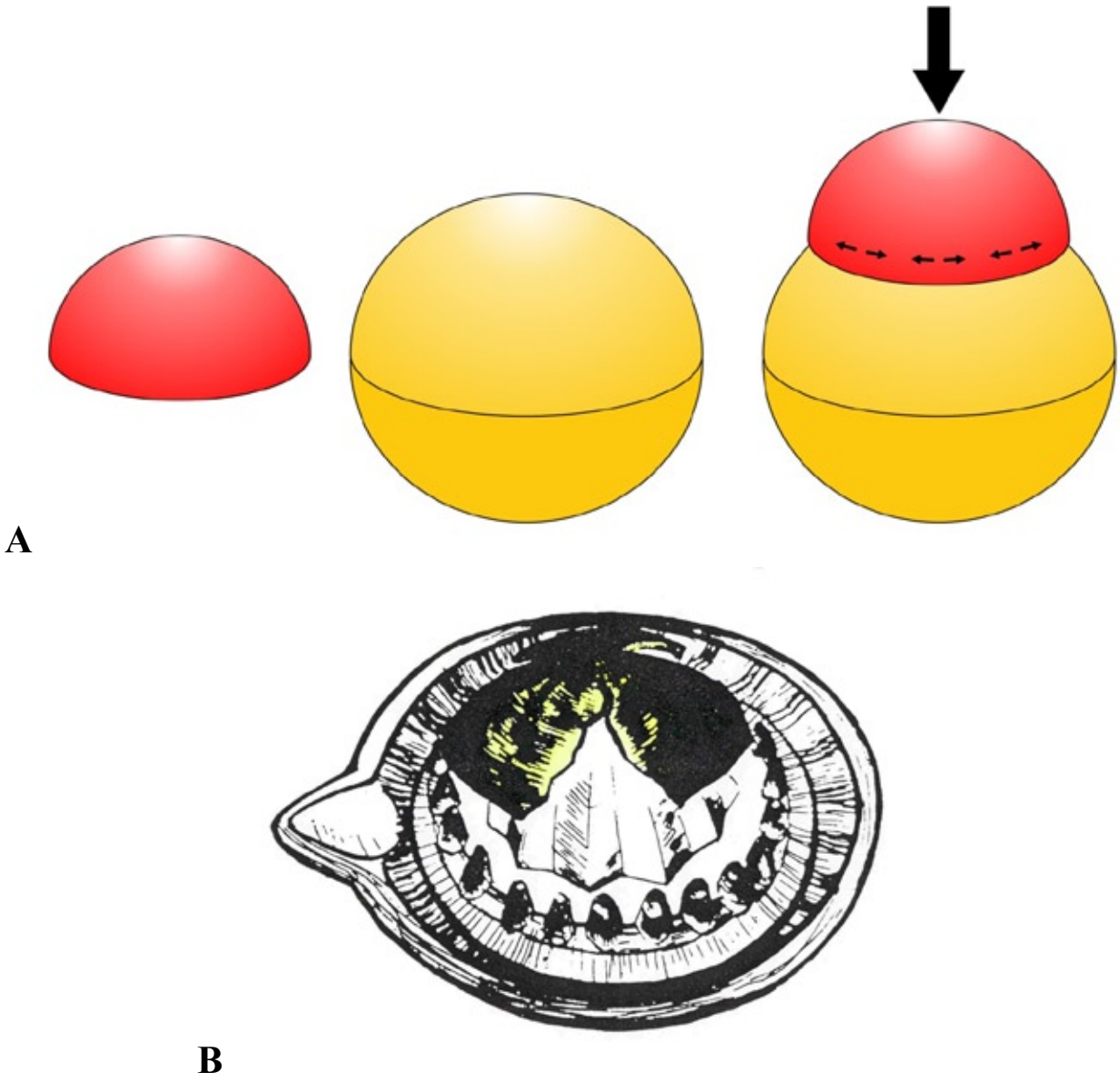


Fig. 50. **A** *– Model illustrating artificial stretching of peripheral parts of Wegener's Pangaea (explanation in text),* **B** *– Carey's model illustrating the origin of artificial Tethys "Ocean" as an extreme gaping gore (explanation in text).*

Let us put a small bowl (red) on a bigger sphere (yellow). When we press on the bowl in order to match it to the sphere, the peripheral parts of the bowl will be stretched, just as in Wegener's Pangaea.

If the small bowl does not resist the pressure and is torn, a gaping gore will appear (Fig. 50B). This, Carey's (1976) model, presents the properties of Pangaeas of Wegener's followers (plate tectonicists) who prefer such a solution.

j. Tensional development of the Mediterranean region

The reconstructions made in accordance with geological reality lead themselves to a greater curvature of the former Earth. An example is the reconstruction of the Mediterranean region (Fig. 51). The geology of the region points clearly to the mutually moving apart of Africa and Europe, which was noticed already by Argand (1924).

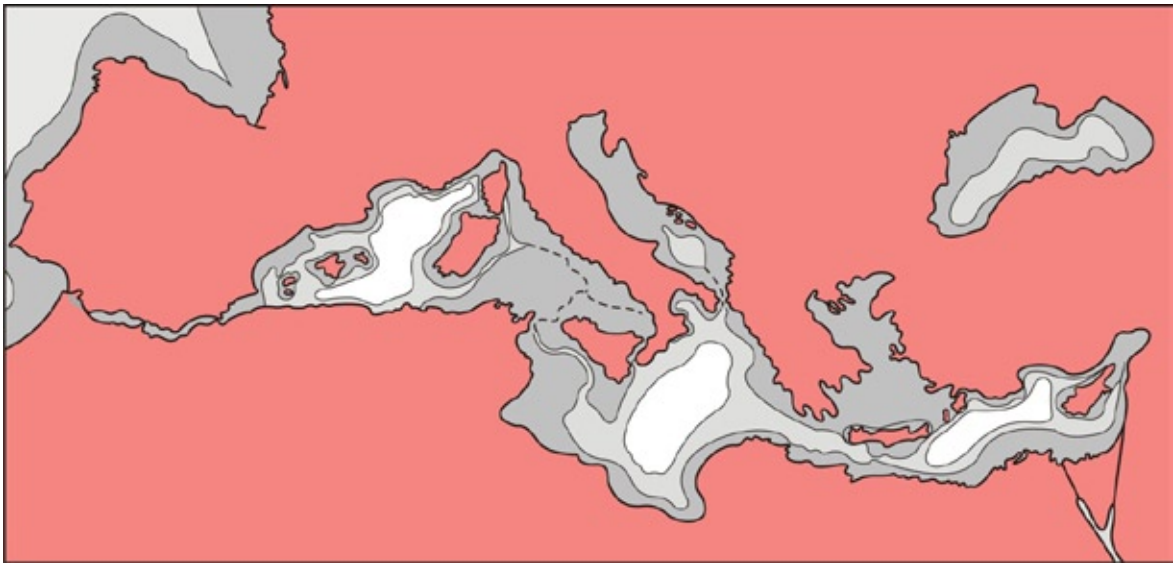


Fig. 51. *Old Tertiary reconstruction of the Mediterranean region (Koziar and Muszyński, 1980). Shelf areas are marked by grey*

In the above reconstruction the following data were taken into account:

1. The presence of the fragments of the old sialic crust inside the Mediterranean basins
2. Cutting of continental structures by the shores of Mediterranean and Black seas.
3. Several identical facies in Europe and North Africa
4. Former (detrital) transport from the side of the present Mediterranean basins
5. Former tectonic transport from the side of the present Mediterranean basins
7. Young age of the sedimentary cover of the Mediterranean basins
8. Paleomagnetism indicating rotation of sialic blocks
9. Geometrical connections between opposite shores of the basins
10. Structural connections between opposite shores of the basins

Thus, only the local geology, not any global a priori assumption, is the basis of the reconstruction presented above.

Just the opposite, a global geotectonic situation (expansion of the Earth) is a conclusion from this reconstruction, because the connection of the latter with the reconstruction of Atlantic is possible only on a smaller Earth.

In contrast, the common opinion at the present day is that the Mediterranean is a closing sea, a collision site. This view results only from an a priori reconstruction (Fig. 46A) based on the present-size Earth. That is, it resulted from the artificial gaping gore of the East Tethys "Ocean". The view is in serious contradiction with the geology of the Mediterranean region. For a while this convergent view obtained support from space geodesy, which suggested a collision between Europe and Africa. But the 'collision' is only an artefact resulting from the same false assumption that the Earth is not expanding (Koziar, 2018a).

k. The whole Tethys tectonic zone as a divergent zone of tension

The Tethys tectonic zone is accompanied by young Alpine fold belts and from the time of the contracting Earth theory has been treated as a zone of collision of Eurasia and Gondwana. Earlier, the fold belts were treated as a result of gravitational tectonics. In such a way they were understood already by James Hutton.

The contracting Earth theory began a period of speculative approach to the origin of fold belts. In its framework they were to be formed by assumed contraction of the whole globe. Collision of Eurasia and Gondwana was to be caused by the same process. However, the theory did not see any "Tethys Ocean" between both super-continents.

Wegener's theory was based on the discovered (by its author) divergent development of Atlantic and Indian oceans (thus moving apart some continents), and a tacit non-expanding-Earth assumption. So its structure was almost the same as that of the later plate tectonics. Wegener's theory introduced convergent movements of continents as a compensation for the divergent movements of continents on the assumed non-expanding Earth. The convergent movements were much bigger than in the contracting Earth theory, especially in the Tethys zone. But even this theory did not see there any former "Tethys Ocean" (see Fig. 49). The "Ocean" was introduced only by plate tectonics and in the way was presented earlier.

Before plate tectonics, the pre-Alpine Tethys zone was seen as a geosynclinal belt with only narrow deep eugeosynclinal basins. What is more, in the time between Wegener's theory and plate tectonics (1940s and 1950s),

Alpine geologists recorded that this geosynclinal belt had a tensional origin. There was only one step to understand also the tensional development of folding process and to remove the big difficulty of gravitational tectonics with understanding the development of the upper mantle upwellings (they are tensional) necessary for gravitational transport of folded belts. This step was done by Carey in 1976. However in the meantime plate tectonics has shifted our understanding of geology far back.

Many geologists, knowing well the Tethys zone (Meyerhoff, A.A. and Meyerhoff, H.A., 1972; Stöcklin, J., 1984; Ahmad, F., 1983), demonstrated that there was never an ocean. Thus the zone at the present time is not a "closed ocean". Just the opposite it can be demonstrated that the whole Tethys tectonic zone and its fold belts (together with Himalayas) are results of the stretching of the lithosphere (Koziar, 2005; 2006).

4. THE FOURTH PROOF
Mutual moving apart of hot spots

a. Mantle plumes, hot spots and their volcanic chains on a non-expanding Earth

In 1963 Tuzo Wilson discovered hot spots and mantle plumes below them. Existence and location of mantle plumes are pointed out by volcanic chains generated by them. An immobile mantle plume generates a volcanic chain on the lithospheric plate moving above it. However, in the very beginning a glaring discrepancy appeared between this interpretation and the Dietz-Hess' early plate tectonics model. The discrepancy is well shown in the first diagram of the process published by Wilson (Fig. 52).

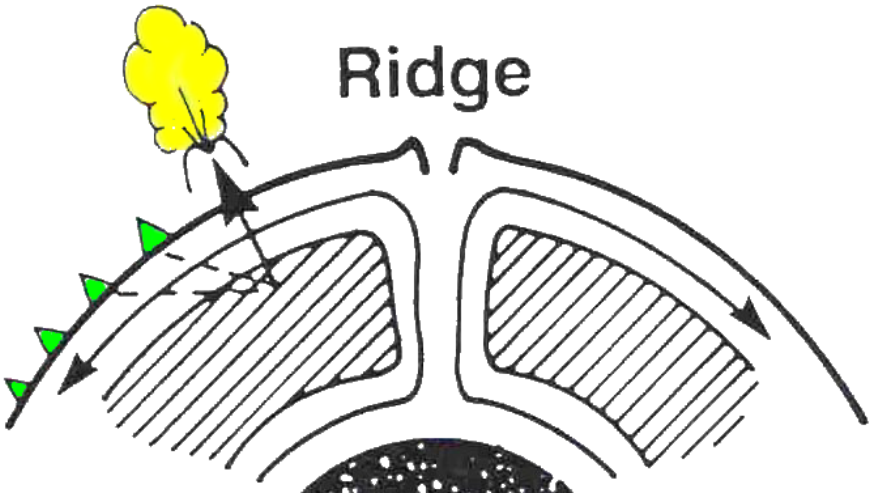


Fig. 52. *The first plate tectonics scheme of mantle plume producing volcanic chain (after Wilson,1963). Explanation in text*

As can be seen, immobility and even the existence of a mantle plume is impossible in the presence of a hypothetical convection current, which is to cause the movement of a plate but simultaneously it mixes the mantle. The immobile inner parts of convection cells, marked by Wilson (hatched areas), are physically impossible and are only a sign of a desperate attempt to reconcile mantle plumes with early plate tectonics. Besides, it is known today that mantle plumes often originate at the core-mantle boundary.

b. Mantle plumes, hot spots and their volcanic chains on an expanding Earth

On the expanding Earth with immobile mantle the former problem does not exist (Fig. 53).

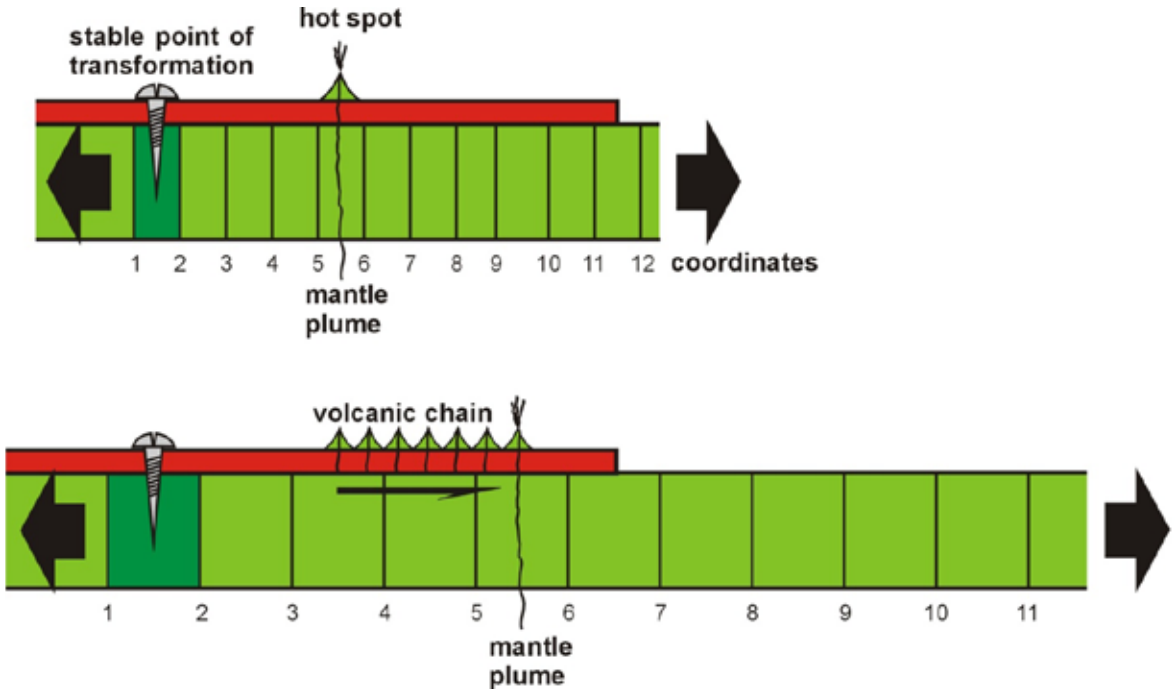


Fig. 53. *Mantle plume, hot spot and volcanic chain on the expanding Earth (explanation in text).*

In the figure the plate is fastened to its basement (i.e. to the sub-lithospheric mantle) at its stable point of transformation which is visualized by a screw (compare with Figs 10 and 11). The mantle plume is located all times within the same part of the mantle, marked by coordinates 5 and 6. When the mantle is stretched, the mantle plume moves away from the stable point of transformation preserving its coordinates. In this way it produces a volcanic chain on the plate.

The same process can be demonstrated on the physical model (Fig. 54) this time in a new version with a silicon disc instead of the rubber one. In

Fig. 54A a red mark imitating a hot spot is glued to the stretched silicon disc at its right side. Then a plexiglas bar representing the lithosphere is put on the disc and fastened to the silicon at its left side by a pin ("forced" stable point of transformation). Then three open circles are drawn on the bar, the leftmost upon the "hot spot".

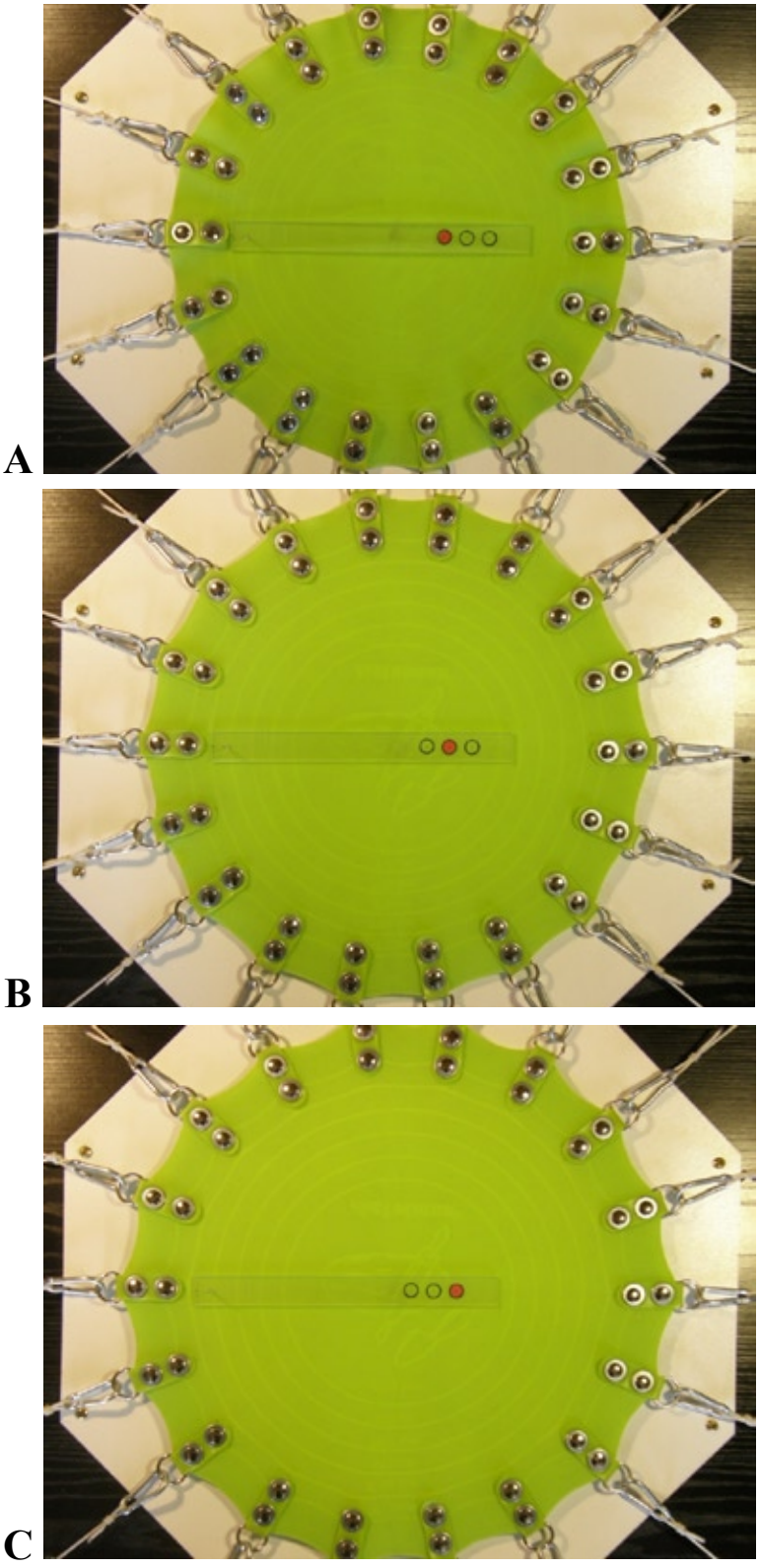


Fig. 54. *Origin of volcanic chain produced by hot spot, demonstrated on the physical model (explanation in text)*

After that the silicon disc is stretched a little (Fig. 54B) and the hot spot is shifted to the right (relative to the bar), to the second circle. The former circle is now an "extinct volcano". Then the disc is stretched further (Fig. 54C) and the "hot spot" is shifted to the third circle. The two former circles form now the extinct volcanic chain (a volcanic tail of the hot spot).

It was soon realized that the hot spots, as outcrops of the mantle plumes, are moving away from each other. It was noticed on the Atlantic Ridge by Burke et al. (1973). The process is demonstrated in Fig.55.

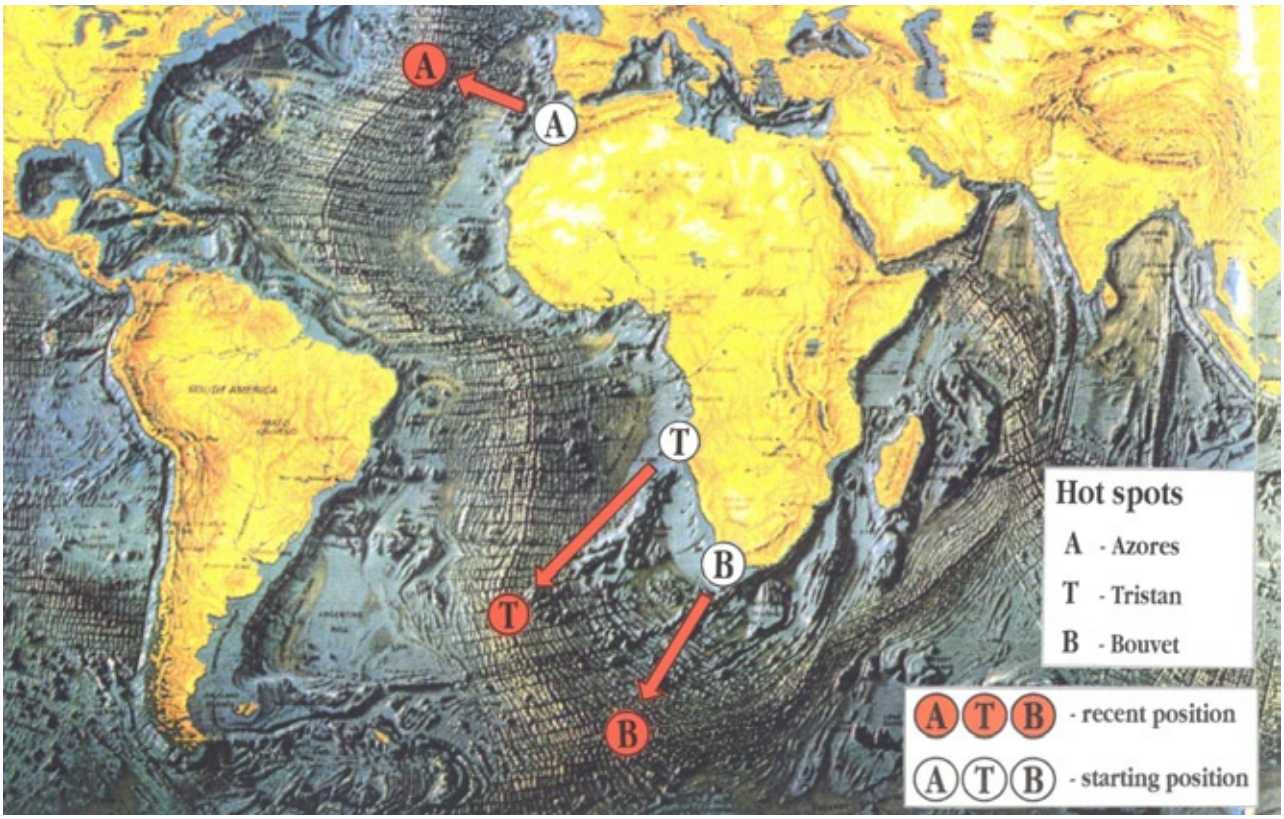


Fig. 55. *Mutual moving away of hot spots on the Mid-Atlantic Ridge during opening of the Atlantic Ocean*

However, the authors did not draw the correct conclusion from their observation. Stewart (1976) showed that generally all the hot spots are moving apart from each other and came to the right conclusion about expansion of the Earth. The process of moving apart of hot spots is visible in the divergence of the volcanic chains generated by them. Stewart even estimated the rate of their moving apart for different periods. The average great circle separation between pairs of hot spots is according to him up to 6% for the past 50 Ma and 11-17% for the past 120 Ma. The same should be the increment of the Earth radius (see Fig. 57).

c. Essence of the proof

The process of moving the hot spots away from each other is tantamount to the expansion of the Earth. The relationship can be demonstrated on an inflated balloon with painted spots on it (Fig. 56).

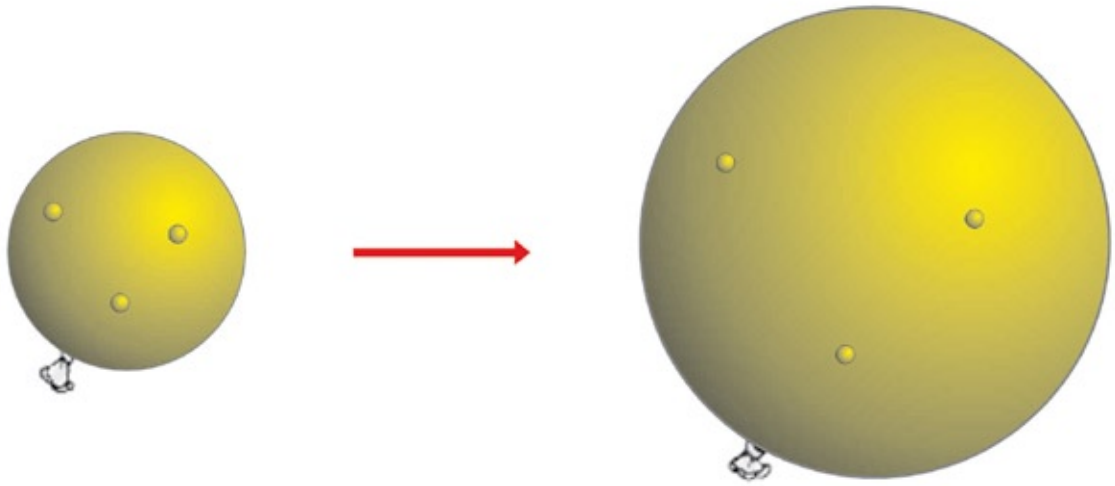


Fig. 56. *Mutual moving apart of spots and their stable positions in relation to their basement.*

The spots on the balloon have fixed positions relative to their basement and simultaneously they are moving away from each other.

The solution of this paradox, insoluble on the nonexpanding Earth, can also be demonstrated on a cross-section where the mantle plumes are visible (Fig. 57).

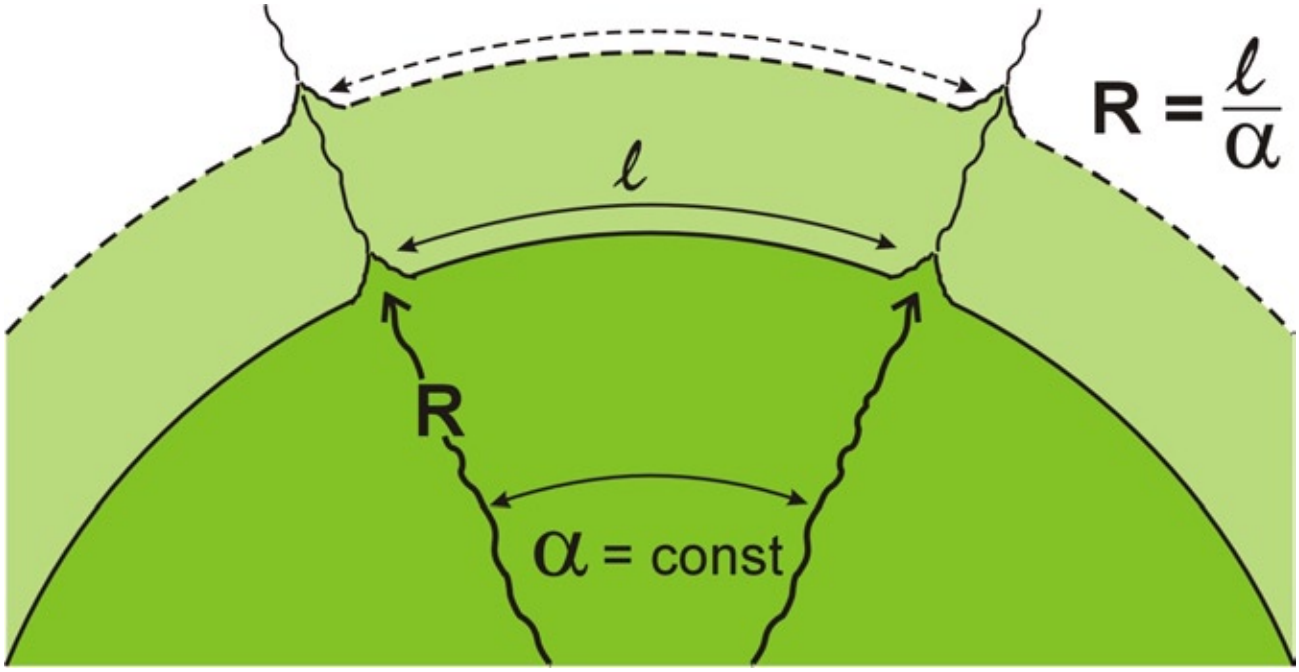


Fig. 57. *Growing arc length between hot spots, at the constant central angle between mantle plumes means the growth of the radius of the Earth.*

The angle (**α**) between the mantle plumes is constant, while the arc length (***l***) between their hot spots is growing. It proves that the Earth radius (***R***) is increasing.

We can discuss the problem of hot spots and mantle plumes in more detail.

Development of the divergence of the hot spot volcanic chains can be demonstrated on my geometrical model (Koziar, 1994; www.wrocgeolab.pl/plates.pdf). In that paper the situation was not described in detail because of lack of space, so it will be done now.

d. Divergent volcanic chains produced by intraplate hot spots

First, we will explain the mechanism of divergence for two intraplate hot spots (Fig. 58).

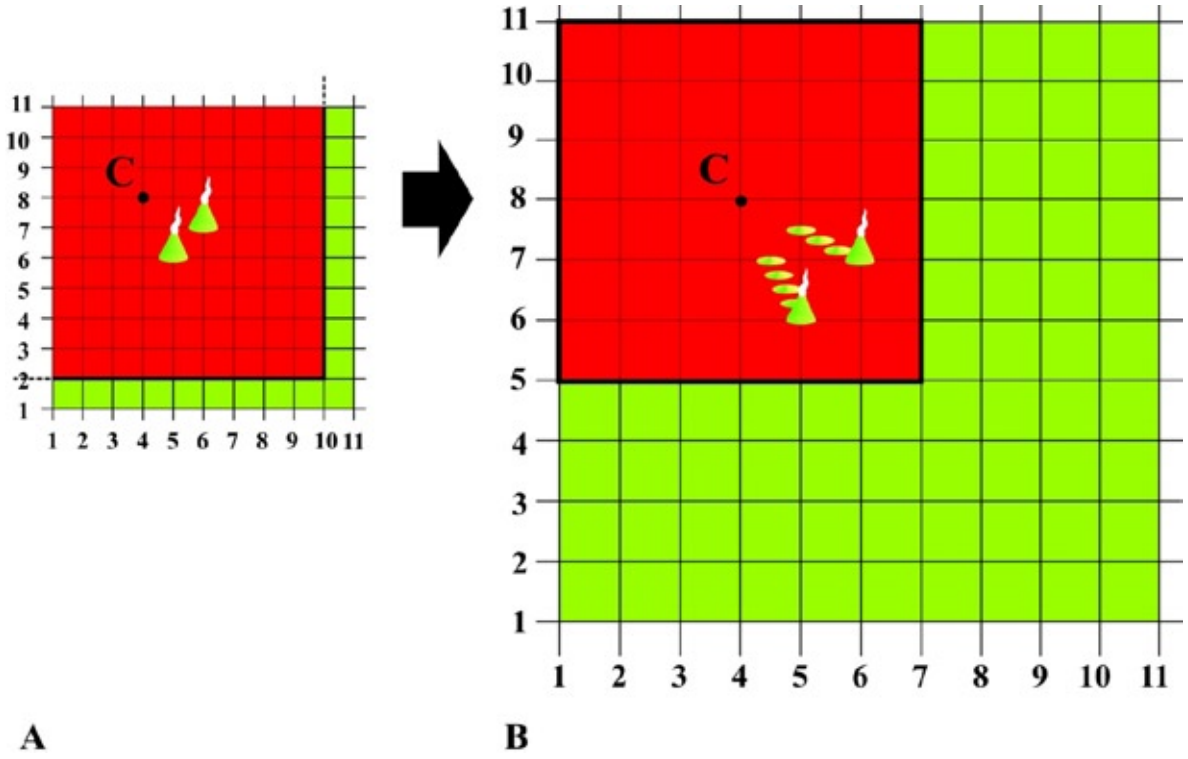


Fig. 58. *Divergent volcanic chains produced by intraplate hot spots on the expanding Earth (explanation in the text)*

A plate, ranging beyond the grid, is fastened to its basement (Fig. 58A) at its center – the stable point of transformation, C (4,8). Two intraplate mantle plumes have stable positions in the mantle described by coordinates, respectively from left to right, (5,4) and (6,7). During isotropic stretching of the basement the left and upper sides of the plate have appeared on the grid and the two hot spots generate two divergent volcanic chains (Fig. 58B).

The same situation can by modeled on my physical model (Fig. 59).

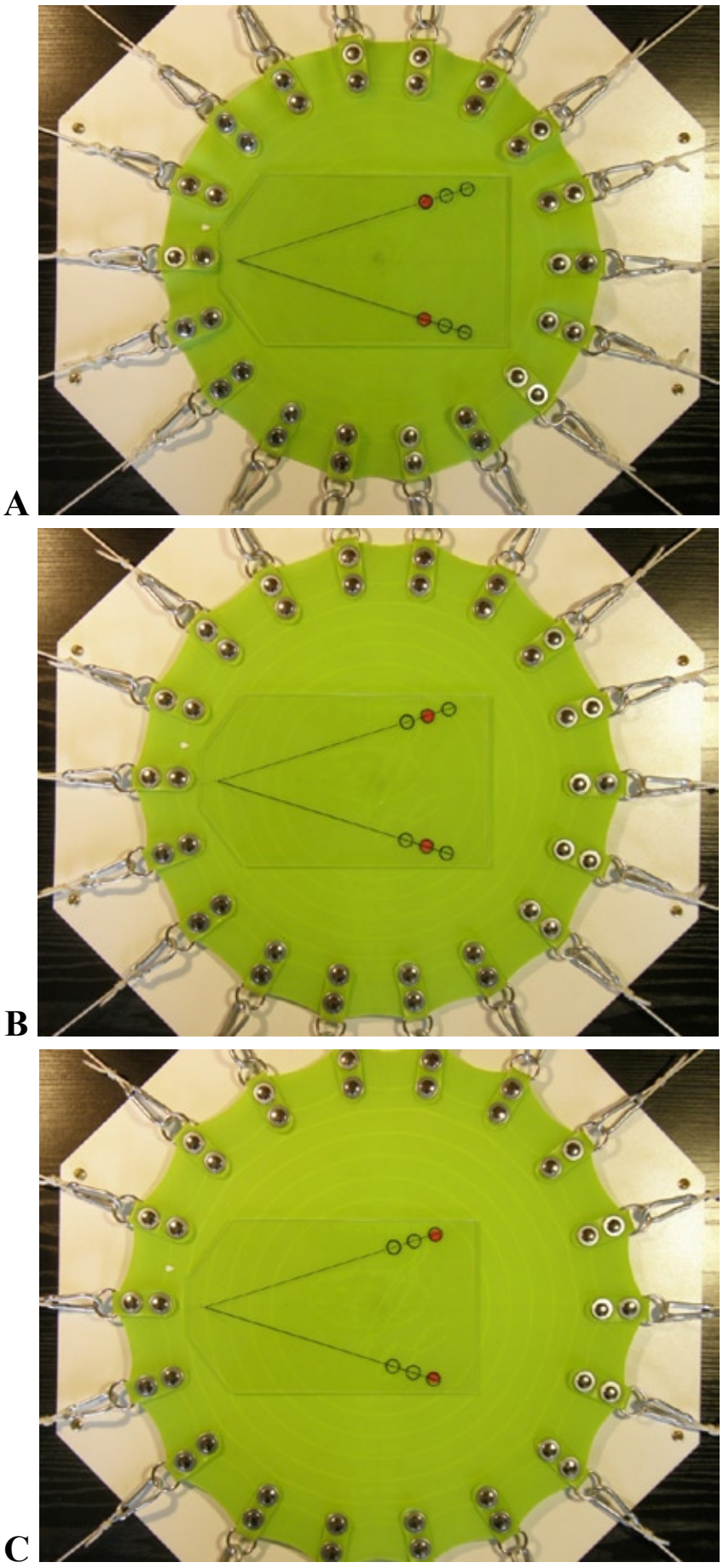


Fig. 59. *Physical modelling of the divergence of two volcanic chains produced by two intraplate hot spots (explanation in text)*

In Fig. 59A two red marks imitating hot spots are glued to the stretched silicon disc at its right side. Then a plexiglas plate imitating lithosphere is put on the disc and attached to the silicon on its left side with a pin ("forced" stable point of transformation). Then two lines are drawn from the stable point of transformation, crossing the hot spots. Then three open circles are drawn on each lines, most to the left upon the "hot spots".

After that the silicon is stretched a little (Fig. 59B) and the hot spots are shifted to the right (relative to the plate) to the second circles. The former circles are now "extinct volcanoes". Then the silicon is stretched even more (Fig. 59C) and both "hot spots" are shifted to the third circles. The former circles form now two extinct volcanic chains (volcanic tails of the hot spots) which are divergent.

e. Divergent volcanic chains produced by interplate hot spots

The same process of divergence occurs in case of interplate hot spots (situated on mid-ocean ridges). This time each of the interplate hot spots generates two volcanic chains. This is demonstrated below on my geometric model (Fig. 60).

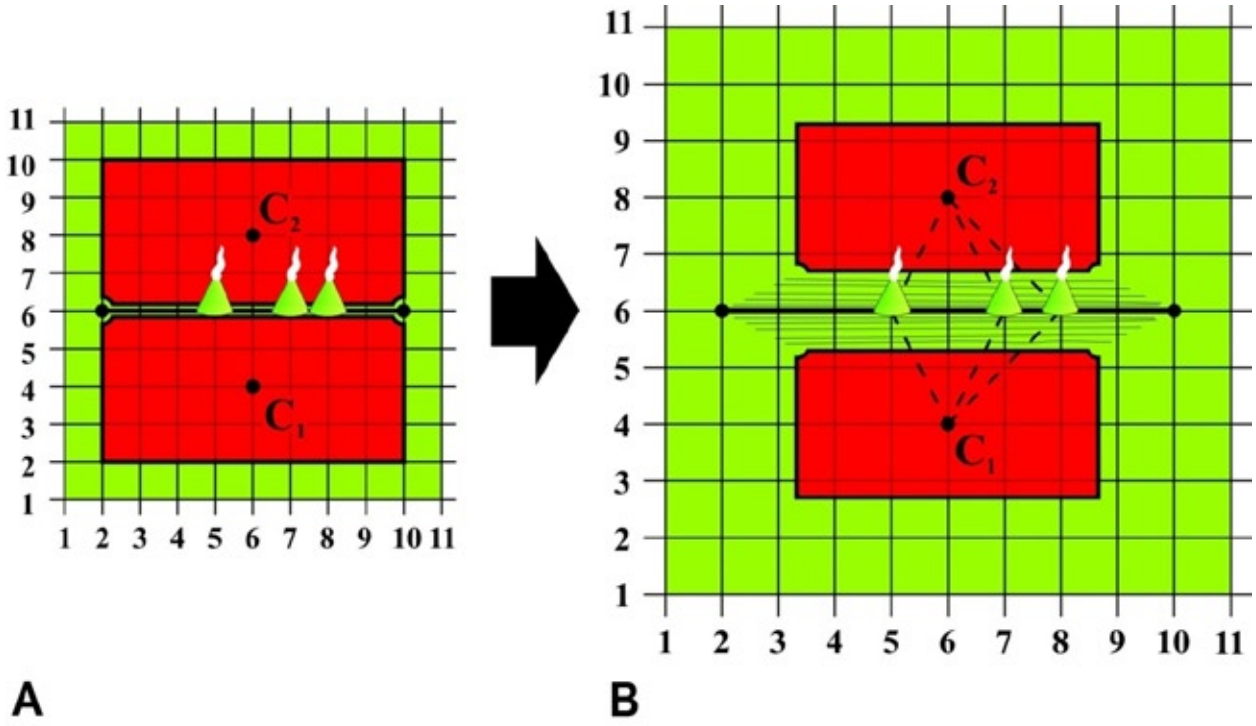


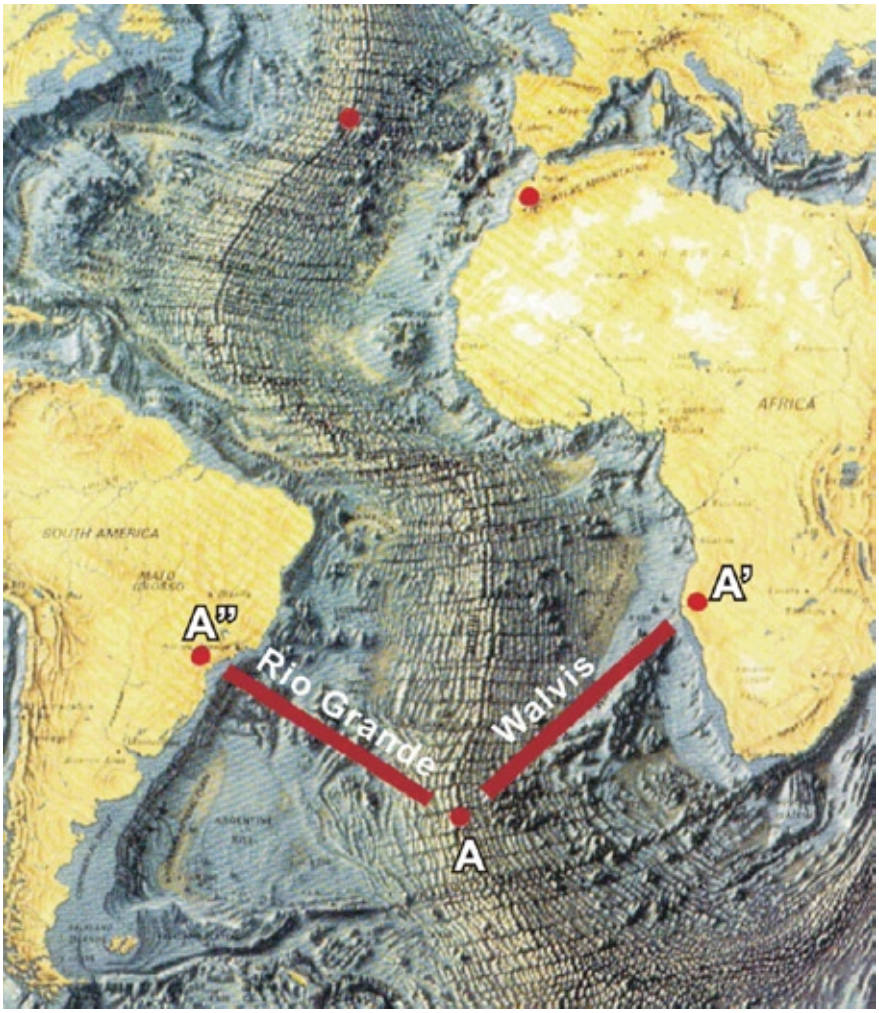
Fig. 60. *Behavior of interplate hot spots on the expanding Earth (explanation in the text)*

In Fig. 60A two plates are fastened to their basement at their stable points of transformation C_1 (6,4) and C_2 (6,8) and are separated by an initial oceanic ridge with three hot spots. The stable positions of the spots (the man-

tle plumes) relative to the basement are described (from left to right) by coordinates (5,6), (7,6) and (8,6). During isotropic stretching of the basement (mantle) all the hot spots are moving mutually apart and create divergent volcanic chains (Fig. 60B). Simultaneously the ridge is being stretched lengthwise (compare with Fig. 23).

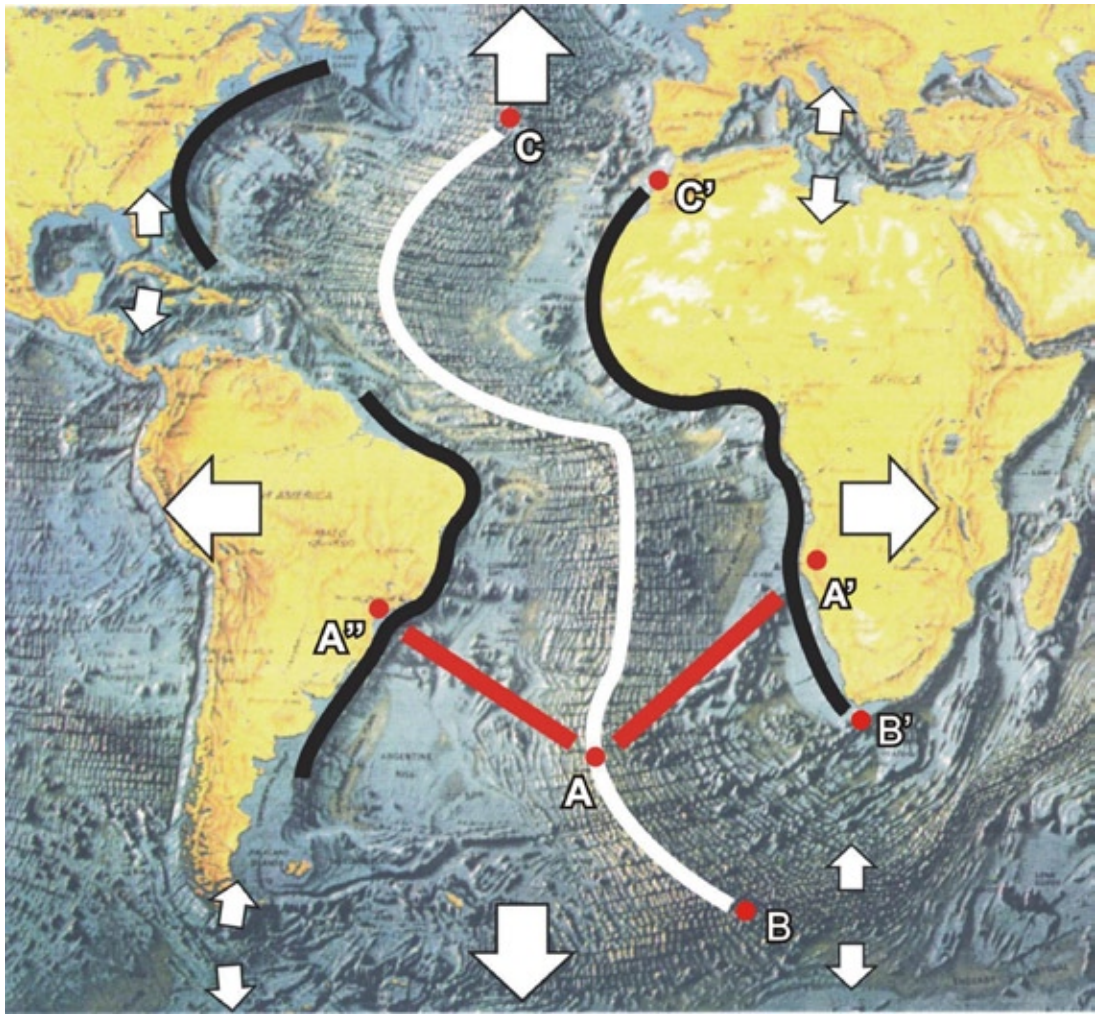
f. Tristan da Cunha hot spot in context of tensional development of the whole South Atlantic region

General expansion of the Earth's mantle explains development of the most prominent interplate hot spot *i.e.* Tristan da Cunha, with its descendant volcanic chains (ridges): Rio Grande to the northwest and Walvis to the northeast (Fig. 61A)[2], and with the development of the whole South Atlantic region (Fig. 61B).



A

[2] In fact the Tristan da Cunha island is an extinct volcano and belongs to the Walvis Ridge. The real hot spot lies on the Mid-Atlantic Ridge a little to SW of the island, on a cross section of the Walvis and Rio Grande ridges. The name of Tristan da Cuhna Island is useful to identify this hot spot.



B

Fig. 61, A – *Tristan da Cunha hot spot (A) with its coupled volcanic chains: Walvis and Rio Grande ridges and their starting points - correspondingly A' and A",* **B** – *general stretching (expansion) of the whole South Atlantic region; marked are: the ends of Mid-Atlantic Ridge (B and C) corresponding to the ends of African parent cost line (B' and C')*

Both chains reach surrounding continents at points with the same Triassic basaltic traps which were produced by the plume at its beginnings before opening of the South Atlantic. The plume and its derivative ridges are an organic part of the wider tectonic plan demonstrated in Fig. 61B which means radial stretching of the whole presented region (see also "The Second Proof"). The whole plan can be physically modeled (Koziar,1980; www.wrocgeolab.pl/floor.pdf) on the stretching rubber (Fig. 62).

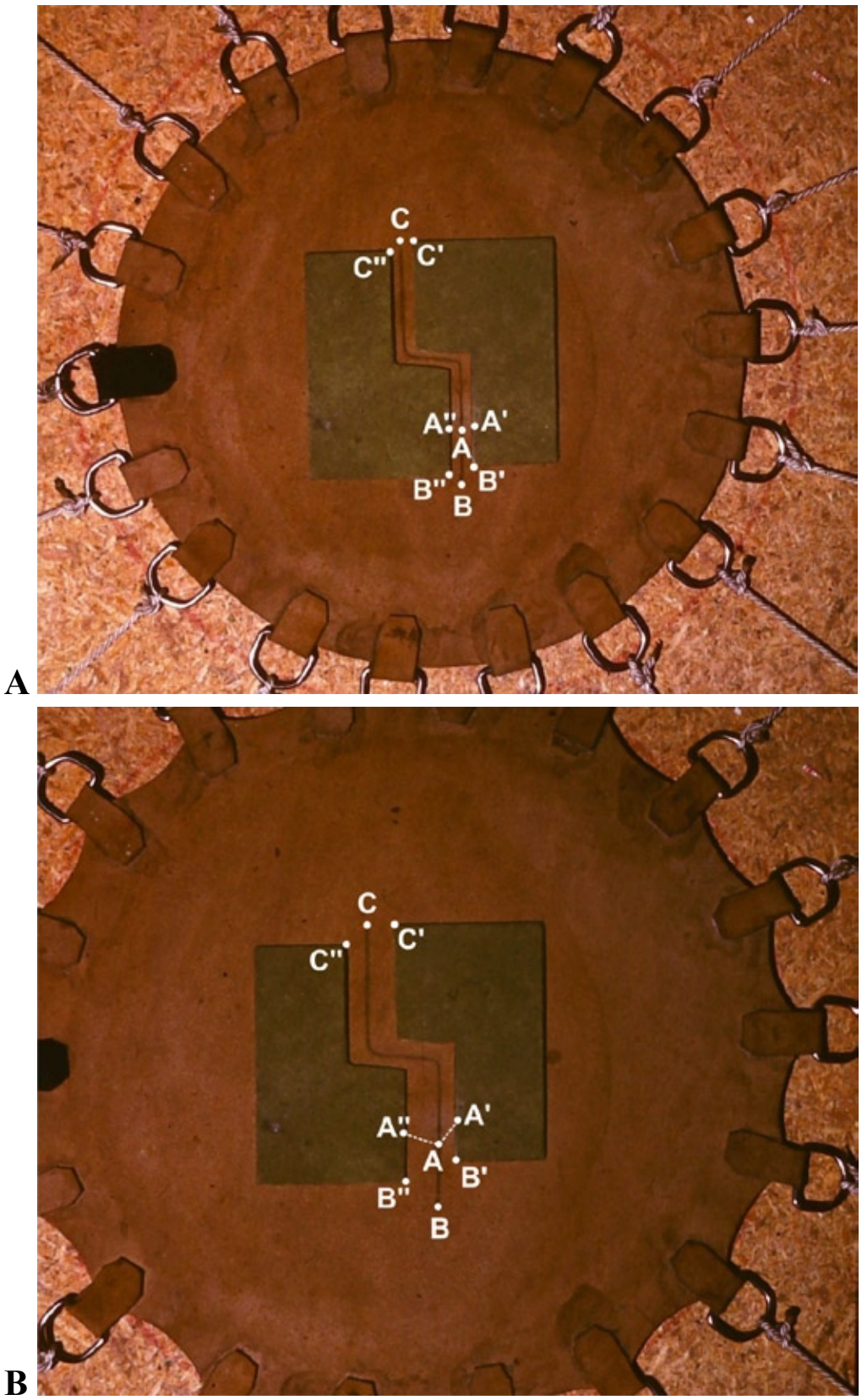


Fig. 62. *Physical model of tensional explanation of development of South Atlantic region with its main tectonic feature shown in Fig. 61B (explanation in text)*

Two plates, imitating roughly Africa and South America, are put on a rubber disc before its stretching (Fig. 62A). Then an initial Mid-Atlantic Ridge

is drawn on the rubber with marked the Tristan da Cunha hot spot (**A**) and the ends of the ridge (**B** and **C**). Then the original position of the hot spot is marked (**A′** and **A″**) on the both adjacent continents and the endings of African coastline (**B′** and **C′**) which is a parent structure of the ridge (Fig 62A). After that the rubber is stretched (Fig. 62B). The obtained situation is as in Fig. 61B. Thus the model depicts the whole tectonic situation presented in Fig. 61B. There are explained: mutual moving apart of Africa and South America, lengthwise stretching of the Mid-Atlantic Ridge, southward migration of the Tristan da Cunha hot spot and V-shape arrangement of the twin ridges – Walvis and Rio Grande.

The plan (Fig. 61B) has also been modelled (Koziar, 1985, 1994) www.wrocgeolab.pl/oceans.pdf) on the geometrical model (Fig. 63), equivalent to the physical model (Fig. 62). Fig. 63 is the 2D version of the 3D version presented in Fig. 14.

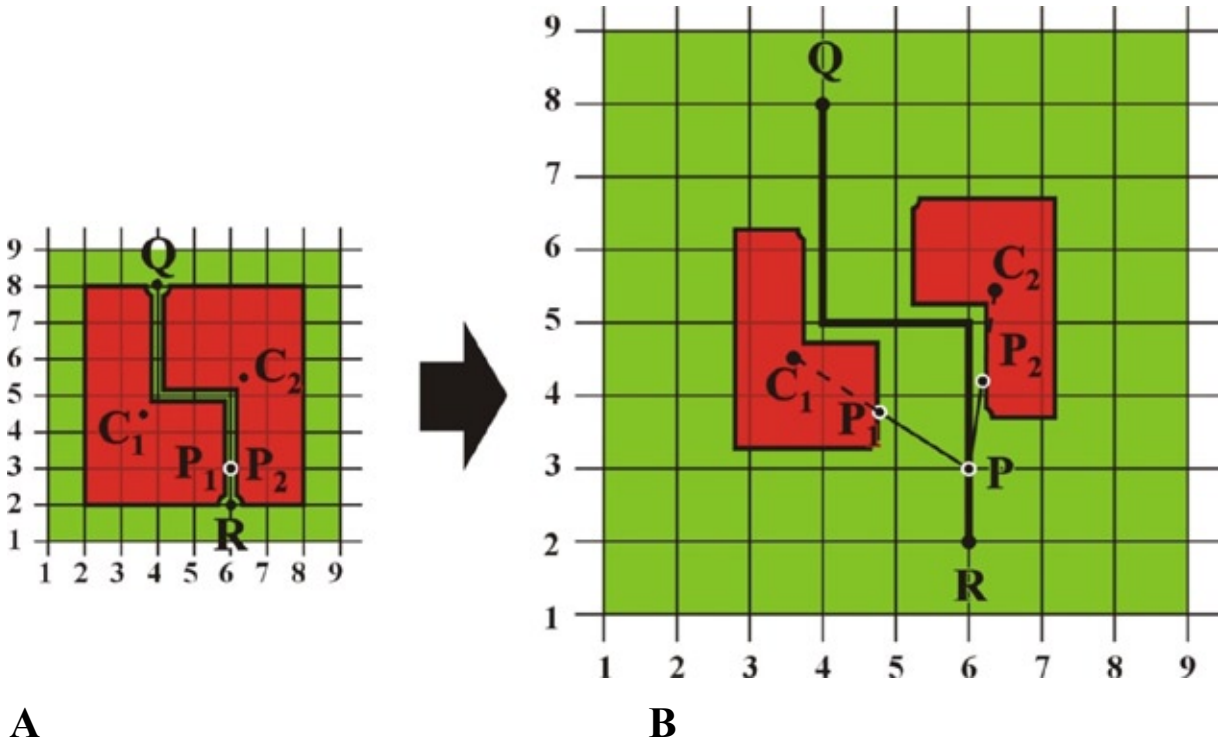


Fig. 63. *Geometrical model of tensional explanation of development of South Atlantic region with its main tectonic feature shown in Fig. 61B (explanation in text)*

The explanation of Fig. 14 adjusted to Fig. 63 is repeated beneath.

The two plates are the simplified models of South America and Africa. In figure A they are close together before the opening of the Atlantic Ocean. Both are "fastened" to their basement by their stable points of transformation – for South Africa, C_1 (3; 4.5) and for Africa, C_2 (7; 5.5). After stretching of the basement (figure B) the South Atlantic is open, the mid-Atlantic

Ridge (Q –R) is elongated relative to its parent continental margins and the point P (the Tristan da Cunha hot spot) has created the V-shape structure of Rio Grande and Walvis Ridges. All points connected with the basement (C1, C2, P, Q and R) preserve their coordinates during expansion.

The whole set of phenomena is explained by the single and simple process of stretching of the sublithospheric mantle.

g. Critique of Wilson's model of development of the region of South Atlantic on a non-expanding Earth

The model presented above can be compared with the plate tectonics model (Fig. 64) made by Wilson (1965).

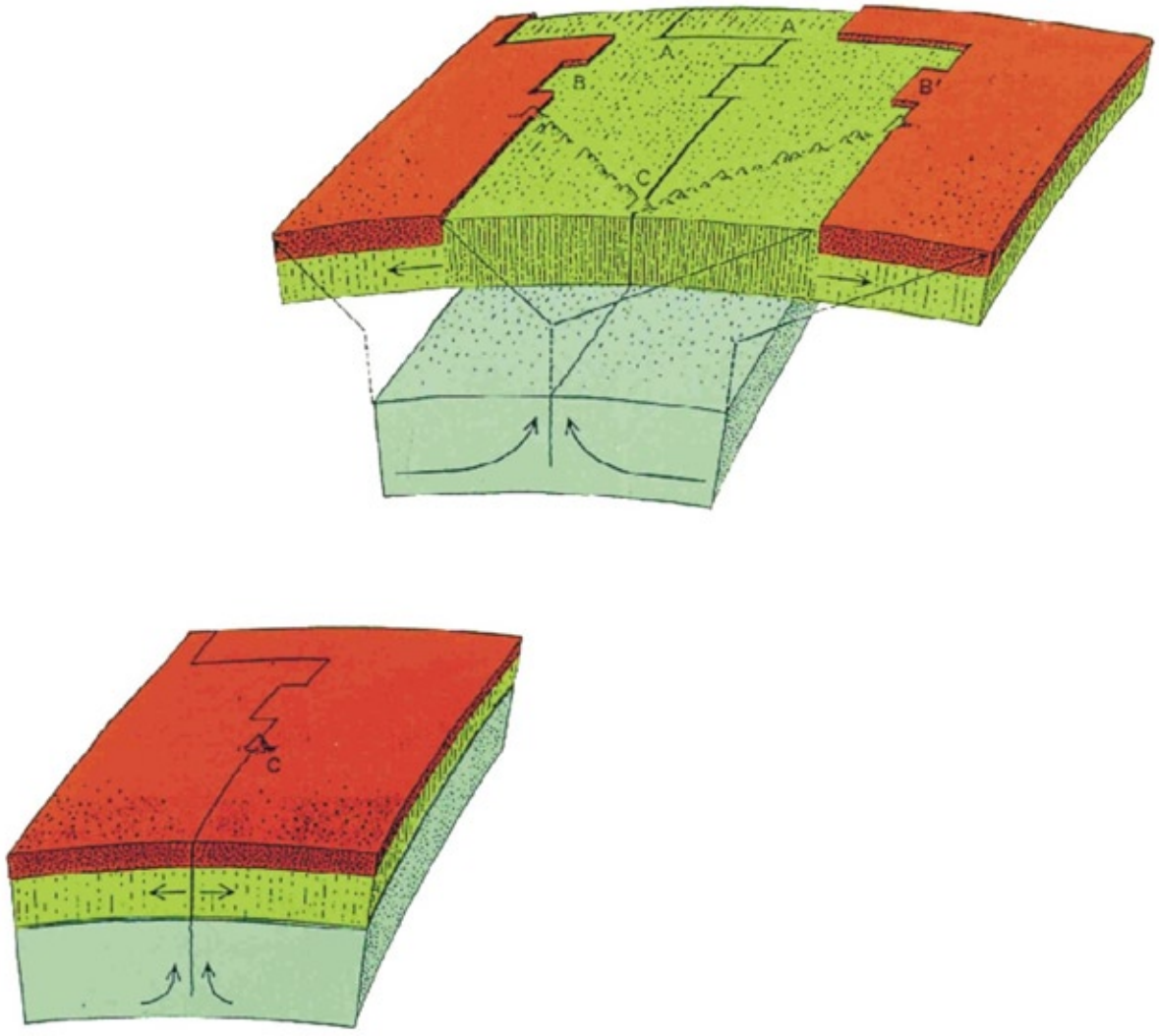


Fig. 64. *Attempt to explain the development of the South Atlantic made in plate tectonics (after Wilson,1965). Explanation in text*

Bilateral moving apart of Africa and South America is there explained by convection currents. To explain the southward shift of the Tristan da Cuhna hot spot and V-shaped geometry of the Walvis and Rio Grande ridges the

author is compelled to introduce an ad hoc hypothesis – the southward shift of the sublithospheric mantle which is something very strange in the frame of the plate tectonics theory. This shift is able to explain also the southward elongation of the Mid-Atlantic Ridge. However in order to explain its northward elongation in its northern part, is necessary to assume the northward shift of the same sublithospheric mantle. This is not only piling up of ad hoc assumptions but these assumptions are in mutual contradiction.

Simultanous movement of the lithospheric mantle northward in the northern part of the region and southward in the southern part of the region is tantamount to meridional stretching of the mantle. If the latitudinal stretching (spreading) is added, the simple explanation of moving apart of Africa and South America is obtained (without any convection current). All these is explained by one simple mechanism – radial stretching of the mantle (Figs 62A and 63A).

The reality of the expansion of the Earth is demonstrated in this paper by proofs. However some very important feature of the true theories is also their simplicity.

Let us quote Copernicus (1976, p. 21)

> *We must follow the wisdom of nature, which does not create unnecessary and useless things and it also frequently makes one thing with the ability to trigger multiple results.*

And Galileo (1962, p.12)

> *... however I know that the easiest and natural way to solve a problem is by one movement than by two– if you do not want to call them contradictory so call them opposite ones.*

The words “contradictory” and “opposite” in particular can be applied well to Wilson’s model.

h. Answer to Sudiro’s argument against expanding Earth

Sudiro (2014) tried to undermine the expanding Earth concept totally, but I consider the whole of his paper to be pseudo-scientific propaganda against the expanding Earth rather than scientific work. But one of his argument is worth discussing here. Sudiro insists that on the expanding Earth radial tension in the lithosphere should produce the mid-ocean ridge (Fig. 65A) instead of transform faults (Fig. 65B). However, as was explained in the Second Proof, the rigid lithospheric ends (mainly continental) of corridors

between neighboring fractures zones prevent their mutual parallelism and they do not move mutually away despite the radial tension. That this radial tension in the underground really exists demonstrates directly lengthwise moving apart of interplate mantle plumes shown in this chapter. Mantle infrastructure of the oceanic ridges expands (as the mantle itself) smoothly while its lithospheric superstructure expands by leaps. As was shown earlier, the lengthwise growth of oceanic ridges is created locally, mainly in Pavoni's lithospheric insertions.

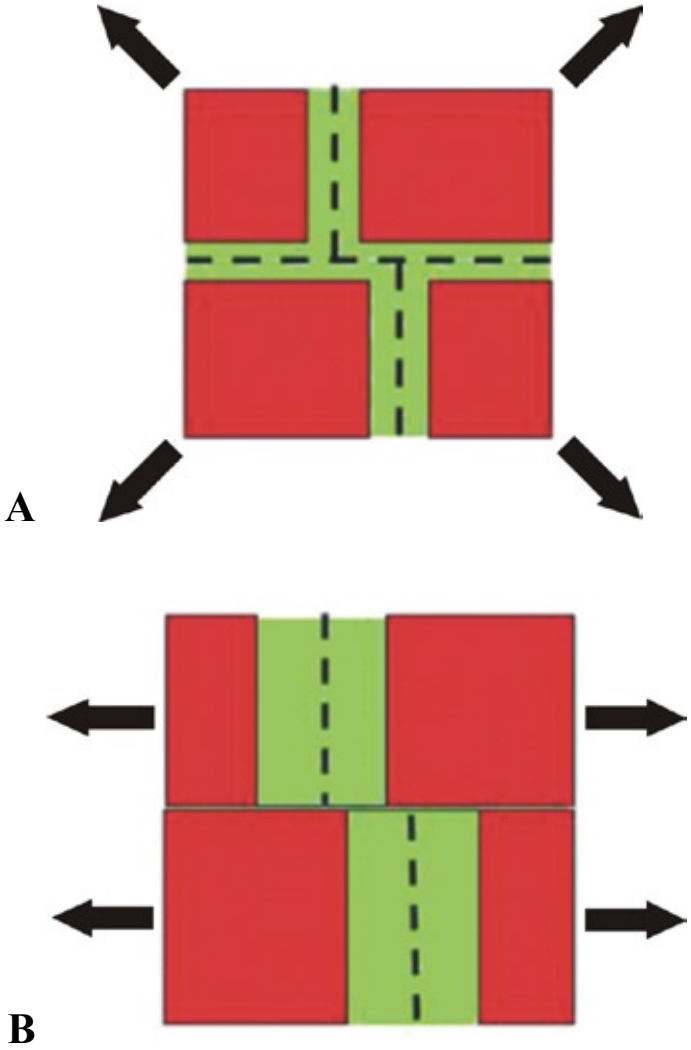


Fig. 65. *Figure redrawn from Sudiro (2014). According to this author on the expanding Earth a rift (horizontal line) should develop (***A***) instead of a transform fault (***B***)*

Sudiro did not draw proper conclusions from the difference between the plastic mantle and rigid lithosphere. He also did not recognize the wider context of his counterargument as this, presented in Fig. 61B.

* * *

A comprehensive discussion of hot spots and mantle plumes in relation to the expanding Earth was also made by Cwojdziński (2004).

5. THE FIFTH PROOF
Carey Arctic Paradox

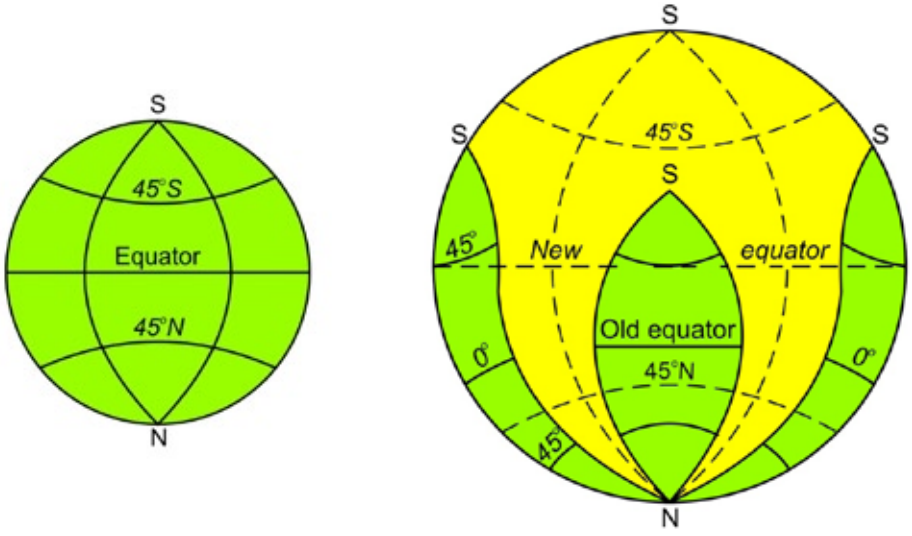
The Carey Arctic Paradox was already demonstrated in my two books: ***Expanding Earth and Space Geodesy*** and ***Falsification of Eulerian motions of lithospheric plates. Circularity of the plate tectonics theory***. The Arctic Paradox is a very important proof of the expansion of the Earth and its description must be repeated here.

a. Essence of the proof

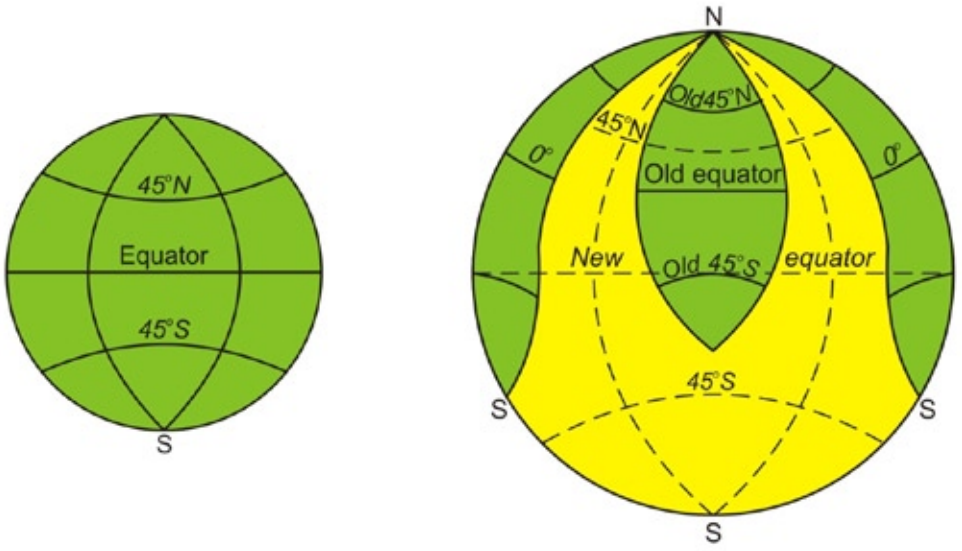
Carey (1976) noticed that all plates, except the Antarctic one, move northward (Fig. 36B), yet they do not collide there. Just the opposite: the Arctic region is entirely tensional. This situation was called by the author the "Arctic paradox" which can be solved only on the expanding Earth. Thus it is the next proof of the expansion of the Earth.

Carey's Arctic paradox has the same geometrical and logical structure as Carey's Pacific paradox, described earlier. The difference is only in the orientation of the axes connecting the centre of dispersion of the plates with the antipodal center of their expected concentration (collision) on a non-expanding Earth. In the Pacific paradox the axis lies in the equatorial plane and connects the centre of Pangaea with the center of Panthalassa (Pacific). In the Arctic paradox the axis is placed between the southern and northern poles.

Carey documented the northward movement of the plates by northward shifting of paleolatidudes recorded by paleomagnetism and paleoclimatology. He compared the process to an opening of the flower bud and that is why he turned the Earth upside down on his scheme (Fig. 66). The physical variation of Carey's flower bud model is a real bud for instance a peony (Fig. 67) where sepals imitate plates and the bud itself – an Earth interior.



A



B

Fig. 66. *Carey's Arctic paradox presented on Carey's flower bud model (explanation in the text)*

Fig. 67. *Carey's Arctic paradox presented on my peony bud model (Koziar, 2018a)*

Another model of the Arctic paradox was presented by Owen (1981) – Fig. 68, referring to van Hilten's "orange peel effect".

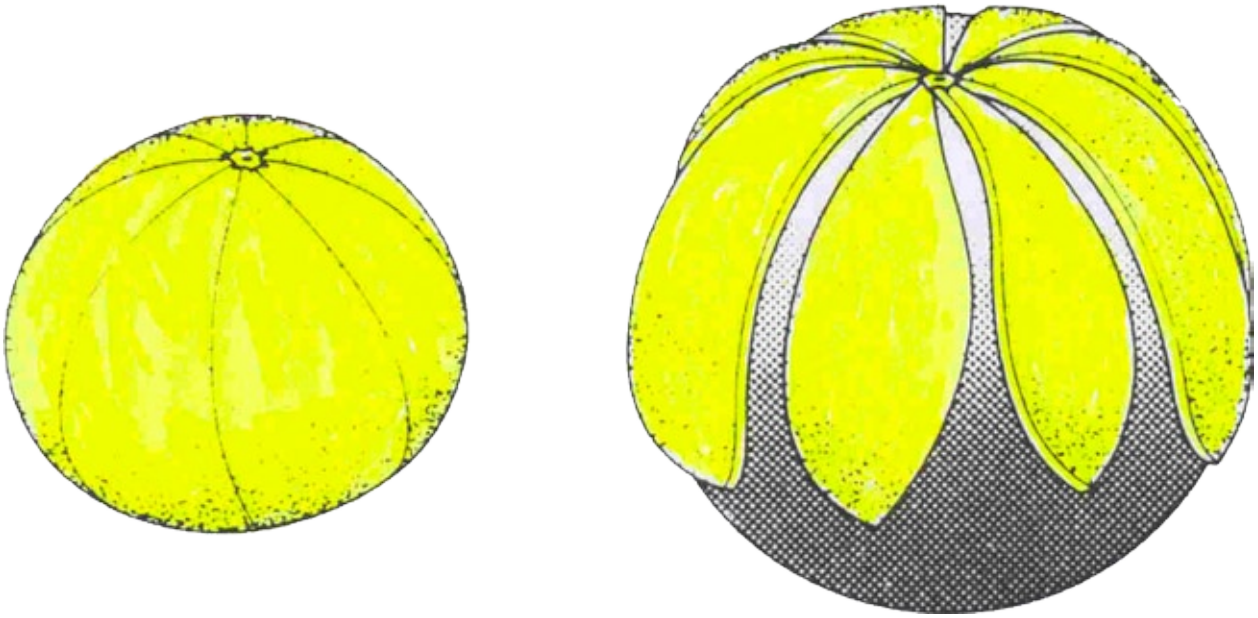


Fig. 68. *Owen's "orange peel" model of Carey's Arctic Paradox*

Still another model, by prof. Oberc, is of an inflated and bulging soccer ball (Fig. 69)

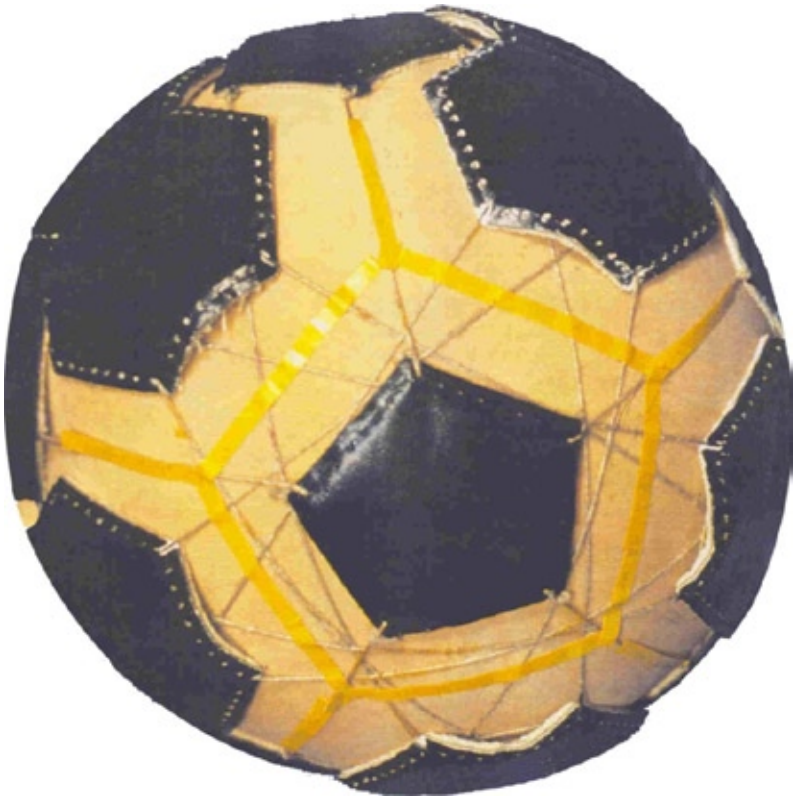


Fig. 69. *Oberc's bulging soccer ball model of Carey's Arctic paradox*

The single isolated plate on it represents an Antarctic plate.

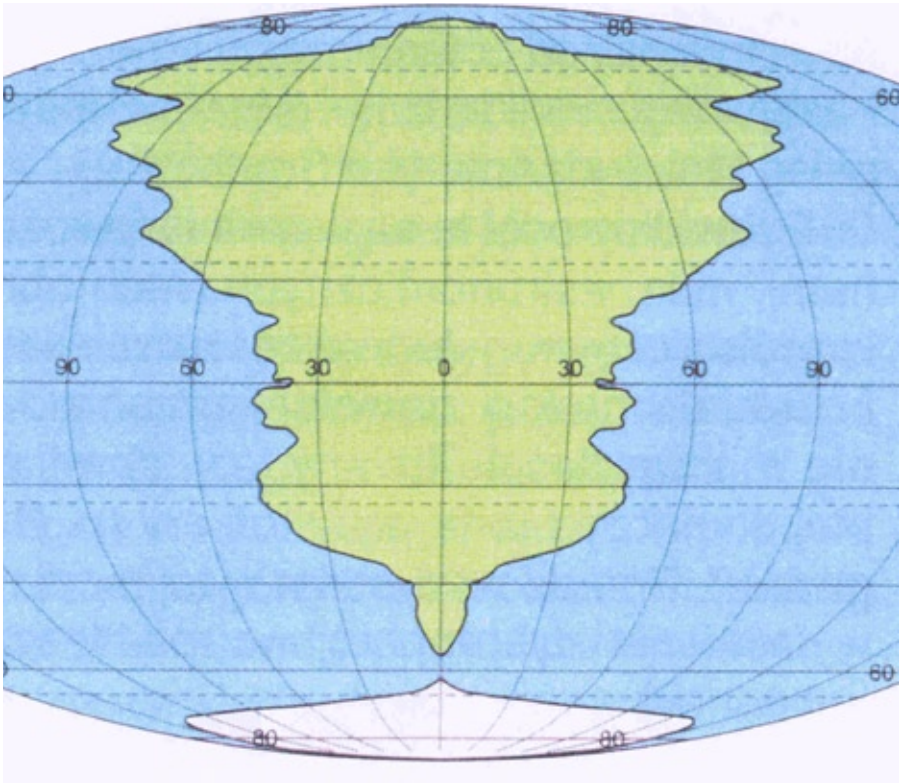


Fig. 70. *Synthetic model of distribution of lands and oceans in individual latitudes*

The Arctic paradox shows that the Earth lithosphere is in fact divided into two plates: the southern Antarctic one and the northern megaplate (broken but sticking together) which consists of all other plates. This division is underlined by a synthetic model of distribution of lands and oceans in individual latitudes (Fig. 70).

b. Carey's Arctic paradox confirmed by global pattern of hot spot volcanic chains

Carey's Arctic paradox is also well confirmed by the global pattern of volcanic chains generated by the mantle plumes. It must be mentioned that – paradoxically – Carey himself did not accept hot spots and mantle plumes.

Let us consider the following model of mantle plumes, hot spots and volcanic chains in the frame of the Arctic paradox as now solved on an expanding Earth (Fig. 71).

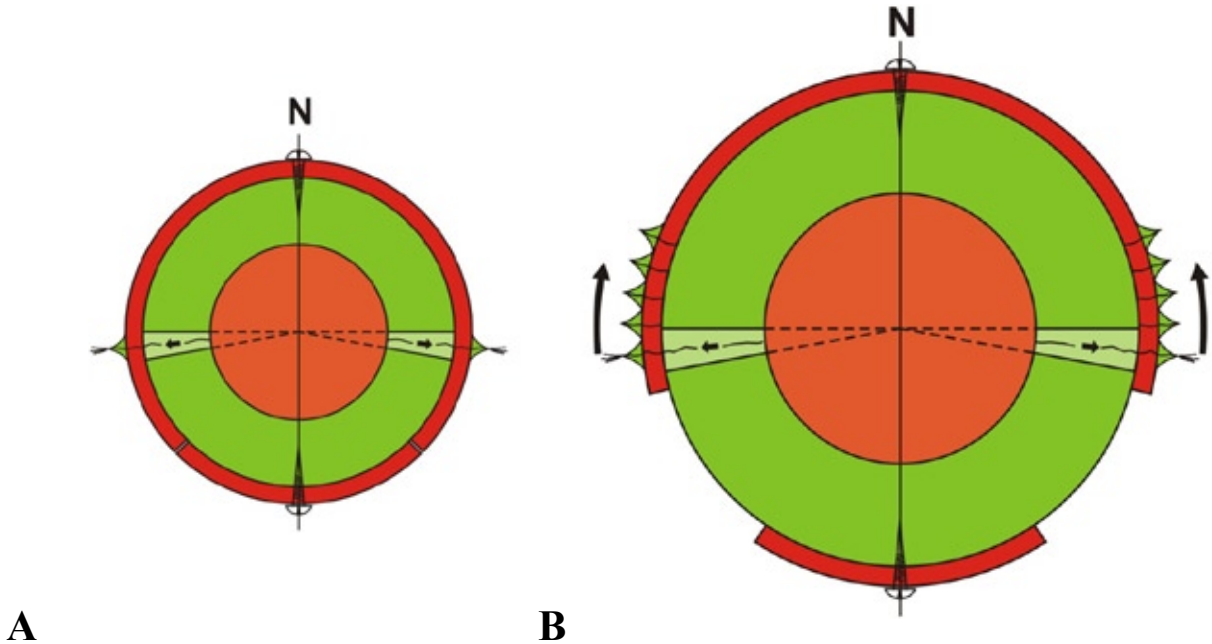


Fig. 71. *Scheme of development of global pattern of volcanic chains (explanation in the text)*

In Fig. 71A, Hilgenberg's type Pangaea is divided into the future southern Antarctic plate and the northern megaplate. Near the equatorial plane two antipodal mantle plumes produce two hot spots on the megaplate. During expansion (Fig. 71B) the megaplate moves apparently northward relative to the mantle and both plumes move southward relatively to the megaplate and produce volcanic tails directed northward. And this is the real situation (Fig. 72).

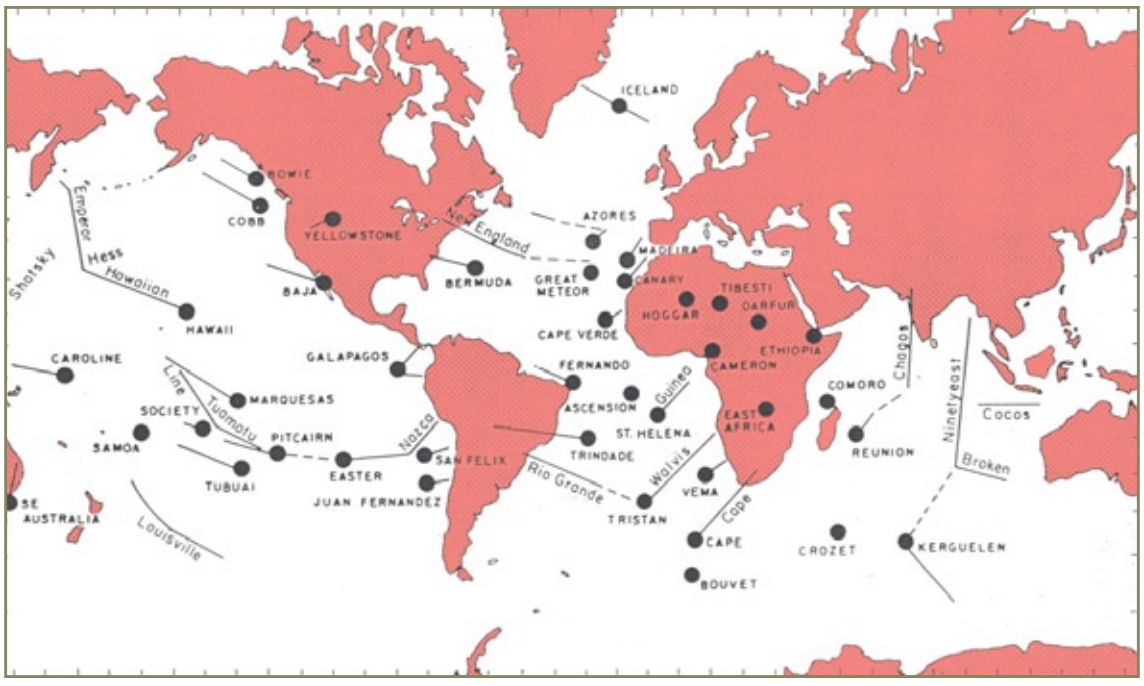


Fig. 72. *Global pattern of hot spots and their volcanic tails (Thompson and Morgan, 1988). Explanation in text*

In Fig. 72 only one volcanic chain is directed to the South (Kerguelen) but it lies on the Antarctic plate, so the Arctic paradox pattern is fully confirmed.

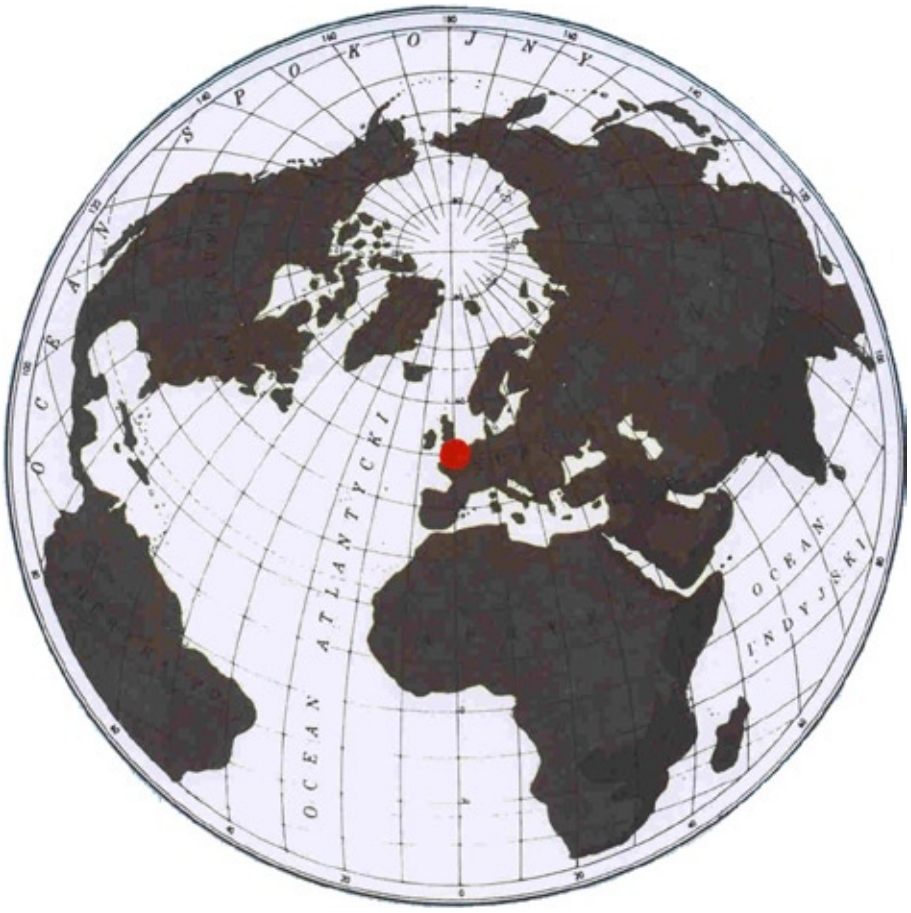
Of course, the volcanic tails of hot spots on the northern megaplate are not precisely directed to the north. This results from the latitudinal disintegration of the megaplate and latitudinal moving apart of its components (see Fig. 78).

The model in Fig. 71 not only explains the global pattern of the volcanic chains recorded in Fig. 72, but in reverse- the pattern recorded in Fig. 72 is a proof of the model presented in Fig. 71.

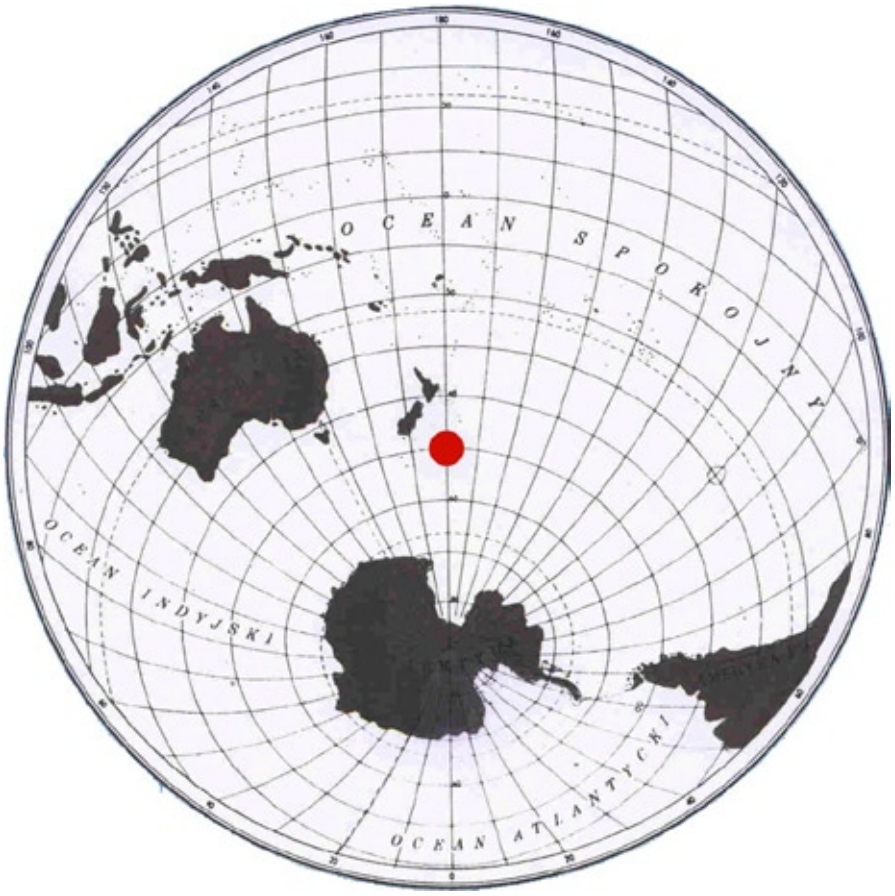
So the Arctic paradox is proved by three independent data sets: paleomagnetism, paleoclimatology (Carey, 1976) and volcanic chains of hot spots. And at the same time it is a proof of the expanding Earth.

c. Asymmetrical expansion as an explanation of asymmetrical displacement of continents and oceans

It must be stressed out that asymmetrical expansion noticed by Carey in his "Arctic paradox" is the only existing theoretical explanation of the long-known division of the Earth surface into the continental (A) and oceanic (B) hemispheres (Fig. 73).



A



B

Fig. 73. **A** *– continental hemisphere,* **B** *– oceanic hemisphere. The red dots mark poles of the hemispheres*

The division is underlined by synthetic distribution of lands, presented in Fig. 70.

It was shown at the beginning of Part One of this book that also only the expanding Earth explains the division of the Earth surface into two main levels: continental lowlands and oceanic bottoms, expressed by the hypsographical and Wegener's curves (Fig. 1 A, and B). Thus, only the expanding Earth explains two foremost global geographical features of the Earth surface.

d. Plate tectonics global movements in hot spots "absolute" reference frame confirm Carey's Arctic paradox pattern

The Arctic paradox should be compared to the plate tectonics global pattern of plate movements. The last is based on so called "absolute reference frames" (see the First Proof, point 4f). One of them is the reference frame based on hot spots. It is the proper absolute reference frame on the expanding Earth. However on a non-expanding Earth it is only a quasi absolute reference frame, so the word "absolute" was put in the title in inverted com-

mas. In spite of its quasi absolute character the frame gives a quite precise plan of the movement in plate tectonics. Thus, the global plan of the motions based on it should confirm Carey's Arctic paradox and therefore the expansion of the Earth. And that really takes place (Fig. 74). The later plans based on hot spots are very similar.

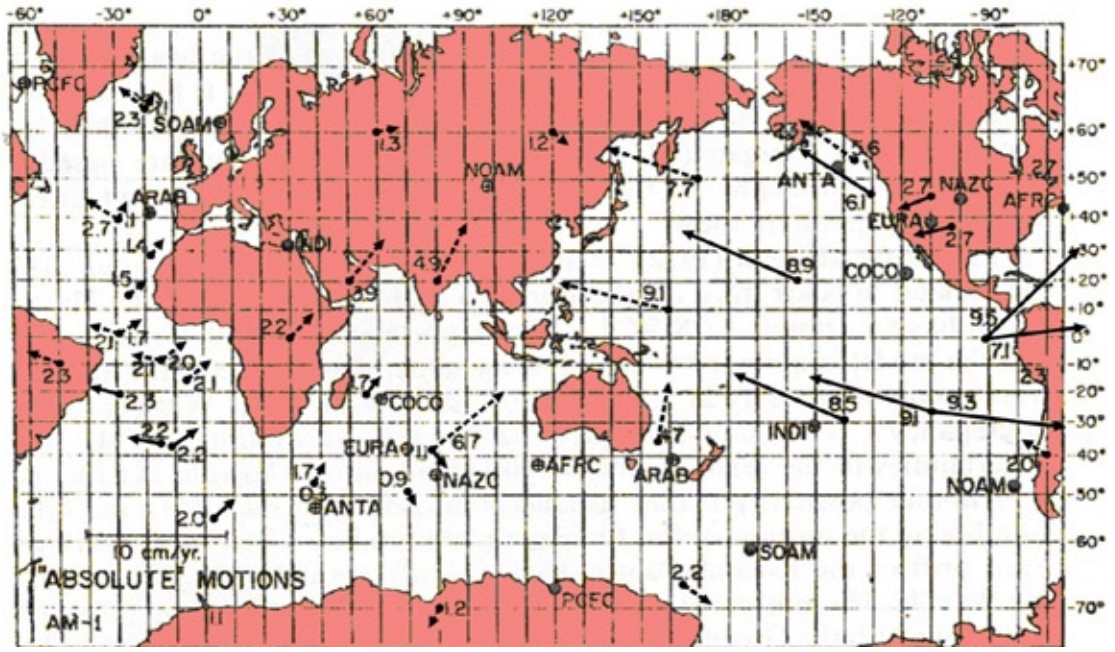


Fig. 74. *Plate motion relative to mantle plumes – AM1 (Minster et al., 1974). The motion confirms Carey's Arctic paradox*

The plan in Fig. 74 demonstrates the present plate motions. The hot spots allow the reconstruction of the global movement also in the past. In the Paleocene the plates were also migrating northward (Fig. 75).

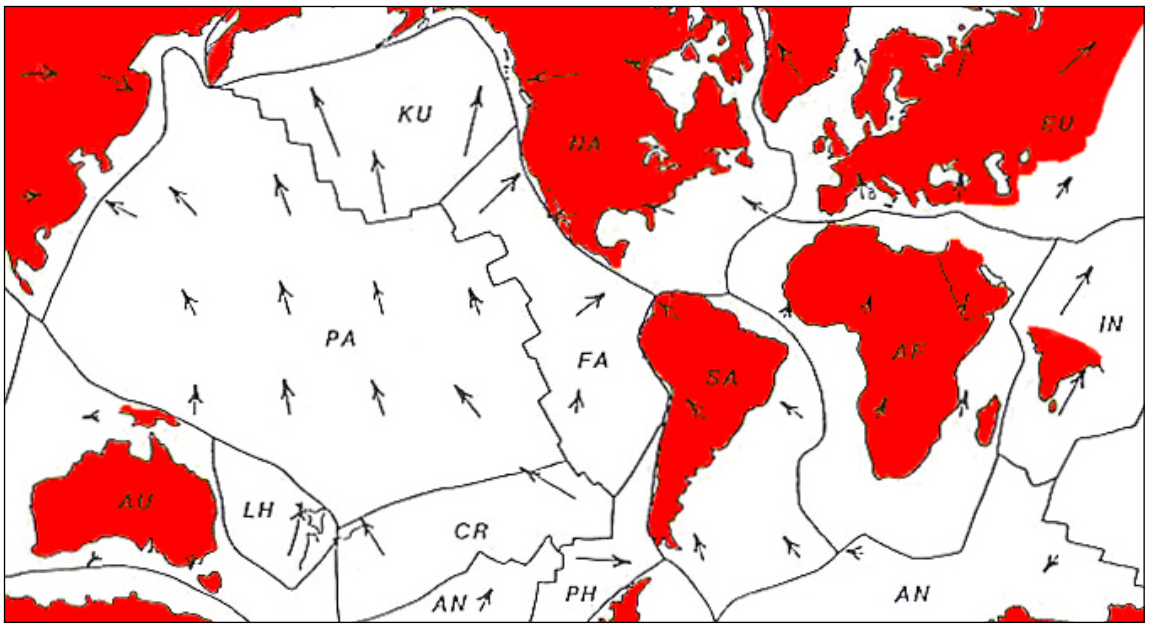


Fig. 75. *Plate motion relative to mantle plumes for 64 -56 Ma (Jurdy and Gordon, 1984)*

So the motion also confirms the Arctic paradox.

Because both plate tectonics plans shown above are based on hot spots, and hot spots were used independently to confirm the Arctic paradox in point 5b (Figs 71 and 72) they contribute nothing new to proving expansion of the Earth. But they are another example of the internal contradiction in plate tectonics.

e. Plate tectonics global movements in NNR "absolute" reference frame confirm Carey's Arctic paradox pattern

However, plate tectonics uses another quasi global absolute reference system, based on the so-called "no net rotation" (NNR) condition using Tisserand's principles (see the First proof, point 4f). It also documents northward shifting of all the plates, except the Antarctica one (Fig. 76).

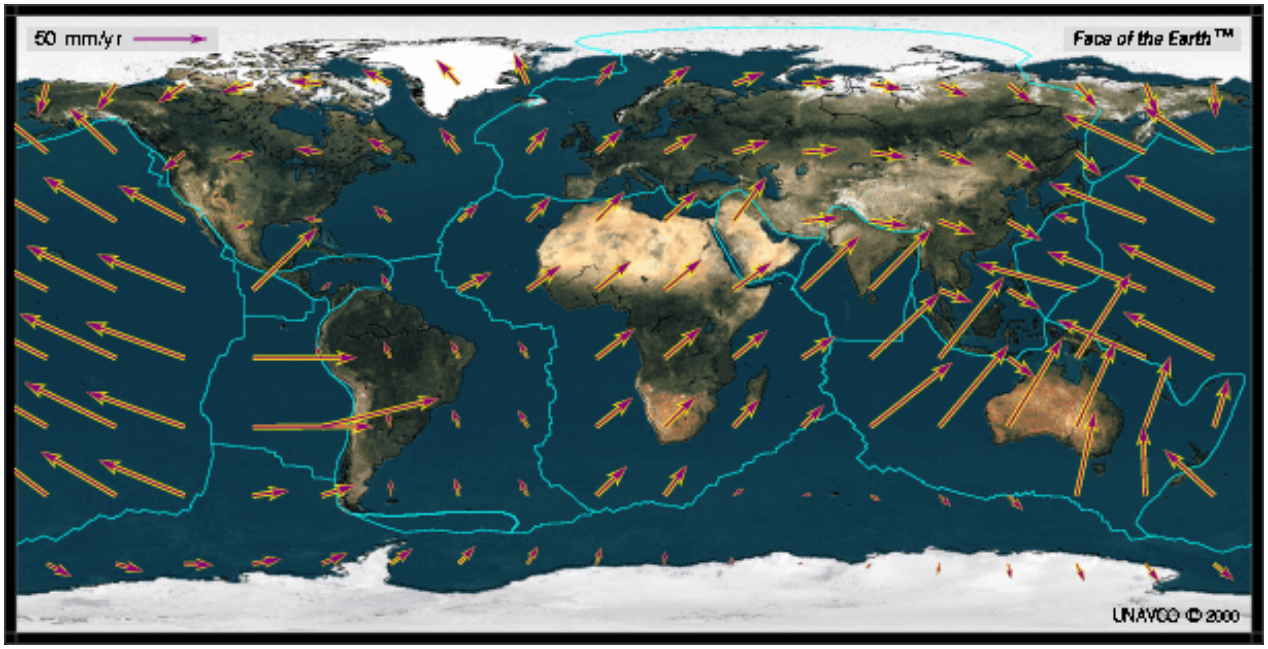


Fig. 76. *Plate motion obtained by plate tectonics in the NNR absolute reference frame (DeMets et al., 1994)*

The motion also confirms the Arctic paradox but this time it is an additional independent (4th) proof of the Arctic paradox performed by plate tectonics itself. Simultaneously, like the two former plans, it is an example of the internal contradiction of plate tectonics.

f. Space geodesy confirms Carey's Arctic paradox

The same NNR absolute reference frame is also used by space geodesy and the result is the same (Fig. 77). That is the next, 5th proof of the Arctic paradox.

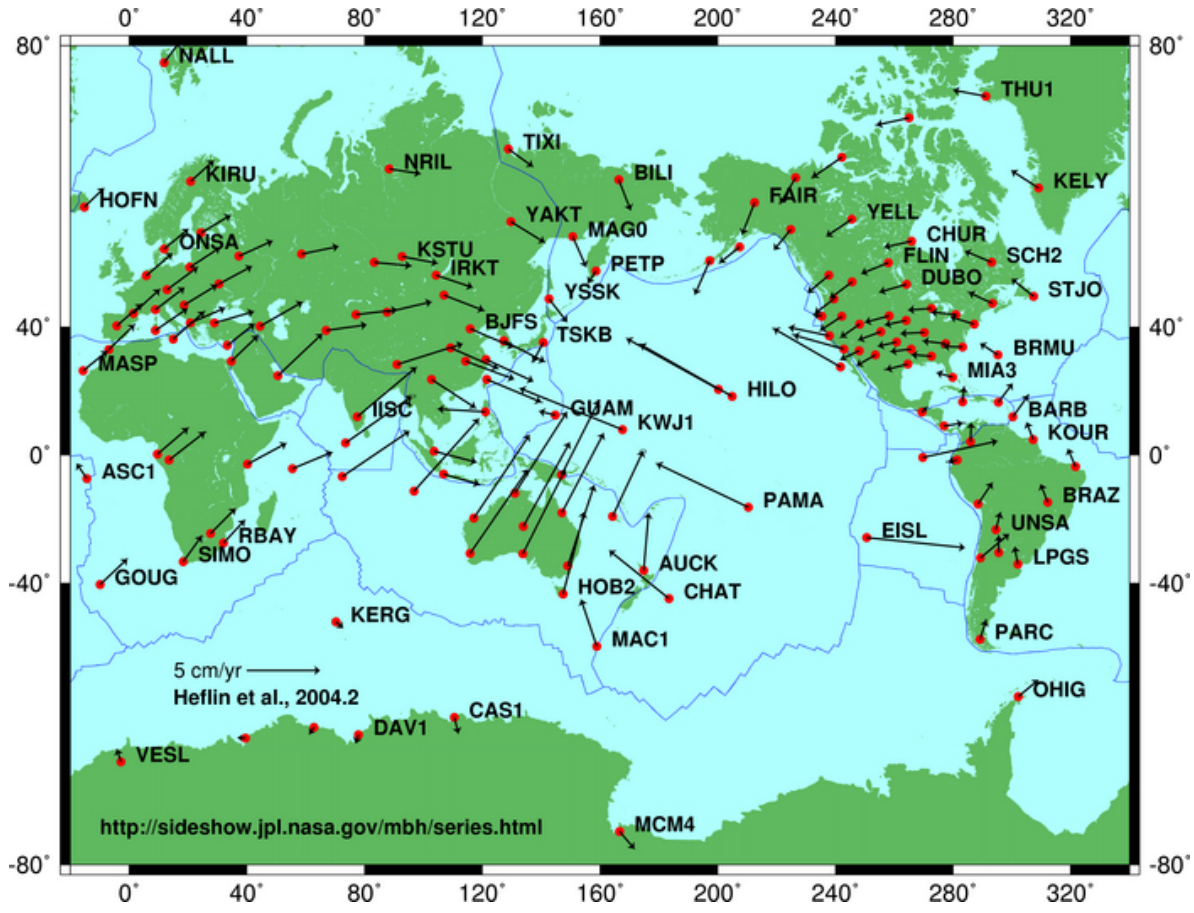


Fig. 77. *Plate motion obtained by space geodesy (source: Internet)*

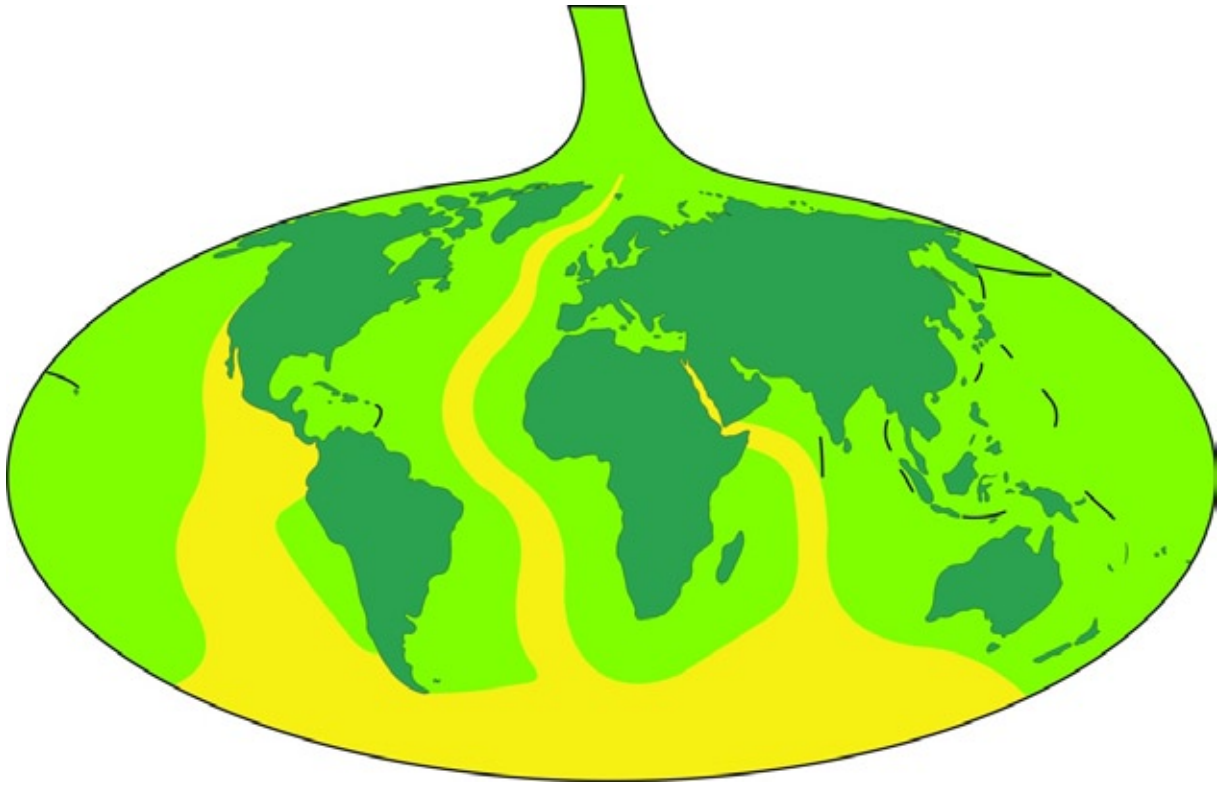
Summing up let us list all the proofs of the Arctic paradox:

1. Northward moving of paleolatitudes recorded by paleoclimatology
2. Northward moving of paleolatitudes recorded by paleomagnetism
3. Northward moving of plates recorded by hot spots
4. Northward moving of plates based on geophysical (spreading) data recorded in NNR "absolute" reference frame
5. Northward moving of plates based on space geodesy data recorded in NNR "absolute" reference frame

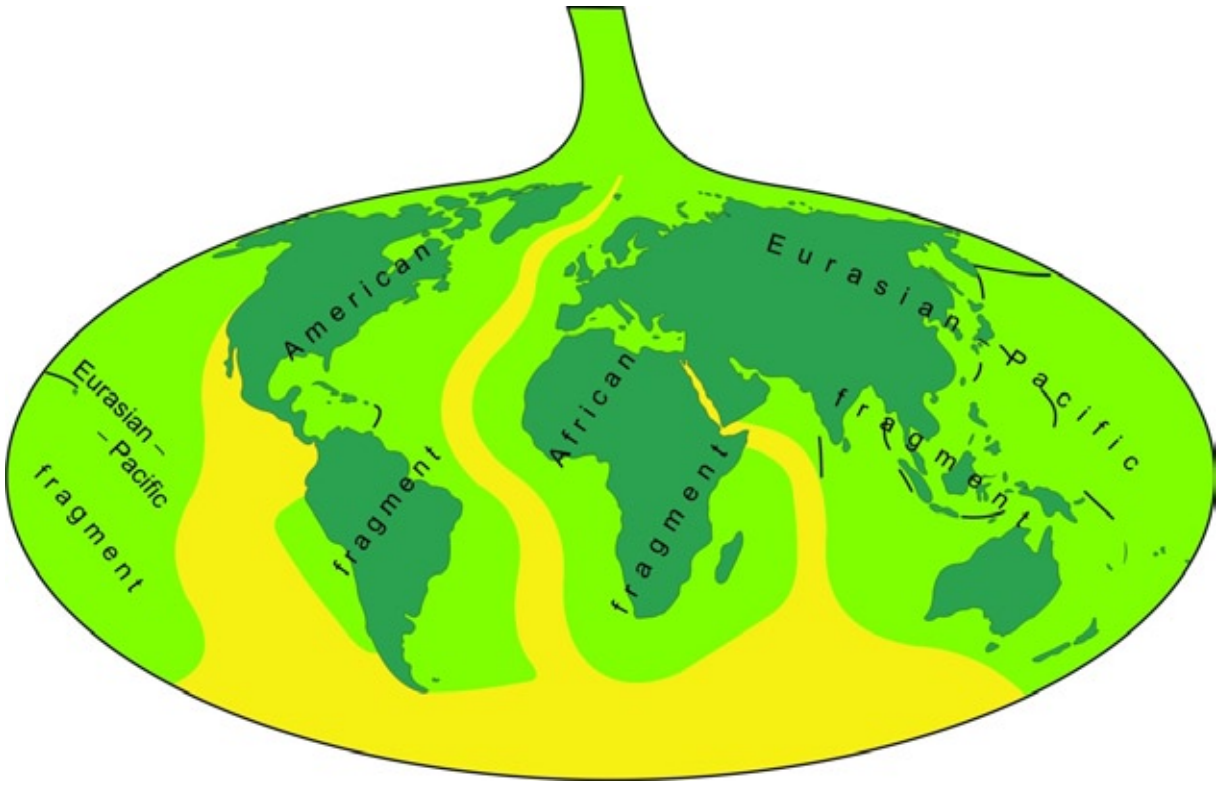
g. Accurate pattern of global geodynamics on asymmetrically expanding Earth

Carey's flower bud model (Fig. 66) can be presented in a more precise form using the real global plate pattern (Fig. 78A). In this figure the whole young, post-Paleogene lithosphere was removed as well as the whole Antarctic plate. So, the figure presents only the old northern megaplate from

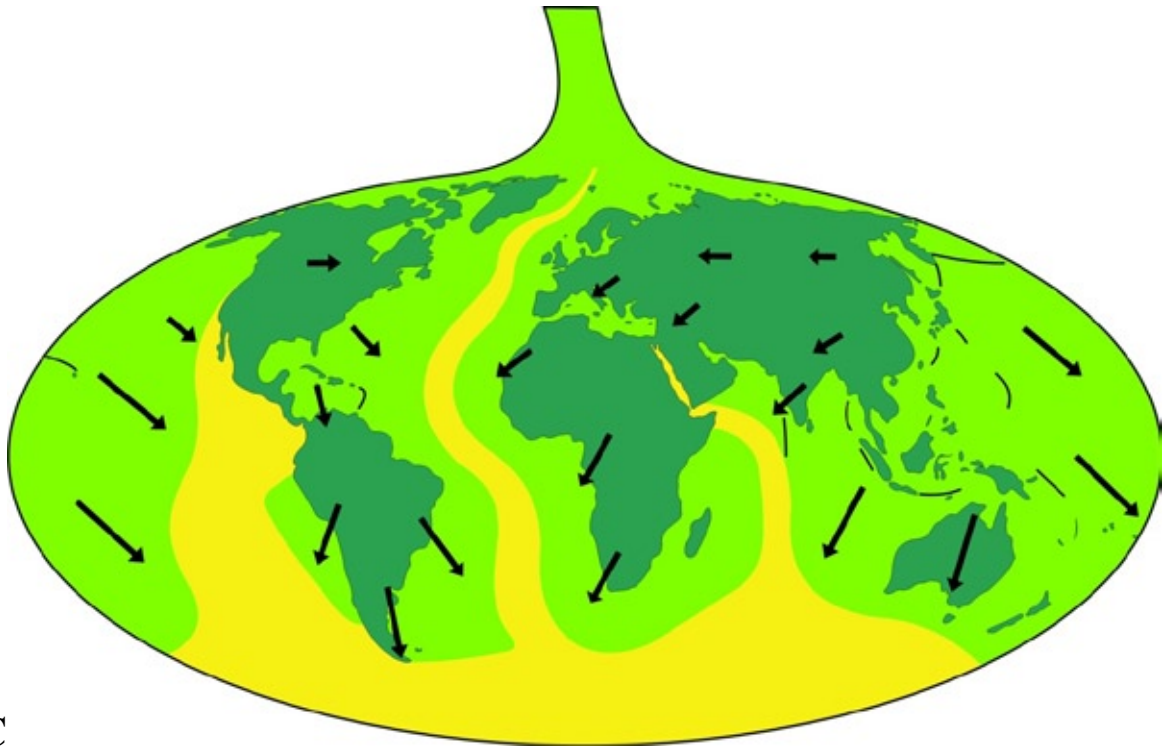
before 20 Ma with its fissures created in the past 20 Ma. The megaplate is divided into three partly separated fragments: American, African and Eurasian – Pacific (Fig. 78B).



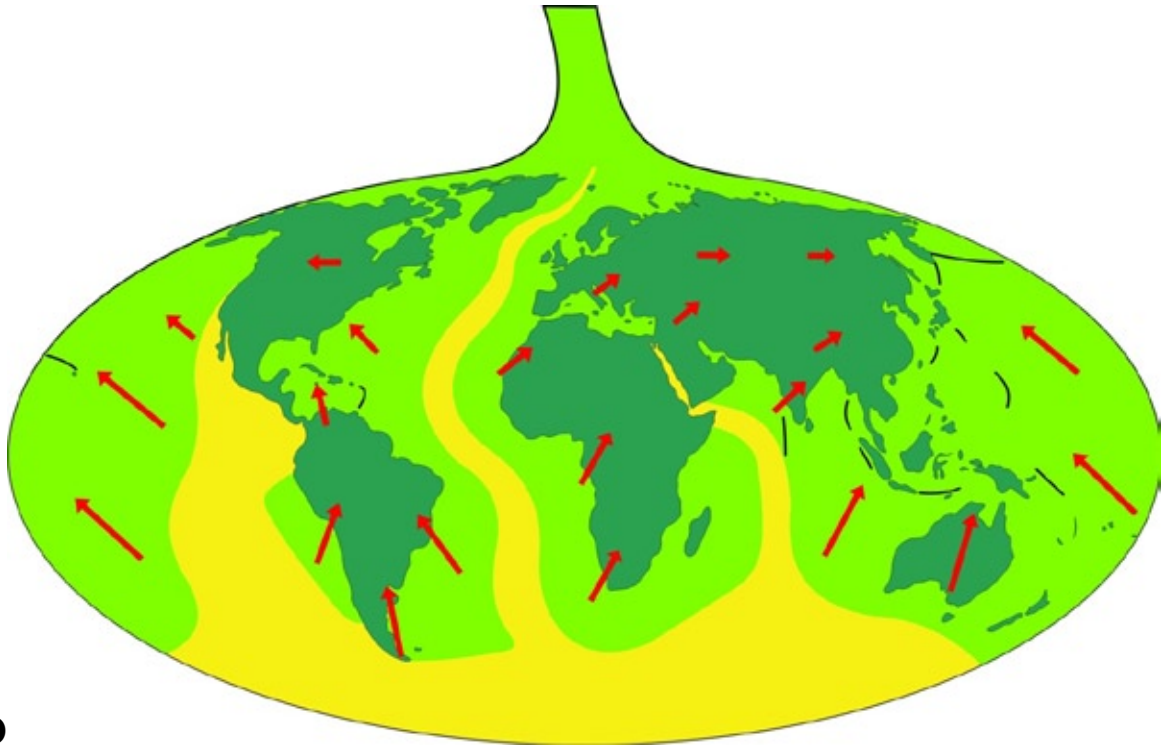
A



B



C



D

Fig. 78. *Precise model of asymmetrically expanding Earth (explanation in text)*

The asymmetrical southward expansion of the Earth interior and partition of the megaplate along generally longitudinal fissures create the following geodynamic pattern of movement of the Earth interior relative to the lithosphere (Fig. 78C). This is the real and divergent movement. The movement of the lithosphere relative to the Earth interior is quite opposite (Fig. 78D). The pattern in this figure is almost the same as in Fig. 77. This is an apparent and

convergent movement. In the frame of the non-expanding Earth theory it is treated as a real one. It creates, in this way, many fictitious collisions which are treated as confirmation of plate tectonics and its basic non-expanding-Earth assumption (circular reasoning).

The fictitious character of all above geodynamic convergences[3] is presented in the paper ***Expanding Earth and space geodesy*** (Koziar, 2018).

The expanding basement in Fig.78 constitutes the correct absolute reference frame for both geodynamics and space geodesy.

h. Average apparent northern movement of the equatorial band of the northern megaplate

The apparent northern movement of the northern megaplate (Fig. 78D) is somewhat chaotic but all arrows (apart of three northernmost horizontal ones) have a northern component. One can ask what is an average northern movement of a particular latitudinal band of the lithosphere resulting from the plate tectonics calculation? The answer was given by McCarthy (2007). According to his calculation (based on plate tectonics algorithms) the aparent average northern speed of the equatorial band of the lithosphere is 2 cm/year (Fig. 79 – the red arrow).

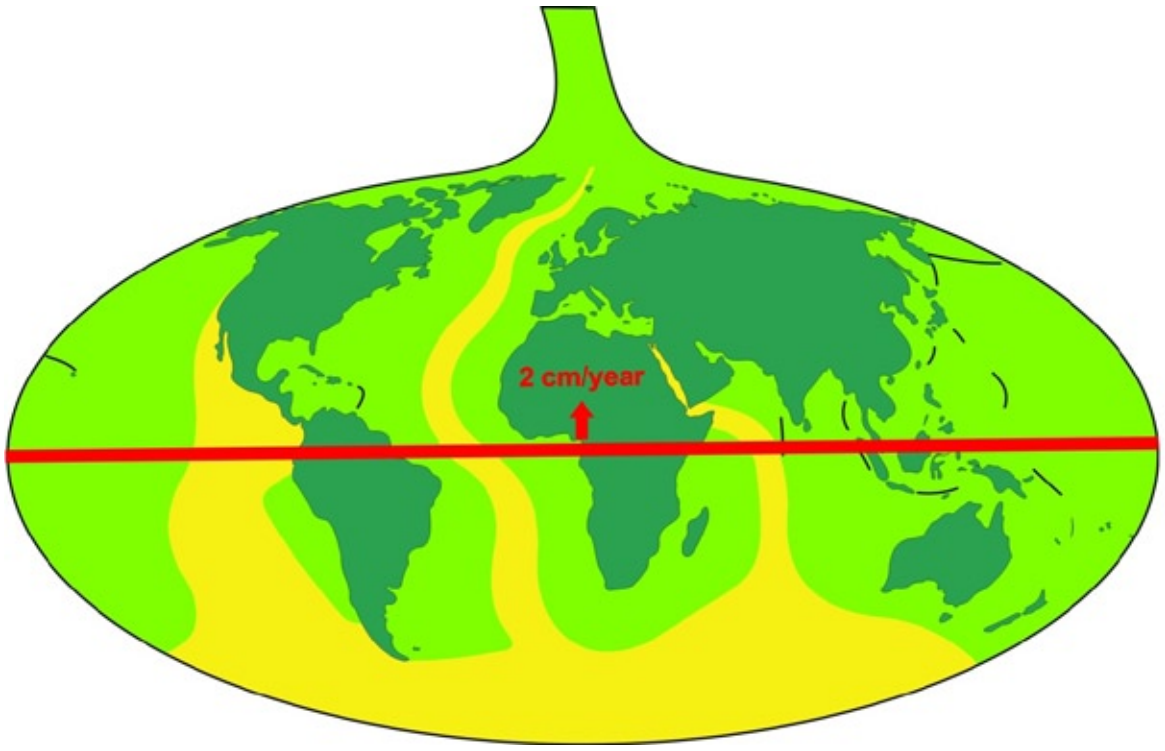


Fig. 79. *Average apparent northern movement of the equatorial lithospheric band (explanation in text)*

[3] The only real collisional movements in tectonics have gravitational or transpressional character and have a limited size.

The real annual increment of the Earth radius is about 2.5 cm/year (see Tables VI and VII) in Part Two of this book. This means that the equator moves away from both poles with the speed (measured along meridians) of about 4 cm/year. Such an apparent northward speed should have the equatorial band of the northern megaplate if the latter were inextensible along meridians. However it does not meet this condition, so the measured value is about half the above value.

6. THE SIXTH PROOF
Deep mantle roots of lithospheric plates

a. Tomographic pictures of mantle roots of the plates

In 1984 the first paper on seismic tomography was published (Woodhause and Dziewoński, 1984) which documented existence of deep mantle roots of the lithospheric plates. The roots are made of cooler and more rigid upper mantle and reach to the depth of about 300 – 400 km. In the following years many similar results were published (Dziewoński and Woodhouse, 1987; Montager and Tanimoto, 1991; Zhang and Tanimoto, 1993; Su et al., 1994) showing the existence of such deep roots beyond any doubt. They are under all continents which are the oldest parts of the plates, except for the Pacific one.

In the published papers the roots are shown on maps and on sections. Below the map of the roots at depth of 300 km is given (Fig. 80).

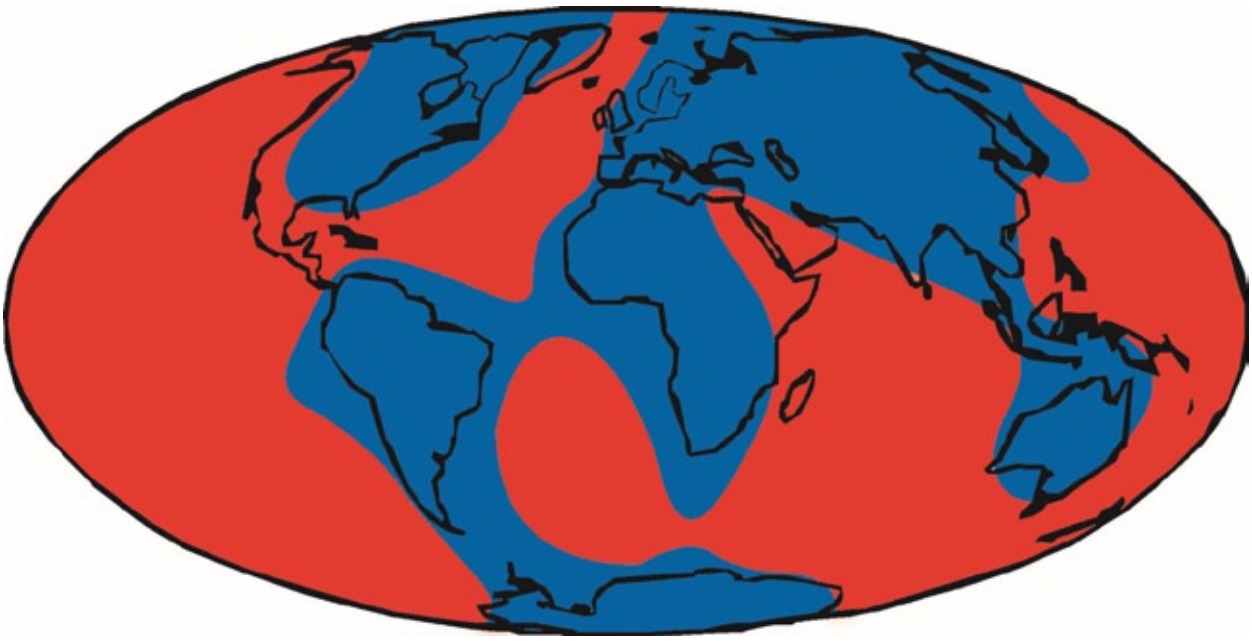


Fig. 80. *Mantle roots of lithospheric plates at the depth of 300 km (explanation in text)*

The blue area is the one of a positive deviation of the seismic wave velocity from the medium one at the depth of 300 km. In other words, in the blue regions the mantle is more rigid than in the red ones. The map is compiled by me from two papers (Zhang and Tanimoto, 1993 and Su *et al.*, 1994).

Below, two sections with mantle roots of continents are shown (Fig. 81).

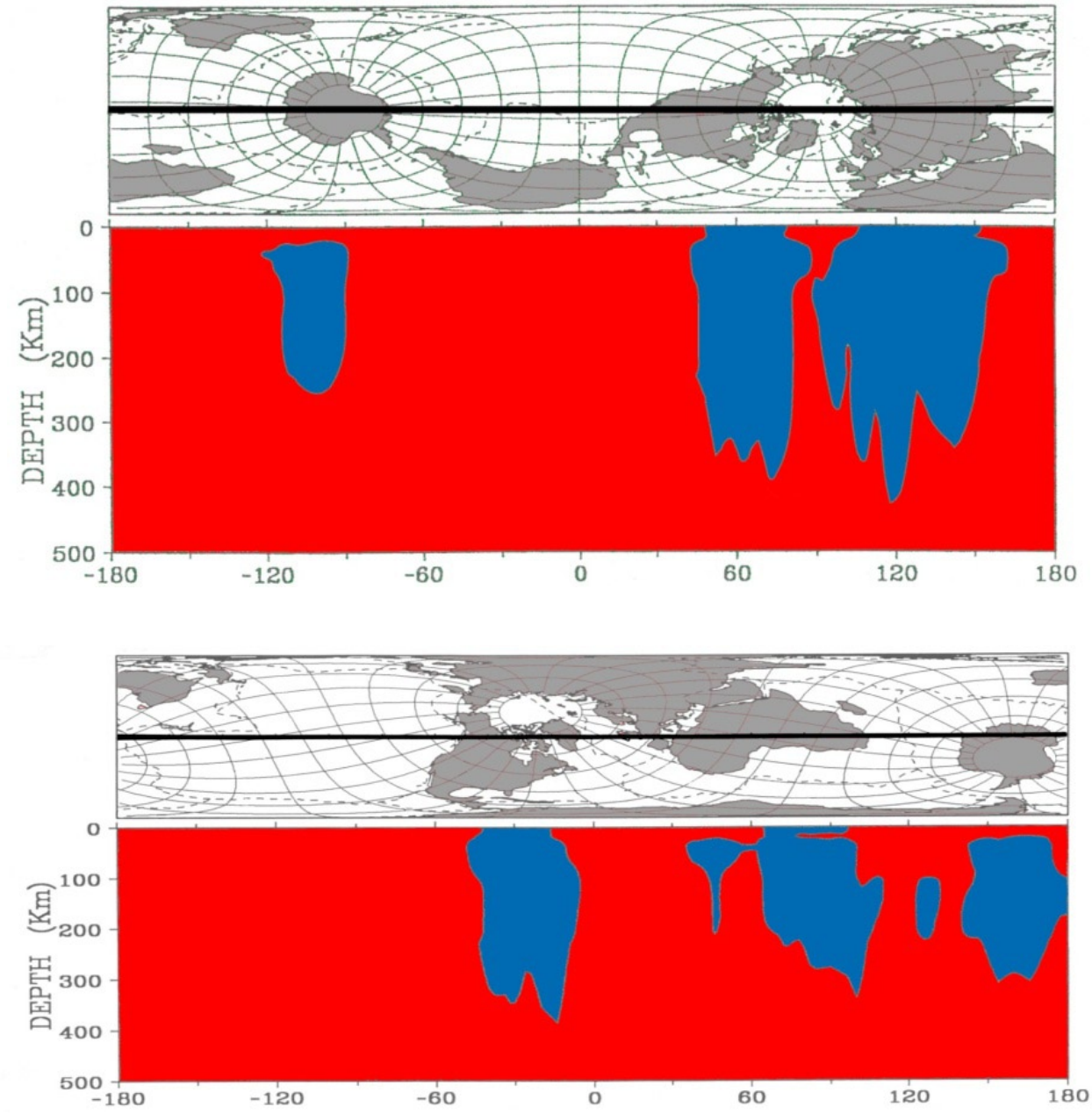


Fig. 81. *Deep mantle roots of continents on the sections made along the straight lines (top of the figures). On the basis of Zhang and Tanimoto (1993)*

The principle of outlining of the blue areas in Fig. 81 is the same as in Fig. 80. It shows the roots reaching down almost to the depth of 400 km.

b. Essence of the proof

The deep roots under continents (which are the oldest parts of plates) show that the plates are generally stable in relation to their basement. On the other hand the plates are mowing apart, as it is shown by the spreading of the ocean floor. That means the expansion of the Earth. This was first pointed out by Kremp (1990) in relation to the first seismic images of continental roots. The reasoning is similar to that in the case of the hot spots and mantle plumes, but this time the structures are very much larger.

A good model of plates which are stable in relation to their basement and simultaneously are moving apart, are fragments of a bark, stretched and torn on a growing trunk of a tree (Fig. 82).

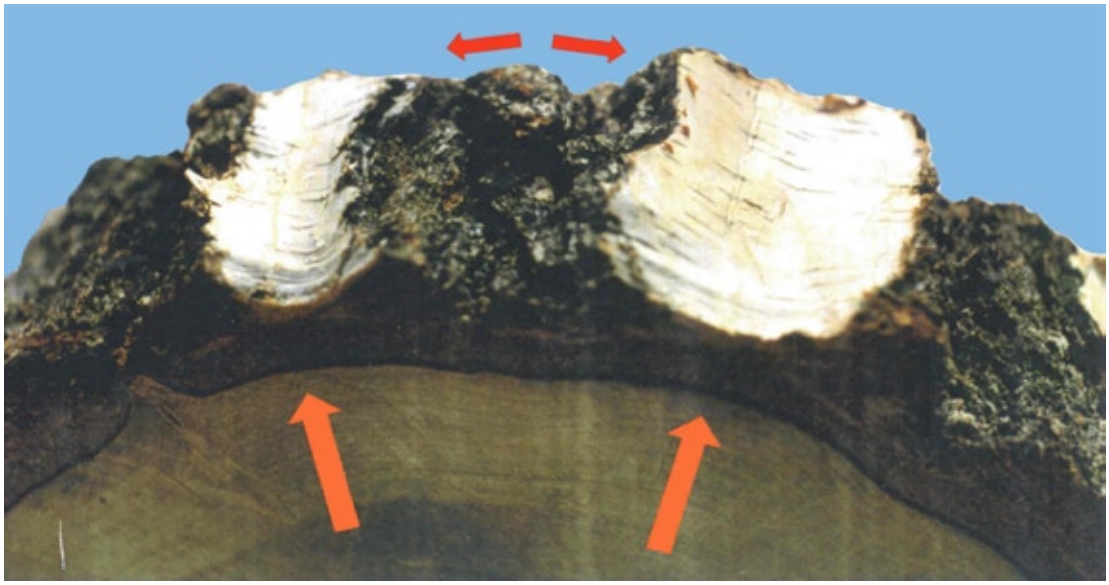


Fig. 82. *Stretched and torn bark on the growing birch-tree as a model of the lithosphere torn and moving apart on the expanding Earth*

c. Mantle roots and the model of plates on a stretched mantle

It has to be mentioned that the mantle roots of plates do not mean roots in a mechanical sense. The difference between rigidity of the lithosphere and the underlying lithospheric mantle is very big, independent of whether the latter is hotter or cooler. The difference is expressed by the ability to accumulate mechanical stress (which is revealed by seismity) by the lithosphere and the inability to do it by the underlying sub-lithospheric mantle (aseismic environment). So the roots only indicate an autochthonic position of plates relative to the mantle not some mechanical ties between them. In the same way the dry area under a parking car, when it is raining, indicates the stable position of the car. It does not mean that the dry area keeps the

car at the same place. That is why the existence of the mantle "roots" of the continents is not in conflict with my model presented in chapter II, but on the contrary it confirms the model by showing that in general continents are stable against the mantle.

The existence of the deep roots of the continents demonstrates their general autochthonism and excludes (in logical not mechanical meaning) their horizontal, large-scale unidirectional movement in relation to the basement (drift), assumed by Wegener and plate tectonics. However, the existence of roots does not exclude the slipping out of the radially stretched mantle from under the plates (Fig. 83). In this process the autochthonism of the plates is preserved.

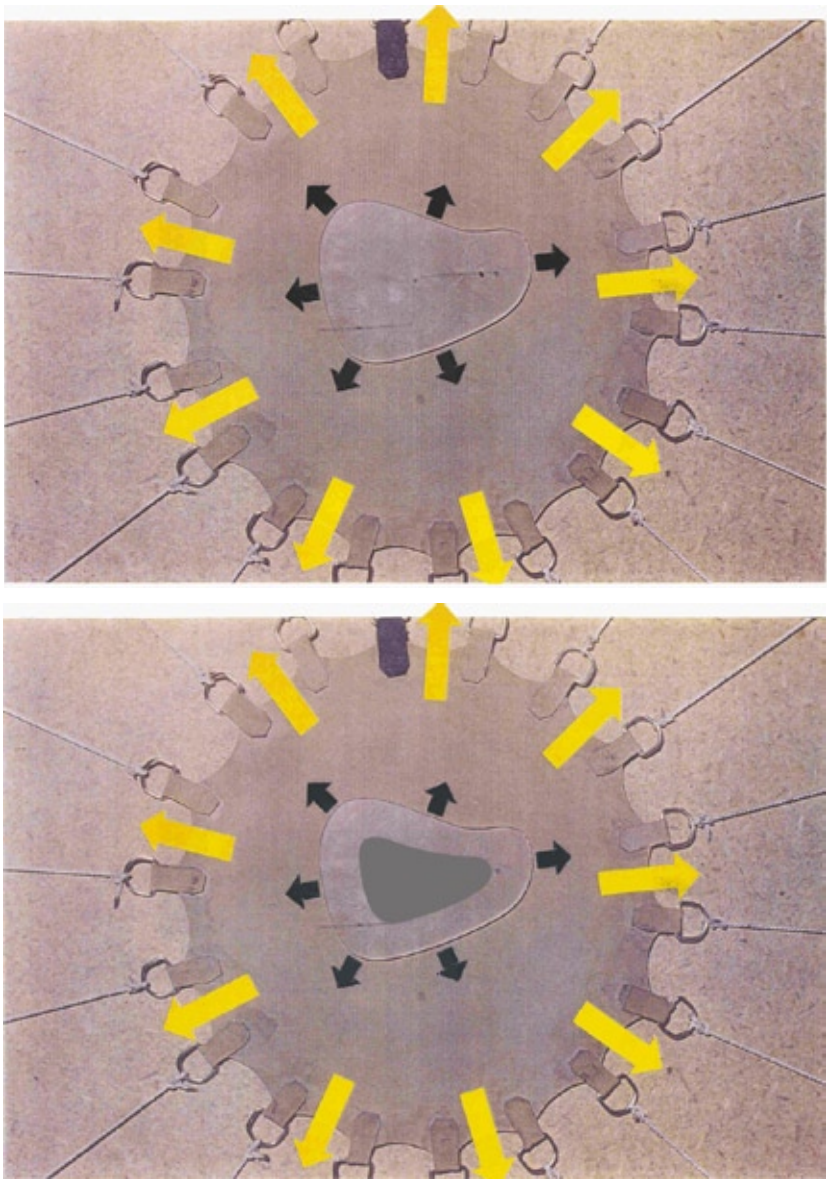


Fig. 83. **A** *– Stretching of homogenous rubber which is slipping out in all direction from under a plexiglass plate,* **B** *– stretching of inhomogenous rubber which is more compact under the plate (dark grey area). The slipping out in all direction from under the plate is preserved*

7. THE SEVENTH PROOF
Ripper–Perin expanding great circle

Ripper (1970) found a great circle on the Earth which crosses only divergent zones, avoiding all convergent ones assumed by plate tectonics (Fig. 84). The circle as such proves expansion of the Earth.

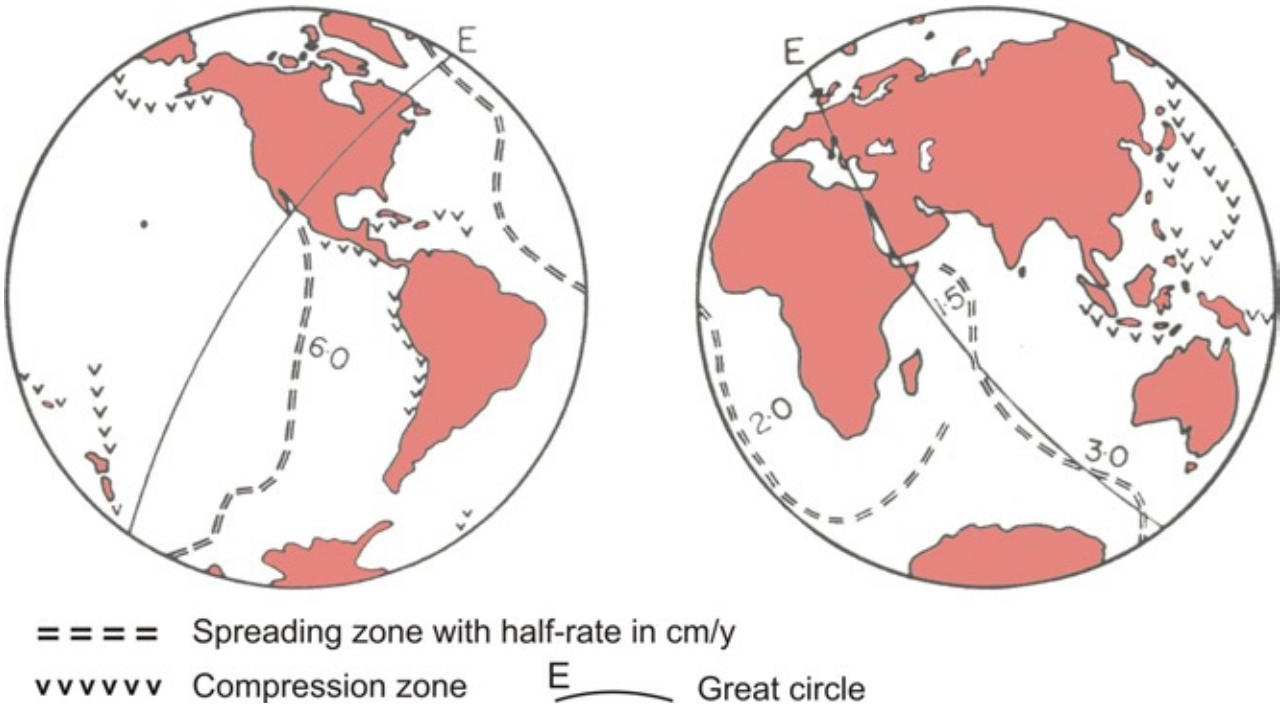


Fig. 84. *Ripper's expanding great circle (full explanation in text)*

Independently Perin (1994) found almost the same great circle (Fig. 85)

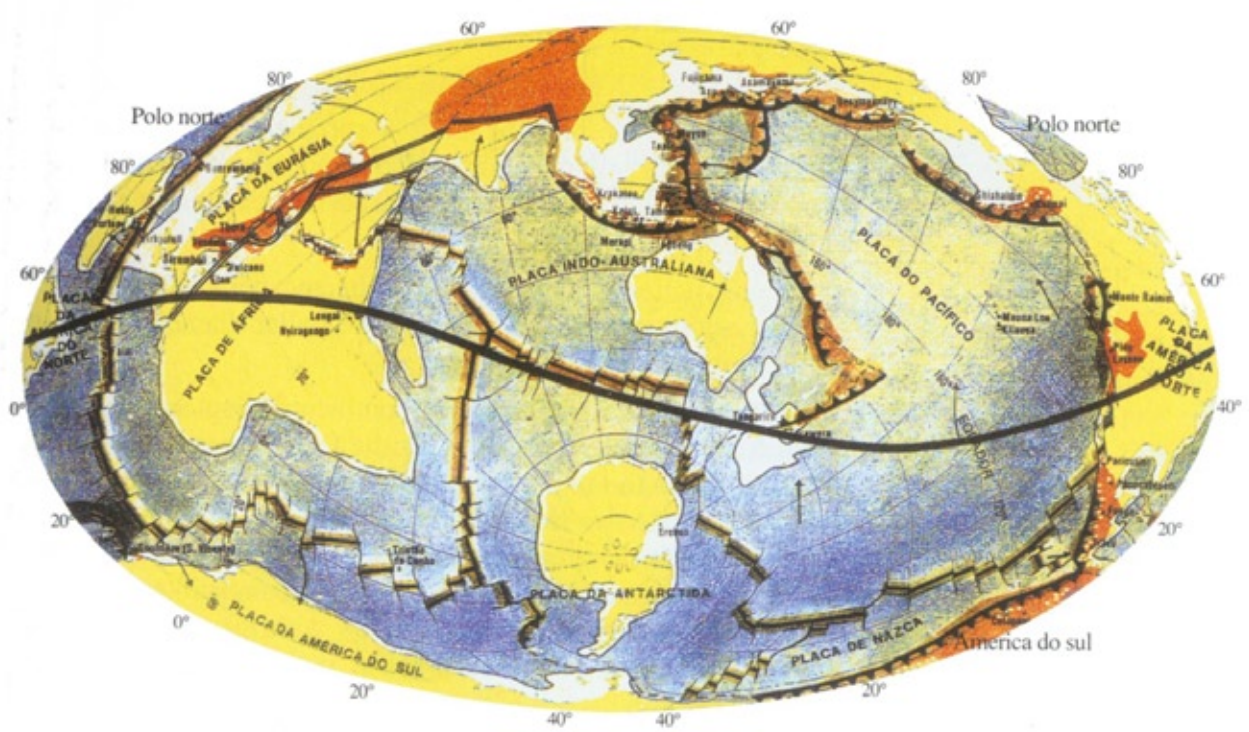
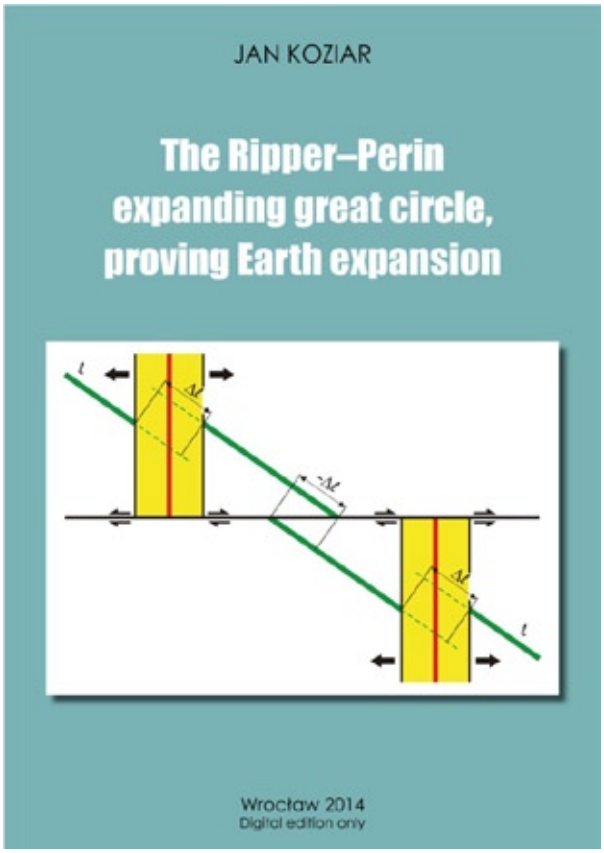


Fig. 85. *Perin's expanding great circle (explanation in text)*

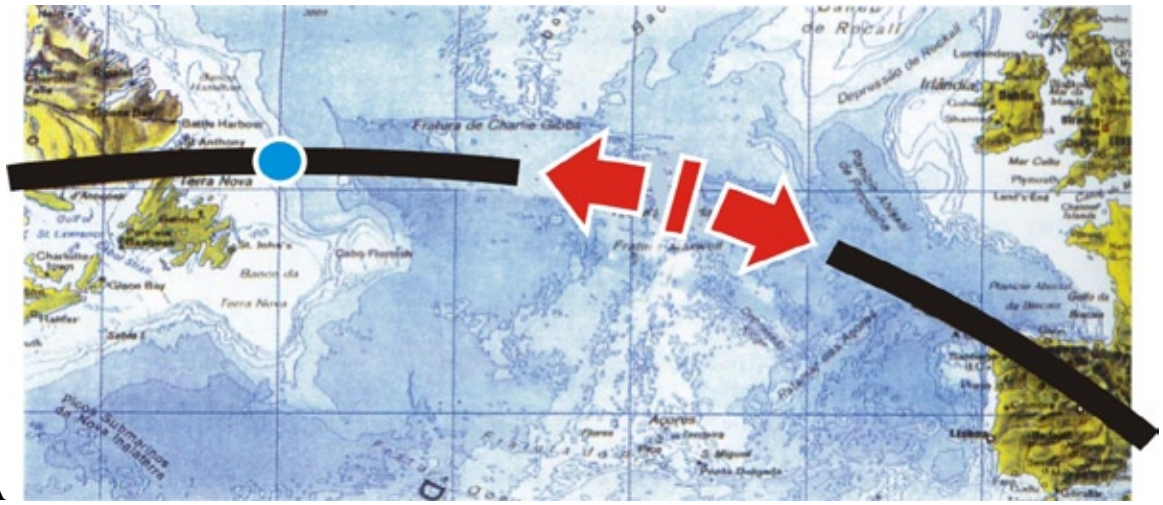
Dooley (1973, 1983) tried to undermine Ripper's proof but I showed his reasoning was not correct in my paper (Koziar, 2014):



www.wrocgeolab.pl/circle.pdf.

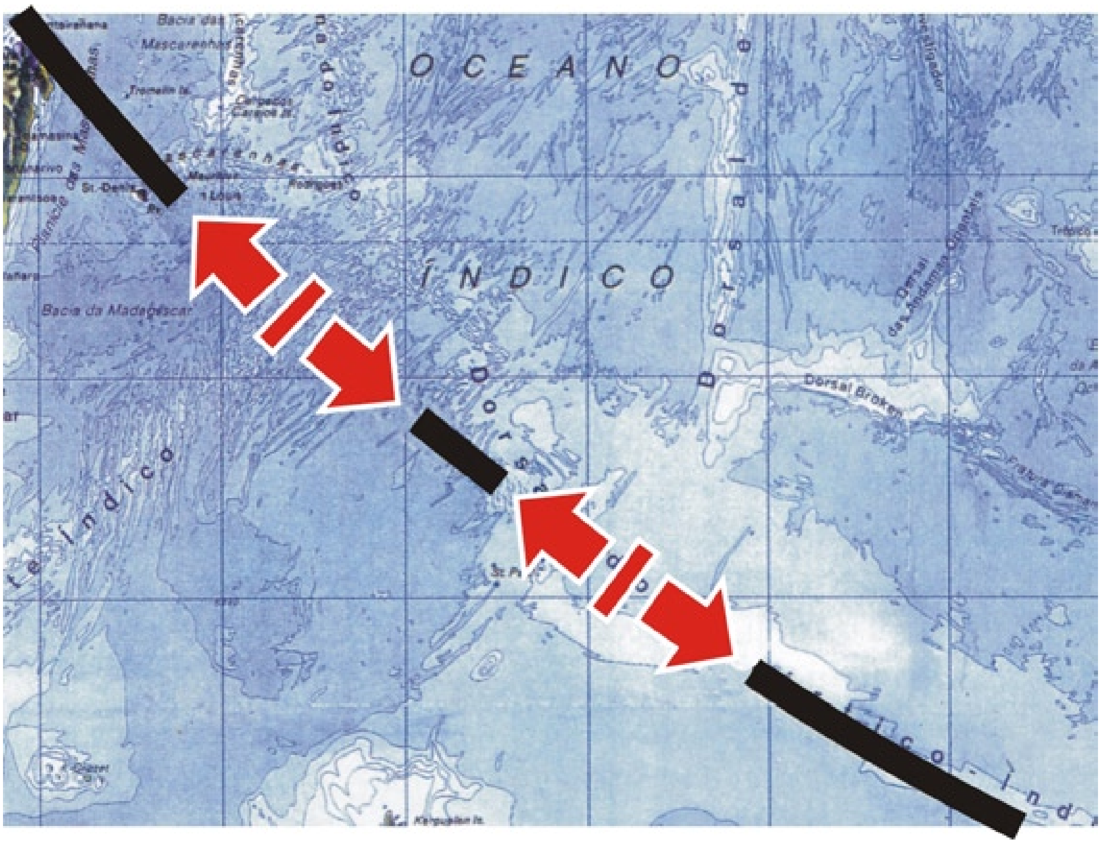
I refer all interested readers to this work for details.

Below the Perin great circle (Perin, 2003) is presented in sections (Fig. 86). The circle is determined by crossing points with the equator (140^0 W, 0^0) and (40^0 E, 0^0), also by the points of the extreme northern range (50^0 W, 51^0 N) and the extreme southern range (130^0 E, 51^0 S). The determining points are marked in Fig. 86 with blue circles. The divergent elements of the circle are marked by red arrows.

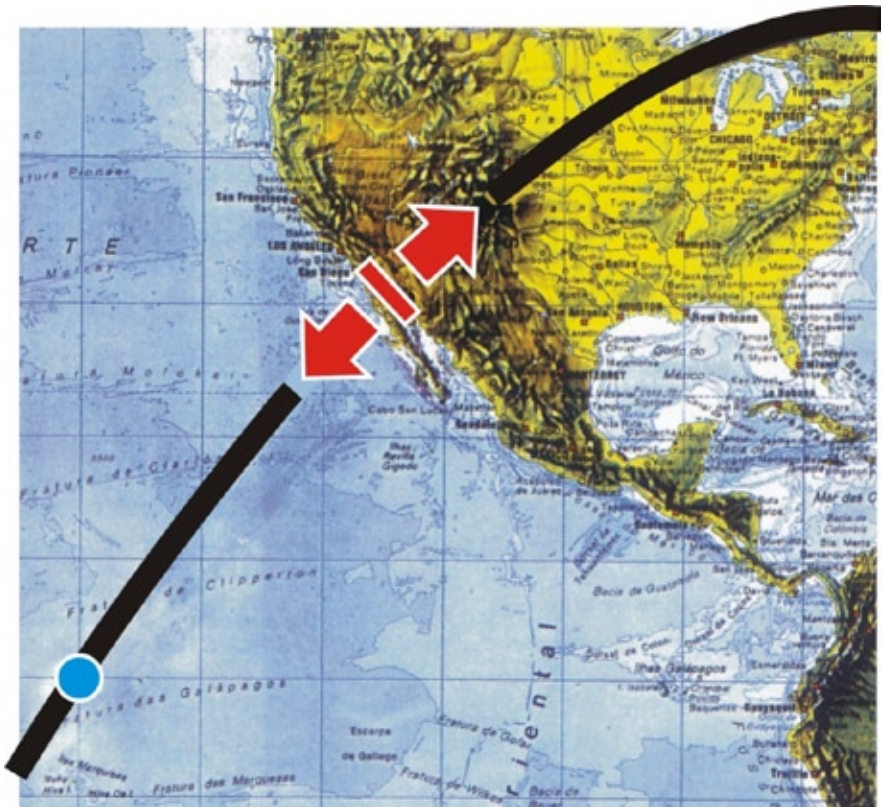


A


S A A R A
S A H E L
S U D Ã O
Golfo da Guiné
Bacia da Guiné
Congo
OCEANO
B


O C E A N O
Í N D I C O
Bacia da Madagáscar
Dorsal Broken
C

D



E

Fig. 86. *Intersection of Perin's perimeter with tectonic divergent zones:*
A *– intersection of Perin's perimeter with the Atlantic Ridge.*
● *point of extreme northern range of Perin's perimeter.*
B *– intersection of Perin's perimeter with the East African Rift.*
● *east point of crossing of Perin's perimeter with the equator.*
C *– intersection of Perin's perimeter with the African-Antarctic Ridge and the Australian-Antarctic Ridge (here it is almost parallel to the axis of divergence) .*
D *– intersection of Perin's perimeter with the Australian-Antarctic Ridge (here it is almost parallel to the axis of divergence).*
● *point of the extreme southern range of Perin's perimeter.*
E *– intersection of Perin's perimeter with the North-East Pacific Ridge and the divergent Basin and the Range Province of the North America.*
● *west point of crossing of Perin's perimeter with the equator*

Thus the great circle found by Ripper and Perin is the well-determined growing perimeter of the Earth. If the growth of only one perimeter of the Earth is proved then the whole Earth globe must be growing. This is the simplest proof of the expansion of the Earth.

IV. THE BEST PRESENT GLOBAL RECONSTRUCTIONS OF THE EXPANDING EARTH

1. Vogel's and Maxlow's reconstructions

After the first global reconstruction made by Hilgenberg (1933) – Fig. 2, many more have been made by others. The best attempts are these worked out by Vogel (1983) – Fig. 87 (smaller globe inside the present size globe) and by Maxlow (1995, 2005 – Fig. 88).

Fig. 87. *Vogel's reconstruction of the expanding Earth*

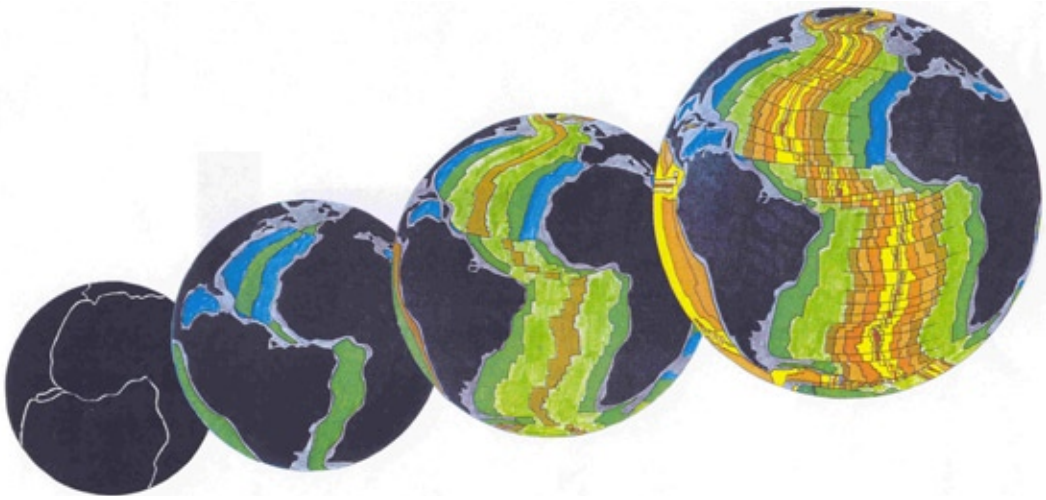


Fig. 88. *Maxlow's reconstructions of the expanding Earth (according to my design)*

2. Maxlow's reconstructions as a strong confirmation of the expansion of the Earth

It has to be stressed that on the expanding Earth the lithosphere under reconstruction has to be closed along all plate and continental boundaries. That is because the reconstructed area does not form a big island (Wegener's island-type Pangaea) on the Earth, but embraces the whole globe (Hilgenberg's whole Earth-type Pangaea). In the latter, free choice in reconstruction is much more limited than at the reconstruction of the island-type Pangaeas. The outer continental (plate) borders along perimeters of Wegener's Pangaeas do not need to be fitted to anything else. What is more, the total length of these neutral borders is much bigger than those which must be fitted together. For instance in Dietz and Holden's Pangaea (Fig. 89) they (red lines) are about 1.5 times longer than the borders used for reconstruction (black lines, counted twice).

Fig. 89. *Dietz and Holden's Pangaea – red lines are the borders that do not need to fit together, black lines are borders that fit together and their total length must be counted twice*

It must be also stressed that the global expanding Earth reconstructions are made exclusively in 3D on globes, whereas maps are usually used for Wegener's type Pangaeas. This 3D basis makes the expanding Earth reconstructions much rigorous and precise than the island Pangaeas which are made on maps.

Vogel used only outlines of continents to put the continental crust together in his 3D reconstructions. This was so with all the former expanding Earth reconstructions, starting from Hilgenberg's Pangaea.

Maxlow was the first to use also a global set of oceanic isochrons. This enabled him to make a whole set of reconstructions for different geologic times. He removed bigger and bigger increments of the oceanic lithosphere along chosen isochrons, starting with the youngest ones and then using older and older ones. He thus produced from the remaining lithosphere smaller and smaller regular Earth spheres. In this way, for post-Triassic times, he produced as many as 11 (!) such spherical reconstructions (Fig. 90) which can be seen from all directions[4].

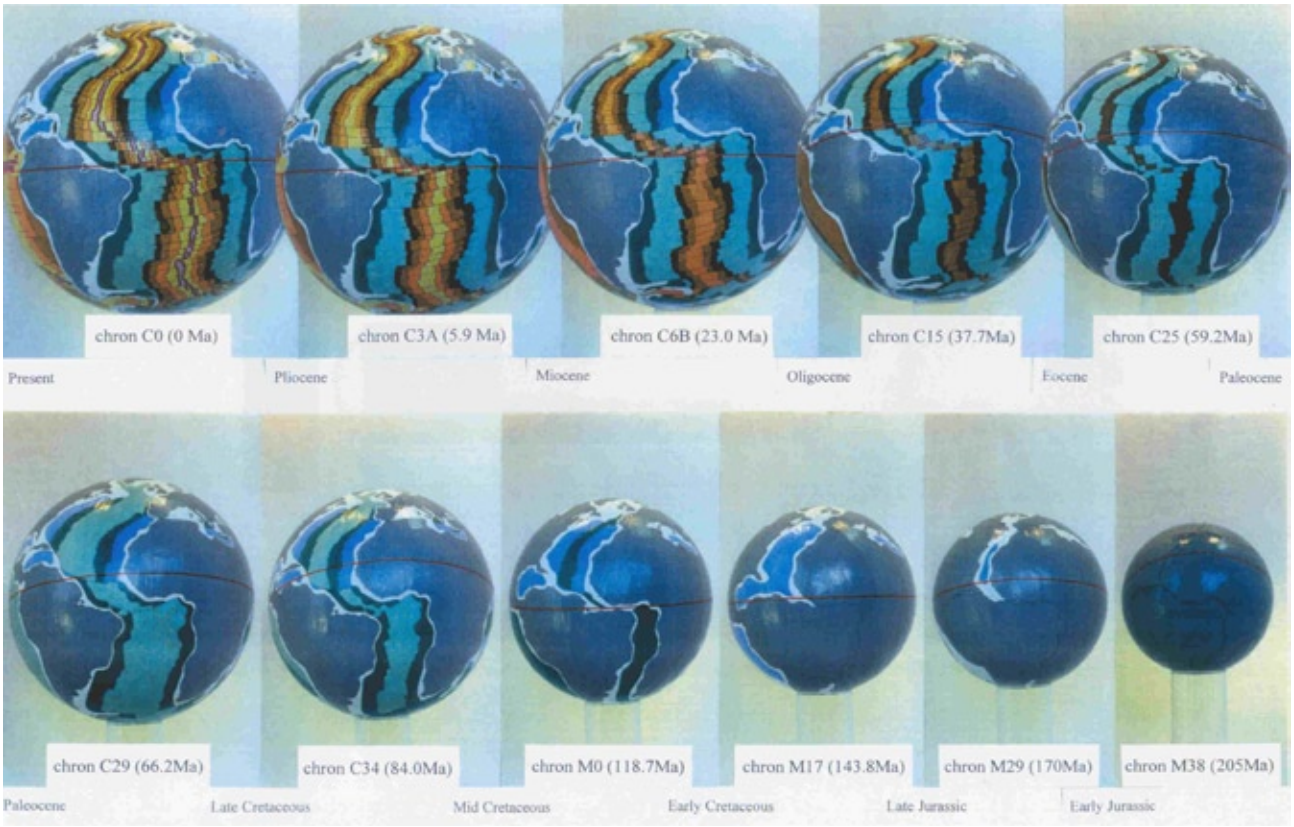


Fig. 90. *All Maxlow's reconstructions made for post-Triassic time seen from the side of the Atlantic Ocean*

[4] The first set of these reconstructions is in Wrocław as the property of the Lower Silesia branch of the Polish National Geological Institute. Maxlow left them there when visiting Poland in 1997.

Such a result is possible only when the bigger and bigger increments of the lithosphere are produced by the expansion of the Earth. Otherwise the formation in Maxlow's way the regular smaller and smaller **spheres** would be impossible.

Thus, Maxlow's reconstructions (even if some parts could be a little improved) provide a very strong confirmation of the expanding Earth.

V. CONCLUSIONS

The seven geological proofs of significant expansion of our globe presented in Part One of this book prove the truth of the expanding Earth theory. At the same time they prove the fallacy of alternative plate tectonics theory based on a priory assumption of the non-expanding Earth.

Any criticism of the Expanding Earth theory must be preceded by an attempt to undermine the proofs presented here. Otherwise such a criticism is not scientific.

Part Two

Broader scientific context of significant expansion of the Earth

CONTENTS

Part Two

BROADER SCIENTIFIC CONTEXT OF SIGNIFICANT EXPANSION OF THE EARTH

I. INTRODUCTION TO PART TWO

Part One of this book has showed that the significant expansion of the Earth is a real process. As I mentioned in the introduction to that part, there is an overpowering tendency on the side of skeptical listeners or readers, at presentation some aspects of the expanding Earth, to escape from direct discussion of presented arguments, by raising other remote issues which are believed to contradict the expansion of the Earth.

In this book the presented arguments are seven geological proofs of significant expansion of the Earth (Part One). Part Two was added to show that there is no room for an escape from these proofs. The topics chosen to this part are of two kinds:

– those that suggest that plate tectonics is true

– those that suggest that significant expansion of the Earth is impossible

The chosen topics are the most important in playing such a role. But, as is shown, the suggestions are misleading.

The topics are treated here only in a basic way. They reach up to cosmological problems, specifically to Ambartsumian's explosive cosmology.

Part Two starts with paleomagnetic tests which are believed by many to falsify significant expansion of the Earth. This topic is presented in full.

II. FALSE PROOFS AND FALSE CONFIRMATIONS OF THE HYPOTHESIS OF THE NON-EXPANDING EARTH

1. Failed paleomagnetic proofs of the hypothesis of the non-expanding Earth

The topic of paleomagnetic tests is very important because it was the only one discussed, after a fashion, by anti-expansionists. The seemingly negative for expanding Earth results of the tests decided about marginalization of this theory without any wider discussion, especially the discussion of its proofs. If today it is claimed that the expanding Earth was scientifically disproved in the past it refers just to the results of paleomagnetic tests. In fact the results indicate expansion.

I demonstrated the discussion almost three decades ago (Koziar, 1991; www.wrocgeolab.pl/research.pdf). Here, I demonstrate it again but in more comprehensive way, using several illustrations.

a. Basic principle of paleomagnetic tests of the change of the Earth's radius

The essence of paleomagnetic tests is the same as that applied by Eratosthenes 230 years B.C. for calculation of the size of the Earth. However he used the angles of incidence of a sunbeam, not slope angles (inclinations) of the Earth's magnetic field.

Eratosthenes' method of calculation of the size of the Earth

Let us take into account Fig. 91.

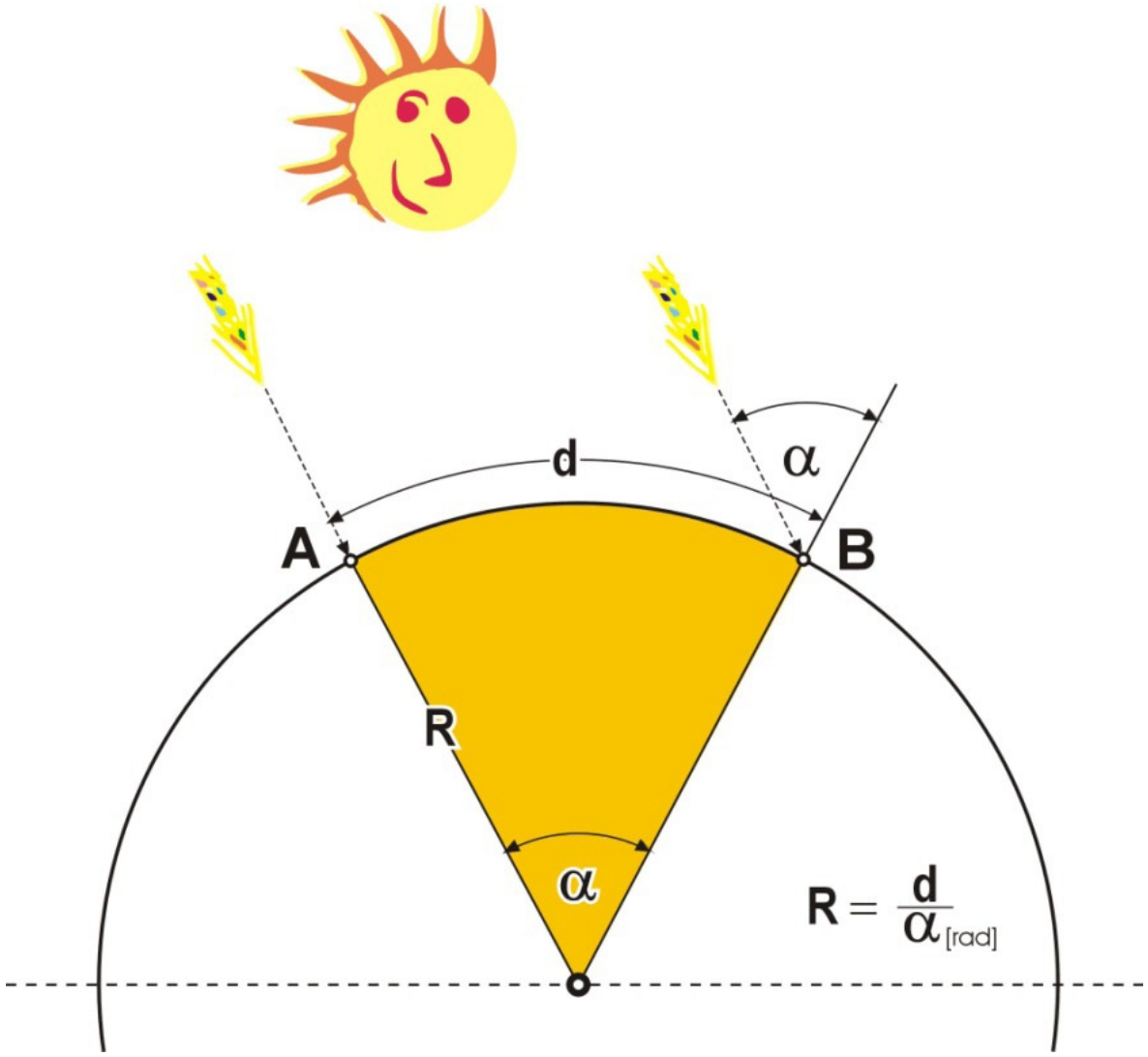


Fig. 91. *Sunbeam method of calculation of the size of the Earth (explanation in text)*

If we know the linear distance d between two points (A and B) on a sphere and the central angle α between them, then we can calculate the radius R of the sphere. Because $d/R = \alpha_{[rad]}$ thus $R = d/\alpha_{[rad]}$. In the case of Eratosthenes' calculation, the known distance on the Earth was the distance between Aswan (A) and Alexandria (B) lying on the same meridian. The geocentric

angle was measured as a decline of the sunbeam from vertical at noon in the summer solstice in Alexandria when the Sun was in the zenith in Aswan (Fig. 91).

In fact Eratosthenes calculated directly the perimeter of the Earth, basing on the proportion that the distance *d* is such a part of the sought Earth perimeter as the measured geocentric angle α is a part of a full angle. Both calculations are equivalent.

Geomagnetic possibility of calculation of the size of the Earth

Let us now assume that we live on an Earth with an atmosphere that prevents us seeing the Sun. The Earth's magnetic field also enables us to calculate the geocentric angle between two points on the surface of the Earth and thus to calculate the size of the Earth. For this purpose we can use the dependence between inclination *I* of the dipole magnetic field at a given point A on the surface of the Earth and its angular distance α from the magnetic pole P (Fig. 92).

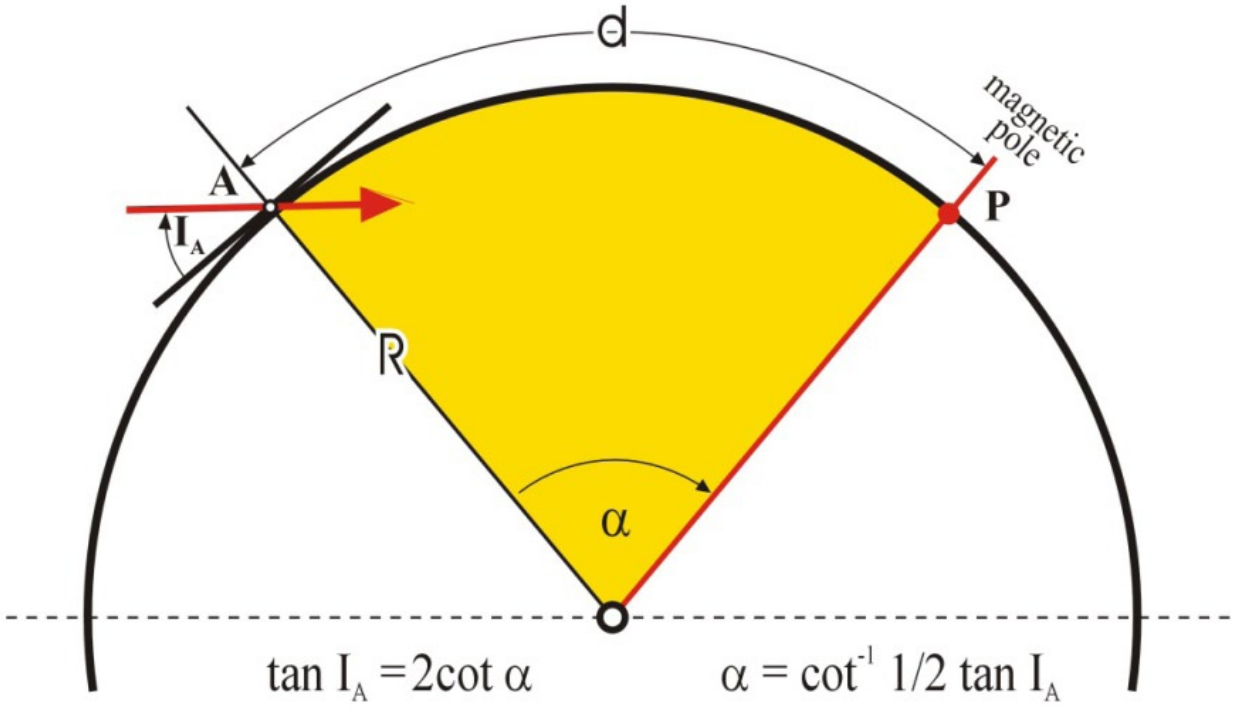


Fig. 92. *Dependence between angular distance α of magnetic pole P from point A and magnetic inclination I_A in point A*

When a linear distance *d* between the points A and P is known, the radius *R* of the planet can be calculated (as before) from the dependence: $R=d/\alpha$, that is $R = d/\cot^{-1}(\frac{1}{2} \tan I_A)$.

The magnetic pole can be inaccessible and so the distance *d* unknown.

Then we can use another point B lying on the same magnetic meridian (Fig. 93). The angular distance α between points A and B is equal to the difference of their angular distances (α_1 and α_2) to the magnetic pole (Fig. 93). Thus the value of the radius of the planet is expressed by the last formula in Fig. 93.

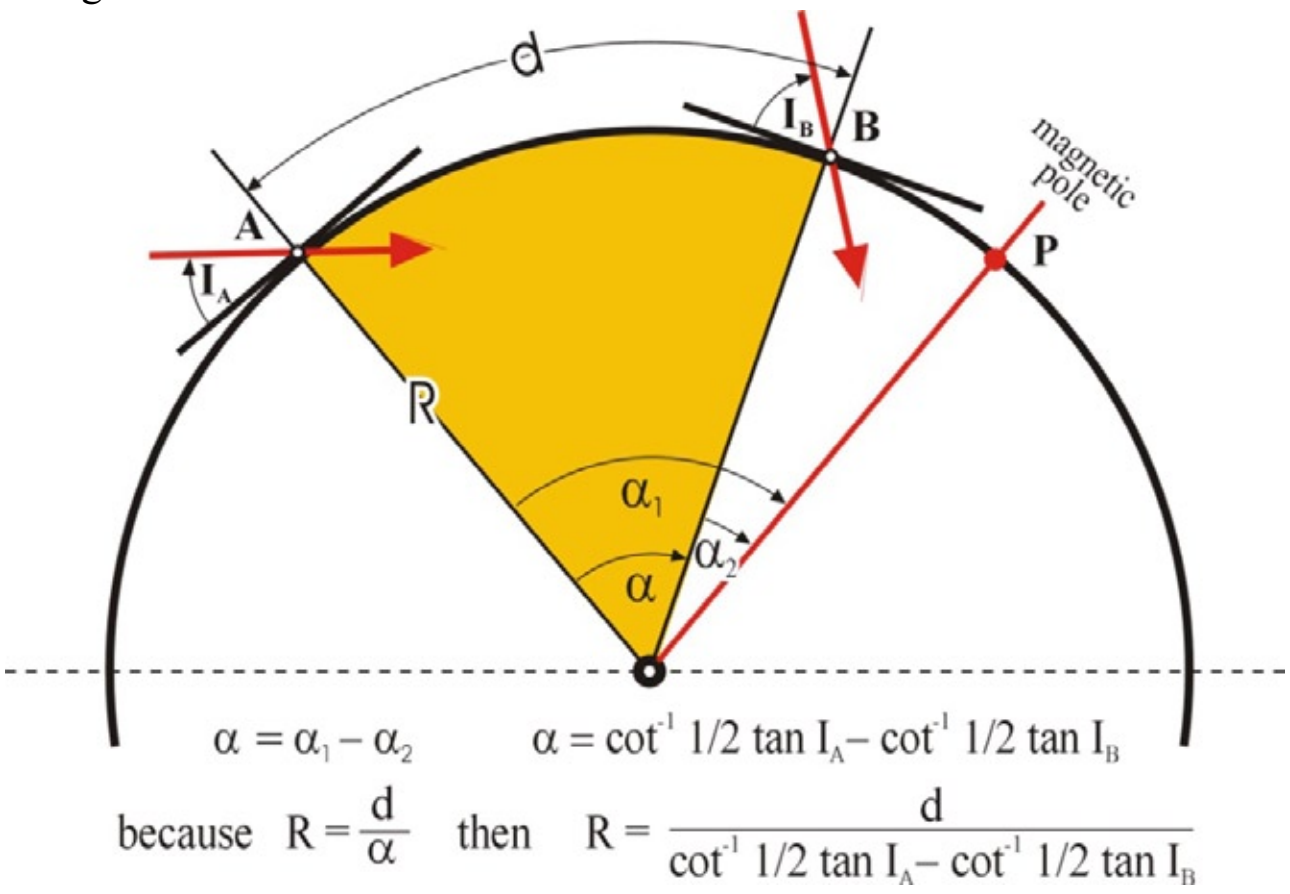


Fig. 93. *Geomagnetic method of calculation of the size of the Earth (explanation in text)*

If the linear (geodetic) distance *d* between the points A and B is known (Fig. 93) then we can follow Eratosthenes and calculate the radius of the planet according to the final formula in Fig. 93.

The magnetic method has an advantage over the Eratosthenes method because an ancient magnetic field is recorded in ancient rocks so we can calculate also an ancient radius of the Earth. The disadvantage is the very low accuracy of the method. But it can be sufficient to record the significant change of the radius.

In case of the expanding Earth almost the whole expansion in Meso-Cenozoic time was realized in ocean basins while continents preserved approximately their sizes and so also the distances between any two given points. Thus, if we are able to know the ancient geocentric angle α_a (for the given time in the past) at these given points A and B, lying on a continent

of the present Earth, then we can calculate the ancient radius of the Earth R_a for this time. It is possible when at the points A and B the fossil vectors of the ancient magnetic field, from the given time in the past, lying on the same paleomeridian, are recorded (Fig. 94 A). If $\alpha_p < \alpha_a$ the vectors record the smaller Earth in the past (Fig. 94 B).

The only difference between the formula in Fig. 93 and Fig. 94 is that in the first one the inclinations of magnetic field I_A and I_B are the present inclinations while in the second one they are the fossil inclinations.

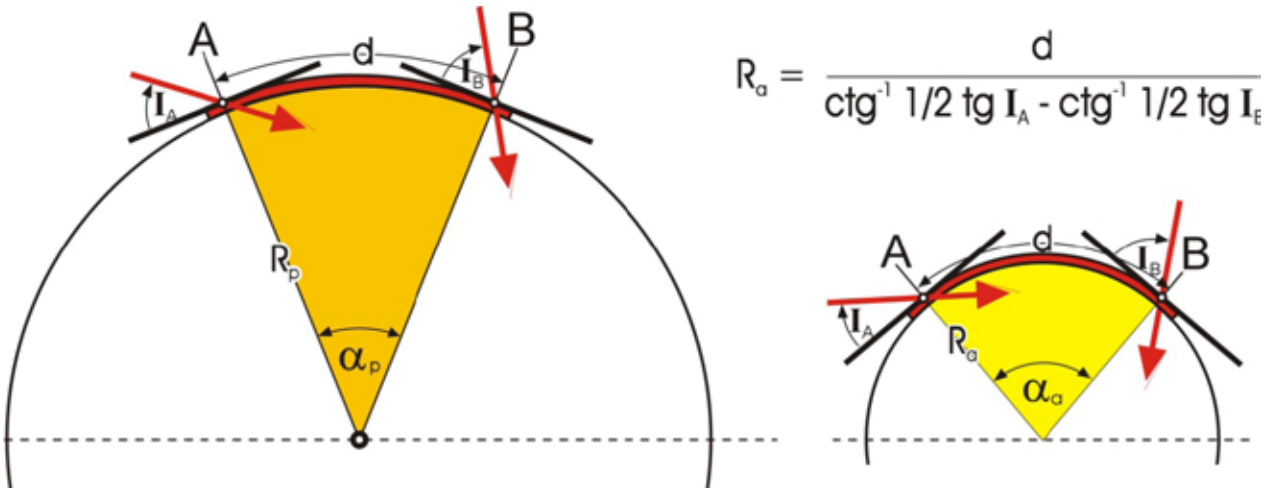


Fig. 94. *Calculation of the paleoradius of the Earth by the method of paleomagnetic meridian (explanation in text)*

In more sophisticated paleomagnetic tests the vectors do not need to lie on the same paleomagnetic meridian.

It must be mentioned, that many paleovectors are sampled from sedimentary rocks because the latter are widespread and have well established chronology. However compaction of sedimentary rocks causes flattening of the paleomagnetic vectors that is, decreasing their inclination. This in turn shows the size of the ancient Earth larger than it really was.

b. Paleomagnetic testing of small and large expansion of the Earth

At paleomagnetic testing usually two types of expansion are considered (Fig. 95): small (the upper part of the figure) and large (the lower part of the figure).

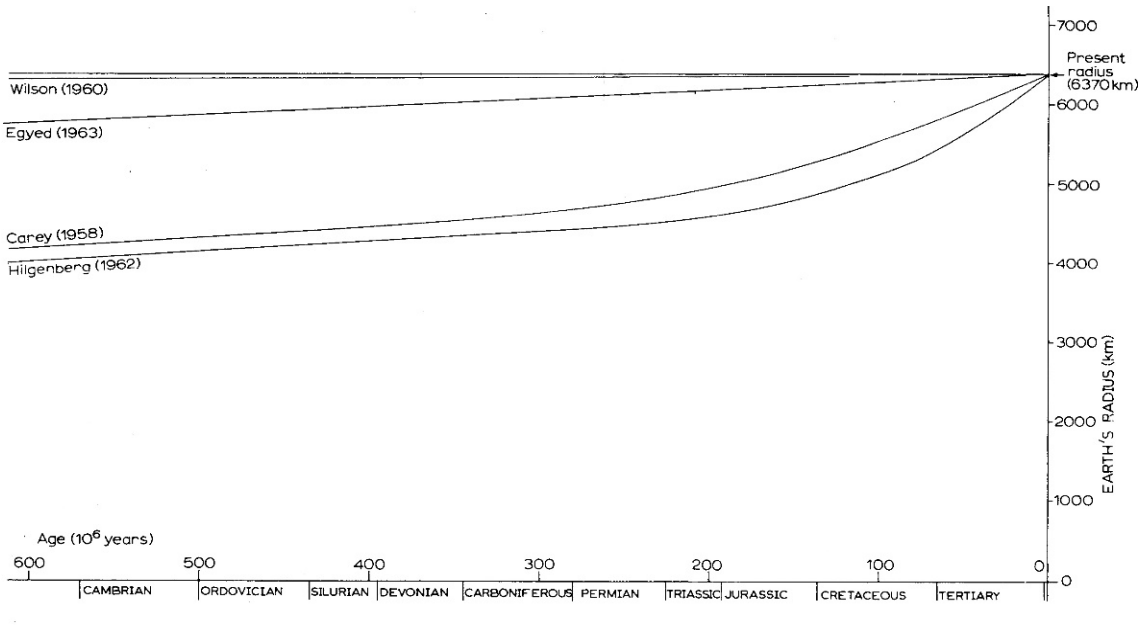


Fig. 95. *Small and large expansion (explanation in text). The figure is based on Fig. 1 (by reducing its content) of Hospers and van Andel's (1967) paper*

The small expansion (Wilson, 1960 and Egyed, 1963) means less than 10% increase in the Earth radius since the beginning of Paleozoic. The large expansion means more than 40% increase in the Earth radius since the beginning of Paleozoic.

The difference is also expressed by the rate of the expansion. The "small" expansion is also a "slow" expansion, today not more than a few millimeters a year. The "large" expansion is also a "fast" expansion, today not less than one centimeter a year.

The small (slow) expansion is meaningless for geotectonics and its fundamental problems. But the large (fast) expansion is crucial.

The paleomagneticians, fighting with the expanding Earth, usually insist that their calculation do not exclude the small expansion but only the large expansion, which is the real expansion of the Earth.

c. Various paleomagnetic tests and their applications

Egyed's paleomeridian method

A Hungarian geophysicist and expansionist Laszlo Egyed proposed the first paleomagnetic test on expansion in 1960. The first sentence of his paper is significant: *The continental drift may be explained by an expanding earth only*. The test was exactly like that presented in Fig. 94. It was later called the "paleomeridian method".

A year later the method was applied by Cox and Doell (1961), who based on juxtaposition of paleovectors between Western Europe and Siberian shields (Norilsk vicinity). Their results did not confirm the expansion of the Earth. But this was because the authors did not take into account a tensional development of the West Siberian Plain which geologically is a gigantic sedimentary basin (see below).

Significance of tensional development of the West Siberian Plain

Soon after Cox and Doell's paper was published, Carey (1961) pointed out that the Siberian shield has moved away from Europe and, consequently, the *sine qua non* condition that the distance between sites of paleomagnetic vectors must be preserved, was violated. Thus the Cox and Doell's results are incorrect.

Two years later van Hilten (1963) raised the same objection to juxtaposition of the paleomagnetic vectors through the West Siberian Plain, introducing simultaneously his concept of the "orange peel effect" (Fig. 96).

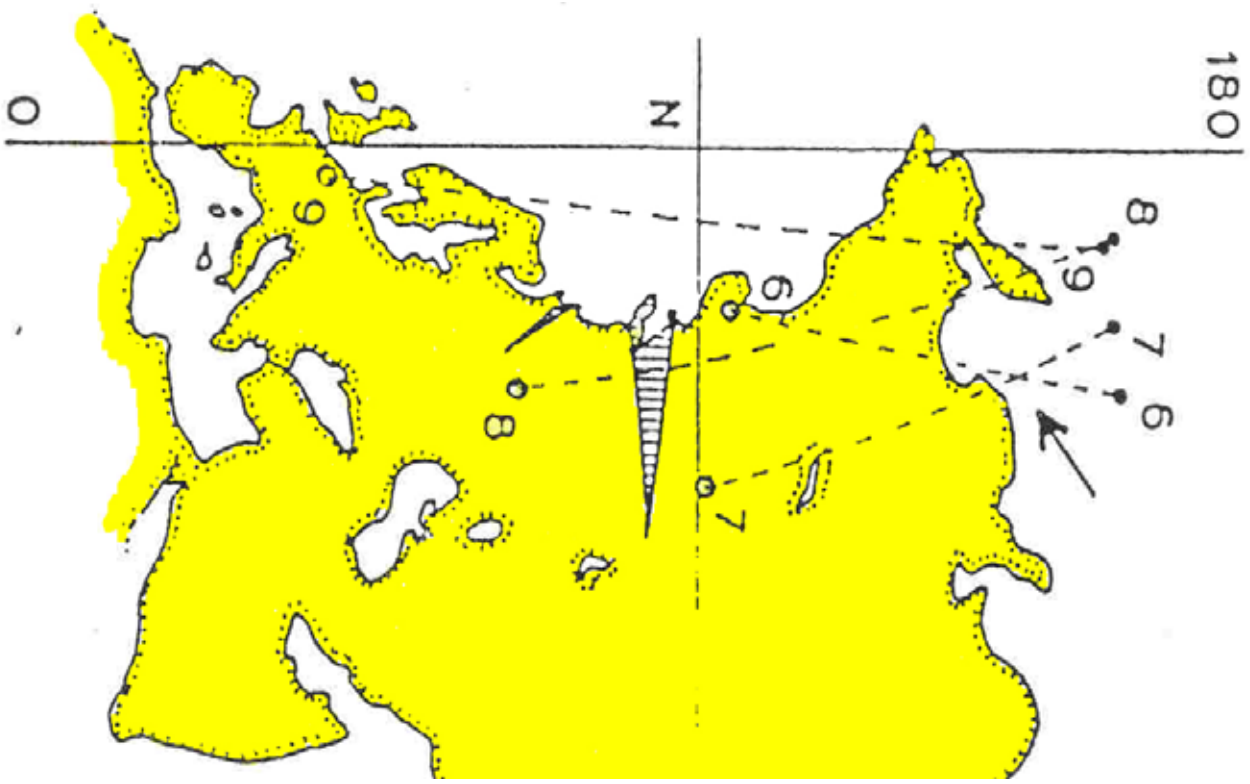


Fig. 96. *Van Hilten's "orange peel effect" in the West Siberian Lowland*

Some years later Hamilton (1970) showed that the routes of pole, determined from the European and the Siberian Shield data, are different (Fig. 97).

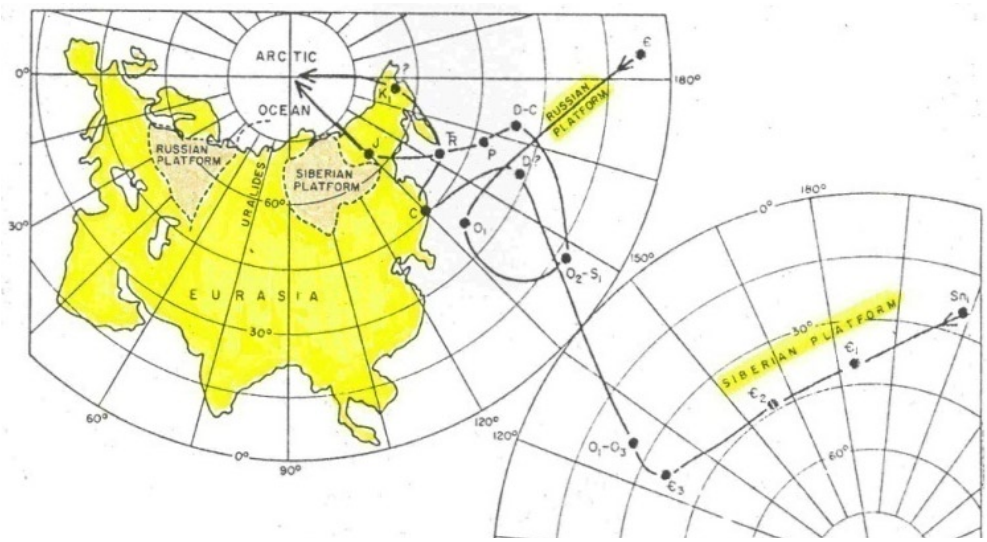


Fig. 97. *Discrepancy of routes of the north pole for Russian and Siberian platforms (Hamilton, 1970)*

As is known, such discrepancies caused reactivation of mobilism in the early 1950s.

In the 1970s I analysed the mutual positions of the East European Platform and the Siberian Shield and as a result I indicated their direct connection in the past (Koziar, 1991). The result is presented in Fig. 98.

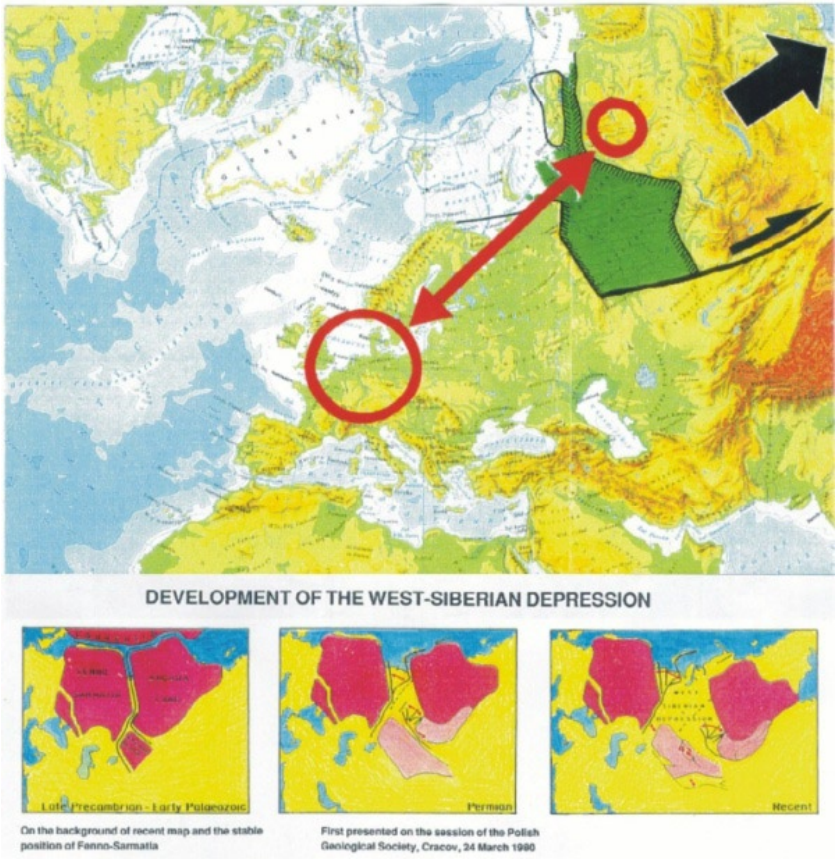


Fig. 98. *Incorrect juxtaposition of paleomagnetic data between Europe and the Siberian shield for calculation of Earth's paleoradius by paleomagnetic methods (Koziar, 1992 – poster)*

The West Siberian Plain is a gigantic sedimentary basin (Rudkevich, 1970) formed by pulling two cratons apart from each other. It is confirmed by the existence of oceanic crust beneath the depression. The oceanic lithosphere shows here linear magnetic anomalies (Aplonov,1981). This author calls the basin "An aborted Triassic ocean".

Despite this, the West Europe and Siberia became favourite areas for paleomagneticians who oppose the expanding Earth.

Egyed's triangulation method

In 1961, Egyed published the next method (the so-called method of paleomagnetic triangulation) that allows juxtaposition of paleomagnetic vectors, lying on two different paleomagnetic meridians. Thus the possibility of using his new test increased significantly. However Egyed's way of calculations was rather complicated. Egyed himself did not realized his both tests.

Van Hilten's triangulation method

Van Hilten (1963) applied a simplified version of Egyed's triangulation method which he called a "graphical" one.

Let us assume that at the points A and B, on a compact continental block, the two coeval paleomagnetic vectors I_1 and I_2, not lying on the same paleomeridian, are given (Fig. 99). The geodetic lines (great circles) drawn by both points, accordingly with paleovectors, will cross mutually at the point P_i which is an ancient pole obtained in this way (intersection pole).

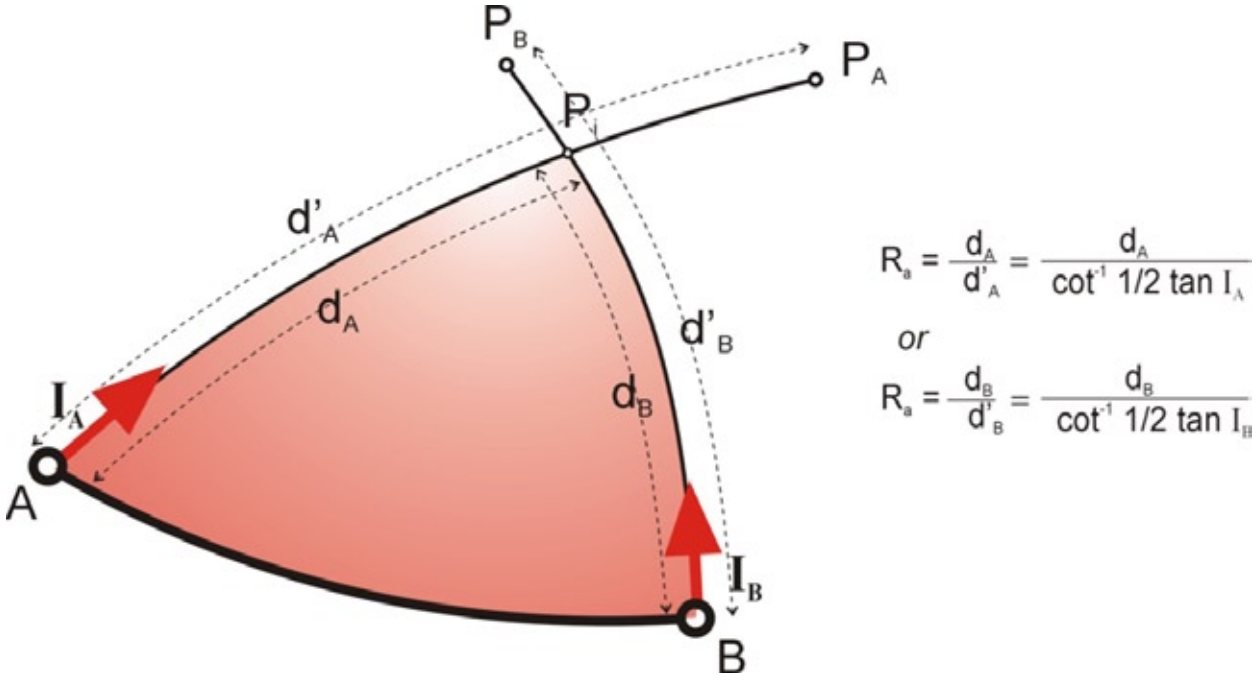


Fig. 99. *Calculation of the paleoradius (R_a) of the Earth by van Hilten's method of paleomagnetic triangulation (explanation in text)*

If we now try to calculate the position of the pole for each point separately, using the dipole equation (Fig. 92) and the present Earth radius then their positions will turn out to be different. Obtained in this way poles P_A and P_B lie usually beyond the point P_i. It means that the Earth has really expanded. Thus if we now want to calculate the ancient Earth radius R_a we must divide the linear distances (d_A or d_B) to the ancient pole P_i by angular distances d'_A or d'_B respectively. The last ones are now distances to the virtual poles P_A or P_B respectively. These distances are expressed by angular measure calculated from relevant inclinations. This is the essence of the method.

The results of both calculations performed for point A and B will differ a little and should be averaged.

In 1963 van Hilten applied his method only to cratons (compact continental crust) and his results confirmed the large expansion of the Earth. The results were presented graphically in the next van Hilten's (1964) paper (Fig. 100).

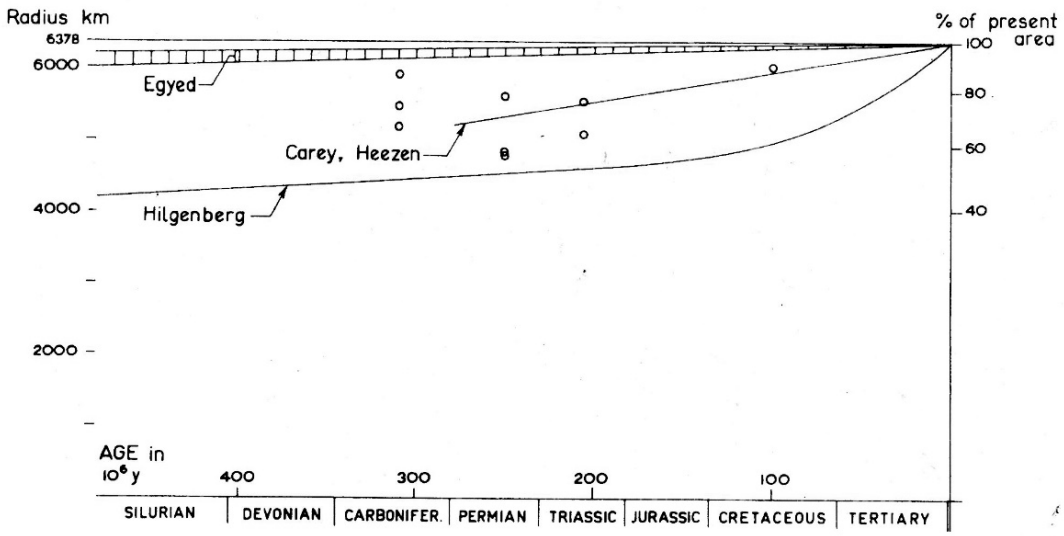


Fig.7. Change in the earth's radius with time according to Egyed (1963a), Carey (1958) and Heezen (1959), and Hilgenberg (1962). Circles show the results of the analyses of paleomagnetic data (Van Hilten, 1963b); they agree roughly with the rate of expansion advocated by Carey and by Heezen.

Fig. 100. *Van Hilten's paleomagnetic results from 1963, published in his 1964 paper (with the original explanation)*

Ward's method of minimum scatter of paleomagnetic poles

The same year an Australian mathematician M.A. Ward, inspired by an Australian paleomagnetician E. Irving, published a new statistical method of simultaneous juxtaposition of a greater number of paleomagnetic vectors, based also on Egyed's second test (Ward, 1963).

In this method a central point of all used coeval paleomagnetic sampling sites is calculated. Then a pole of a new system of spherical reference frame is connected with this point. Next all former geographical coordinates of the paleovector sampling sites are transformed to the new frame. Then all positions of the paleopoles, specified by paleovectors, in all sites are found in the new coordinates. Then the dispersion of paleopoles for small changes of R is measured by means of Fisher's spherical statistic. The size of R, responding to a minimum scatter of paleopoles, is considered to be the real size of paleoradius.

Ward assumed that during expansion each continent is uniformly flattened around the central point (which in his method is not a central point of a continent). Thus, all the new meridians reduce their curvature, preserving their length, whereas the distances between them increase, and so the distances between all paleovector sites. All such local tensional discharges of tensional stress as the West Siberian Basin are excluded in his method.

Ward applied his method again to paleovectors from the West Europe and Siberia and, of course, the result again did not confirm expansion.

Van Hilten's criticism of Ward's paper

Van Hilten (1965) criticized Ward's wrong selection of areas of investigation, referring to his tensional interpretation (the orange peel effect) of the development of the West Siberian Lowland.

Ward's incorrect response to van Hilten's criticism

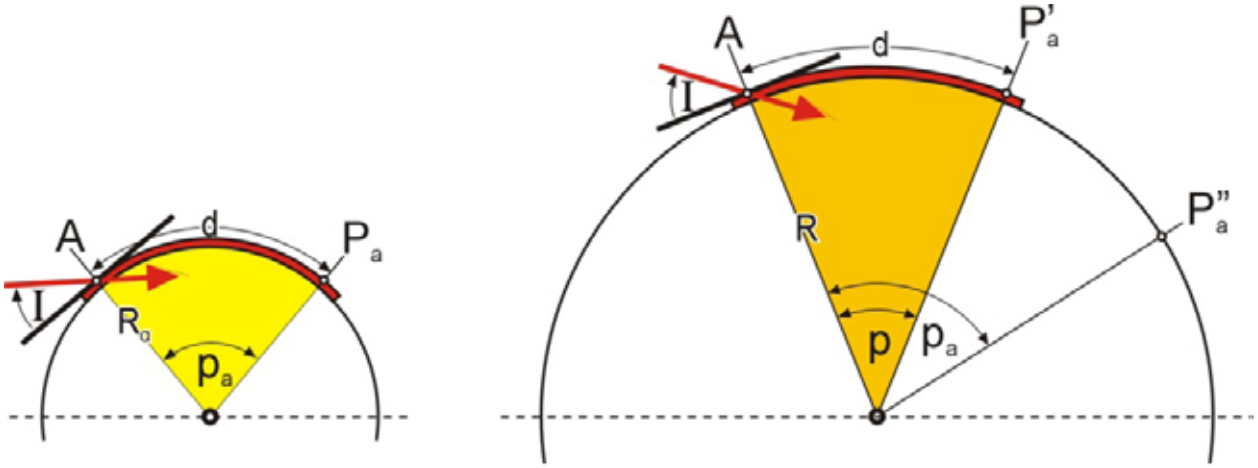
Ward ignored van Hilten's "orange peel effect" stipulation and questioned seriously his method, writing *that van Hilten's method is at variance with his model*. However he simply did not understand well Van Hilten's notation, which is explained below.

Van Hilten (1963) wrote (pp. 1277-1278):

> *From the direction of magnetization measured on rocks of one sampling site the ancient position of the geomagnetic pole with respect to the sampling site may be reconstructed: the declination of the direction of magnetization shows the direction (a great circle trough the collecting site) in which the ancient pole was situated. From the inclination (I) the ancient distance of the pole from the sampling locality can be calculated from:*
>
> $$p = R_a/R \cot^{-1} (1/2 \tan I) \quad (1)$$

Where (p) is the geocentric angle between sampling site and ancient pole position, adapted to the present day radius of the Earth (R) [underlined by J.K.]*; R_a represents the ancient radius of the Earth at the time of deposition of the rocks investigated.*

Let us show this relationship on the section of the Earth (Fig. 101) according to van Hilten's Fig. 6 presented in his next paper (van Hilten, 1964).



$$p = (R_a/R)\ \cot^{-1}(1/2 \tan I) \quad \text{or} \quad p = (R_a/R)p_a$$

$$\text{because} \quad \cot^{-1} 1/2 \tan I = p_a$$

$$\text{hence} \quad R_a = Rp/\cot^{-1} 1/2 \tan I \quad \text{or} \quad R_a = d/\cot^{-1} 1/2 \tan I$$

$$\text{because} \quad Rp = d$$

Fig. 101. *Demonstration of the correctness of van Hilten's formula (1)*

However Ward (1966) wrote further:

Now in equation (1) of van Hilten's paper we see the geocentric angle between a rock unit and the corresponding pole is considered to change proportionately to the ancient radius - contrary to the requirements of the model.

The problem was, that Ward understood (*p*) as (p_a) in above dependences.

Carey (1976, p. 187) pointed out Ward's misunderstanding of van Hilten's notation.

General criticism of Ward's method

However Ward's method has a real fundamental fault. Carey (1976) pointed out that it always shows a constant radius of the Earth. He wrote (p. 194):

Using his [Ward's] *centroid azimuthal equidistant frame he feeds in all the coeval sites polar geocentric angles with their, and computer pole*

positions, assuming progressive steps in ancient radius (in terms of ratio of ancient radius to present radius, R_a/R). That assumed ratio which results in the least scatter of poles is for him most probably correct. As all of the parameters assumed to be constant vary with the radius, at a rate which increases rapidly as the size of the triangle increases, the minimum scatter inevitable occurs with the least change from this base radius (R), i.e. when $R_a/R = 1$. This indeed is what everyone has found who has used the method, and as everyone will find who uses the method in future. This predictable result has nothing to do with the former radius of the earth.

Yurij Chudinov, a Russian geologist, together with a mathematician, M.I. Terticki came to the same conclusion (Chudinov, 1984). However Ward's method became the main tool for discrediting the expanding Earth (about which more later).

In 1967 van Hilten tried to improve Ward's method, but the trial was not successful.

Irving (1964) published some results based on the paleomeridian and Ward's methods, applied only to Europe – Siberia. Of course they did not confirm large expansion of the Earth.

Hospers and van Andel's strange contribution

In two subsequent papers (1967 and 1968) these authors significantly contributed to disqualification of the expanding Earth, though their own results did not indicate this at all. In their first paper (Hospers and van Andel, 1967) the authors questioned the accuracy of van Hilten's triangulation method.

I wrote about their paper in 1991; www.wrocgeolab.pl/research.pdf (pp. 18-19):

The authors analyzed and eliminated the mathematical incorrectness of van Hilten's calculations and then applied the method of triangulation to the cratonic areas. According to my own analysis, the incorrectness caused not big declines and not weakened van Hilten's conclusion. Consequently, the results obtained by Hospers and Van Andel should confirm the expansion of the Earth. And they really did. Surprisingly the final conclusions of their paper did not. That happened because the authors mixed (averaged) their own results with the results of other authors, including Cox & Doell's and Ward's. Such a procedure is inadmissible.

Now I will discuss the problem in more detailed way.

The authors accepted Egyed's and van Hilten's basic assumption that the distance between two sampling sites of coeval paleomagnetic vectors, as well as the angles between the vectors and the geodetic line connecting the sites are constant during expansion (Fig. 102.)

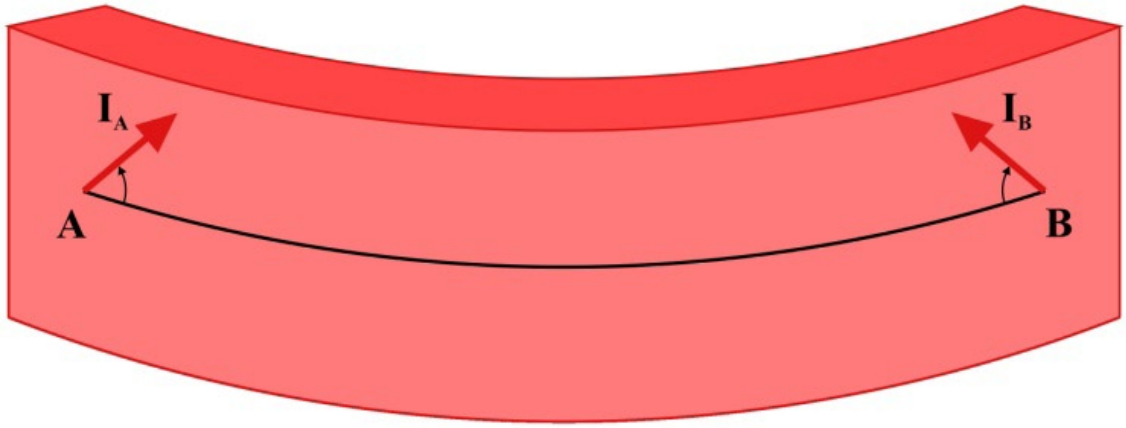


Fig. 102. *The crustal strip illustrating stability of the distance AB and stability of angles between line AB and paleovectors I_A and I_B. The figure is made according to an analogous figure in Hospers and van Andel's 1967 paper.*

However, they noted that the position of an ancient magnetic pole, marked by van Hilten on the present size Earth (as an intersection pole), differs from that on the smaller Earth (coeval with the paleomagnetic vectors). In other words, van Hilten considered the triangle on the present size Earth, but according to the authors it should be considered on an ancient Earth (the original triangle), because both triangles are not the same.

The authors carried out suitable trigonometric calculations to support their thesis. To follow better their reasoning and calculations as many as three triangles should be considered (Fig. 103). Sizes of all sides of the triangles are expressed in angular dimension and so they change with the radius of the Earth. Characters A, B and C denote not only the vertexes of the triangles but also horizontal angles between their relevant sides. By the assumption: *angle A = angle A'* and *angle B = angle B'* and the linear size of the side *c* is constant.

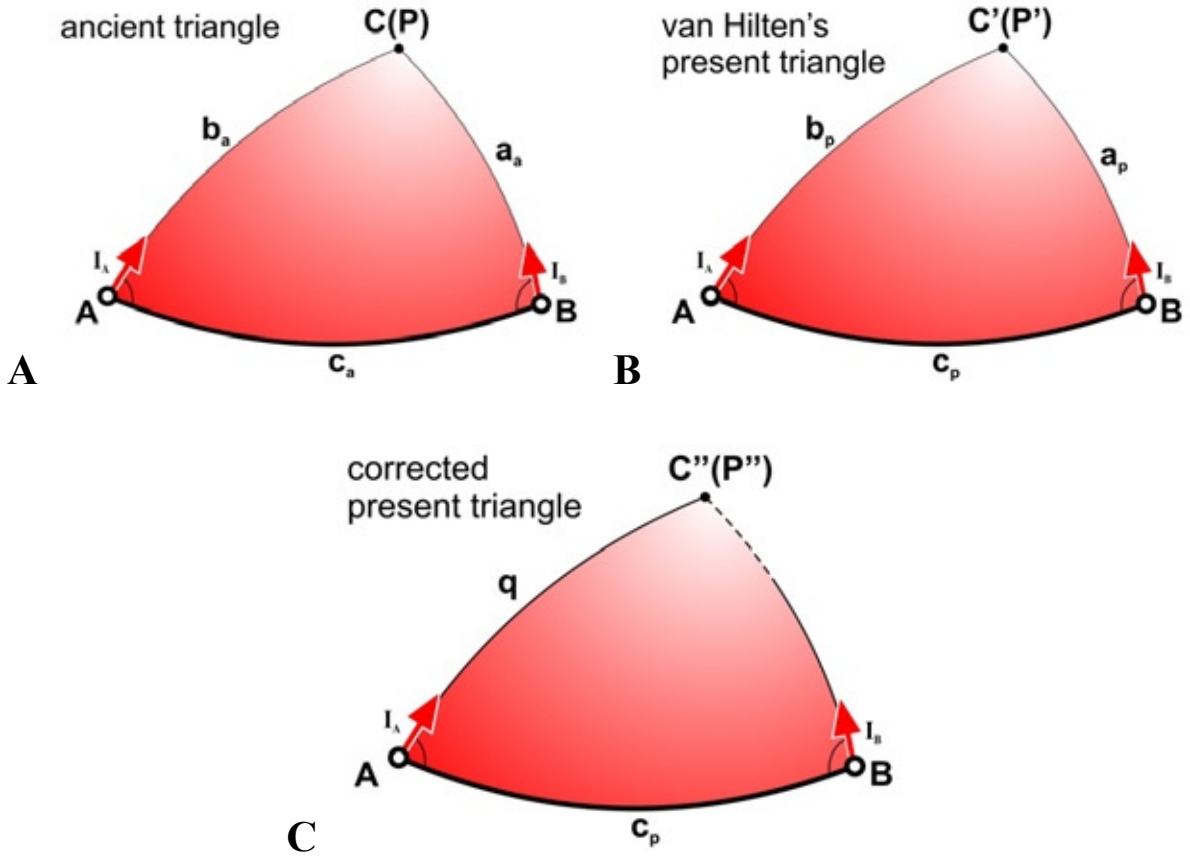


Fig. 103. *Three triangles used for the explanation of Hospers and van Andel's critical analysis of van Hilten's triangulation method (explanation in text)*

The authors started with the ancient triangle (Fig. 103A). The side *a* or *b* of the triangle can be chosen for the calculations. The authors chose the side *b* and its correct present angular size marked *q* – Fig. 103C. The ancient size of this side is marked b_a which is equal to p_A – that is the paleomagnetic co-latitude of the triangle's top A (Fig. 104). Of course $p_A = cot^{-1}\ (1/2\ tan\ I_A)$. However the quantity I_A does not have to be used in further calculations.

There is a dependency: $q/b_a = R_a/R_p$ (Fig. 104).

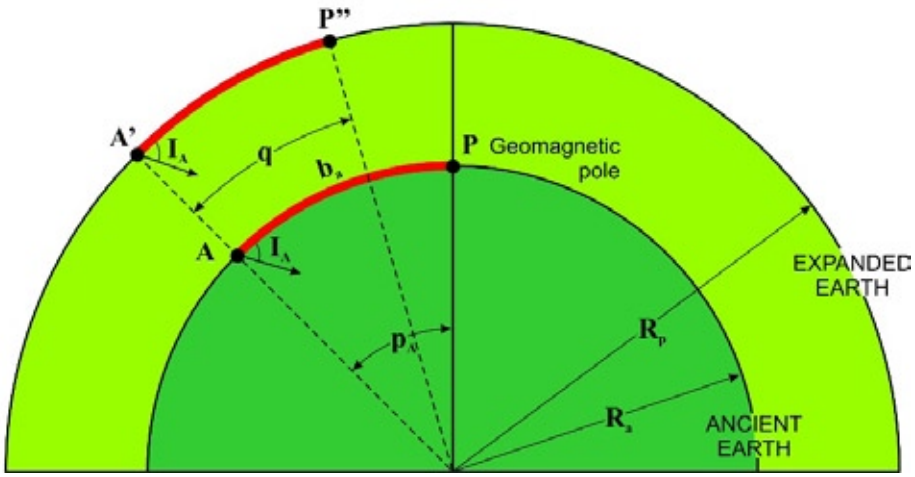


Fig. 104. *Figure prepared on the basis of Fig. 6 from Hospers and van Andel's 1967 paper (explanation in text)*

To calculate the value of b_a on the ancient Earth, independently of the inclination I_A (and p_A) and basing only on other known quantities *A, B* and *c*, the authors used a proper formula of spherical trigonometry:

$$\cot b_a \sin c_a = \cot B \sin A + \cos c_a \cos A$$

where c_a is a central angle of side (a) on the ancient Earth

hence $$cotb_a = \frac{\cot B \sin A + \cos c_a \cos A}{\sin c_a}$$

and $$b_a = cot^{-1} \frac{\cot B \sin A + \cos c_a \cos A}{\sin c_a}$$

Now they transform the above angular value b_a on the ancient Earth into the precise angular value of the side *b* on the present Earth. That is to the value *q*. So:

because $$q = \frac{R_a}{R_p} b_a$$

hence $$q = \frac{R_a}{R_p} cot^{-1} \frac{\cot B \sin A + \cos c_a \cos A}{\sin c_a} \qquad \text{(I)}$$

Then the authors calculate the side *b* on the present Earth – that is b_p. This is a value used by van Hilten (Fig.103B). The calculation is as before, but the present value of *c* is used, that is c_p. Thus:

$$b_p = cot^{-1} \frac{\cot B \sin A + \cos c_p \cos A}{\sin c_p}$$

To compare *q* and b_p the value of c_p should be expressed by c_a

because $$c_p = \frac{R_a}{R_p} c_a$$

the former formula can be written as:

$$b_p = cot^{-1} \frac{\cot B \sin A + \cos \frac{R_a}{R_p} c_a \cos A}{\sin \frac{R_a}{R_p} c_a} \qquad \text{(II)}$$

Now we can compare formulas for *q* and b_p that is formulas (I) and (II) and see that they are different.

The authors wrote that

> *in order to calculate (R_a/R_p) van Hilten intends to divide (q) by (p_a)[1] but in fact divides (b_p) by (p_a). The expressions for q and b_p show that they are not identical, and hence the computed ratio is not exact.*

The authors were of course right, but the problem arises of how large the differences are and in which direction (positive or negative) are they turned?

[1] p_a is the authors' notation. It should be marked (p_A) as in present notation (Fig. 104).

To check this I used in the late 1970s a procedure (only now published) of calculation the differences for some exemplary triangles. Its result is mentioned in the earlier quotation of my 1991 paper, but only now it will be fully presented.

I considered two triangles $A=30^0$, $B=60^0$ and $A= 45^0$, $B=45^0$ (with variable bases c_p) and two ratios of ancient and present Earth's radii: $R_a/R_p = ¾$ and $R_a/R_p = ½$. Then for some combinations of these triangles, ratios R_a/R_p and series of c_p (with the step of 10^0) the calculations of b_p and q were done and their values were compared. The combinations were:

$A=30^0$, $B=60^0$ and $R_a/R_p = ¾$
$A= 45^0$, $B=45^0$ and $R_a/R_p = ¾$
$A= 45^0$, $B=45^0$ and $R_a/R_p = ½$

For comparison all relative differences $\frac{b_p - q}{b_p}$ are calculated and expressed as a percentage of b_p. Let us see.

Table III. $A = 30^0$, $B = 60^0$ and $R_a/R_p = ¾$

C_p [^{0}]	C_a[^{0}]	b_p[^{0}]	q[^{0}]	b_p-q[^{0}]	$(b_p-q)/b_p$ [%]
20	26.70	17.23	17.17	0.06	0.36
30	40.00	25.70	25.52	0.19	0.73
40	53.33	34.02	33.65	0.37	1.10
50	66.70	42.18	41.60	0.58	1.37
60	80.00	50.19	49.48	0.72	1.43

Table IV. $A = 45^0$, $B = 45^0$ and $R_a/R_p = ¾$

C_p [^{0}]	C_a[^{0}]	b_p[^{0}]	q[^{0}]	b_p-q[^{0}]	$(b_p-q)/b_p$ [%]
20	26.70	14.00	13.90	0.10	0.75
30	40.00	20.75	20.43	0.33	1.57
40	53.33	27.24	26.54	0.70	2.56
50	66.67	33.40	32.19	1.21	3.62
60	80.00	39.23	37.41	1.82	4.64

Table V. $A = 45^0$, $B = 45^0$ and $R_a/R_p = ½$

C_p [^{0}]	C_a[^{0}]	b_p[^{0}]	q[^{0}]	b_p-q[^{0}]	$(b_p-q)/b_p$ [%]
20	40.00	14.00	13.62	0.38	2.74
30	60.00	20.75	19.62	1.14	5.48
40	80.00	27.24	24.94	2.30	8.43
50	100.00	33.40	29.66	3.74	11.21
60	120.00	39.23	33.90	5.33	13.60

As is seen, the differences between b_p and q are small and thus the whole Hospers and van Andel's analysis did not give important results. But another finding is much more important: paradoxically q is always smaller than b_p and thus q indicates smaller ancient Earth than b_p. Thus, Hospers and van Andel's correction strengthen van Hilten's conclusion about large expansion. Of course, this fact is not mentioned in their paper. The only information given by the authors is that the ratios R_a/R_p, computed by van Hilten, *are inexact.*

Because of above dependency Hosper and van Andel's own results should confirm large expansion. And they really did (Fig. 105).

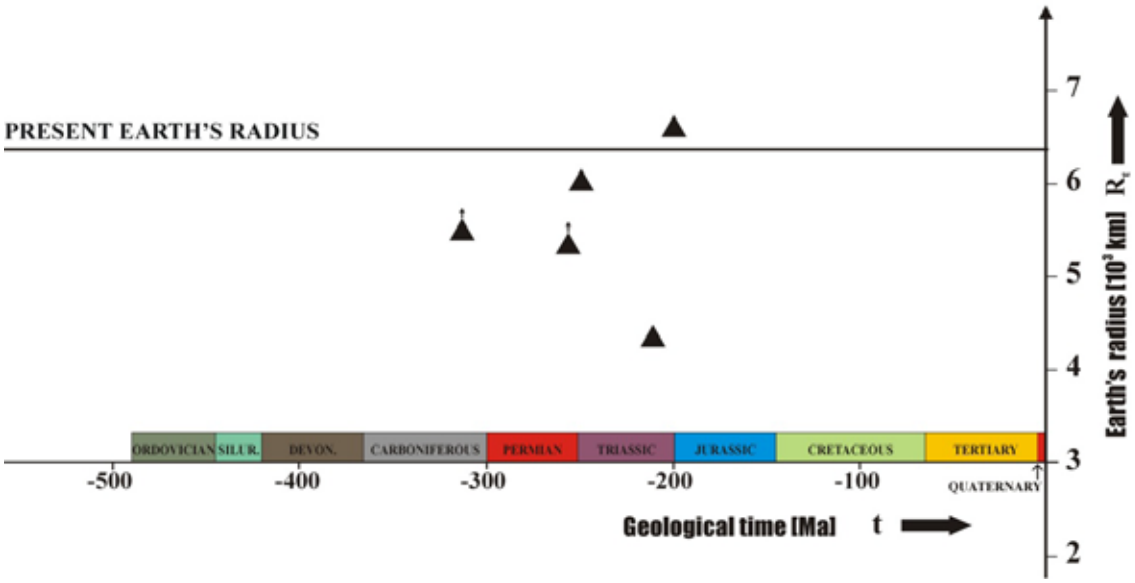


Fig. 105. *Hospers and van Andel's (1967) paleomagnetic results confirming large expansion of the Earth. The marks with tiny arrows mean minimum value of the Earth's radius for these measurements*

Despite this confirmation, the summary of their paper is negative for the large expansion. The authors achieved this negative conclusion by averaging their results with those obtained by Ward's method and all results calculated above the West Siberian Plain (Fig. 106, originally Fig. 1 in their paper).

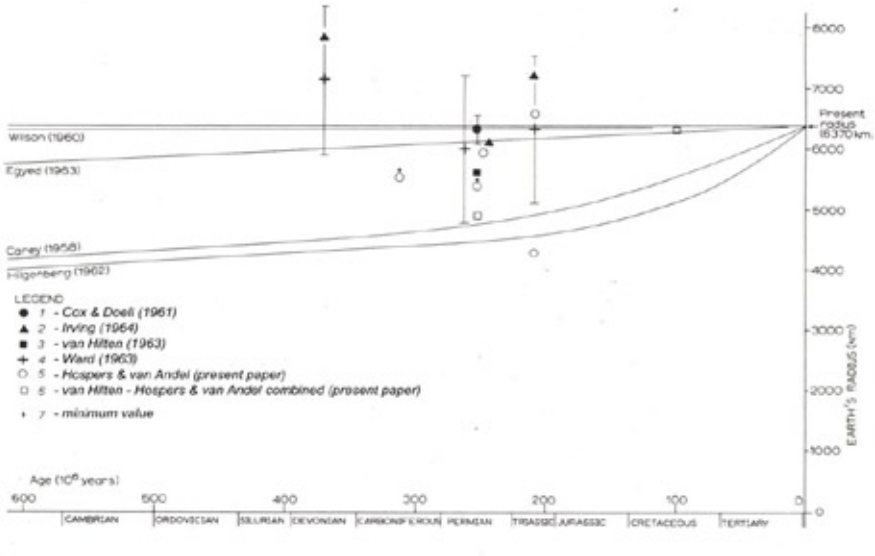


Fig. 106. *Hospers and van Andel's (1967) figure, mixing their positive for large expansion results (empty circles) with negative ones obtained by wrong methods. The explanations of symbols is moved to the figure from the originally separate authors' explanation*

Even without these reservations such a big dispersion in opposite directions from the present size of the Earth leads to only one conclusion – that something is wrong and that the results presented in the Fig. 106 should not be averaged.

In Fig. 107 only these results from Fig. 106 are presented which should be rejected. They played an important role in Hospers and van Andel's struggle with the expanding Earth, because they were used also in their subsequent paper (see later).

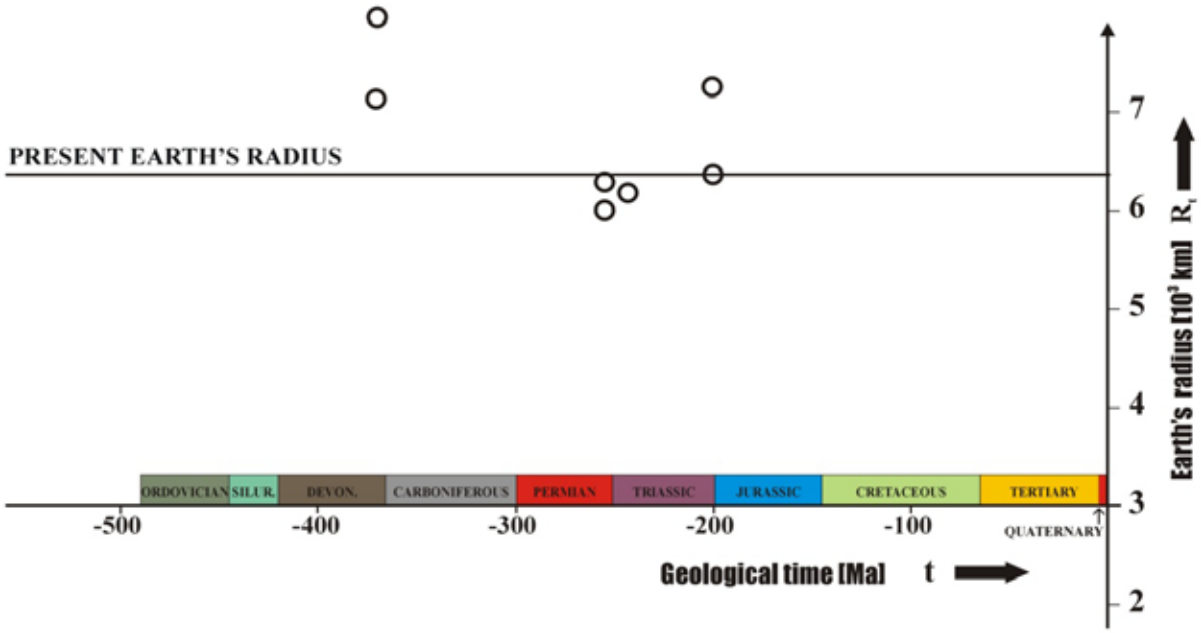


Fig. 107. *The wrong paleomagnetic results from Fig. 106 which should be removed from all combined sets of results (explanation in text)*

At the end of their paper they present another figure (Fig. 108 here, and their Fig. 7) which looks even more unfriendly for expanding Earth than Fig. 106.

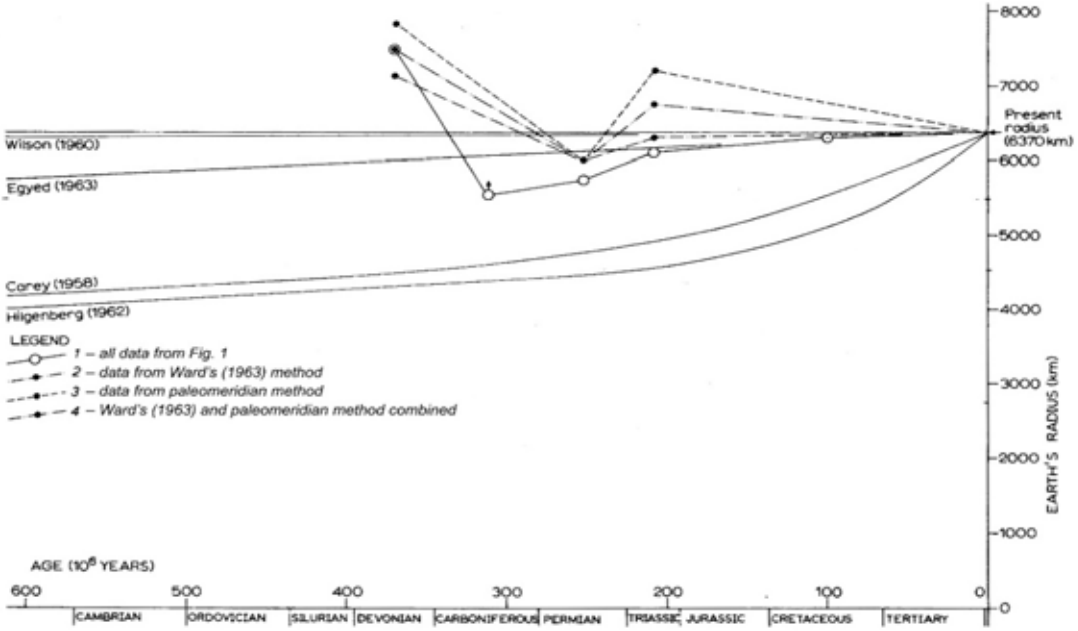


Fig. 108. *Hospers and van Andel's (1967) figure of combined paleomagnetic results. It is a result of manipulation (explanation in text). Explanations of symbols is moved to the figure from the authors original separate explanation*

The figure presents an even higher level of manipulation. The empty circles are combined results from authors' former figure (Fig. 106). In this way authors' own results (quite friendly for the expanding Earth) were significantly increased toward the present size of the Earth radius. Apart from that the wrong high results which should be rejected, but were already included in the lower line with empty circles, were again presented by small full circles. Because these wrong results are very useful for negation of the expanding Earth, the authors made here spectacular use of them. Namely, they presented separately wrong Ward's and paleomeridian results and furthermore they added the combined results of this two group of results! In this way the "center of mass" of all graphs was significantly elevated (relatively to authors own results) and allowed the authors to negate the Earth expansion.

If the authors had combined their own results with van Hilten's ones (Fig. 109, compare with Fig. 100) a quite different result would have been received (Fig. 110).

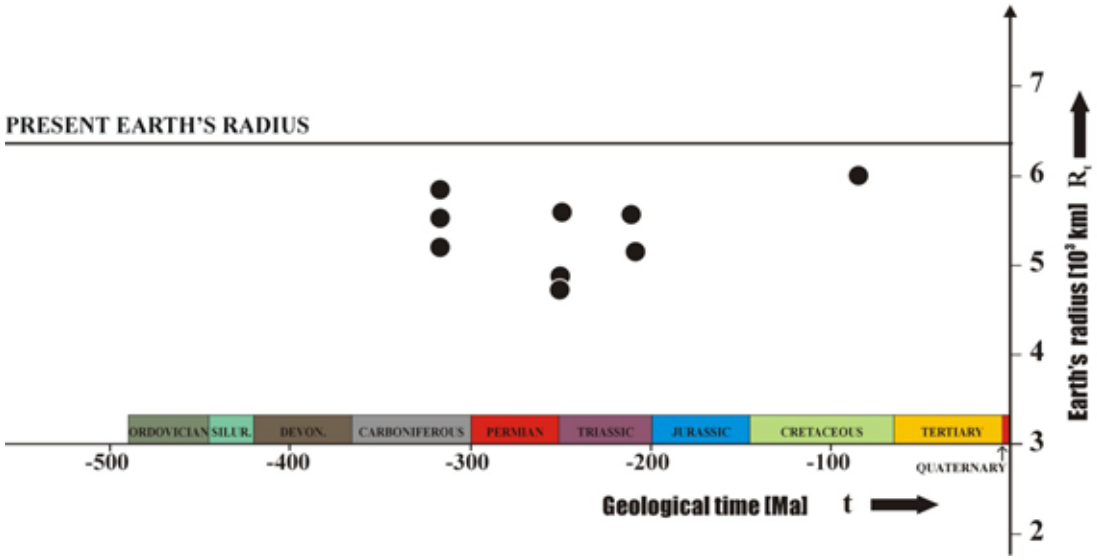


Fig. 109. *Van Hilten's paleomagnetic results according to his figure (Fig. 100 – this paper)*

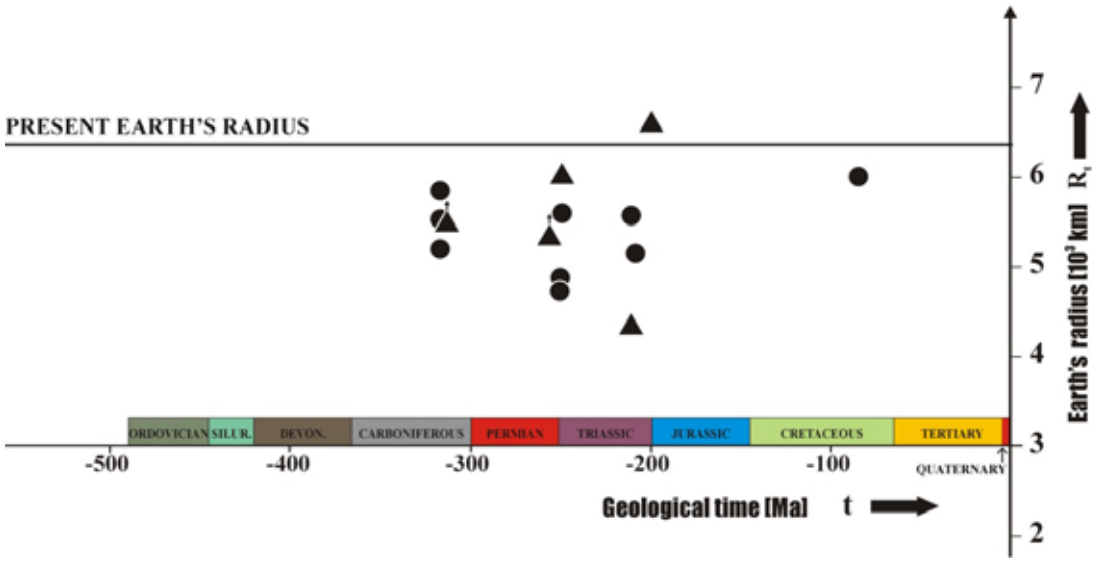


Fig. 110. *Hospers and van Andel's (1967) paleomagnetic results combined with van Hilten's (1963) results*

These combined results, by no means, exclude large expansion.

There is a similar problem with the authors' second paper (van Andel and Hospers, 1968).

This time the authors developed a new method of determination of R_a/R_p recalling Ward's method. However their earlier proper requirements of the constancy of the distance between sampling sites and angles adjacent to the line, connecting the sampling sites, are preserved. Now they calculated the distance ED between virtual poles (Fig. 111) for different ratios of R_a/R_p. They concluded that the proper ratio of R_a/R_p is that for which the distance ED reaches a minimum.

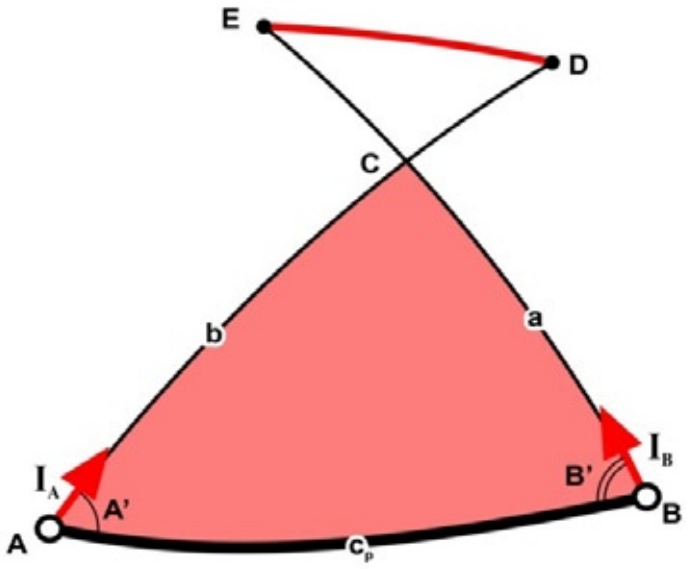


Fig. 111. *The new van Andel and Hosper's triangulation method (explanation in text)*

Taking into account proper author's requirement (preservation of the distance between A and B), we can expect again positive results for large expansion. And they really are. However the authors applied the former inadmissible procedure, mixing their own results with others which should be rejected (Fig. 112).

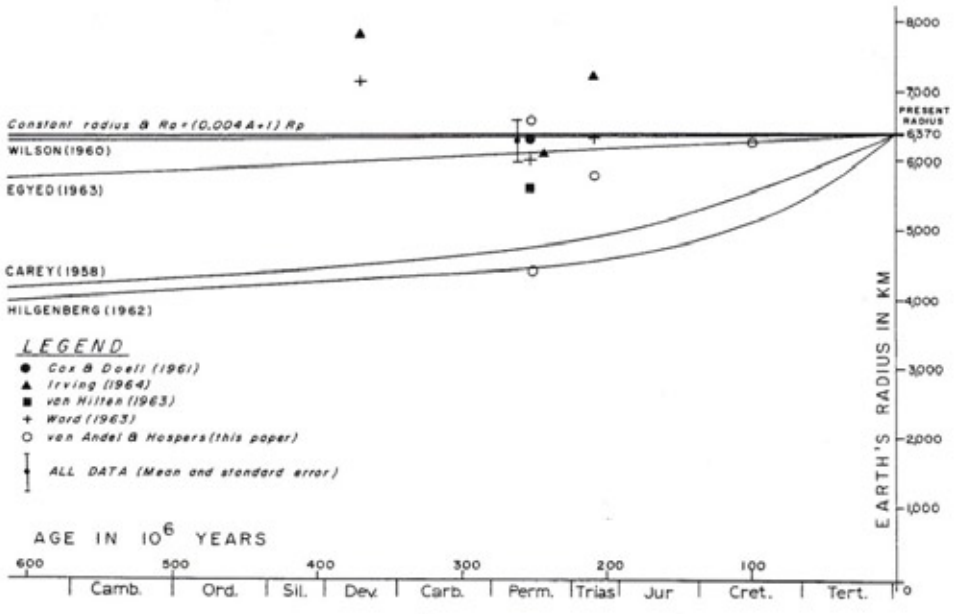


Fig. 112. *Van Andel and Hospers's (1968) figure, mixing their positive for large expansion results (empty circles) with negative ones obtained by wrong methods.*

Thus their final conclusion was again against large expansion.

However taking only their data from Fig. 112, one comes to the opposite conclusion (Fig. 113).

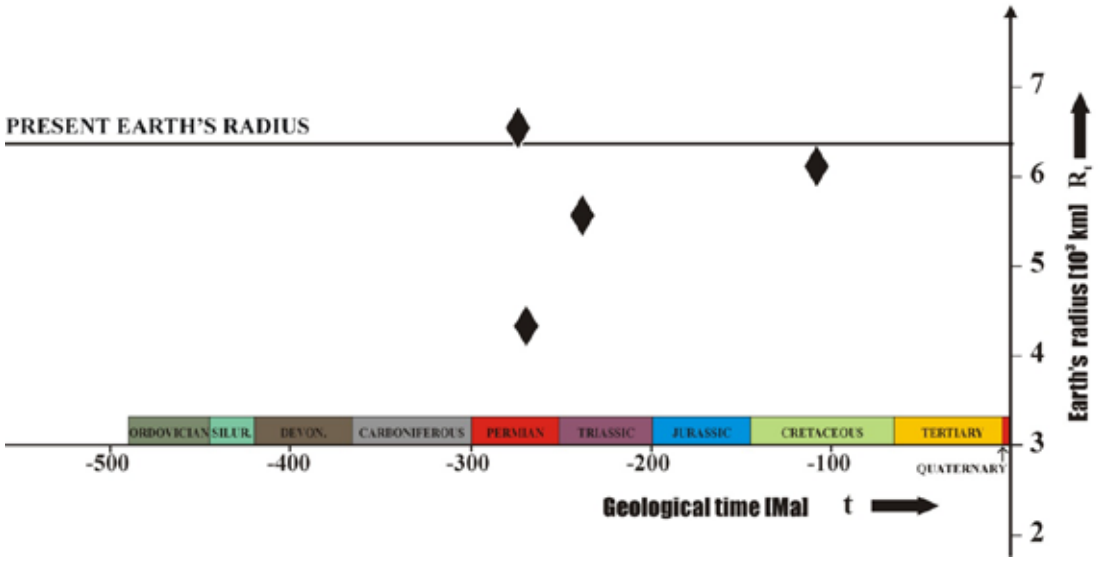


Fig. 113. *Van Andel and Hospers's (1968) own results, confirming large expansion*

It is quite bizarre that the authors did not combine their new (1968) results with their old (1967) ones (Fig. 105). Instead of this they combined them again with the defective results of other authors.

The combined results of authors' 1967 and 1968 papers are shown in Fig. 114.

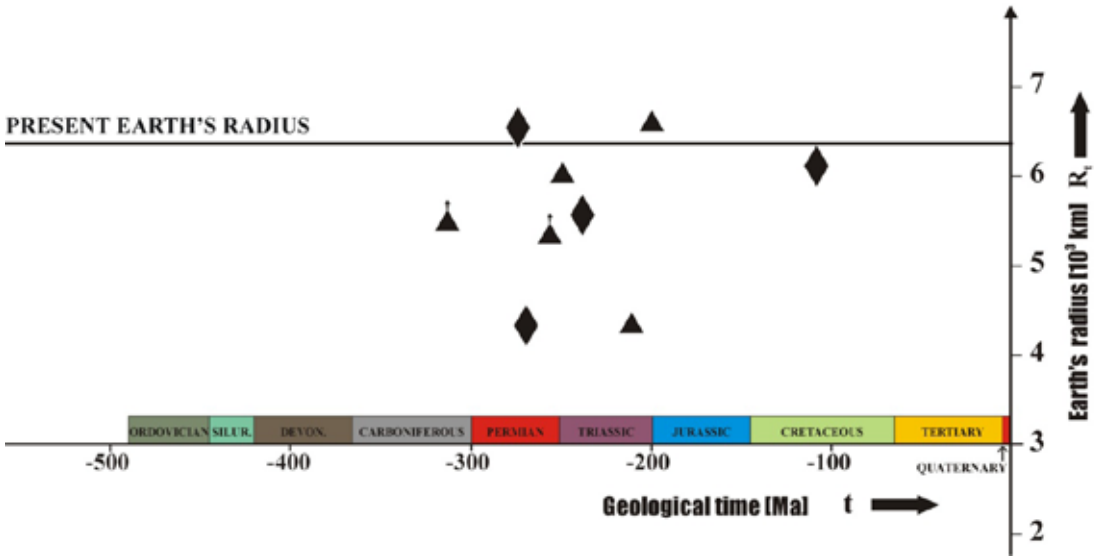


Fig. 114. *Van Andel and Hospers' combined (1967 and 1968) paleomagnetic results, confirming large expansion*

This picture clearly shows that the real results of authors' two papers are in support of the expanding Earth, and not against it as they claimed.

The above set of joined Hospers and van Andel's results should be still combined with van Hilten's results (Fig. 115).

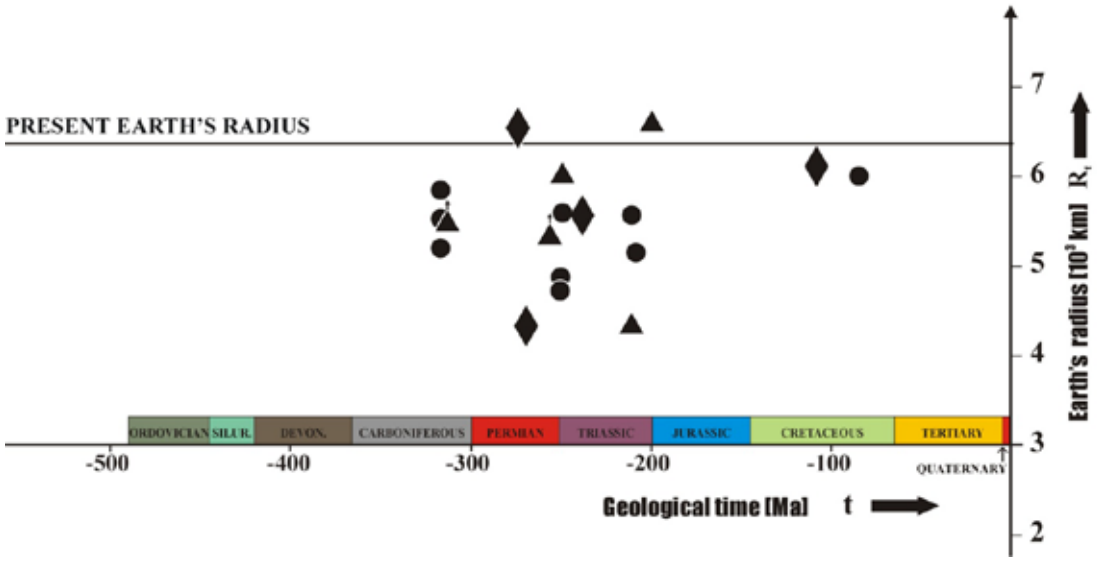


Fig. 115. *The combined set of van Hilten (1963), Hospers and van Andel's (1967) and van Andel and Hospers' (1968) paleomagnetic results*

This gives a clear picture of the large expansion of the Earth.

The expanding Earth buried alive by McElhinny

An Australian geophysicist specializing in paleomagnetism, Michael William McElhinny, can be compared to the well-known British geophysicist Harold Jeffreys who before the WWII buried alive Wegener's theory. McElhinny tried to do the same in the late 1970s with the expanding Earth.

McElhinny used only Ward's method, so the result was inevitably always negative for the expanding Earth. The first paper (McElhinny and Brock, 1975) concerned only African data. The next one (McElhinny *et al*. 1978) was based on a lot of data from all around the world and had a crucial impact on marginalizating the expanding Earth. The wide scope of the title of the paper signalled a mortal blow to the theory. It was: *Limits to the expansion of Earth, Moon, Mars and Mercury and to changes in the gravitational constant*.

The ending of the title shows an inability to separate the problem of existence of a phenomenon and the problem of its casual explanation. At that time Dirac's theory of decreasing gravitational constant with time was popular as a causal explanation of Earth's expansion. Such an explanation should have a general effect on all celestial bodies. Thus, if Mercury does not expand neither can the Earth. Of course an explanation can be different and such reasoning is meaningless. At that time Hilgenberg's and Carey's growing mass explanation was known, but this was meaningless for the authors of the paper.

McElhiny tried to reject expanding Earth using only Ward's method, and his results were negative not only for large but also for small expansion.

There is a surprising opinion expressed at the beginning of the paper:

> *It is not possible to calculate any possible changes in the Earth' radius from an examination of its surface features because these have been reshaped by a variety of geological processes. The only viable technique is that which uses the results of paleomagnetic studies.*

This is quite opposite to the facts. The process that extensively reshaped the Earth's surface is development of the ocean basins. Knowing direct proofs that the Earth is expanding, we also know that before emergence of the oceans the Earth's radius was about two times smaller (at the beginning of Mesosoic era) than the present one. This result require only a simple calculation using the surface area of the whole Earth and the surface area of the all oceans. Knowing the oceanic lithosphere's isochrones, we can precisely calculate the function of growth of the Earth radius. I did it already in 1974 (Koziar, 1980) – *i.e.* four year before McElhinny *at al.'s* paper. After me the same Blinov (1984) and Maxlow (2002) did.Whereas paleomagnetic methods remain a "blunt tool" as Carey (1976, p. 195) called them. They are unable to measure precisely the former size of the Earth but are sufficient to demonstrate that the Earth is fast expanding, in contrast to McEllhiny et al.'s conclusion.

McElhinny's discussed paper had a crucial impact at its time. Smith (1978) wrote a paper entitled: *The end of the expanding Earth hypothesis?* A Polish author, Ryszkiewicz (1978) wrote a paper entitled: *"Knell for the hypothesis of expanding Earth".*

McElhinny wrote later many papers and books connecting paleomagnetism with plate tectonics, however the 1978 paper was the most harmful for the expanding Earth.

Tertícki's method of triangles

The method (Chudinov, 1984) is based on the statement that for the determination of the radius of a sphere is enough to know the latitudes (colatitudes) of three (not collinear) points lying on it and the distances between them.

In the first step a spherical triangle (ABC) is made of three sampling sites of coeval paleomagnetic vectors, lying on a stable part of a continent (Fig. 116). Then on a basis of geographical coordinates and spherical trigo-

nometry formulas, the length of all three sides (*a, b* and *c*) of the triangle is calculated. Then the value of *R* is changed by some constant step *ΔR*. Terticki applied the value 25 km. Then a new triangle is calculated. This time paleomagnetic colatitiudes are used (they must precisely meet at the pole of the new sphere) and the lengths of two sides *a* and *b*, treated as constant parameters.

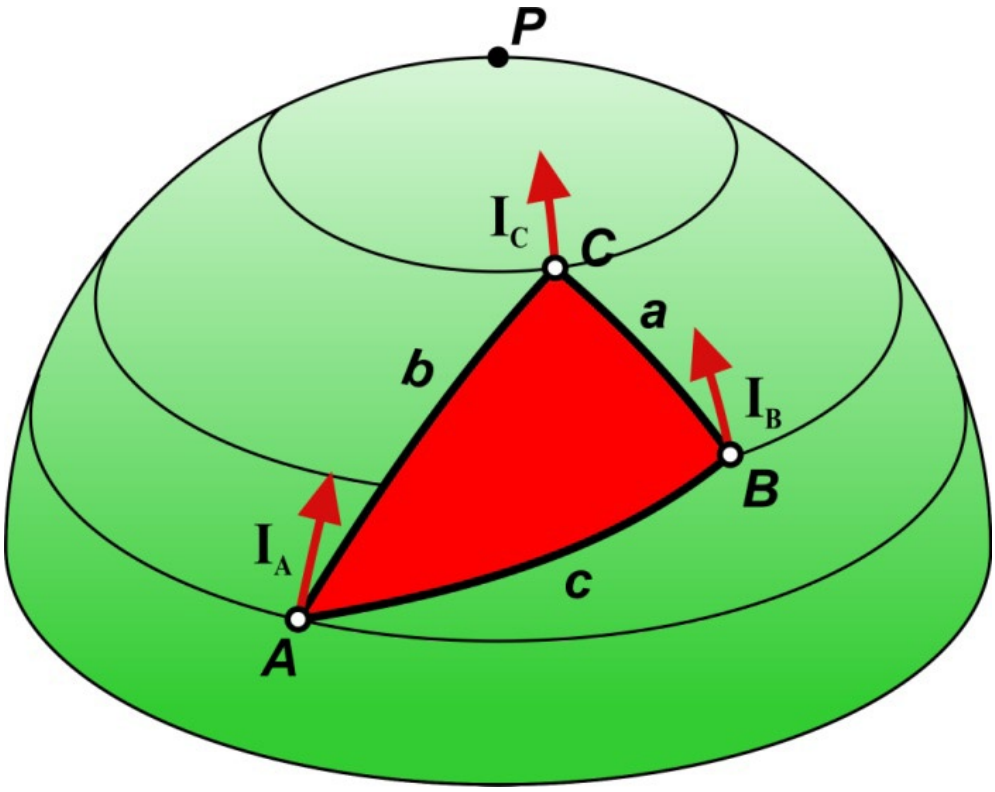


Fig. 116. *Terticki's method of triangles (explanation in text)*

The radius of the Earth ($R' = R \pm n\Delta R$, where *n* is a natural number) is given and so the new length (*c'*) of the side (*c*) of the triangle is calculated. At each step a value of the parameter $\varepsilon = (c - c')/c$ is calculated which is a measure of a deviation of (*c'*) from (*c*). Terticky accepts that for $\varepsilon \leq 0{,}03$ the deviation is small enough so as the *R'* to be the ancient and sought after radius R_a.

Terticki together with Chudinov examined the range of *R'* from 7000 km to 3000 km, using *ΔR* step equal to 25 km and using a computer technique. They obtained an averaged value of *R = 3915 km* for the Upper Triassic – Jurassic, and 5112 km for the upper Cretaceous (Fig. 117).

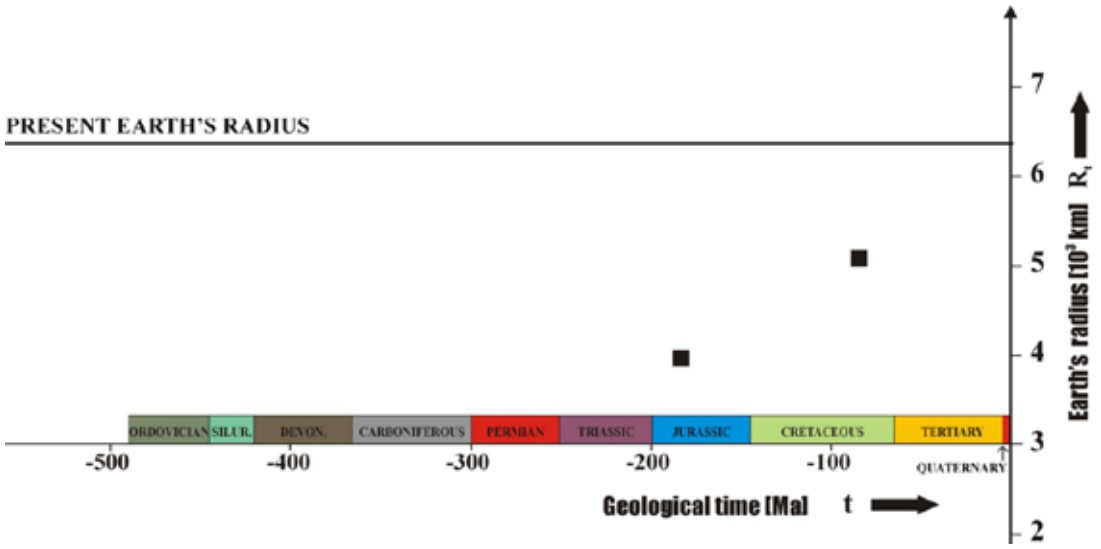


Fig. 117. *Chudinov and Terticky's paleomagnetic results obtained by Tertici's method*

The results confirm large expansion.

Chudinov and Terticky's results should be added to all former correct results in Fig. 115. Thus we obtain a full picture of fast expanding Earth based on paleomagnetic methods (Fig. 118).

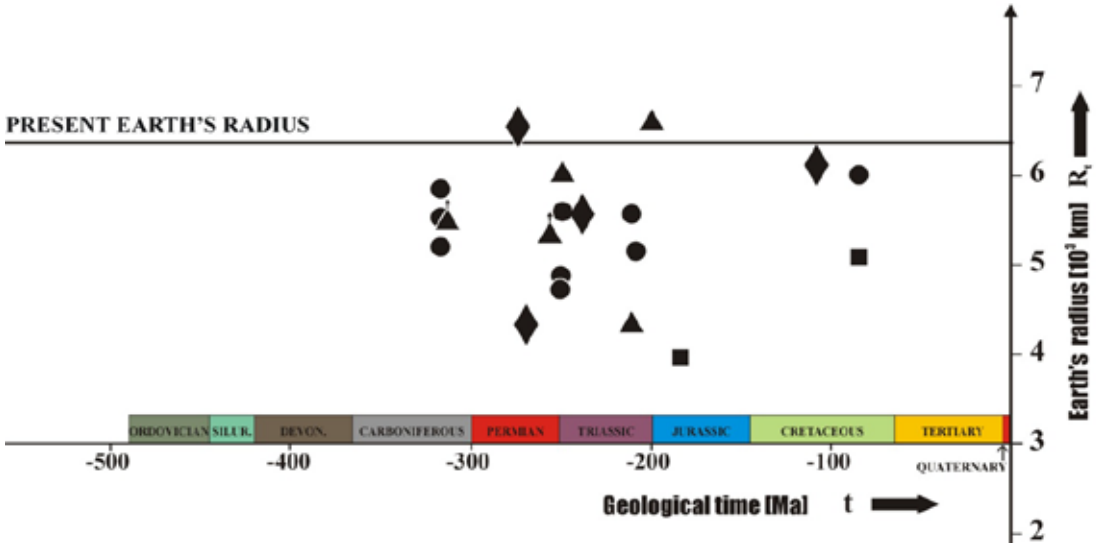


Fig. 118. *Combined set of results presented in Fig. 115 and Fig. 117*

Finally it becomes clear that paleomagnetic records do not exclude but confirm the large expansion of the Earth.

d. Wrong paleomagnetic method leading to wrong paleomagnetic reconstructions

Plate tectonics paleomagneticians, after convincing themselves and others that the Earth is not expanding, started in other faulty, but now circular way trying to confirm plate tectonics. Namely, their false belief contributed

to the concept of closed oceans and migration of terranes – the most crazy concept in the history of geology. The faulty procedure was explained by me (Koziar, 2006) as follows (Fig. 119).

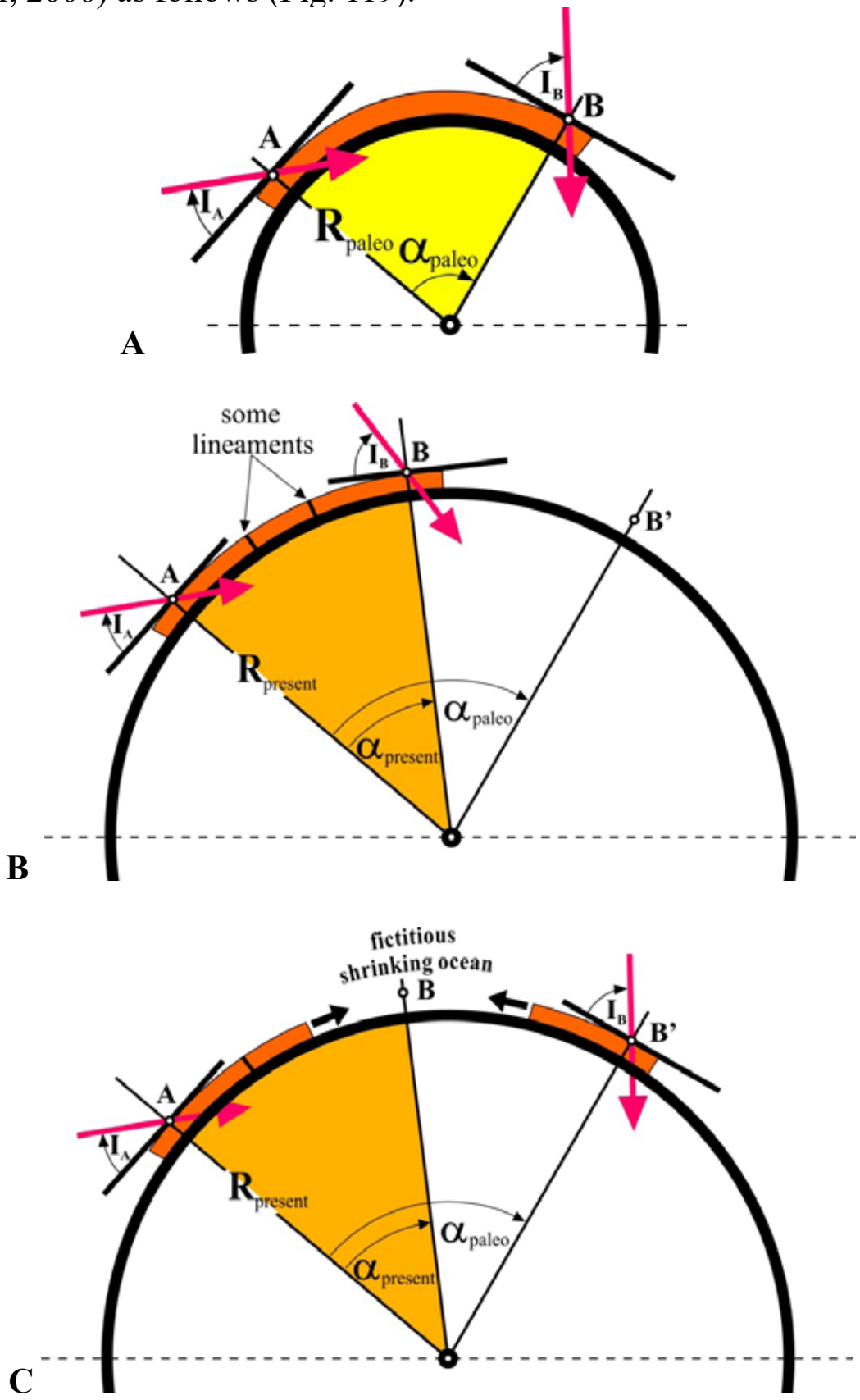


Fig. 119. *Incorrect palaeographic reconstruction resulting from incorrect palaeomagnetic method (explanation in text)*

In Fig. 119A a former small Earth is presented with a compact, inextensible plate. There are two coeval magnetic vectors recorded in rocks at the edges of the plate at the points A and B. Inclinations of these vectors define a coeval central angle (α_{paleo}) between the points A and B. After expansion of the Earth up to its recent dimension (Fig. 119B) the real central angle has decreased ($\alpha_{present}$) but the angle recorded by paleovectors remains the same and it indicates a larger distance (A, B') on the Earth surface than before. Plate tectonicists, not seeing expansion, concluded that the two points moved closer together. Then they have to find some tectonic reason for the understanding the situation. So they look for some lineament which could be interpreted as a suture after a hypothetical closed ocean. Then they tear the plate along this lineament and create this ocean (fictitious, of course) – Fig. 119C. Then they insist that this ocean has been closed.

The fictitious closed ocean, "proved" in this way, became then a "proof "of plate tectonics. However, this "proof" is based on circular reasoning, since the assumed constant Earth radius was its starting point.

In the same way large distances of migration of seeming terranes were calculated. However, sedimentologists pointed out (Kerr, 2003) that terranes in Cordilleras are homebodies and that there is something wrong with the paleomagnetism. The fault is in the wrong assumption of the constancy of the Earth's radius.

In my 2006 paper ***Terranes or geology in a phantoms world*** the falseness and circularity of the concepts of closed oceans and terranes is exactly demonstrated.

e. Blinov's effect of fictitious shrinking of lithospheric plates

In my book ***Expanding Earth and space geodesy*** (Koziar, 2018a) I described Blinov's effect and applied it to space geodesy (as the author did). Then, I only mentioned that it could be applied also to paleomagnetism. That is the situation presented above. Below, I repeat the general idea of Blinov's effect.

Let us consider a section of the expanding Earth with an inextensible plate (Fig. 120A).

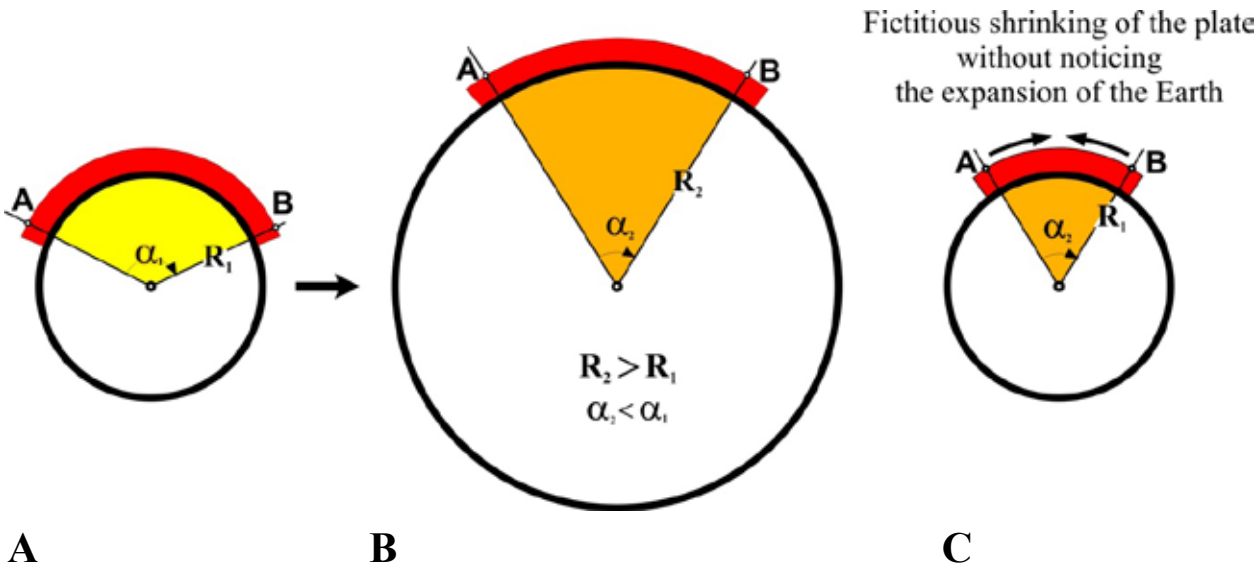


Fig. 120. *Blinov's effect (explanation in text)*

Two points on the plate A and B mark a central angle α_1. After some time the radius of the Earth has increased (Fig. 120B). Since the plate is not stretched the distance between points A and B has not increased Therefore, their central angle has decreased α_2. The only deformation of the plate is flattening which does not change the geodetic distance between A and B.

Now let us consider the situation in which the change of the central angle between the points A and B is recorded but the expansion of the Earth is not taken into account (Fig. 120C). Thus, on the base of the decreased central angle a reduction of the distance between A and B will be inferred. Of course the reduction is fictitious (false).

The difference in applying Blinov's principle to space geodesy and paleomagntism is, that in the first case the decreasing of the central angle is inferred from the change in the geographical coordinates of points A and B in the time span of a few years. In the second case the decrease in the central angle is inferred from inclinations of coeval paleomagnetic vectors in points A and B and present positions of these points. The time span is here much bigger and covers tens of millions of years.

f. Final remarks

Paleomagnetism plays a significant role in geotectonics. In the early 1950s it contributed significantly to reanimation of mobilism, by showing that divergent routes of magnetic paleopoles, determined for different continents around the Atlantic Ocean, begin to overlap when this ocean is closed.

Then Carey's and Heezen's concept of the spreading of the ocean floor was proved by Vine and Mathews' (1963) mechanism of creation of a new

sea floor at mid-ocean ridges, bordered by magnetic anomaly stripes in the ocean floor. This discovery changed the contemporary geotectonics by establishing the paleomagnetic chronological scale and recognizing the young chronological structure of oceanic lithosphere.

However, paleomagnetism played a very controversial role in the calculation of the size of the paleoradius of the Earth. This led geotectonics astray for many years, and paleomagnetic tests appeared to be a "blunt tool" as Carey called it. In fact, as was shown above, they confirm the large expansion of the Earth. But the decisive role is played by the geological proofs of large expansion, presented in detail in Part One of this book.

In the future paleomagnetism will probably play only a marginal role which will be reduced to recognition of the proper localization of magnetic paleopoles (and indirectly geographical ones) on the correct reconstructions of the expanding Earth, made on a geological base. This task has begun to be successfully realized by James Maxlow (2005, 2014, 2018), the author of the best reconstructions of the expanding Earth.

2. Le Pichon's failed attempt to prove the hypothesis of the non-expanding Earth

Xavier Le Pichon is in a unique position between the rest of the founding fathers of plate tectonics paradigm *i.e.* Jason Morgan and Dan Mc Kenzie. That is because only he openly shows that plate tectonics is built on the negation of the expansion of the Earth *i.e.* on the assumption of the non-expanding Earth. What is more, he tried to prove this assumption. However after precise analysis of his proof it changes into confirmation of the expansion of the Earth.

I presented this topic almost three decades ago (Koziar, 1991). Below I do it again.

a. Essence and incorrectness of Le Pichon's reasoning

Le Pichon (1968) assumed that the global growth of the lithosphere is by bilateral spreading on oceanic ridges only. Since the ridges have mainly meridional orientation the spreading acts mainly parallel to lines of latitude. According to Le Pichon, without an assumed compensation of spreading by subduction, the Earth should excessively increase its equatorial radius, relative to the polar one. Because the Earth retains its spherical shape, he concludes the compensation does take place, and the Earth does not expand.

However, Le Pichon did not take into account the longitudinal growth of the oceanic ridges (Proof 2 – in this book) what was pointed out by Carey (1976). What is more, Le Pichon did not notice the moving apart of continents, perpendicular to the equator along the Carey great circle (Fig. 16, Part One).

b. Le Pichon's correct calculation of the increment of the Earth's perimeter

Le Pichon tried to support his reasoning by calculation of the sum of spreading along the equator (Fig. 121).

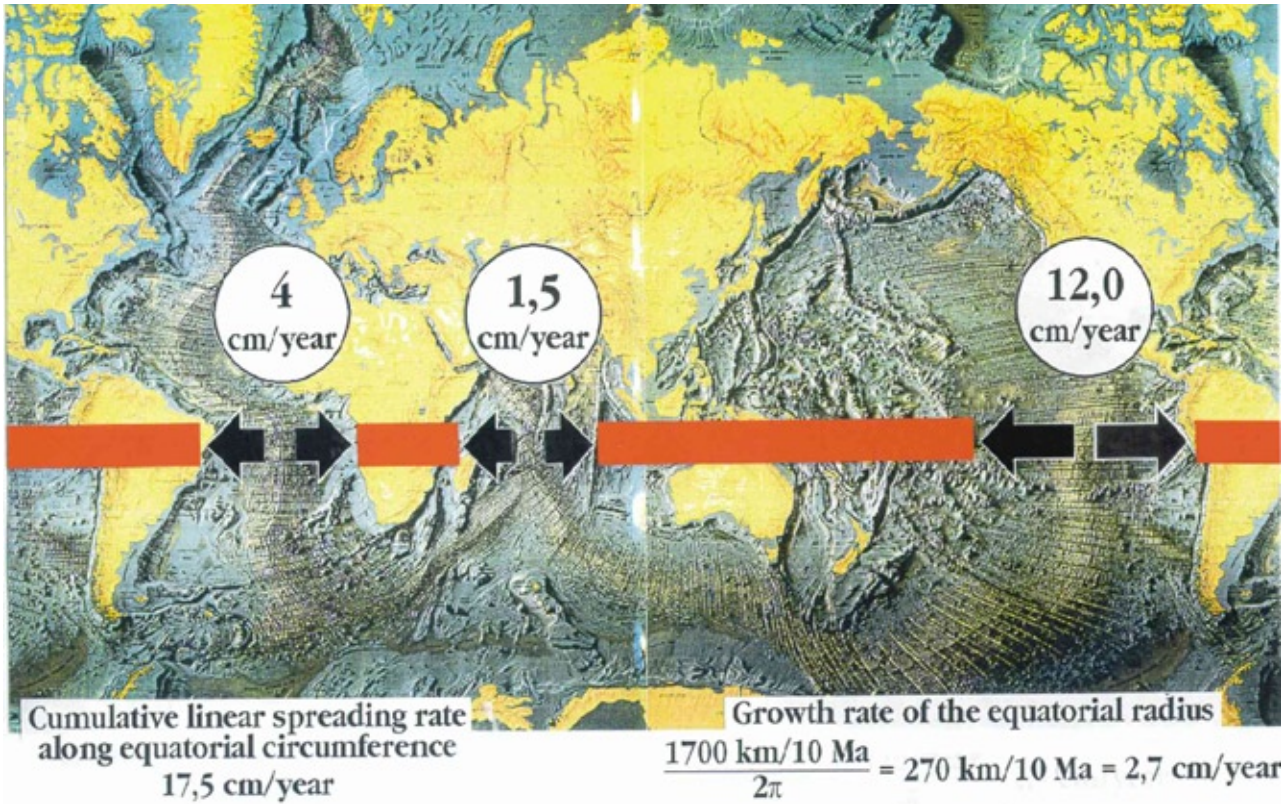


Fig. 121. *Calculation of the rate of growth of the equatorial radius by Le Pichon (explanation in text).*

He obtained 17.5 cm/year. After rounding this result down to 17 cm/year he obtained 1700 km/10 Ma and after dividing it by 2π, he obtained the increment of the equatorial radius equal to 270 km/10 Ma. That means 2.7 cm/year. I obtained almost the same value, 2.6 cm/year (Koziar, 1980) – see Fig. 130 and Table VI, in a quite different way.

The expanding equator in Fig. 121 can be called "Le Pichon's expanding great circle" (Koziar, 2014) in addition to Carey's and Ripper-Perin's expanding great circles.

3. Circularity in the defective space geodesy proof of the non-expanding Earth

Space geodesy, as soon as it became involved in geodynamics, accepted, as an obvious, the plate tectonics paradigm and its Eulerian motions of lithospheric plates. The motions, as mathematically expressed, were very convenient for this discipline which is more involved in mathematics than in a real geology.

By many years space geodesy simply ignored expanding Earth as an alternative which should be considered. Only fairly recently a team of space geodesists tried to test the expansion (Wu *et al.*, 2011). The test seemingly failed for the expansion of the Earth, however it was based on just Eulerian motions of lithospheric plates which a priory exclude the expansion. Thus, the proof has the structure of a circular argument.

The Eulerian motions of lithospheric plates can be falsified and I did it in a separate paper (Koziar, 2016; www.wrocgeolab.pl/falsification2.pdf). The precise analysis of space geodesy geodynamic results confirms significant expansion of the Earth (Koziar, 2018; www.wrocgeolab.pl/geodesy2.pdf) – see for example Table VII. It can be also shown that the whole plate tectonics is based on circular arguments (Koziar, 2017b; www.wrocgeolab.pl/falsification3.pdf).

4. False convergent development of some large tectonic structures

These structures are:

1) island arcs and active continental margins

2) intra-continental fold belts

3) intra-continental basin inversions (basin upwellings).

Convergent interpretations of these structures are not treated in plate tectonics as proofs in the strict sense of the word. However almost all their followers treat them just in this way – especially in case of the first two.

The "proof" by Le Pichon is almost totally unknown. It is not better with the space geodesy "proof" by Wu *et al*. (2011). While the understanding the island arcs, active continental margins and intra-continental fold belts as convergent structures is almost universally accepted and is the main way of understanding of the whole plate tectonics. This "knowledge" has become popular also in the field of politics – regional political conflicts are often compared to "colliding plates".

However the convergent interpretation of these structures is false. The problem was touched in the Introduction to Part One of this book. Now it will be completed.

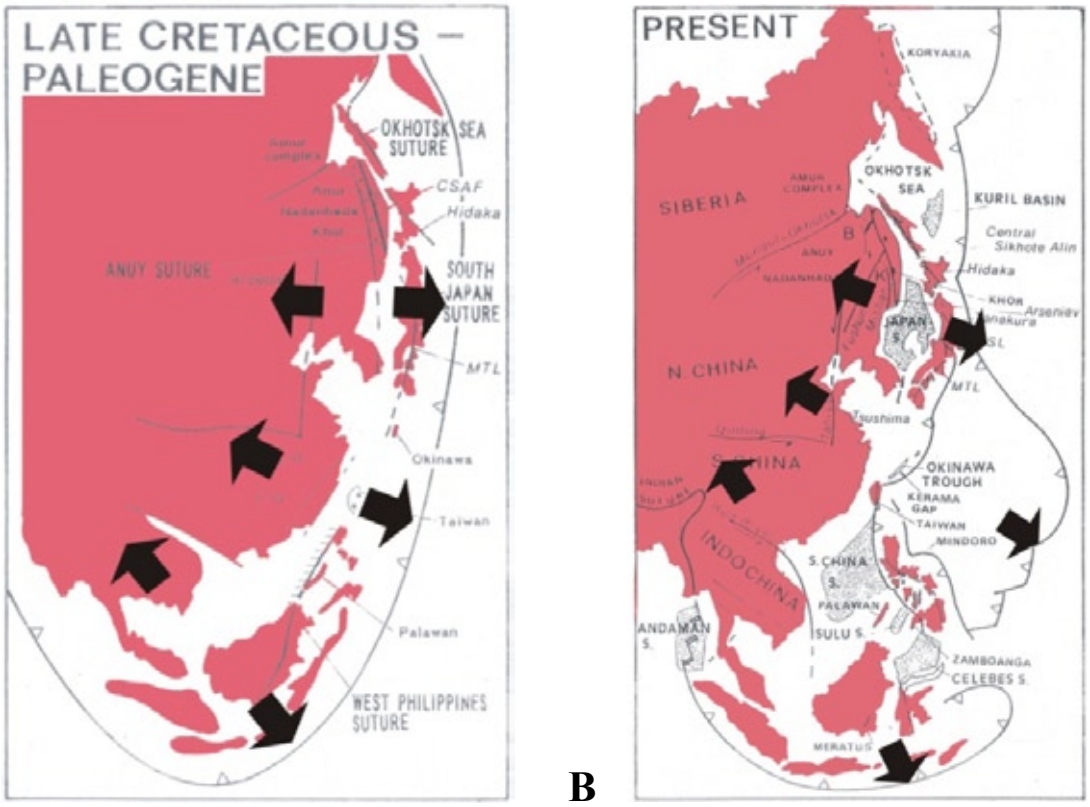
a. False convergent development of island arcs and active continental margins

The most important example of false convergent structures is the model of plate convergence and subduction at island arcs and active continental margins. It was created at the same time as the mature plate tectonics (Isacks *et al*., 1968). But soon after that Karig (1971) pointed out that the arcs are moving away from the continents. The process was noticed already by Wegener (1915).

Simultaneously it became clear that there is a hot diapiric mantle beneath the back-arc-basins as beneath the evidently divergent oceanic ridges. It resulted from attenuation of seismic waves and high heat-flow in these places.

Divergent development of island arcs is best seen in the reconstruction of the whole East Asia continental margins by Faure and Natalin (1992) – Fig. 122. The process is accompanied by tearing the whole continental part of East Asia towards the Pacific (for instance Kearey and Vine, 1996).

The process speaks for itself and the plate tectonics concept of convergence of plates in such zones is fundamentally wrong.



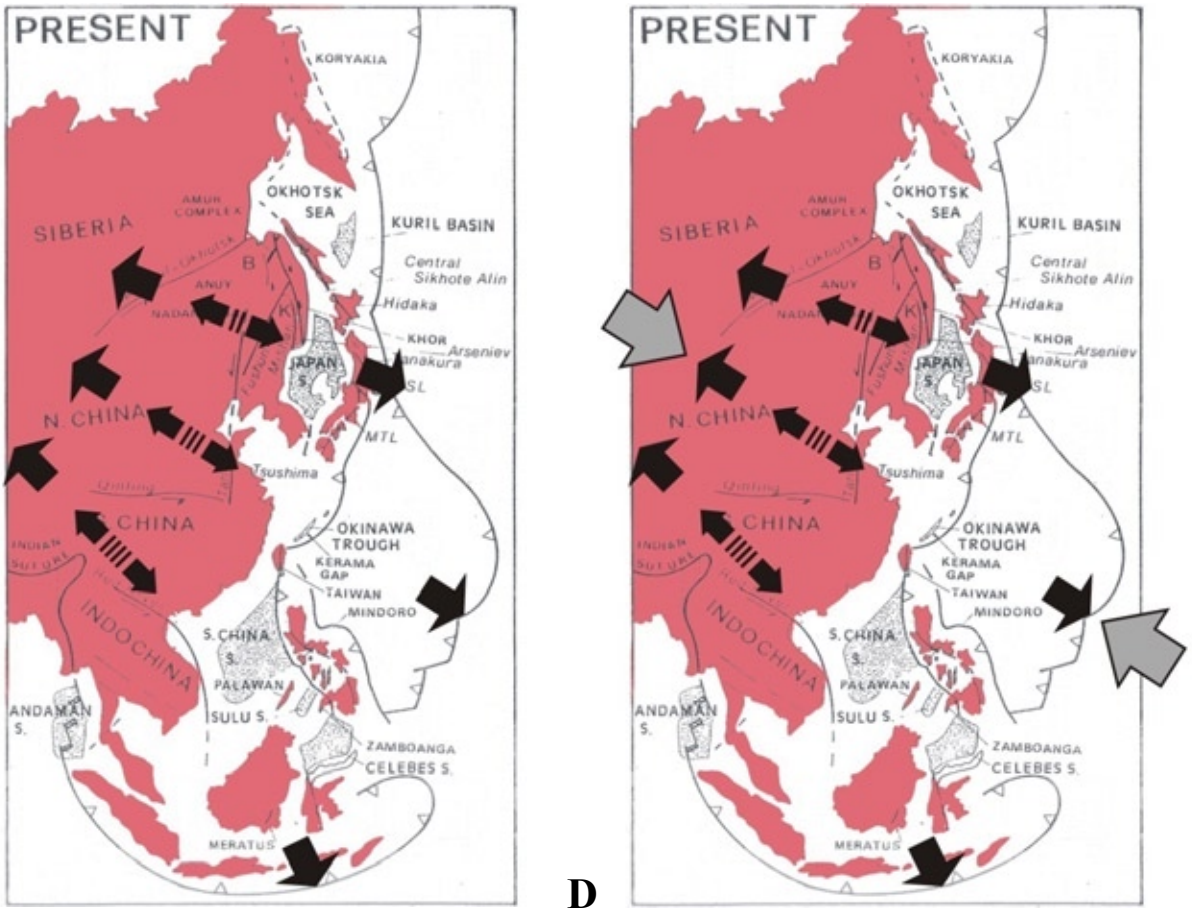


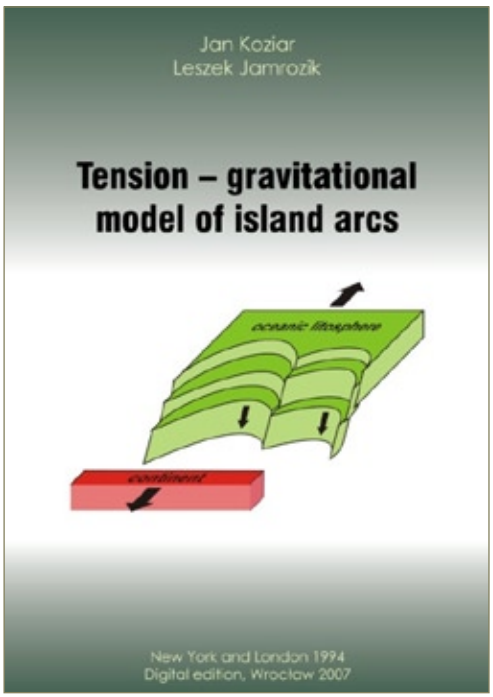
Fig. 122. *Tensional development of East and South-East Asia margins. On the basis of reconstruction by Faure and Natalin (1992) [arrows J.K.],*
A *– State of extension of the east Asia margins at the turn of Mesozoic and Cenozoic*
B *– Present state of extension of the east Asia margins,*
C *– Present inland extension of the east Asia,*
D *– The collision (the biggest and gray arrows) of the Pacific plate with Asia plate, assumed by plate tectonics, is in the area of evident large scale extension.*

The faith in convergence in such extremely extensional zones is so strong today that it is used as an argument against expanding Earth which "does not explain the subduction". This is an extended piece of a circular argument.

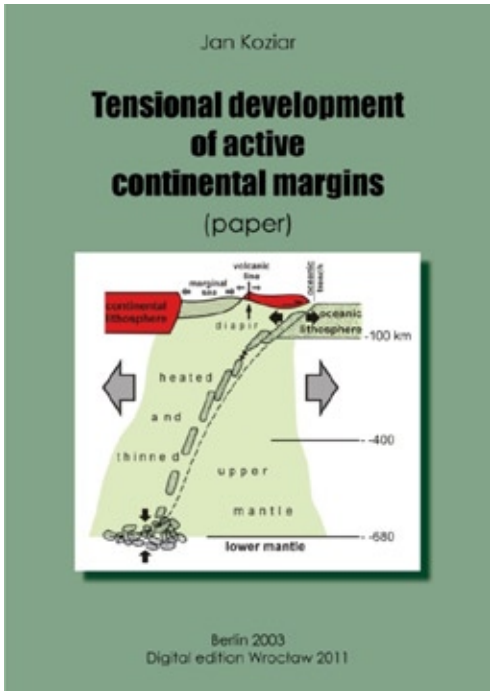
It must be stressed that Wegener himself treated island arcs as tensional structures. According to him they were to be torn from the continents which were to drift to the West (Westdrift) driven by Coriolis force.

The plate tectonics' concept of subduction had a huge impact on the thinking of geologists and laymen alike. Present-day geologists are unable to consider development of any metamorphic complex without "subduction". I personally met laymen who were well familiar with "subduction" but knew nothing about oceanic ridges and the spreading of the ocean floor.

I refer readers to the section 3 (www.wrocgeolab.pl/cont_island.htm) of my website with following items:



www.wrocgeolab.pl/margins1.pdf



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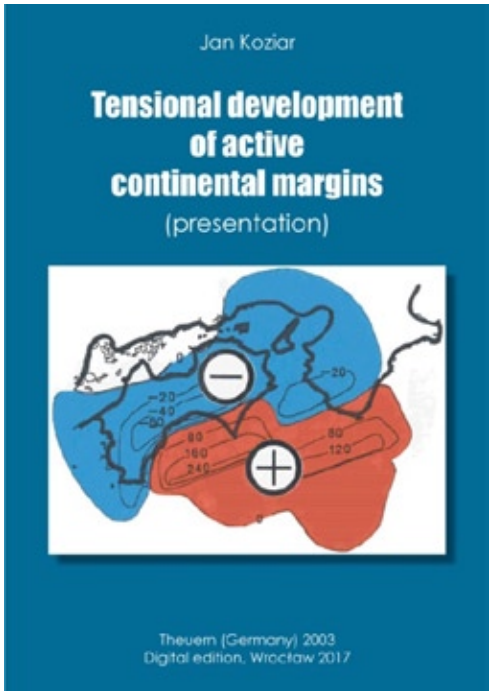
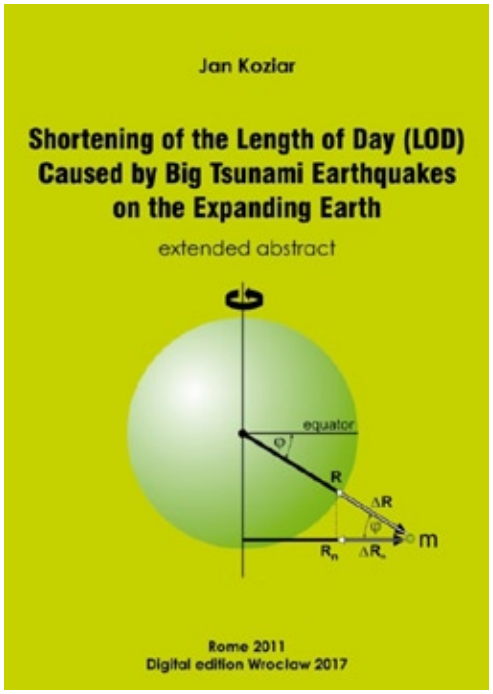


www.wrocgeolab.pl/margins2a.pdf



www.wrocgeolab.pl/LOD.pdf

The first three present only crude approximation of the tension-diapir-gravitational mechanism. Only recently I was able to elaborate a more specific version. It was presented at the XIX Meeting of the Society of Geologists Alumni of Wrocław University held on 28 January 2017 at Wrocław University. The title was: ***Tensional development of island arcs and active continental margins. Detailed mechanism***. The topic is shortly mentioned in the fourth brochure (www.wrocgeolab.pl/LOD.pdf).

The following schemes present the general substance of the detailed version (Fig. 123)

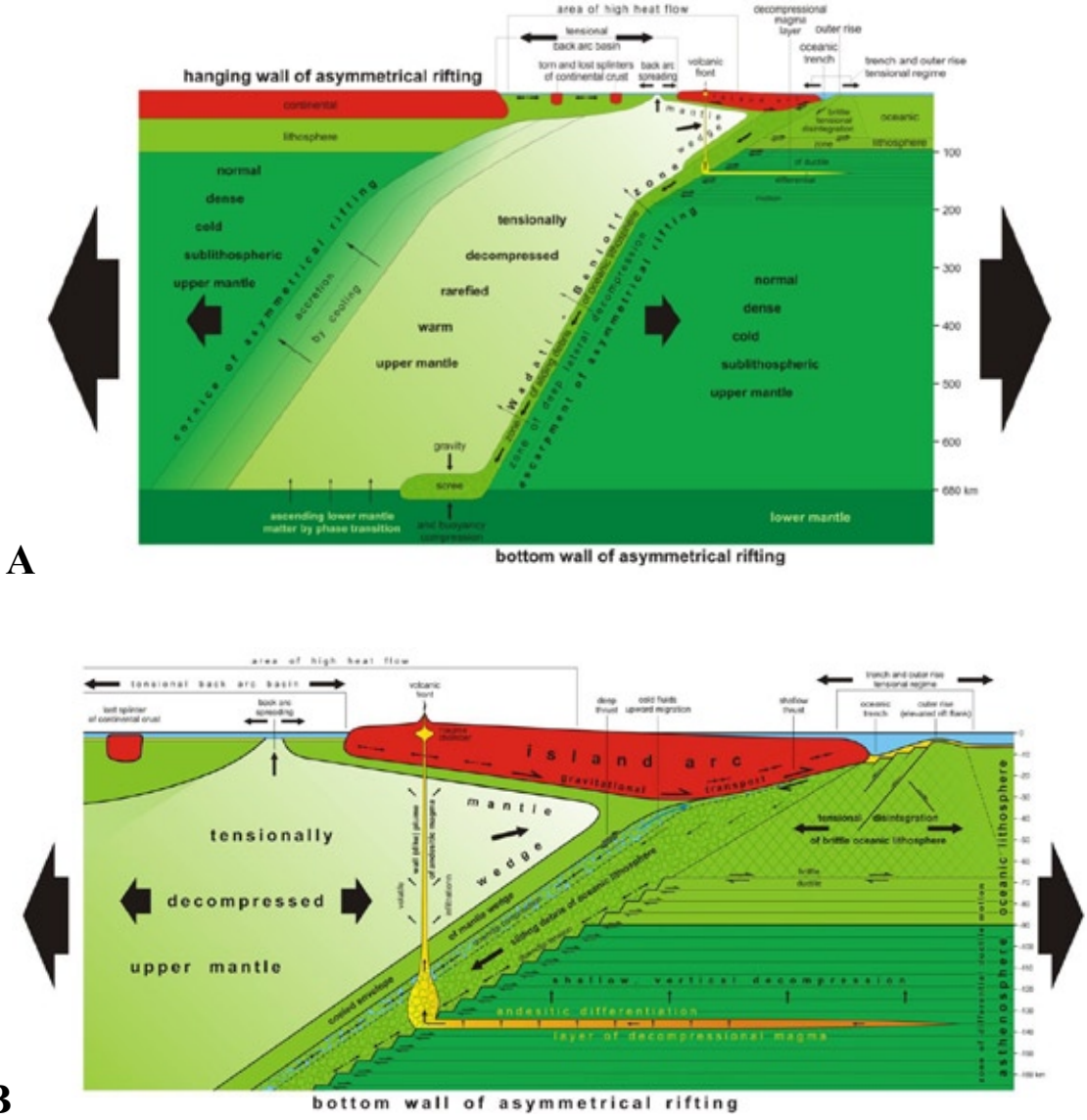


Fig. 123. *Tension - diapiric - gravitational development of island arc (according Koziar, 2017),* **A** *– full section,* **B** *– upper part of the full section*

The topic will be elaborated as a separate comprehensive brochure.

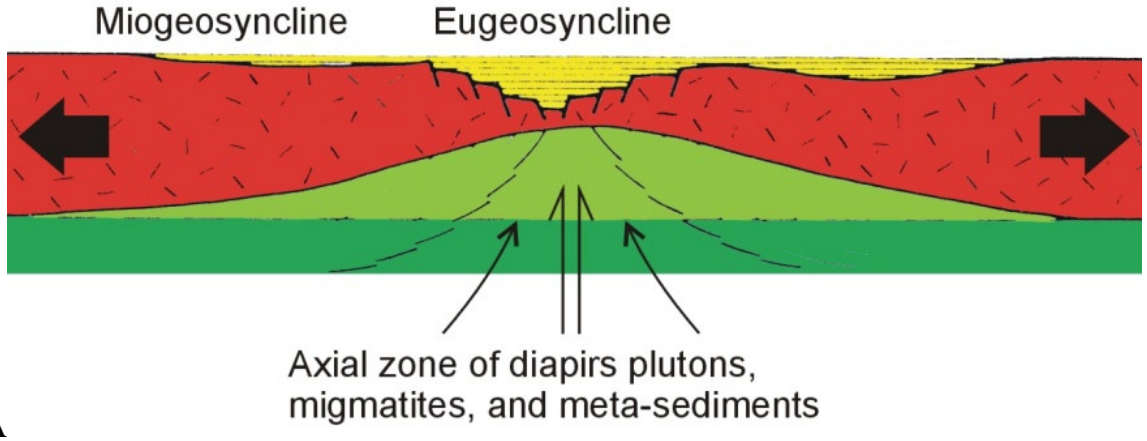
b. False convergent development of intra-continental fold belts

The convergent interpretation of fold belts became a flagship mechanism in geology since the time of Elie de Baumont and his theory of contraction of the Earth. Wegener's theory only increased the size of supposed convergence, by proving something quite opposite – the huge sizes of divergence. However Wegener accepted tacit assumption that the size of the Earth is constant. Thus the proved divergence had to be compensated by speculative convergence. The same way of thinking is accepted by plate tectonicists in the situation of much better proved divergence by the proces of the spread-

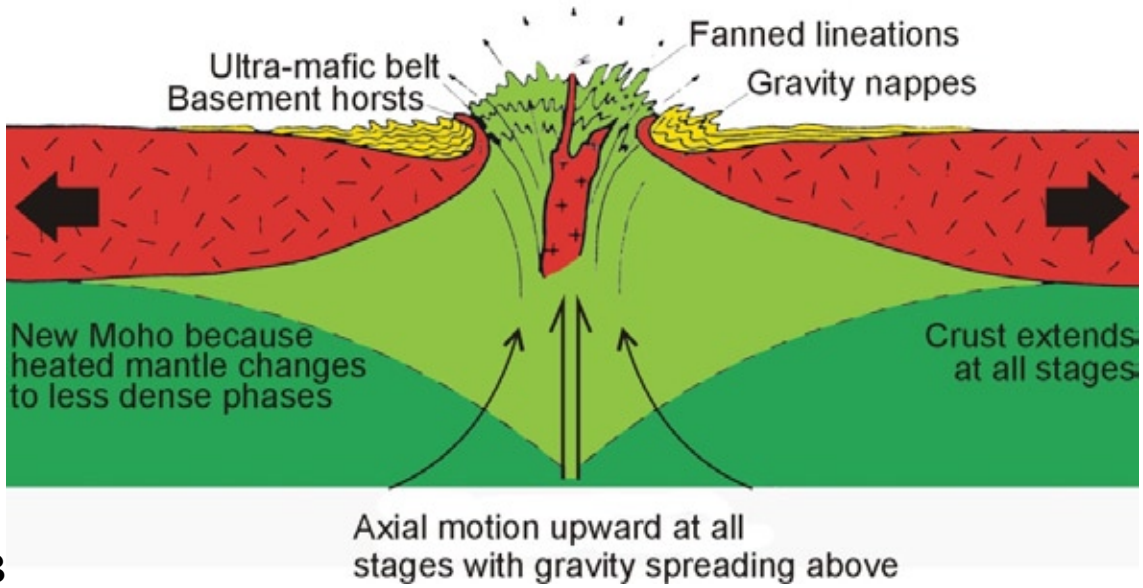
ing of the ocean floor – also in the Pacific! The latter was not taken into account by Wegener. Expanding Pacific ocean floor doubled the size of supposed Wegener's convergence. Then introducing to plate tectonics the concepts of Wilson's cycles and of terranes increased the size of convergence to unimaginable proportions. The area of lithosphere supposedly drowned into the mantle must exceed the surface area of the present Earth many times.

However convergence of lithosphere was not the only explanation of development of fold belts. From the begginning of geology, since James Hutton himself, the other, much more rational, mechanism has been developed. That is gravitational tectonics. The main problem of this tectonics was to find the cause of upwelling of the upper mantle (geotumors) as well as its subsidence (geodepressions) which both provoke gravitational transport.

The cause was found by Carey (1958). This is the stretching of the lithosphere (Fig. 124) and ultimately the expansion of the Earth.



A



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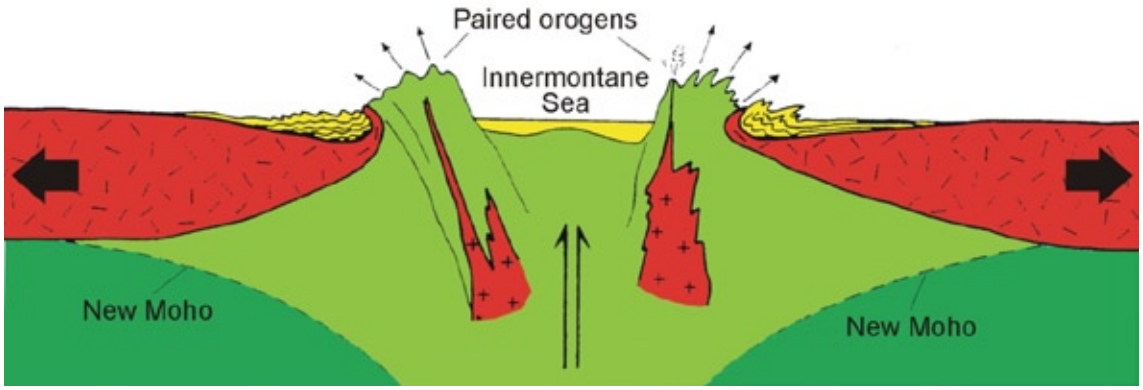
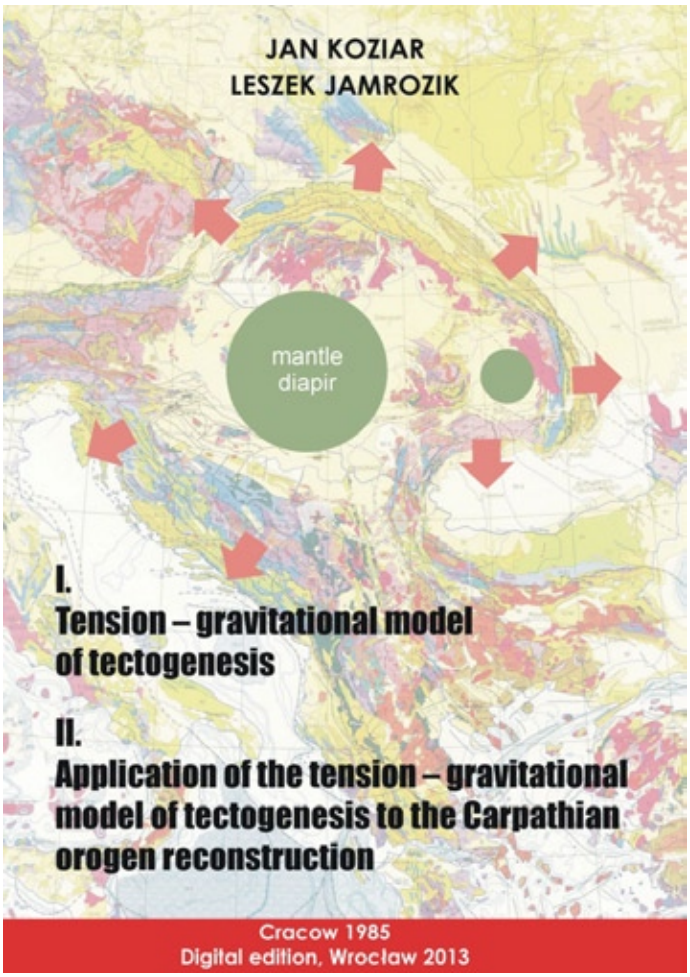


Fig. 124. *Development of fold belt according Carey (1976)*
A *– geosynclinal stage,*
B *– folding stage,* **C** *– intramontane depression stage*

Thus the real process of development of fold belts turned to be opposite to the one, extremely popular in geology since the 19th century.

The divergent (tensional) mechanism of development of fold belts can be called "tension - diapiric - gravitational". It was described and applied by me and Leszek Jamrozik to the Carpathians in 1985 (Koziar and Jamrozik, 1985a; 1985b.



www.wrocgeolab.pl/Carpathians.pdf

In 2005 I published (in Polish) two comprehensive papers on tensional fold belts (Koziar, 2005a; 2005b). In the first one the exact mechanism was described while in the second the global examples are presented (all important fold belts). In the near future both papers will be presented in English.

c. False convergent development of basin inversions

In 1978 Dan Mc Kenzie "discovered", quite obvious otherwise, the tensional origin of the continental basins[2]. Instantaneously all plate tectonicists began to treat the basins as tensional structures. However, in the frame of plate tectonics, it was necessary to invent some mechanism compensating such unpleasant expansion of continental lithosphere. The invented mechanism was alleged compressional basin inversion. As an example there can be such an interpretation of the inversion of the Polish Basin made by Mazur *et al*. (2005) – Fig. 125.

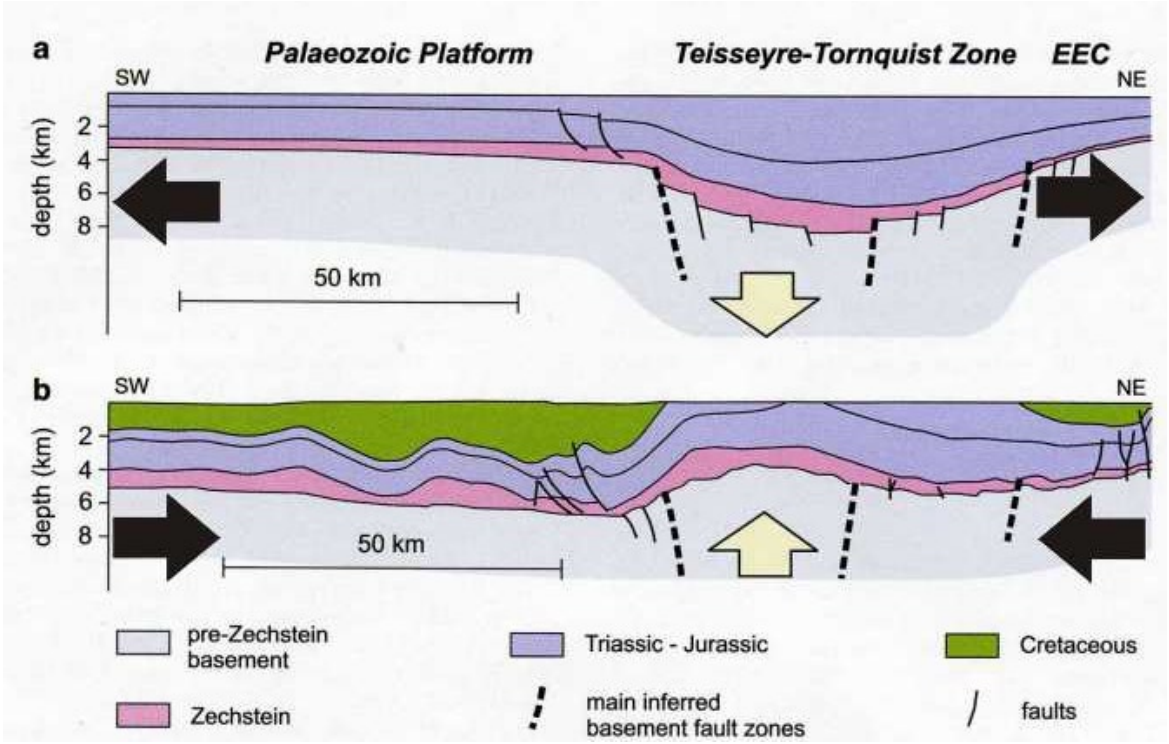


Fig. 125. Development of the Polish Basin*, according to Mazur et al. 2005 (arrows J.K.),* **A** *– tensional stage (subsidence of the Mid-Polish Trough),*
B *– supposed compressional stage (inversion of the Mid-Polish Trough)*

However a real development of the inversion of the Polish Basin (and the other ones) is quite the opposite, *i.e.* is tensional too (Fig. 126). What is more it is a result of intensification of tension (jerk).

[2] In the middle of 1970s I proposed to my associate, Leszek Jamrozik, the subject matter "Tensional development of the Polish Basin" as a topic of his doctoral thesis. It was a few years before Mc Kenzie's paper.

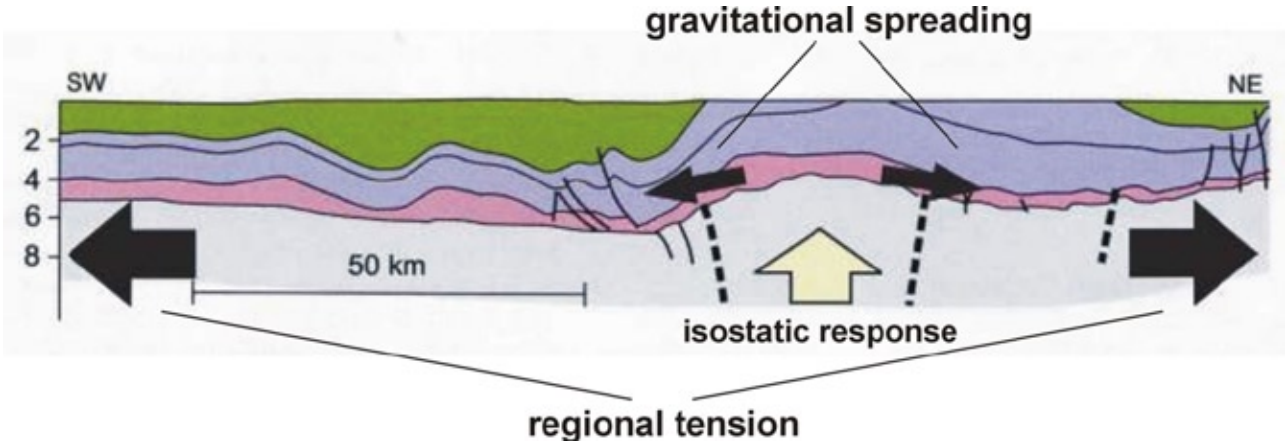
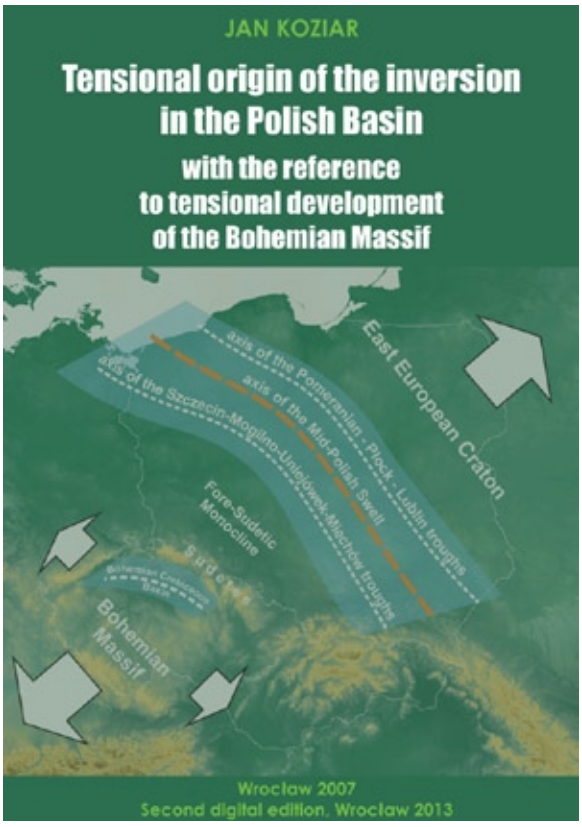


Fig. 126. *Tensional mechanism of the inversion o the Mid-Polish Trough. According to Koziar (2007).*

The detailed explanation of tensional mechanism of the inversion of sedimentary basins is presented in my Internet-accessible brochure, shown below.



www.wrocgeolab.pl/inversion.pdf

Summary of section 4

It must be said that all the bizarre convergent interpretations of some large tectonic structures are a consequence of the speculative assumption that the Earth is not expanding. Facing huge and well proved divergent (tensional) processes (spreading of the ocean floor, tensional development of

continental basins and geosynclines) and believing in the not-expanding-Earth dogma, plate tectonicists are compelled to invent all this false convergent interpretation.

In fact the supposed convergent structures are also divergent. Thus they not only fail to compensate gigantic divergent movements but even add further to them. In this way, the main popular "proofs" of plate tectonics turn into proofs of opposite solution – significant expansion of the Earth.

The demonstration that in all supposed convergent structures no compensation of divergent movement takes place, is the next independent proof of the expansion of the Earth. Thus, the seven geological proofs of expansion of the Earth, shown in Part One of this book, are not only ones. They are only more simple than demonstrations of the real divergent (tensional in fact) development of island arcs, active continental margins, intra-continental fold belts and basin inversions.

II. PROOFS OF THE EARTH'S GROWING MASS

1. Introduction

The growth of the Earth's mass can be proven on paleontological grounds, as well as on the orbital decay of geodetic satellites and measurements from ground-based gravimeters. For now the topic is demonstrated only cursorily but it will soon be published in a more detailed version on the Internet under the title ***Yarkovsky Gravitational Effects*** (see the back cover of this book) at the below address: www.wrocgeolab.pl/Yarkovsky.pdf . The plural in the title is used because the orbital decay of geodetic satellites and growth of the surface gravity are two Yarkovsky gravitational effects.

2. Paleontological proof of the growth of the Earth's mass

a. Hurrell's *Reduced Gravity Earth Theory* and *Increasing Mass Expanding Earth Theory*

When the skeletons of the first gigantic tetrapods were discovered, scientists wondered how they were able to move. At first it was assumed that they were amphibious creatures whose weight was partially reduced by water buoyancy. Then their dry land traces were found which showed that the tetrapods were able to move without water support. Thus they were treated as very clumsy creatures. Then their considerable agility was documented.

In this confusing situation a design engineer, Stephen Hurrell, entered the action in the late 1980s. He came first to the ***the Reduced Gravity Earth Theory*** then to ***the Increasing Mass Expanding Earth Theory***.

Based on biomechanics and so called "scale effect", the latter very important in the field of engineering and architecture, Hurrell proved that the gigantic tetrapods were unable to move at the present Earth's surface gravity. Then (also taking into account other ancient gigantic land organisms) he showed that the Earth grows in the size and mass. He presented his arguments in three editions of his book ***Dinosaurs and the expanding Earth. Solving the mystery of the Dinosaurs' gigantic size*** (1994), with expanded versions in 2003 and 2011.

The surface gravity, suitable for the gigantic dinosaurs, would be about two times smaller than the present day one. Hurrell calculated that at roughly constant Earth's mean density[3] the Earth's radius should be half its present size in the days of dinosaurs.

Only after his initial, but firm conclusions, Hurrell came across the Expanding Earth theory in the literature – a frequent situation among expansionists. His half size Earth at the beginning of the Mesozoic Era agrees well with other authors' earlier estimates, based on geological data. However some expansionists consider growing Earth's mass but some only constant mass (decreasing density). Hurrell proved both expansion of the Earth and the growing Earth's mass. The latter is proved by him exceptionally well.

b. Strengthened Hurrell's proof of the significant growth of the Earth mass

As is showed in Part One of this book, the expansion of the Earth itself is, in fact, well proved empirically for a long time, no matter what was its cause and particularly its mass. This makes it possible to strengthen considerably Hurrell's paleontological proof of the growing Earth's mass. It is because proving of the Earth expansion itself (as such) and proving the growing Earth's mass can be separated. At the beginning of the Mesozoic the Earth radius was (roughly) half its present value (no matter what was the Earth's mass) so the Earth's volume was eight times smaller.

[3] The steady density of the expanding Earth is well confirmed for the Mezo-Cenozoic time by petrology of mantle plumes. Many of them were active then and many of them crossed the whole mantle. Their petrologic contents is the same all the time and the same as the rest of the mantle which volume grew in the Meso-Cenozoic about eight times. It means that the new matter is contributed to the Earth in form of matter already existing.

Now let us assume that the Earth mass is constant during the process of expansion. That means that at two times smaller radius the surface gravity should be four times greater (Fig. 127).

Now let us apply Hurrell's considerations not to the present size Earth but to this smaller and hypothetical eight times denser Earth. Certainly not only gigantic dinosaurs but also much smaller tetrapods would be unable to walk on such an Earth (Fig. 128).

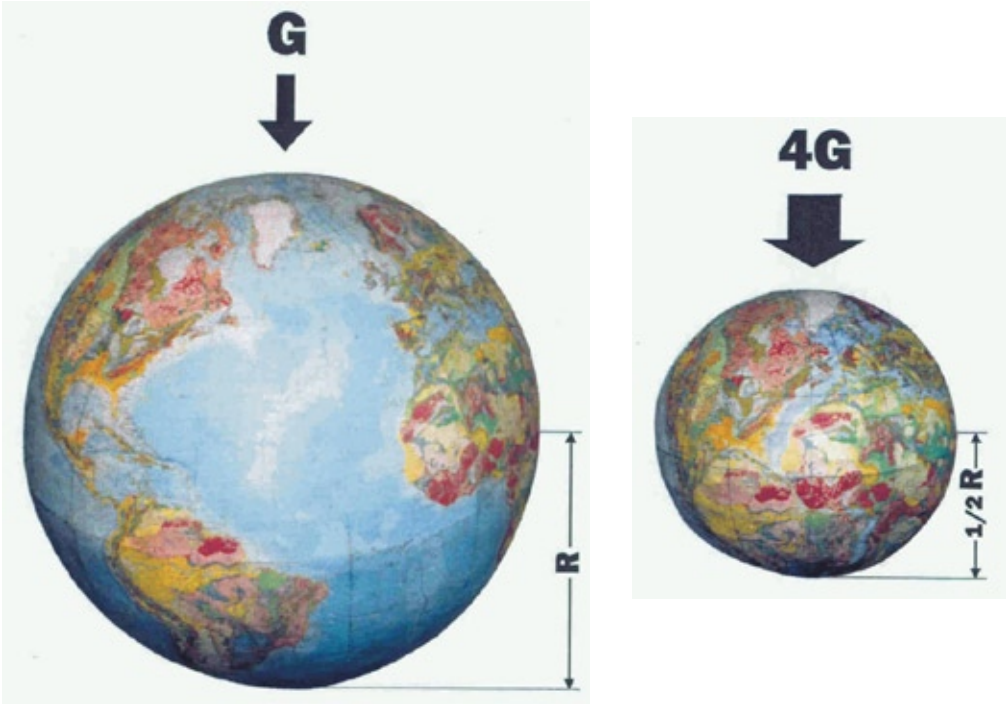


Fig. 127. *Assuming constant Earth's mass, the surface Earth's gravity should be fourth time greater at half the Earth's radius. The globes were made by Klaus Vogel on the basis of the Russian spherical geological map – scale 1: 15 mln.*

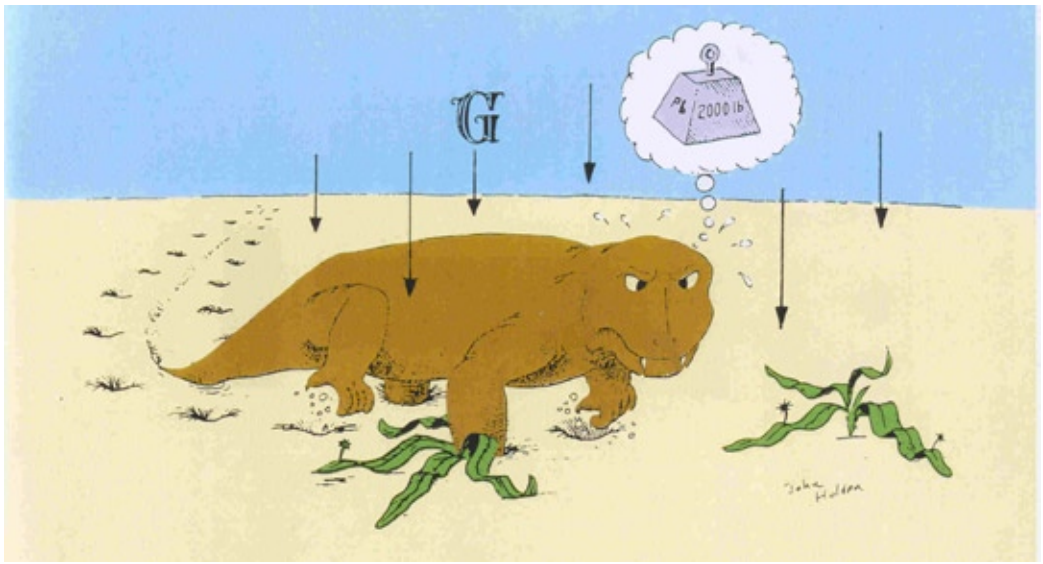


Fig. 128. *Satiric illustration of an enormous gravity on a "small world of the Triassic", at constant Earth mass assumption (by Dietz and Holden, 1973)*

If someone doubts the impossibility of the gigantic dinosaurs' ability to walk on the present size Earth and is not convinced by Hurrell's arguments, he (she) should transfer these arguments on the small Earth in Fig. 127. However he (she) should also become familiar with the empirical geological proofs of the Earth expansion, presented in this book.

3. Calculation of the present annual increase in the Earth's mass and surface gravity

a. Calculation of the present annual increase in the Earth's mass

The present annual growth of the Earth's mass (at assumed constant density) is best calculated from an annual increment of the Earth's radius (if it is known). The increment should be multiplied by the Earth's surface and in this way the annual increment of the Earth's volume is obtained. This should be multiplied by the Earth's mean density and this gives the annual increment of the Earth's mass.

The function of the growth of the Earth radius, based on measured increments of the lithosphere for the time span of Phanerozoic, expressed by a mathematical formula, was published the first time in 1980 (Koziar, 1980). It appeared to be exponential (Fig. 129).

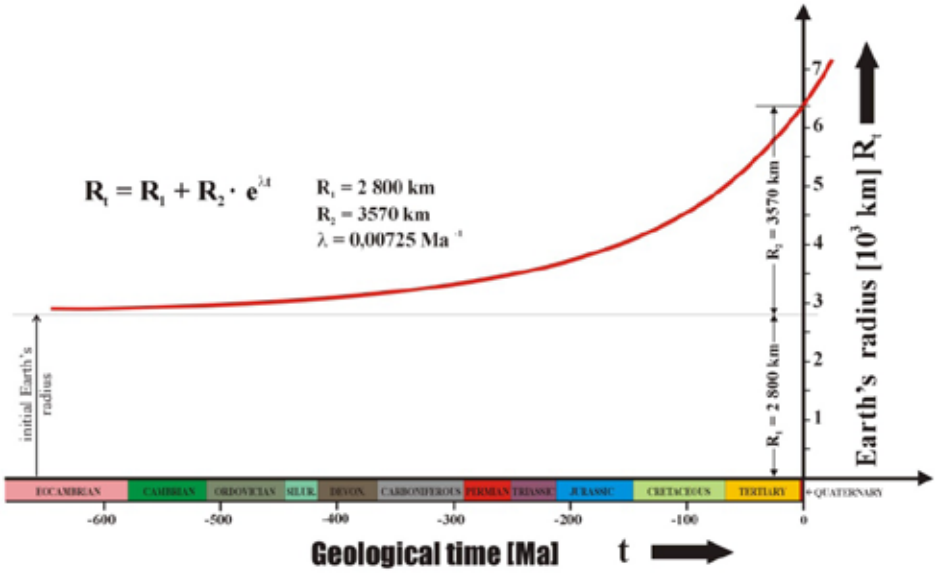


Fig. 129. *The first published function of the growth of the Earth radius expressed by the mathematical formula and based on measured surface area increments of the lithosphere (Koziar, 1980)*

The exponential character of the function was already predicted by Hilgenberg and Carey. However its later mathematical formula allows calculation of many derivative functions. The first of them was the function of

the rate of the growth of the Earth radius (Fig. 130) obtained by differentiation of the first function.

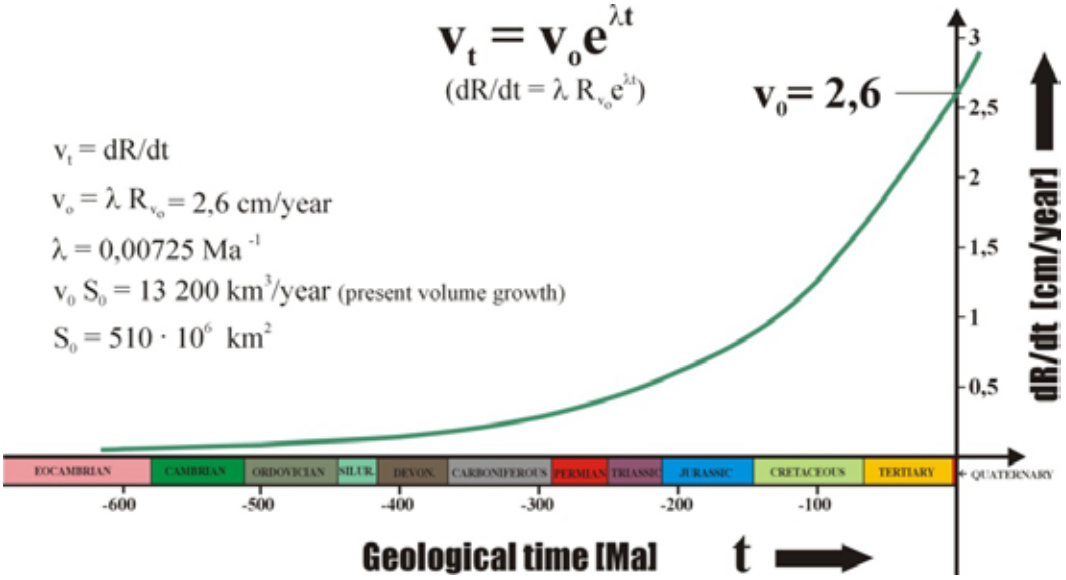


Fig. 130. *Function of the rate of growth of the Earth radius obtained by differentiation of the function in Fig. 129.*

The present annual increment of the Earth radius appeared to be 2.6 cm/year. The order of this value was later confirmed in many ways (see Tables VI and VII; Koziar, 2018a; Koziar, 2018b and Koziar, 2018c).

Table VI. Present rates of the growth of the Earth's radius obtained by geological methods

Author	Year	Rate [cm/yr]	Method
Koziar	1980	2.59	Increase in the Earth's surface area (Phanerozoic)
Blinov [a]	1983	1.99	Present annual increase in the surface area of oceanic lithosphere
Blinov [b]	1983	>1.91	Present annual increase in the Earth's circumference
Blinov & Schuber	1984	≅ 2.0	Increase in the Earth's surface area (Cenozoic)
Osipishin & Blinov	1987	1.96	Increase in the Earth's surface area (Meso-Cainozoic)
Koziar [c]	1996	2.7	Present annual increase in the Earth's circumference
Maxlow [d]	2002	2.2	Increase in the Earth's surface area (from the Archean)
Koziar	2011	>2.0	ratio of the lengths of Atlantic Ridge and its African parent margin

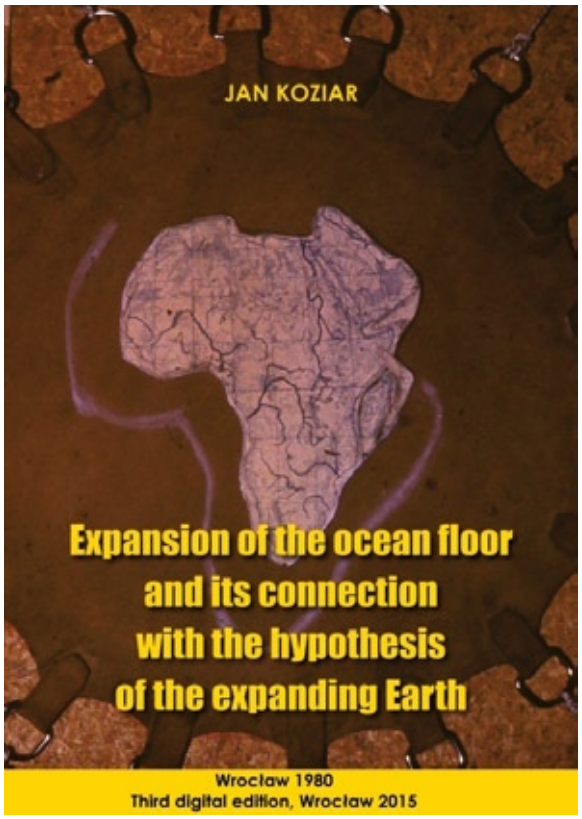
[a] correct interpretation of the result obtained by Steiner (1977)
[b] correct interpretation of the result obtained by Kulon (1973)
[c] correct interpretation of the result obtained by Le Pichon (1968)
[d] book written and accesssible in 2002, but published in 2005

Table VII. Present rates of the growth of the Earth's radius obtained by space geodesic methods

Author	Year	Rate [cm/yr]	Method
Blinov [a]	1987	2.43	Doppler Surveying (general uplift)
Carey	1988	2.08 ± 0.8	SLR (chord analysis)
Maxlow [b]	2000	>1.8	VLBI (general uplift)
Koziar [c]	2011	>1.0	VLBI (apparent baselines contraction)
Koziar [d]	2018	2.72	increase in the equatorial semiaxis of global geodesic ellipsoid

[a] correct interpretation of the results published by Anderle & Malyevac (1983)
[b] correct interpretation of the results obtained by Robaudo & Harrison (1993)
[c] correct interpretation of the results obtained by Heki *et al.* (1989)
[d] correct interpretation of the results published by McCarthy ed. (1992) and McCarthy & Petit eds (2003)

Multiplying my value 2.6 cm/yr by the present Earth's surface area allowed the present increment of the Earth volume to be obtained. It appeared to be 13 200 km^3/year. Both values were published in 1980 and they were the first ones of this kind (see below).



www.wrocgeolab.pl/floor.pdf

By multiplying the last value by the Earth mean density (5.5 g cm^3) the annual increment of the Earth mass is obtained. It is equal to 7.25 x 10^{19} g/year.

It is equal to the weight of a cube with a side of 23.6 km and with the Earth mean density (Fig. 131 A).

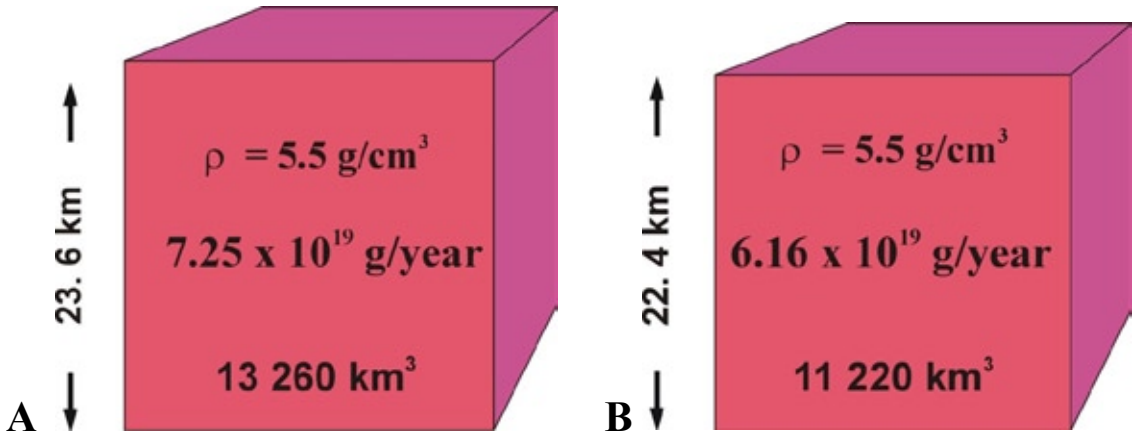


Fig. 131. *The cubes of present annual increase in the Earth's volume and mass,* **A** *– according to Koziar (1980) and* **B** *– Maxlow (2005)*

According to Maxlow's (2005) function of growth of the Earth's radius, based on more advanced chronological maps of the ocean floor, the present annual increase in the Earth mass is 6.16 x 10^{19} g/year (Fig. 131B). This value is, of course more correct than my earlier one. However my value was not published in 1980 – only the annual growth of the Earth's volume. The first value of the present annual increase in the Earth's mass was published by Ciechanowicz and Koziar (1994). But it was smaller – only 1.67 x 10^{19} g/year because the high surface gravity in the Ordovician, measured by Hladil (1991) from impact structures of then dropstones, was taken into account. This high value could be explained by rarefaction of the primordial Earth's super dense neutron matter according to Ambartsumian's Explosive Cosmological Theory (see later).

However Hladil's result was not confirmed. The rarefaction certainly took place at a very early stage of the Earth's history but later (upper Paleozoic and Meso-Cenozoic) growth of the Earth' volume was caused by growth of a new mass at the roughly constant Earth's mean density, as paleontological evidence shows.

Other expansionists also tried to calculate the present annual increase in the Earth mass. Beneath are their published results in chronological order:

Ciechanowicz and Koziar - 1994 - 1.67 x 10^{19} g/year

Scalera – 2003 – 1.37 x 10^{19} g/year

Maxlow – 2005 – 6.0 x 10^{19} g/year

Hurrell – 2011 – 1.7 x 10^{19} g/year

The most reliable is Maxlow's value based on the most precise calculation of the present annual increase in the Earth's radius equal to 2.2 cm/ year.

b. Direct calculation of annual increase in surface gravity

In this method the surface gravity of annual increment of the Earth's mass alone is calculated. The increment is located, of course, in the center of the Earth and the Earth's surface gravity acceleration is calculated using Earth's radius. Then the result is reduced by the product of the annual increment of the Earth's radius and vertical gravity gradient (Faye's free air gravity reduction) which is about 3 μGal/cm.

c. Calculation of annual increase in surface gravity from the function of the growth of the Earth radius

At constant Earth's mean density the surface gravity is proportional to the Earth radius. Let us calculate the proportionality coefficient *k*.

We start from the formula for the gravity force on the surface of the Earth:

$$F = G\frac{Mm}{R^2}$$

The surface gravity acceleration is:

$$g = \frac{F}{m} \qquad \text{and} \qquad g = G\frac{M}{R^2}$$

The Earth's mass expressed by Earth's volume V and mean density ρ is:

$$M = V\rho \quad \text{because} \quad V = \frac{4}{3}\pi R^3 \quad \text{thus} \quad g = \frac{4}{3}\pi G\rho R$$

Let us mark $\frac{4}{3}\pi G\rho$ as k so $k = \frac{4}{3}\pi G\rho$

and it is the sought coefficient of proportionality. Thus:

$$g = kR$$

Because $G = 6{,}67 \times 10^{-8}\ cm^3 g^{-1} sec^{-2}$ and $\rho = 5.5\ g\ cm^{-3}$

the value of k is: $k = 1.54 \times 10^{-6}\ sec^{-2}$

In order to obtain the function of growth of the surface gravity on the *constant-density-expanding-Earth* it is enough to multiply the given function of the growth of the Earth radius by this coefficient. In the case of my function (Fig. 129) it gives the result presented in Fig. 132. The shape of the new function is the same as the initial one, only the scale on the vertical axis of coordinates is different. Then the new function should be differentiated. In the case of my function (Fig. 132) the result is as follows (Fig. 133).

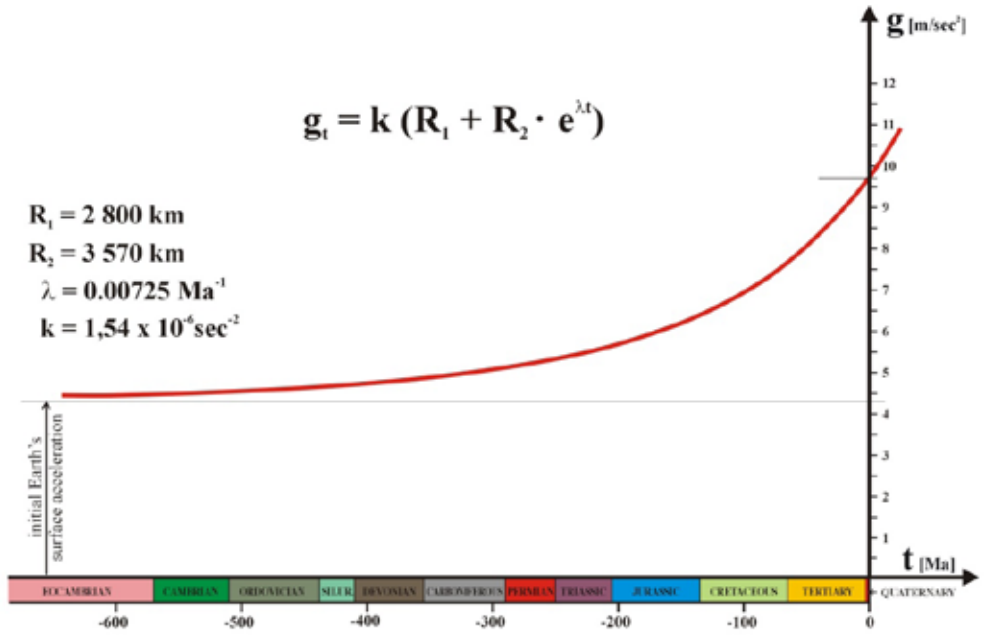


Fig. 132. *Exponential growth of the Earth's surface gravity acceleration at constant Earth's mean density. The function is calculated on the basis of my function of growth of the Earth's radius (Fig. 129). Detailed explanation in text*

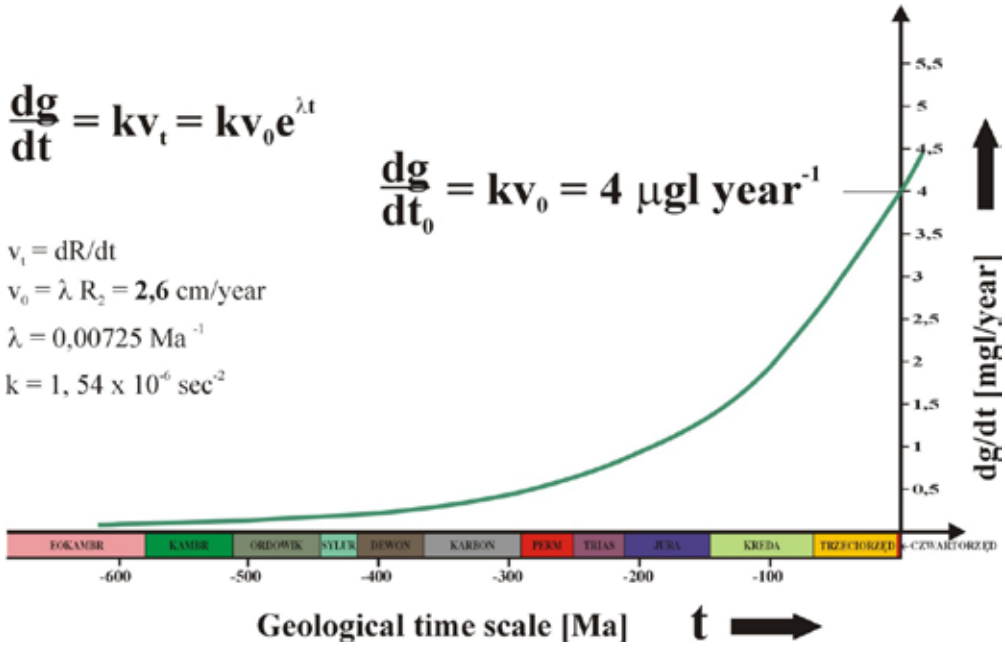


Fig. 133. *The function of growth of the rate of the Earth's surface gravity acceleration. The function is calculated on the basis of my functions presented in Figs 129 and 132. Detailed explanation in text*

In order to obtain the present annual growth of the surface gravity it is enough to multiply the given value of the present annual increment of the Earth's radius v_0 by the calculated earlier constant coefficient k.

The present annual growth of the surface gravity is (according my initial function) 4 μGal/year (Fig. 133) – not yet published.

Below are the present rates of the surface gravity acceleration calculated – and published – by different authors in chronological order:

Blinov – 1983 – 1.65 μGal/year
Maxlow – 2005 – 3.4 μGal/year
Hurrell – 2011 – 3.6 μGal/year

The most reliable value is that obtained by James Maxlow.

4. Direct measurements of the growing Earth's mass (Yarkovsky gravitational effects)

a. Measurement of the growing Earth's mass by orbit decay of geodesic satellites (the first Yarkovsky gravitational effect)

Soon after launching in 1976 geodesic satellite LAGEOS a mysterious decay of its orbit appeared. The decrement in its major semiaxis is about 20 cm/year. Some tried to explain the decay by the so-called Yarkovsky effect (Yarkovsky, 1901) which modifies orbits of small bodies under the influence of thermal radiation, but the effect is too small to explain the whole decay. The rest of the decay is explained just by growing Earth mass. This can be called Yarkovsky gravitational effect, because Yarkowski (Jan Jarkowski – the Polish engineer and scientist) was the first who also postulated the significant growth of the Earth's mass and, in a consequence, the significant expansion of our globe (Yarkovsky, 1888 and 1889).

The former Yarkovsky effect should be called "Yarkovsky radiation effect" to distinguish it from the "gravitational" one which is the first kind of such an effect. The second one is presented below.

b. Measurement of the growing Earth's surface gravity by ground-based gravimeters (the second Yarkovsky gravitational effect)

Not long ago the precision of ground-based gravimeters was too small to measure the presented above values of annual increments in surface gravity, connected with growing Earth mass, but recently their precision has become sufficient. And really, the increment began to be measured as the next mysterious process. In France the recorded value is about 1 μGal/year (Amalvict *et al.* 2002; Rosat *et al*., 2009). It is a little less than the calculated values presented earlier, but this can be explained.

The growing Earth's surface gravity measured by ground-based gravimeters can be called "the second Yarkovsky gravitational effect".

III. POSSIBLE CAUSES OF THE GROWTH OF THE EARTH MASS

1. Introduction

The subject of this chapter will be presented in a more expanded version in the separate digital brochure entitled ***Possible causes of the expansion of the Earth*** (see the back cover of this book). It will be published soon at the address: www.wrocgeolab.pl/causes.pl.

It must be remembered that undermining of any causal explanation of the expansion of the Earth does not undermine the expansion as such, proved empirically by geological proofs demonstrated in Part One of this book.

2. Most probable possibilities of the creation of matter in the Universe

a. Dirac's Large Numbers hypothesis

This hypothesis (LNH) was published by Dirac in 1938 and then he returned to it in 1974. The basis of this concept is a notion that the ratios of some similar quantities of the same dimensionality in the micro- and macro-world give large numbers of the same order of about 10^{40} or 10^{40n} (where "n" is a natural number). Examples are:

– the ratio of the radius of the Universe to the radius of electron

– the ratio of the electrostatic force between an electron and a proton in a hydrogen atom to their gravitational attraction (which is a force ruling in the macro-world)

– the ratio of the mass of the Universe to the mass of a proton – this time the ratio is about 10^{80}.

Dirac believed that such a coincidence cannot be accidental and is a manifestation of some mysterious connections between the micro- and macro-world. What is more, when the age of the Universe is expressed in natural units of time given by atomic constants (which Dirac defined as e^2/mc^3) the result is the same – about 10^{40}. Dirac concluded that this means that all the previous ratios are time dependent.

Starting from this assumption he demonstrates that the gravity constant G should diminish inversely with time ($G \propto t^{-1}$) and the mass of the Universe M should grow proportionally to time squared ($M \propto t^2$).

The conclusions concerning the decrease in gravity "constant" was picked up by several authors (mainly physicists – Egyed, Jordan, Dicke, Hoyle) for explanation of the expansion of the Earth. However even if real, the postulated decrease in G could have not caused such a large expansion. Thus, only the second aspect of Dirac's hypothesis, that is the creation of mass, is important for the expanding Earth.

Dirac considered two ways of creation. The first way he called *additive creation*; the matter is created in empty cosmic space.

The second way he called *multiplicative creation*; matter is created where matter already exists.

Only this second way is applicable to the expanding Earth.

b. Tryon's and Carey's Null Universe

Null Universe theory is another concept of creation of matter "from nothing" but which preserves the principle of conservation of matter-energy. It is based on another shocking coincidence. According to the present fairly precise estimation of mass of the Universe (M_U) and its radius (radius of Hubble horizon R_H) it appears that the following equation occurs:

$$\frac{GM_U}{R_H} = c^2$$

Let us consider a small mass **m** and multiply by it the both sides of the above equation:

$$\frac{GmM_U}{R_H} = mc^2$$

The left side means mutual gravitational potential of m and M_U. Such gravitational energy is negative. So:

$$-\frac{GmM_U}{R_H} = mc^2$$

The right side is the energetic equivalent of mass m. So both of these kinds of energies are mutually canceling:

$$mc^2 + \frac{GmM_U}{R_H} = 0$$

This is the Null Universe. Positive energy of all partial masses in the Universe is zeroed by their negative gravitational energy and the total sum is equal to null. If the new matter is born it simultaneously creates its negative potential energy and the sum is again null. So the new matter can appear from "nothing" without violation of matter-energy law of conservation.

The first scientists who pointed out the possibility of the Null Universe was (according to Carey, 1983) the Danish physicist Christian Møller at the 1958 Solvay Conference in Brussels. The second was the American physicist Edward P. Tryon (1973). This author applied the idea only to the very beginnings of the Universe. The third was Samuel Warren Carey (1976). He had hit on the idea independently and only later found his two predecessors. Of course Carey applied the idea to the expanding Earth. It means that the creation of matter according to Null Universe is not limited to the zero time but works all the time and does not cover all celestial bodies. This was Carey's big contribution to the theory of Null Universe.

Carey delivered a lecture devoted to the Null Universe theory, Dirac's large number hypothesis and Expanding Earth at the 1981 "Expanding Earth Symposium" in Sydney. The published version of the paper appeared two years later (Carey, 1983). In the meantime several scientists (Brout *et al*. 1978; Dicke and Peebels, 1979) were developing Tryon's idea while still applying it only to the initial moment of the Universe.

The Null Universe theory was finally included in the Big Bang theory. This happened practically at the same time as Carey's Sydney conference, where the former was discussed. In the same year Allan Guth (1981) had published his inflation version of Big Bang theory in which the Null Universe concept was employed. According to that author's phrase the whole Universe is a "free dinner". Guth (1997) refers to Tryon as an author of the idea in his first chapter entitled just "The biggest free dinner".

The inflation was almost generally accepted in present cosmology and with the Null Universe concept. Steven Hawking presents Null Universe in his popular books (Hawking, 1988, 1993).

Tryon applied the creation of matter on the Null Universe principle only at the zero point in time. Guth stretched it to the first very short period of the evolution of the Universe. Carey pointed out that it works all the time and, including among other places, under our feet.

c. Hoyle's field of creation of matter

This concept originated from the steady state cosmology (SSC) formulated at the end of 1940s by Hermann Bondi and Thomas Gold (1948) and independently by Fred Hoyle (1948). The theory was developed in opposition to the Big Bang theory. SSC theory postulated continuous creation of mater. Initially this creation was considered in the empty cosmic space and

in a form of free hydrogen atoms. Later, since the paper by Stothers (1966), it has been considered in massive celestial bodies[4].

From the very beginnings Hoyle began to develop the concept of the field of creation of matter (C-field). Aspects of it were later adopted by his opponents and incorporated into the Big Bang inflation theory. From 1993 Hoyle, together with Geofrey Burbidge and Jayant Narlikar, began to develop a new version of SSC – the Quasi Steady State Cosmology (QSSC) presented in Hoyle at al. (1993, 2000). This version strongly refers to Ambartsumian's explosive cosmology (see the next section) and stressed the eruption of matter from the galactic centers where massive black holes are situated. So the latter develop in a manner quite contrary to the way than is generally conceived.

The C-field can produce a new matter only in cooperation with a strong gravitational field of black holes. The black holes which begin to throw out matter are already not complete-black holes but near-black holes or white holes. The production of matter is associated with creation of a negative field, so energy conservation is preserved. It is like in the Null Universe, but it is explained on a local scale. Negative energy causes explosive effects and, on a large scale, the expansion of the Universe. So, in fact, the creation of matter causes this expansion.

New matter originates by the "opening-up" of space-time by a strong gravitational field of the near-black hole. There is a threshold energy of 6×10^{18} GeV for creation of matter. The biggest energy considered by the Big Bang theory at the beginnings of Universe is 2×10^{15} GeV, that is three order smaller. At this latter energy the symmetry of matter-antimatter is partially broken. At the C-field threshold energy the symmetry is totally broken and a newborn matter is exclusively normal matter. It appears as so called Planck particles. In case of the Planck particle its Schwarzschild radius is equal to the corresponding Compton wavelength. The mass of a Planck particle is expressed by the following equation

$$m = \sqrt{\frac{hc}{2G}}$$

where: h is the Planck constant, c – speed of light, and G – gravitational constant.

[4] For the Expanding Earth the problem of beginning (Big Bang) or eternity (SSC) of the Universe is a marginal problem. The main problem is just creation of matter.

The Planck particle is a mini-black hole of a mass 1.06 x 10^{-5} g and of corresponding energy 6 x 10^{18} GeV which constitutes the mentioned energy threshold for matter creation. The Planck particle is unstable and dissipates into ordinary matter. It can produce 10^{19} neutrons and so all kinds of atoms by transforming some neutrons to protons and electrons. The production is by fission.

As was mentioned, the C-field theory is compatible with the Null Universe theory. Both are compatible with the mass-energy conservation law. The latter shows how it works in a general scale. The first explains, in a more detailed way, how it works on a local scale. Both of these and Dirac large numbers hypothesis seem to be connected in some way (Kurz, 2011).

3. Possibility of the creation of matter in the Earth's core

As was shown, the process of creation of matter is explained and accepted in all main cosmologic theories and is considered by leading physicists and cosmologists. If anyone tries to disprove expansion of the Earth by alleged impossibility of such creation he only proves his limited knowledge of modern physics and cosmology.

There is no scientific barrier in considering creation of matter inside the Earth. What is more, a growing mass of the Earth will become crucial empirical data for all cosmological theories. The Earth becomes again the most important part of the cosmos. This is not because of its exceptional position but because it is the celestial body most accessible to our observation.

At the creation of terrestrial matter the Earth core must possess specific properties and the processes cannot be dependent solely on the Earth's mass but also on its specific configuration.

4. Earth's inner core device for the production of new matter

The suspected device for production of terrestrial matter is the Earth's inner core. It is built of flat hexagonal crystals of iron oriented perpendicularly to the Earth's rotation axis. So they create a gigantic monocrystal or rather liquid monocrystal because of some amount of liquid phase. Such a structure is by itself quite extraordinary. In 2002 seismologists discovered the innermost inner core with a radius of about 300 km (Ishii and Dziewoński, 2002).

Cahill (2012) postulates a mini black hole in the very center of the Earth on the basis of the so called borehole gravitation anomaly. Such a mini black

hole would explain the mysterious density surplus of the inner core. This surplus is about 4.5 g/cm^3. After multiplying it by the volume of the inner core this gives about 3.4 x 10^{22} kg. It would be the mass of the mini black hole which might create the threshold energy for the production of a new terrestrial matter. Apart from that the whole structure of the inner core produces a strong magnetic field certainly in a different way than by assumed convection currents. This plate tectonics device does not work in the Earth's mantle. Still less could such currents operate in the Earth's core.

V. ORIGIN OF THE EARTH. AMBARTSUMIAN EXPLOSIVE COSMOLOGY

1. Introduction

The Ambartsumian Explosive (Eruptive) Cosmology (based on empirical observational data) rejects nebular hypothesis (condensation of celestial bodies from gaseous-dust nebulas) and demonstrates that matter in the Universe evolves from the super-dense states to the less dense ones.

Ambartsumian's Explosive Cosmology is an unequivocal cosmological background for the Expanding Earth and is its most important interdisciplinary link. I lectured on it in Wrocław already in 1980, then in my course lectures (2001-2008). I presented it in two additional lectures delivered on request: No 18; ***Ambartsumian's Eruptive Cosmology in comparison with other cosmological theories***, and No 19; ***Eruptive origin of the Earth and the whole Solar System***. Only these two lectures are summarized in my brochure ***Expanding Earth with basic geotectonics*** (www.wrocgeolab.pl.lectures.pdf), presenting generally only the contents of my course lectures.

Originally I had planned to elaborate widely the Ambartsumian Explosive Cosmology in connection with Expanding Earth at the end of the presentation of the main geological subjects connected with expansion. However it is better to do it sooner. So the detailed digital brochure entitled ***Ambartsumian Explosive cosmology and expanding Earth*** will be published in the Internet soon (see back cover of this book) at the address:

www.wrocgeolab.pl/cosmology.pdf

In the meantime I present here the mentioned summaries under slightly changed titles.

2. Ambartsumian's Explosive Cosmology (summary of lecture 18)

An Armenian astrophysicist Victor Ambartsumian and his co-workers found that matter in the expanding Universe develops from super-dense states into less dense forms. Clusters of celestial bodies develop from one, more dense, parent body (black hole or neutron star) by partition (eruption or explosion). Nebulas originate from stars or other compact bodies by explosions or emissions of dispersed matter but the reverse process never occurs. That is, the condensation theory, coming from Newton, Kant and Laplace, is false.

In Ambartsumian's theory the interior of the expanding Universe develops in harmony with general expansion, not in the opposite direction as is assumed by mainstream cosmology which combines the discovery of expansion of the Universe with the old speculative hypothesis of condensation of dispersed primordial matter into the present celestial bodies.

Ambartsumian was inspired by the concept of the primordial atom given by Lemaître but his cosmology is well documented by data from observations which were later well confirmed by Halton Arp's observational results, gained with a much better telescope. However unlike Lemaître, Ambartsumian consequently rejected the condensation hypothesis.

A parent, dense body of multiple systems of stars or planetary systems is a neutron star. Chemical elements originate from compact neutron matter by fission during the disintegration of the neutron star or shortly after that. The remnants of neutron matter can be preserved in the centres of stars and planets. The fusion of hydrogen atoms into helium and some heavier elements inside the stars is only a long-term, slow, regressive process.

The idea of the origin of chemical elements by fission was given in 1949 by Maria Goeppert-Mayer and Edward Teller who positively tested, in theory, origin of 17 heavy elements from compact neutron matter (polineutron) which corresponds to the later discovered neutron stars. The results were in harmony with the real spread of these elements in nature.

Ambartsumian's theory solves several basic cosmological problems:

– Development of super-dense matter which evolved in an opposite way to what is now accepted and is compatible with development of the whole Universe

– The hierarchical structure of the Universe

– The main source of cosmic energy that causes the fragmentation of super-dense matter against its gravitational cohesion

– The theory avoids the problem of breaking the symmetry of matter – antimatter because matter emerges from black holes exclusively as normal matter

– The Big Bang decay of the primordial centre of matter into primordial black holes results in extremely low entropy. In the now accepted model of Big Bang such low entropy should occur at transformation of evenly dispersed atomic matter (mostly hydrogen and helium) into galaxies. It is not understandable from either thermodynamic or mechanical points of view.

Ambartsumian's theory was partly incorporated into the Quasi Steady State Cosmology (QSSC) model by Hoyle, Burbidge and Narlikar. However the QSSC model did not free itself wholly from the hypothesis of condensation. On the other hand the explosive cosmology can easily incorporate Hoyle's mechanism of creation of matter together with negative repulsion energy. Ambartsumian's theory can also easily incorporate the creation of matter from the Null Universe theory in which the whole positive mass energy of the Universe is canceled by its negative potential energy. The latter concept was developed by Møller, Tryon and Carey, and was incorporated into the Big Bang theory by Allen Guth. It is also accepted by Stephen Hawking.

3. Explosive origin of the Earth and the whole Solar System (summary of lecture 19)

According to Ambartsumian's theory the whole Solar System originated from one[5] super-dense celestial body by its disintegration. Most probably the body was a neutron star. The proof of such an origin is that the age of the Solar System's atomic matter is the same as the age of the Solar System itself. The former is recorded by two independent isotope clocks: $^{129}I \rightarrow {}^{129}Xe$ and $^{26}Al \rightarrow {}^{26}Mg$. They give no time for the hypothetical synthesis of Solar System's (Earth's) chemical elements in the whole sequence of previous hydrogen stars which should in sequence explode and condense as the current condensation theory assumes.

In Ambartsumian's Cosmology asteroids originated from explosion of the former planet Phaeton orbiting once in the place of the present asteroids

[5] Or two.

ring. The sudden decrease in gravitational pressure on Phaeton's remnants (now asteroids) released internal high pressure volatiles. These transformed the previous normal rocky structure of the Phaeton's chunks into a chondrite structure by the process of fluidisation. The same process and resulting structure occur in Earth's kimberlites.

Moons originated by eruption from parent planets. Comets originate by eruption from giant planets and their moons.

All planets originated from big drops of neutron matter (gremlins according to Zwicky's nomenclature) of only tens or hundreds of metres in diameter. The first stage of their expansion was the transformation of the primordial neutron matter into chemical elements. This takes place by fission. The micromechanism of expansion consists in creation of electron shells by nuclei of chemical elements that had previously formed the neutron matter. This process was common for all planets. Then, some of them (Earth for sure) were able to create new matter which caused a subsequent expansion. The best candidate for the new matter in the Earth core are Planck particles of mass about 10^{-5} g. They are predicted by Hoyle's theory of the origin of matter. The Earth's new chemical (atomic) matter should be created from Planck particles also by fission.

Because of the big gaseous shells of giant planets their expansion is now not recorded. Among Earth-like (near-Sun) planets signs of expansion are visible on the Earth, Venus and Mars. They are also visible on two moons of the Jupiter: Europe and Ganymede.

The extreme process of expansion among the Earth-like planets took place in case of Phaeton (explosion) and the Earth.

It must be noted that Ambartsumian's school was not aware of the theory of the expansion of the Earth and did not take into account such big expansion of our planet. And in turn – Ambartsumian's theory is rather unknown among expansionists, despite the fact it provides a natural cosmological framework for the expanding Earth.

It must be also noted that fundamental problems of contemporary cosmology and geology have a common origin in the false condensation hypothesis which for the first time was postulated by Isaac Newton.

In cosmology the problem of the origin of galaxies by condensation from nebulas takes first place. In geology the theory of contraction of the Earth was established as a speculative consequence of the hypothesis of condensation. The condensation from the nebula was supposed to lead to hot liquid

Earth which contracted as it cooled down slowly. The theory of contraction of the Earth appeared to be false. But the "compressive" way of thinking survived, and was even developed further in Wegener's theory and plate tectonics. It is a paradox that while the more divergent processes in the lithosphere (divergent break-up of Pangaea, see floor spreading even in the Pacific) are documented the larger opposite (convergent) processes are assumed (ultra-nappism and subduction respectively). This is a consequence of the false assumption of non-expanding-Earth which demands hypothetical compensation of the real divergent processes.

VI. CONCLUSIONS

Part Two of this book presents a broad scientific context of the Expanding Earth theory in its most important issues. The context shows that there is no room for escape from the seven proofs, presented in Part One of this book, which prove that significant expansion of the Earth is a real process.

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