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# Research on the Expanding Earth in the Wrocław scientific community



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Thirty years of the Department of Physical Geology  
of the Institute of Geological Sciences of the Wrocław University

■ Front cover:

The main building of the Wrocław University

■ The first page:

A copy of the front cover of the volume of *Acta Universitatis Wratislaviensis* in which the original paper was published

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[www.wrocgeolab.pl/research.pdf](http://www.wrocgeolab.pl/research.pdf)

## Acknowledgements

I would like to thank my former boss the late Professor **Józef Oberc** who promoted the presented paper to *Acta Universitatis Wratislaviensis* and whose support for the expanding Earth theory and for me personally made it possible to carry out the research on this theory in Wrocław.

Many thanks to Dr **Roman Żurawek** for the translation of the original Polish text to English.

I also thank Professor **Cliff Ollier** and his wife **Janetta** for the correction of the translation.

Thanks also to Professor **Wojciech Nemeč**, my former student, then a colleague in our Department of Physical Geology of the Institute of Geological Sciences of the Wrocław University and now a professor at the University of Bergen (Norway), for the correction of the English of the introduction. He played an important role in my encounter (1970) with the expansion of the Earth, as is mentioned in this paper.



## Introduction (2015)

The presented paper was published in 1991 on the occasion of the 30th anniversary of the foundation of the Department of Physical Geology of the Institute of Geological Sciences of the Wrocław University in which I was employed. Just in this year, the founder of the Department, his long-standing director, and from 1971 a convinced supporter of the expanding Earth theory – Professor Józef Oberc – has finished his 30-year directorship.

The anniversary was celebrated only two years after the collapse of the communist system in Poland in the building of the former Lower Silesia authorities of the dissolved communist party, to which our department was transferred.

I was then given back my geological job, after almost 7-year absence (having been removed from the University for political reason, as involved in the underground “Solidarity” movement). This social involvement continued after my emerging from the underground (1989) and was a serious obstacle to my full devotion to geotectonic investigation of the expanding Earth, carried out earlier, since the end of 1970.

In that period, before the announcement of the martial law in Poland, I solved in outline many problems of the expanding Earth, lectured on them, but rarely published. Then in 1991 I decided to write the story of the investigation to bring about a closer understanding of the reality of the process of expansion.

If the content of the paper was of historical significance already in 1991, it is so, all the more, in 2014. After more than two decades it has preserved its positive feature – that is a popular outline presentation of solutions of several basic geotectonic problems. The popular level and the wide scope of topics may make it easy to comprehend the expansion of the Earth.

The paper is also important to me for I have not yet translated into English the expanded version of some topics published only in Polish, nor have I yet published such versions of other topics. Thus, I can refer to the present text, before presenting such extended papers. The first set includes the tension-diapiric-gravitational development of fold belts and the critique of the hypothesis of exotic terranes. The second set includes the wrong interpretation of paleomagnetic tests, a critique of the hypothesis of convection currents in the Earth mantle, and the failed Le Pichon’s (1968) proof of the hypothesis of non-expanding Earth, that is – plate tectonics. The fundamental problem of cognitive relativism in geotectonics is also raised. In the past I was not aware that it was connected with the popular Kuhnian general scientific relativism. I was convinced that it is only an internal problem of geotectonics.

The topic of the paper is, by its nature, connected with my personal story. But I do not want it to be treated in this way. The paper is, first of all, about the expansion of the Earth and geological problems arising from not understanding this fundamental process.

The presented story ended in 1991 and a question arises – what come later? The best answer is the list of publications of the Wrocław group of expansionists ([www.wrocgeolab.pl/papers.pdf](http://www.wrocgeolab.pl/papers.pdf)) and contents of my course lectures “*Expansion of the Earth with basic geotectonics*” given for students of geology at the Wrocław University in 2001–2008 ([www.wrocgeolab.pl/lectures.pdf](http://www.wrocgeolab.pl/lectures.pdf)).

Readers may also look at other papers already accessible at this website.

A subsequent two-decade story should be published as a separate brochure, but this is not the time for it. The most important is presentation of scientific results.

The presented paper was not the only one published by me in the anniversary volume. The other was of strictly scientific character and presented my reconstruction of the Gondwana supercontinent on the expanding Earth ([www.wrocgeolab.pl/Gondwana.pdf](http://www.wrocgeolab.pl/Gondwana.pdf)).

In the present edition of the paper a list of contents is introduced and all sections are numbered. All figures are elaborated on computer and many are colored. All footnotes are up-to-date and, to avoid misunderstanding, they are marked by contemporary date (2015). One supplement is added.

- 1. Beginnings**
- 2. Presentation of the first results in the Department of Physical Geology**
- 3. Exploring the literature about mobilism**
- 4. Mirage and trap of the hypothesis of convection currents**
- 5. Weakness of the hypothesis of a non-expanding Earth**
  - a. The attempt to prove the hypothesis of a non-expanding Earth by Le Pichon**
  - b. Controversy over paleomagnetic tests**
- 6. Relative balance of the displacement of the Earth mass with assumption of convection or expansion**
- 7. Research on the Tethys zone**
- 8. The first official presentation of results**
- 9. Analysis of contradictions between geotectonic hypotheses**
- 10. Tension – gravitational model of fold belts**
  - a. Intra-continental fold belts**
  - b. Island arcs and active continental margins**
- 11. Lectures on geotectonics**
- 12. Beginnings of wider popularization of the expanding Earth**
- 13. Geological cognitive relativism**
- 14. Further popularization of the expanding Earth**
- 15. Work on reconstruction of the lithosphere**
- 16. Work on the text “Reinterpretation of the theory of fold belts”**
- 17. Between December 13 (1981) and the “Round Table” (1989)**
- 18. In the Old and the New Building of the Institute of Geological Sciences**

### Supplement (2015)

*I met the idea of an expanding Earth and understood that the concept was true in 1970. I have worked on it systematically since 1972, being supported by more and more members of the Wrocław scientific community. Since that time, some of them published their own papers.*

*Problems that have been elaborated successively, were:*

- *Quantitative rules of the plate movement on expanding Earth*
- *Function of growth of the Earth radius*
- *Pacific crucial test (Carey's test)*
- *Contradictions among geotectonic hypotheses*
- *Tension – gravitational mechanism of intra-continental fold belts*
- *Tension – gravitational mechanism of active continental margins and island arcs*

*All these works have been accompanied by wide studies of regional geology and attempts at reconstruction of the lithosphere on a global scale. In 1972 the first such a reconstruction (in a preliminary version) was made. In 1980 an improved but also preliminary reconstruction was made and a key to it was the discovery of the correct link between Africa and Antarctica.*

*The imposition of martial law in Poland in 1981 and the consequent situation in the country caused a break in author's investigations of expansion of the Earth for almost ten years. Nevertheless, other scientists have continued the research in Wrocław. Later, the period after the so-called "Round Table" (1989)<sup>1</sup> has been aimed mostly at the studies of a huge amount of new publications and finishing topics that have been considered previously. Moreover, during this period contacts with foreign authors working on the expanding Earth theory have been established.*

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<sup>1</sup> February 1989 – negotiation of communist authorities with members of Solidarity opposition which formally ended the communist system in Poland. (2015)

## 1. Beginnings

The idea of the expanding Earth appeared in Wrocław, or, more precisely, in the Department of Physical Geology of the Institute of Geological Sciences of the University of Wrocław, in autumn 1970. It was a subject of a seminar work by Wojciech Nemec – at that time a student and today a professor at University of Bergen (Norway). Then, there was not a large choice of publications aimed at fundamental geological problems, as is nowadays. This, actually, was the reason, why a paper entitled “A new dynamic conception of the internal constitution of the Earth” by Laszlo Egyed (1956) has been put on the list of topics for the seminar in the year 1970/71, although it has been aimed at something so strange as the Earth expansion.

Wojciech Nemec has chosen the issue and reported it without great conviction. The audience listened to it (together with me) with no larger conviction than the speaker. However, my personal interest in Egyed’s thesis increased suddenly as soon as I checked the written study (Nemec 1970) and started to consider the subsurface mechanism of the drawing apart of the continents, i.e. the rules of their movement caused by the volume growth of the Earth. I came to the conclusion that they are very simple and, what is more, – it was a crucial moment - that they explain the enlargement of the shape of the oceanic ridges when compared to the corresponding outlines of the continents. At this moment I understood that the Earth is really expanding.

One of the important factors facilitating acceptance of the expansion of the Earth was consciousness of the fact that geotectonics has been in an impasse from the very beginning. Speaking more firmly – all important problems raised at its beginnings and afterwards have not been solved yet, despite the large progress in research, good recognition of many structures and correct solutions of numerous cases. Such state of the art suggests clearly that we commit a fundamental error again and again while accepting as obvious an assumption that has never been proved and, in fact, is false.

The enlargement of the oceanic ridges showed, that this fundamental fault was the assumption that the size of the Earth is not growing

The important and unsolved problems of geotectonics are:

1. formation of fold belts
2. development of continents
3. development of oceans



#### 4. explanation of mobilism

The two latter problems were solved at once in general on the expanding Earth. However, the problem of fold belts appeared to be the most difficult one. I would like to emphasize that having studied some foundations of physics<sup>2</sup> I was very sceptical about the concept of tangential pressure causing huge overthrusts that can reach tens or even hundreds kilometres. Using an analogy – any large displacement of squeezed toothpaste only due to squeezing it out, is virtually impossible. In such a case, the toothpaste would only pile up at the outlet of the tube. The large-scale transport upon a resistive basis needs gravitation, which affects every part of the volume of the transported mass<sup>3</sup>.

It must be emphasized that different gravitational models of the fold belts (Reyer, 1888; Haarmann, 1926, 1930; van Bemmelen, 1933, 1952, 1960, 1966) have been developed in parallel to the concept of tangential pressure and their beginnings are even older. So, it is not true that the existence of the overthrusts contradicts the expanding Earth, as I heard during discussions many times. Anyway, I developed later my own gravitational concept – it will be considered further.

Another factor, which made my perception of the expansion of the Earth easier, was some knowledge of possibilities of the behaviour of matter, which was connected with my studies of physics mentioned above.

In physics, transitions of matter from super dense states to super rare ones are considered. Such phenomena are observed in astrophysics. In comparison with them the range of the volume growth of the Earth considered by expansionists, is not big.

Apart from that, the physicists take into account a possibility of the creation of matter and the change of the gravitational constant. The latter was postulated by Dirac (1937, 1938). Such heresies destroy the certainty of the school image of the world of those who are not physicists. Because of it I experienced some paradoxes when I later presented the expanding Earth to different listeners. Namely, physicists were not shocked by the problem of expanding matter inside the Earth, but they were deeply interested in geological phenomena indicating the expansion of the Earth. On the opposite side, there is a tendency among geologists to disregard geological facts pointing to the expansion of the Earth. The main arguments put forward by them are the apparent impossibility of expansion of the matter inside the Earth or lack of theoretical explanation of the physical reasons for the expansion<sup>4</sup>.

Finally, probably the most important factor that allowed me to understand the expansion of the Earth was the observance of the hierarchy of the importance of the issues. That is the major problem for the geotectonicists. For instance, for years the most important problem to tectonics was the development of fold belts and particularly its collision model worked out on a relatively small structure such as the Alps. The Mid-Atlantic-

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<sup>2</sup> Parallel to the last 2 years of geological studies I also studied physics at Wrocław University. (2015)

<sup>3</sup> This is so-called “body force”. (2015)

<sup>4</sup> Paradoxically the same attitude have geophysicists as opposed to physicists. (2015)

Ridge, that expands both latitudinally and meridionally, has got an overwhelming advantage over the Alps with regard to both size and simplicity of its development. If there is a necessity to revise something, it is the still unclear model of the Alps that needs a reinterpretation. However, the model has been (especially in the seventies) of crucial importance for the opponents of the expansion of Earth, while the development of oceans (3/4 of the Earth surface) seemed to them a secondary problem.

An objectification of hierarchy of the importance of the issues is necessary not only between different structures or models, but also within some of the theories or models, in cases when hypothetical superstructures are often considered more seriously than their empirical bases.

As I already mentioned, I came into contact with the idea of the expanding Earth while considering the movement of the continents on the expanding basement. It appeared to me only later, that this problem has not yet been elaborated. I worked out the quantitative basis of the flat two-layer model (isometric stretched basement and rigid, breaking plates upon it) and explained at first approach the development of the Central and South Atlantic. As a whole, it has been presented as a paper consisting of 16 pages, in March 1971, to Professor Józef Oberc, at that time the head of the Department of Physical Geology.

The Professor was very interested in it and took out from his drawer some maps of ocean floor by Heezen et al. (1967, 1968, 1969) that I did not know at that time. Many tension lineaments oriented perpendicularly to the ocean ridges was one of the major features shown on them. It confirmed the longitudinal stretching of the ridges, which I have inferred earlier exclusively on the basis of their enlargement in relation to the neighbouring coastal lines.

Until that time I thought, that a correct mobilistic reconstruction could be obtained mathematically on the assumption of expansion of the Earth and that it would be possible to prove the assumption in this way. Adopting my model to the spherical surface would be required in such a case. However, while finding so-called fixed points of transformation of flat plates was relatively easy, in the case of spherical plates it was much more complicated, so I had to ask mathematicians for their help. The problem has been used as a subject of a M.Sc. thesis and has been given to student Franciszek Soja by professor Andrzej Krzywicki. He solved it only in 1974 (Soja, 1974). I myself could spend more time on the problem of the expanding Earth starting from the autumn 1972.

First, I made a tentative reconstruction of the lithosphere. It was far from a perfect one, but better than all I have known before.

First of all I was able to close the Atlantic on the Mid-Atlantic Ridge by relative enlargement of continents. The same effect is available by putting on a smaller globe the continents modelled on a bigger one (I used wire models of continents – Fig. 1).



**Fig. 1.** One of my early reconstructions, done with help of contours of continents modelled in wire

During the making of the reconstruction I realized that a global mathematical reconstruction of the lithosphere according to the elaborated model<sup>5</sup> is not possible, because the continents in many regions behave not as rigid, crushing, plates but are being stretched and disrupted gradually<sup>6</sup>. However, the model cannot describe such a process. Nevertheless, the model keeps its importance because it can be shown that some regions of a simple structure behave in conformity with its rules. It refers especially to the Atlantic and the whole surroundings of Africa and Antarctica (Koziar, 1980a<sup>7</sup>, 1985<sup>8</sup>). The impossibility to use the mathematical model for full reconstruction of our globe meant for me the necessity to engage in geotectonics. As a consequence, I finally changed my specialization from meso-structural analysis that I have concentrated on at that time, to geotectonics.

First, I decided to carry out the geotectonic analysis based on geographical maps only, without any touch of widely understood geology and its attainments. The aim was to avoid the suggestion of existing interpretations. In order to do it I have used the Polish “World Atlas”, published in 1964. Its numerous and precise maps were even better for such a purpose than satellite pictures<sup>9</sup> because they comprise much large areas, as a rule.

My study of morphology lasted to the end of 1972. I came to the three most important conclusions, fully confirmed by later geological analyses.

<sup>5</sup> Published only in 1994, see: [www.wrocgeolab.pl/plates.pdf](http://www.wrocgeolab.pl/plates.pdf) (2015)

<sup>6</sup> Today’s „diffusive borders” of plate tectonics. In fact they all are tensional areas (2015)

<sup>7</sup> [www.wrocgeolab.pl/floor.pdf](http://www.wrocgeolab.pl/floor.pdf) (2015)

<sup>8</sup> [www.wrocgeolab.pl/oceans.pdf](http://www.wrocgeolab.pl/oceans.pdf) (2015)

<sup>9</sup> At that time (2015)

1. The Mediterranean and Black Sea are structures created by drawing apart Africa and Europe.
2. Island arcs are tensional structures and some of them (for instance the Japan Islands) have been formed by tearing off from the nearby continent.
3. The lens-like intermontane depressions are not lowered intermontane massifs (implied from the theory of contraction of the Earth in fact) but structures formed by tearing of continental crust.

Only at the beginning of 1973 I started to study geotectonic literature and the regional geology. Leszek Jamrozik supported me in this very much. He had a lot of professional books and has engaged himself in the theory of the expanding Earth as well, so since that time we discussed most problems together.

Then, I met for the first time the theory of spreading, plate tectonics and the hypothesis of subduction. While the theory of spreading was an evident great achievement and a fundament of geotectonics<sup>10</sup>, the hypothesis of subduction had quite a different position. It was clear to me that it is an artificial construction resulting from combination of the spreading of the oceanic lithosphere and an assumption that the Earth is not expanding – the latter one has not been proved up to now. The founders of the plate tectonics do not hide the logical construction at all<sup>11</sup>. Only later attempts have been made to support the hypothesis of subduction by facts. As a result different models have been obtained contradictory to facts and incoherent. It is not clear as yet whether the oceanic plate is pulled or pushed under the island arc. Moreover, tearing of the arc from the continent against the rushing plate remains the most improbable mechanism invented in geology.

Studies of data have been simultaneously accompanied by the attempts of solving different problems. It was a rule from the very beginning that the successive analyses supported the expansion of the Earth.

## **2. Presenting of the first results in the Department of Physical Geology**

In the first half of 1974 I have given eight following lectures at the scientific meetings of the Department of Physical Geology:

1. Testability of the hypothesis of the expanding Earth
2. Development of the Tethys zone
3. Scheme of the development of the Pacific

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<sup>10</sup> It should be noticed that the ocean-floor spreading was discovered by expansionists S.W. Carey and B.C. Heezen, see: [www.wrocgeolab.pl/priority.pdf](http://www.wrocgeolab.pl/priority.pdf) (2015)

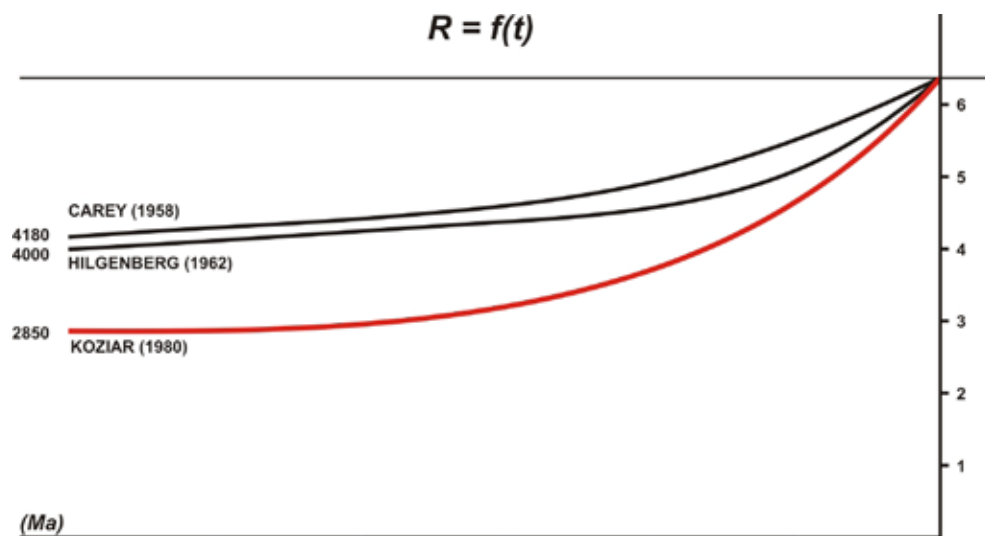
<sup>11</sup> Le Pichon (1968, p. 3673) – “If the earth is not expanding, there should be other boundaries of crustal blocks along which surface crust is shortened or destroyed” (2015)

4. Criticism of the hypothesis of subduction
5. Horizontal intra-continental displacements
6. An outline of tectonic development of Europe
7. Criticism of the classic theories of fold belts
8. Function of growth of the Earth radius and its derivatives

All these topics were developed later, except of the function of growth of the Earth radius (Koziar, 1980a<sup>12</sup>), which needs only slight improvements.

The function was calculated on a new (as it appeared later) way using the global increments of oceanic lithosphere during Mesozoic and Cenozoic. I calculated the value of the radius for the beginning of Phanerozoic from the sum of areas of all Precambrian shields, taking into account the fragments of the Precambrian crust dispersed in younger formations. I was possible due to results of my own intra-continental reconstructions. As a result, it turned out that at the beginning of Phanerozoic the entire globe was covered approximately by the Precambrian crust, which has preserved until today.

I obtained, as I got to know later from the literature, the extreme size of the expansion (Fig. 2)<sup>13</sup>.



**Fig. 2.** Function of growth of the Earth radius. The function was calculated on the basis of the radius values calculated from the following formula:

$$R_t = \sqrt{\frac{S_0 - \Delta S_t}{2\pi}}$$

where:  $S_0$  – present surface area of the Earth,  $\Delta S_t$  planimetered global

increment in lithosphere from a given moment “t” till present

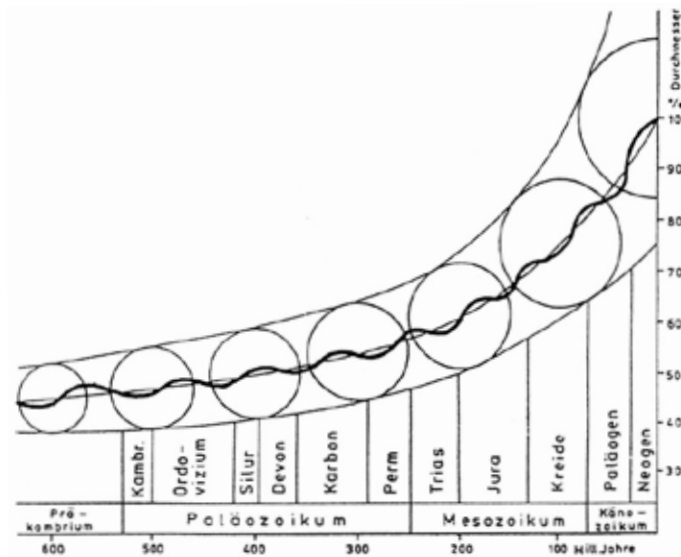
The obtained exponential curve is expressed by the formula:  $R=A+Be^{\lambda t}$   
 where:  $A=2800$  km (primordial radius),  $B=3570$ km,  $\lambda=0.00725$  Ma<sup>-1</sup>.

The derivative of this function is expressed by the formula:  $v_t = v_0 e^{\lambda t}$ , where:  $v_0 = 2.59$  cm/year

<sup>12</sup> [www.wrocgeolab.pl/floor.pdf](http://www.wrocgeolab.pl/floor.pdf) (2015)

<sup>13</sup> In fact more extreme size was obtained by Vladimir B. Neiman in 1962 basing on paleomagnetism, see: [www.wrocgeolab.pl/function.pdf](http://www.wrocgeolab.pl/function.pdf). There is also a detailed explanation of my function and other derivative functions and values at this site. (2015)

However the size is approached now by other researches (Fig. 3).



**Fig. 3.** Diagram of the Earth radius growth, according to Vogel (1990)

The mathematical derivative of the function delivered the present rate of the growth of the radius – 2.6 cm/year. The results have been published (Koziar, 1980a<sup>14</sup>).

In 1985 the first results of satellite measurements of relative plate movements were obtained. The annual increment of the Earth radius calculated from them by Parkinson (vide: Carey, 1988) was  $2.8 \pm 0.8$  cm/yr<sup>15</sup>. Similar result was obtained in a third, independent way, which will be explained further.

In the latest one of the lectures quoted above I explained connection between expansion of the Earth and Ambartsumian's<sup>16</sup> eruptive cosmological theory of (1972). He and his co-workers presented it in a set of papers (Ambartsumian, 1972; Mirzojan, 1972; Saakjan; 1972; Vsiechsviatsky, 1972; Kaziutynsky, 1972). Wrocław geologist Bolesław Wajsprych turned my attention to above book. The expansion of the Earth, recorded independently, is the missing link of Ambartsumian's theory. According to the theory the Earth matter originated from super-dense pre-stellar matter.

I reported the second time the affinity between both theories during the meeting of the Wrocław Scientific Society in May 1980 (Koziar, 1980b). Neither representatives of the so-called Byurakan School (Armenia) of Ambartsumian nor geologists-expansionists knew their theories at that time mutually. I could find the next association between both theories only in the book by Pfeufer (1981) sent to me by the author.

The third lecture was decisive, as I presented in it a crucial test between the theory of expanding Earth and plate tectonics based on the development of the Pacific<sup>17</sup>. The test is an analysis of the change of the length of the circum Pacific zone. It can be proved

<sup>14</sup> [www.wrocgeolab.pl/floor.pdf](http://www.wrocgeolab.pl/floor.pdf) (2015)

<sup>15</sup> The value was a Carey's 1988 book typo and was corrected in his 1996 book to  $2.08 \pm 0.8$  cm/year (2015)

<sup>16</sup> An Armenian astrophysicist and cosmologist (2015)

<sup>17</sup> At this time I did not know yet the analogical Carey's test (2015)

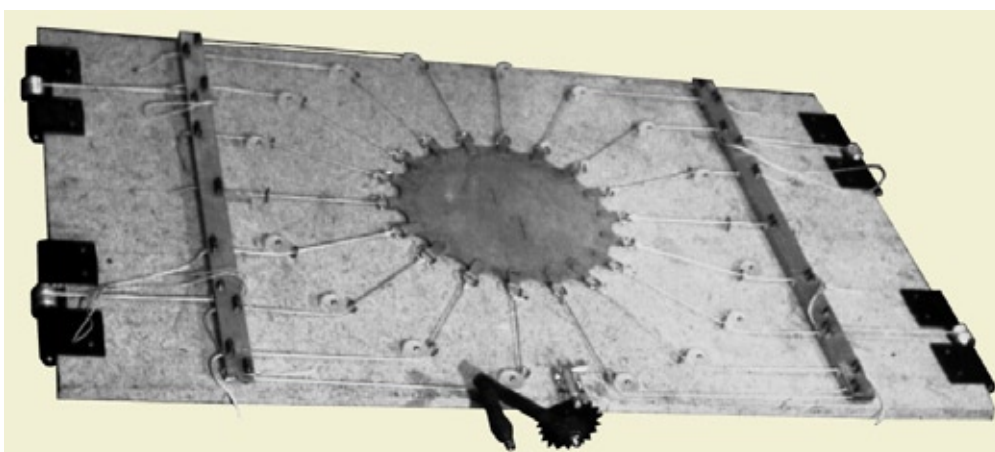
that the zone is getting longer and so, the Pacific is getting bigger. It is tantamount to the expansion of the Earth. At the end of 1974 I found the same test in Carey's paper from 1958.

After that lecture I asked Professor Józef Oberc to change the subject of my doctoral dissertation. The former subject "Geometric analysis of folding", based mainly on the methods of differential geometry was already advanced. I had not worked on the subject since some time and I told Professor Oberc that I was not able to work on anything else beyond the expansion of the Earth. Professor agreed to change the subject and it has really been a heroic decision.

I have to mention here that I did not make any public presentation of the work on the expanding Earth beyond our department in order to avoid the negative reaction, until obtained results did not embrace a wider range of geotectonic phenomena. Professor Oberc disclosed publicly the subject only in 1975 at the meeting of the Scientific Council of our Institute when proposing to change the subject of my doctoral dissertation. Consternation aroused and the situation was saved only by the book by Pascual Jordan "The expanding Earth. Some consequence of Dirac's gravitation hypothesis" (1971) which was shown by Him. The book was newly brought to me from Switzerland by my Father. The tension was relieved by the then director of the Institute, Professor Zbigniew Różycki. He said that if the subject is considered abroad, why not to study it in our country too?

### 3. Exploring the literature about mobilism

In the autumn 1974 I still was working on the tensional model of development of lithosphere, constructing a device for modelling processes in condition of isotropic tension (Fig. 4) and studying literature, including the one on expanding Earth. It turned out that it had a pretty large tradition and substantial results already have been achieved.



**Fig. 4.** Device radially stretching a rubber disk, for modelling isotropic tension

The particular feature of the older period of development of the idea (until the fifties) was, that authors working on it did not know each other's papers. In other words, most of the authors came to it independently and in different ways of inference. So there

were neither mutual suggestions nor accidental starting from only one phenomenon or theoretical assumption. Cosmological considerations were one, extraordinary way, among others, of coming to the Earth expansion. They were prevailed by geological (empirical) approach, referring to phenomena in the lithosphere and beneath it. The starting point of the theory of expanding Earth is very simple and it has been shown by the real founder of the theory – Bruno Lindemann (1927). He realized that all the continents withdraw from each other. It was a consequent completion of the Wegener's theory.

I learnt that the spreading theory was anticipated in the fifties by Carey (1958) from the University of Tasmania, the most meritorious scientist in developing and popularisation of the theory of expanding Earth.

I also got to know that Bruce Heezen (1960, 1962), the discoverer of a rift valley on oceanic ridges and (together with Carey) a proper founder of the theory of spreading and developing of lithospheric plates, joined his discoveries with expansion of the Earth. So, one could wonder again, how it was possible to invent the plate tectonic theory.

#### 4. Mirage and trap of the hypothesis of convection currents

The theory of plate tectonics has been created as follows: in 1961 Dietz and in 1962<sup>18</sup> Hess combined the theory of spreading (then not well proved) with the hypothesis of convection currents. The history and ways of combining the hypothesis with mobilism is very interesting. Arthur Holmes was the first who did it (1928). Later Vening Meinesz (1951, 1955) identified oceanic trenches with descending branches of the currents and assumed that they result from compression. He located the ascending branches under continents. In the early sixties, the mid oceanic ridges with their newly discovered tensional rift valley became a much better place to fasten the currents (this time their ascending branches) than the oceanic trenches. And that has been done by Dietz and Hess. However, after publication of their models the seismic investigations (Worzel, 1965 and Stauder, 1968) revealed as well the tensional character of oceanic trenches. It has been interpreted in the correct way by Heezen in 1960. It did not prevent Isacks, Olivier and Sykes (1968) from following the compression schemes of the trenches. Their starting point was as follows: **“If crustal material is to descend into the mantle, the islands arcs are suspect as sites of the sinks”**<sup>19</sup> (p. 5866).

However, already at that time, some problems with the convection current hypothesis appeared. The plate tectonics idea that has been developed on the basis of models given by Dietz and Hees, clashed with the convection current hypothesis. This has been pointed out by Heezen (1962) and Carey (1976). One of them is a reversal of casual relationship between the hypothetical currents and the recorded relative movement of the plates. Namely, African and Antarctic plates growing in all directions, would have

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<sup>18</sup> See [www.wrocgeolab.pl/priority.pdf](http://www.wrocgeolab.pl/priority.pdf) (2015)

<sup>19</sup> As is seen the subduction is here treated as an a priori assumption on which the whole model is built. It is a starting point for circular reasoning and argument. (2015)



to push aside the convection cells from the centres of the plates. Consequently, the movement of convection currents would be determined by the movement of plates and not inversely. The other problem is multiplicity of the zones of ascending asthenosphere (for instance: South Atlantic Ridge, East African Rifts and Carlsberg Ridge). There are no traces of the supposed descending currents between the zones, which would close the presumed convection cells. So, there is no convection but only diapirism. The hypothesis of the convection currents is also contradictory to great transform faults, triple junctions and mantle plumes. As a result, one of the founders of plate tectonics McKenzie (1972) admitted that the driving mechanism in the theory is unclear<sup>20</sup> whereas others - Morgan (1968) and Le Pichon (1968) did not mention convection currents at all. So, that factor which enabled the plate tectonics to become more popular than the theory of expanding Earth turned out not to be true. Nevertheless, it is always emphasized in popular presentations as well in professional papers and is considered only theoretically without taking into account plate movements.

To summarise: no convective currents drive the plates but the hypothesis of convection currents drives another hypothesis i.e. plate tectonics.

## **5. Weakness of the hypothesis of a non-expanding Earth**

The basis of plate tectonics is, in fact, the hypothesis of a non-expanding Earth. It was formulated by Le Pichon (1968) who wrote introductorily, that he is going to check, whether the spreading of the ocean-floor can be conciliated with the non-expanding Earth or not<sup>21</sup> (p. 3661).

So, a non-expanding Earth is an openly articulated hypothesis (not merely a tacit assumption) and it is a base for the plate tectonics theory.

### **a. The attempt to prove the hypothesis of a non-expanding Earth by Le Pichon**

Le Pichon (1968) assumed that the global increment in the lithosphere results from a two-sided spreading of the lithosphere only. As the oceanic ridges run in general meridionally, the Earth, according to Le Pichon, should increase excessively its equatorial radius, if there was no compensation for the spreading at active continental margins. Because the Earth is a sphere the author concludes that the Earth does not expand. However, Le Pichon did not take into account the meridional elongation of the oceanic ridges and this has been reproached by Carey (1976).

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<sup>20</sup> “*The origin of the forces that move the plates is by no means clear*” – wrote McKenzie (1970, p. 323) in the introduction to his 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.*” (2015)

<sup>21</sup> “*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*”. (2015)

Le Pichon tried to support his way of inferring by the calculation of the rate of spreading along the equator. It is 17 cm/year. I divided this result by  $2\pi$  and obtained annual increment in the Earth radius as large as 2.7 cm/year. That is almost the same value as that obtained by me (2.6 cm/year) from measuring the global increments in the **area** of the lithosphere. These are two independent methods and the convergence of their results speaks profoundly for the expanding Earth. Additionally, the third result can be quoted, i.e.  $2.08 \pm 0.8$  cm/year<sup>22</sup> obtained by Parkinson (found in Carey, 1988) from satellite measurements.

So, the Le Pichon's "proof" of the hypothesis of non-expanding Earth changes, when considered more carefully, in the confirmation of the expansion of the Earth.

## **b. Controversy over paleomagnetic tests**

The question of paleomagnetic tests looks similarly. I came across them for the first time in 1974.

Laszlo Egyed proposed the first test of such kind as early as in 1960. It has been based on calculation of the ancient Earth radius from two paleomagnetic vectors lying on the same paleomagnetic meridian. The calculation has been done with the assumption that the distance between paleovectors does not increase during the expansion<sup>23</sup>. The method was applied in order to compare paleovectors between Europe and Siberian shields by Cox and Doell (1961). Their results did not confirm the expansion of the Earth. Soon after that Carey's (1961) objections were published. Carey pointed out that the Siberian shield has moved away from Europe and, consequently, the results obtained cannot be correct. Also in 1961, Egyed published the next method (so-called method of triangles) that allows comparison of paleovectors, which mark out two different paleomagnetic meridians. Due to it, the possibility of using the test increased significantly. However its application should be used only to the cratonic areas.

In 1963 Van Hilten applied the new method only to cratons and his results confirmed the expansion of the Earth. The same year an Australian mathematician Ward (1963) published a new statistical method of simultaneous comparison of a greater number of vectors. Again, he applied it mainly to comparison of vectors between Europe and the Siberian shield and the results again did not confirm the expansion of the Earth. Then, Van Hilten (1965) criticized the wrong selection of areas of investigation. Ward responded to that argument by pointing out mathematical shortcomings in his opponent's paper.

In 1963 a comprehensive paper by Hospers and Van Andel appeared. The authors analysed and eliminated the mathematical incorrectness of Van Hilten's calculations and then applied the method of triangles to the cratonic areas. According to my own analysis, the incorrectness caused not big declines and weakened van Hilten's conclusion. Consequently, the results obtained by Hospers and Van Andel should confirm

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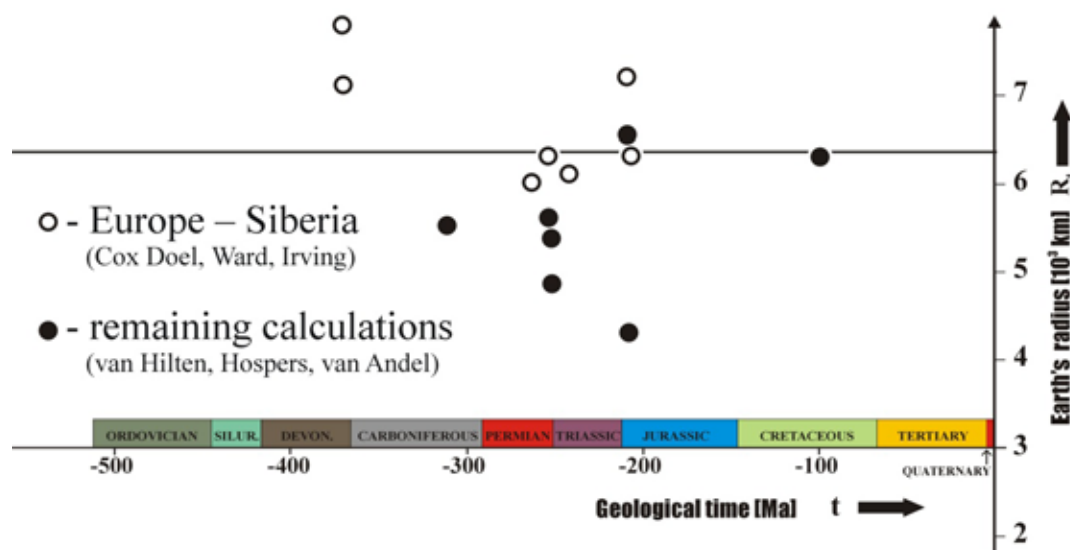
<sup>22</sup> See the footnote 15 on the page 15. (2015)

<sup>23</sup> Cratonic conditions (2015)

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 and Ward. Such a procedure is inadmissible.

I have analysed the mutual position of the East European Platform and the Siberian Shield on my own and as a result I have proven their direct connection (already reported results). In other words the West Siberian Depression appears as a big gap filled with sediments and created by drawing of two cratons apart from each other. It is confirmed by quite recent investigations that reveal the existence of oceanic crust beneath the depression. The oceanic lithosphere shows here linear magnetic anomalies (Aplonov, 1981). Moreover, three years after publication of papers by Hospers and Van Anandel, Hamilton (1970) showed that the trajectories of pole wander of Europe and the Siberian Shield are different. As we know, such discrepancies caused a re-activation of the mobilism in early fifties.

I divided the results of paleomagnetic tests done by Hospers and Van Anandel into “cratonic” and “intercratonic” ones, getting the following picture (Fig. 5).



**Fig. 5.** Length of the ancient Earth radius calculated by paleomagnetic methods. Results marked with empty circles do not fulfil necessary geotectonic conditions

The values showed by empty circles have been obtained from the Europe – Siberian Shield analysis and so, do not fulfil required geotectonic conditions. If we exclude them from the consideration, remaining points mark the expansion of Earth.

The story with the paleomagnetic tests has been continued. In 1968, Van Hilten improved Ward’s method and used it in order to analyse data gathered within cratons. Although the results indicate expansion, the author treated them as not decisive. Only eight years later, Carey in co-operation with Parkinson (Carey 1976) showed, that Ward’s method is wrong and always gives the proportion of former and present Earth radius near one, independently from data being used. Two years later, McElhiny

et al. (1978) published comprehensive results based on Ward's method. They showed stability of the Earth radius. The paper has been discussed in the Polish "Geological review" by Ryszkiewicz (1978) under the title "Knell for the hypothesis of expanding Earth". In 1984, Chudinov published a paper presenting results of analysis of Ward's method, carried out together with the mathematician Terticki. They showed, again, that it gives always-stable radius of the Earth. Terticki developed a new computer method and its results show significant expansion of the Earth.

So the second "proof" of stability of the Earth radius has changed into confirmation of the expansion. There were no further attempts to prove the presumed stability of the Earth radius.

So, the hypothesis of non-expanding Earth that actually is the fundament of the plate tectonics is still based only on our traditional opinions and not on any scientific basis.

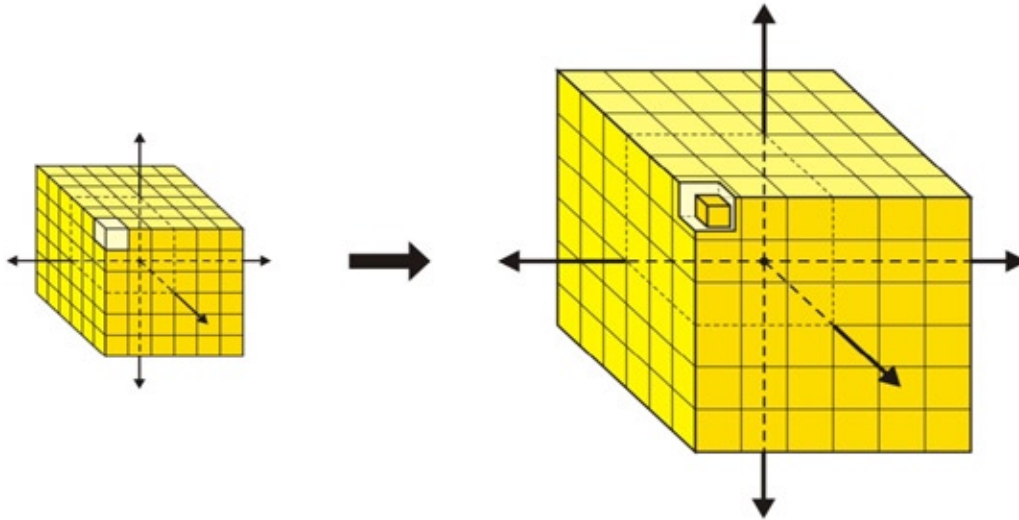
## **6. Relative measure of the displacement of the Earth mass with assumption of convection or expansion**

Another problem that I focussed on in 1974 was the relative measure of mobility of the Earth matter implied by expanding Earth or assuming the hypothesis of convection currents. The expanding Earth gives not only a very simple explanation of the movement of the continents but it also needs much less displacements of matter inside the Earth than the hypothesis of convection currents. The latter feature may be hard to notice.

The relative measure of displacements has been estimated as follows: a simple lump of matter from the interior of the Earth - a cube - is divided into smaller parts (cubicles). As a unit of the displacement a length of the edge of the cubicle is taken. The absolute measure of displacements connected with given type of mobilism (expansion or convection) is the sum of shifts of all cubicles that are being moved either in the model of expansion or convection. Obviously, it depends upon the size of cubicles given. If we consider quotient of the two absolute measures and calculate its limes at the volume of the cubicles going to zero, we obtain the reliable relative measure. So, I have carried out the calculation for two bigger cubes. I assumed that one of them (Fig. 6) is a result of twofold enlargement of a smaller one (according to the theory of expanding Earth such enlargement takes place<sup>24</sup>).

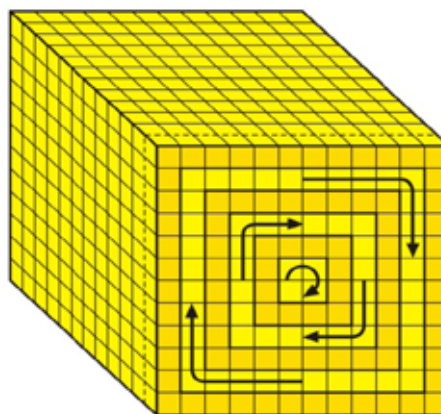
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<sup>24</sup> Such enlargement takes place since the Paleozoic and is responsible for development of all the oceans. The former growth of the Earth volume was small and can be omitted in above approximations. But convection cycles in plate tectonics cannot be omitted because they are to perform in a 20fold bigger way before Meso-Cenozoic than in this period. (2015)



**Fig. 6.** Expanding Earth. Model of the displacements of the matter inside the Earth that allows us to estimate the size of the displacement

One cycle of convection has been taken for the second cube (Fig. 7).



**Fig. 7.** Convection. Model of the displacements of matter inside the Earth that allows us to estimate the size of displacement

It turned out that this one convection cycle gives the displacements of the Earth matter ten times bigger! Because the time of one convection cycle is estimated to be 200 Ma, so from the beginnings of the Earth there should be at least 20 of such cycles. Thus, on the scale of life of our globe, the hypothesis of convection currents implies about 200 times larger mobility of the Earth's matter than those of expanding Earth.

We should focus on this problem more profoundly. The proponents of hypothesis of the convection currents, which is supposedly a less radical solution than simple expansion of the Earth<sup>25</sup>, escaping from the latter one, have placed inside the Earth a hyper-mobile mechanism which causes subsequent decomposition of classical geology and its progressing illegibility – especially as the geology of continents is concerned.

<sup>25</sup> Robert S. Dietz and Harry H. Hess see [www.wrocgeolab.pl/priority.pdf](http://www.wrocgeolab.pl/priority.pdf) (2015)

Our planet is becoming slowly a ball of mobile plasma, and no more a relatively firm solid body with well recognisable history. Wegener's theory, which did not introduce convective currents, assumed disappearance of the hypothetical crust of the old Pacific (Panthalassa) only equal to the areas of the newborn oceans inside of the Pangaea. On the contrary, plate tectonics adds to it the hypothetical pre-Jurassic oceanic crust of the whole present Pacific. The crust miraculously was to be changed to the younger one exactly at the same time as the remaining oceans were created<sup>26</sup>. The subduction hypothesis, applied to the geology of the continents, regards vanishing of enormous areas of oceanic crust within the present continents. According to this hypothesis, the continents should be composed of quite alien elements and their origin has often not even been considered. The good old custom of classical geology was to connect geological units in a logically coherent entirety of mutually related elements. The concept of the so-called exotic terranes caused it to be replaced by a fashion of splitting the entirety into elements completely independent from each other.

Even Wegener's Pangaea did not resist the convection storm inside the Earth. It turned out that Pangaea was to be only a temporary, Late Paleozoic assemblage (amalgamation) of continental masses. They were earlier to float on our globe separated from each other (Fig. 8).

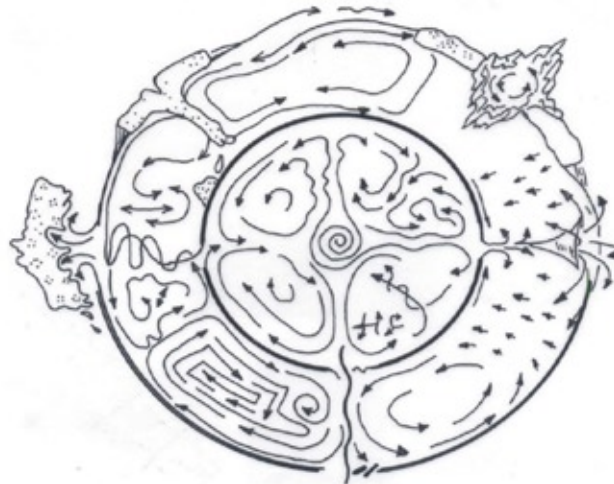


**Fig. 8.** An example of the consequence of combining mobilism with the hypothesis of non-expanding Earth. One of the presumed configuration of continental lithosphere in Early Paleozoic (after Ziegler et al., 1979 – simplified by the present author).

Such a random concentration of all continental lithosphere in one supercontinent (which, however, really existed), as the hypothesis of convection currents assumes, is not much more probable than the precise exchange of the Pacific lithosphere that has been mentioned above.

The plate tectonics led to the creation already the “third generation” of paleogeographical maps (their own term related to the products of high technology) displaying more and more arbitrariness and fantasy. The Earth, according to its proponents, is like a pot with boiling water with pieces of bark floating on its surface. Reconstruction of any of their remoter position on the time scale is virtually impossible and the boiling basis cannot be regarded as any reference frame for them (Fig. 9).

<sup>26</sup> Carey (1976, p. 53) in the section “The young oceans”. (2015)



... wheels within wheels within wheels

**Fig. 9.** Satiric model of convection currents (by Dietz and Holden, 1973<sup>27</sup> – simplified by me)

On the contrary, in case of the expanding Earth, the whole sublithospheric mantle is such a reference frame. The lithosphere can be reconstructed on a contracted mantle and it can be traced back to the Precambrian. The whole lithosphere, whenever created, still exists – if only the changes of its surface caused by denudation were excluded from considerations. So, there are no vast areas that disappeared in the Earth abysses. Due to this fact the Earth history could be reconstructed simply and correctly.

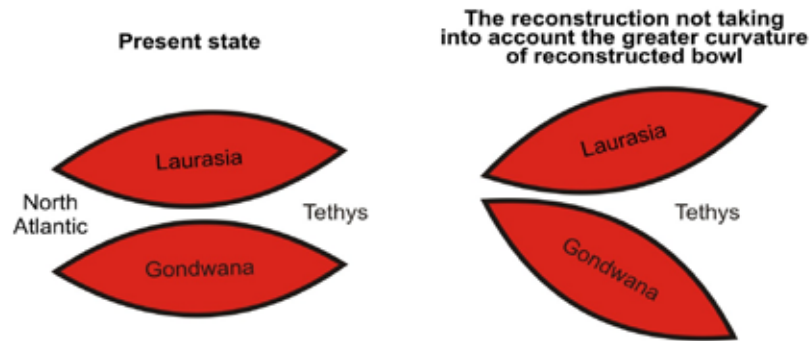
## 7. Research on the Tethys zone

In January 1975 Professor Józef Oberc suggested me to develop a study of the Tethys zone as a subject of my Ph. D. thesis. This topic was the most traditional from the geological point of view of all I had presented before and actually this fact was the reason for the professor's choice.

Work on the Tethys zone was very laborious and lasted over one year. It consisted, first of all, of regional geological studies and attempts to reconstruct the zone in detail. As a result, I obtained full confirmation of continuous tearing of Africa away from Europe and Asia, deduced before only from the analysis of the morphology. In case of tearing of Africa away from Asia it concerned not only the unquestionable Red Sea rift but also the whole region of the Southwest Asia from Hazarajat and Urals

<sup>27</sup> In the subsection entitled as their figure caption the authors wrote: „*With convection currents one can do almost anything as the entire process is wonderfully amenable to mathematic manipulation. And there are many modes of convections – toroids, plumes with thunder-heads, helixes, etc. – all of which can be readily explained by arm waving which conjures up explicit models*” (p. 1113). Note, that one of these authors – Dietz - was the one who attached below the ocean-floor spreading (newly discovered by the expansionists: Carey and Heezen), the hypothetical convection currents, marking the way (in 1961) to the future plate tectonics. See [www.wrocgeolab.pl/priority.pdf](http://www.wrocgeolab.pl/priority.pdf) (2015)

to the Zagros foredeep. What is more, it turned out that the scale of the tearing increases from the Gibraltar to the southeast. As is known, plate tectonics assumes here just the opposite, i.e. tightening of the Tethys zone which is increasing to the southeast. That result has been exclusively based on the reconstruction of the Atlantic on a sphere of today's radius. It gives the Mesozoic gap between Europe and Africa, in accordance with the "orange peel law" of Van Hilten (1963, 1965) – Fig. 10.

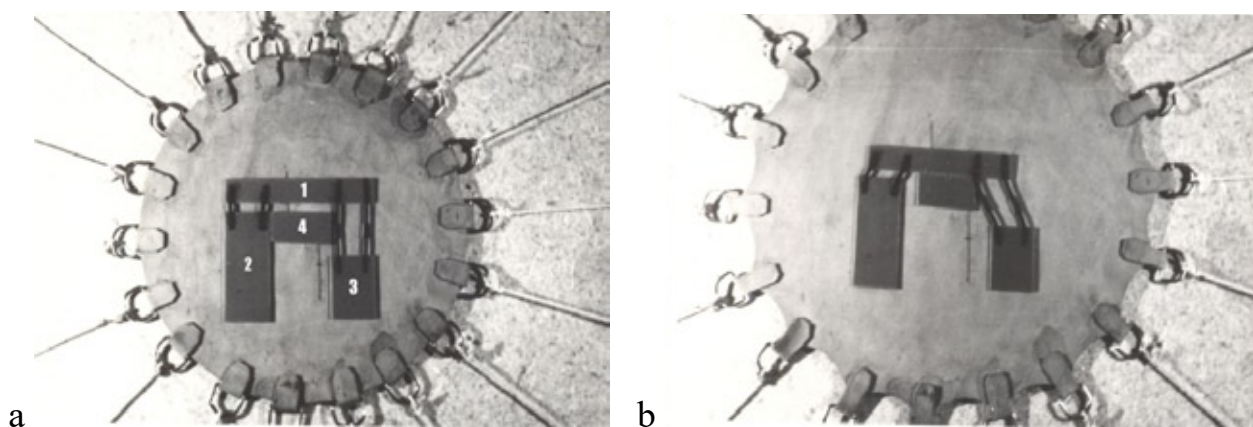


**Fig. 10.** Illustration of the "orange peel law" of Van Hilten with reference to the Tethys zone.

It turned out that the Tethys "ocean" was merely an epicontinental sea lying on stretched continental crust. The Alpine ophiolites appeared to be products of narrow rifts, and not relicts of vast oceanic floors.

The analysis of the eastern part of the Tethys zone showed that also Australia is a continent torn away from Southeast Asia and that the entire region of Malaya and Philippine Archipelagos is an area of extensional tectonics, as already noticed by other expansionists. It is fundamentally different from results of the reconstruction made in the frame of plate tectonics. However, in case of India I have been influenced by strong suggestions of its ramming into the Asiatic continent. The suggestion has been induced mainly by two wonderful syntaxes on both ends of the Himalayas.

I put the above elements together and constructed a model of the Indian Peninsula, using the isotropic stretched basement (Fig.11).



**Fig. 11.** Attempt to explain presumed push of India towards Eurasia, done with help of isotropically stretched basement; 1 – Eurasia, 2 – Africa, 3 – Australia, 4 – India; a – initial state, b – state after isotropic stretching of the basement



The model aroused big interest in our Institute but finally it turned out to be wrong. If it were right, the whole region between India and the Angara Shield should be compressed. However, not far to the north from the Himalayas there are evident signs of tension extending as far as Mongolia and Lake Baikal.

Finally, the Indian Peninsula turned out to be a fragment of Gondwana, strongly attached to Asia and drawn away by the core of Asia (Siberian shield) from Africa and Antarctica. The Himalayas turned out to be a fold belt similar to others, formed under control of extensional tectonics. I came to it later, however.

Summarising, divergent kinetics of Indian Peninsula relative to the Siberian Shield and tensional origin of the Himalayas confirm the expansion of the Earth much stronger than the model demonstrated above.

## **8. The first official presentation of the results**

At the end of 1975, Professor Oberc proposed me to give some lectures at scientific meetings of the Institute of Geological Sciences of Wrocław University. I have given two lectures, in March and in May 1976. I presented outlines of the theory of expanding Earth and plate tectonics in the first one and my own results – concerning mainly the principles of movement of lithospheric plates on expanding Earth, in the second one. The lectures, especially the second one, have been received well. Professor Henryk Orkisz a geophysicist from Cracow assumed the problem was one “of the first range of importance”. Due to his initiative, I repeated the second lecture at the Institute of Geophysics of the Polish Academy of Sciences in Warsaw with much less success, though no serious counter-argument has been put forward during the discussion. The latter has become, by the way, a rule during my whole practice of popularization of the expanding Earth theory.

At this one, as well as at further discussions, a very characteristic feature appeared, i.e. discussing almost exclusively problems that have not been presented during the lecture. In Warsaw one of the present professors has given a complete co-lecture aimed at the origin of fold belts. As a result, I had no time to present my objections to the common approach to the topic that, anyway, was behind the subject of my lecture.

The theory of expanding Earth interferes in all geotectonic and most geological problems and on top of that they contain the huge heritage of the theory of contracting Earth. Such a specific character of discussions on expanding Earth resulted in my reluctance to publish papers. I preferred to work on each problem successively, especially that it gave results and I could hardly tear myself away from the studies.

After the successful presentation of the subject in Wrocław, Professor Oberc and I came to the conclusion, that it would be better to polish up the basic topic i.e. principles of the plate movements and the general tensional model of the development of lithosphere. So, I stopped writing the paper on the Tethys zone, which comprised, as a manuscript, about 120 pages. I presented a part of this study, which has been aimed at Mediterranean and Black Seas, at the meeting of the Wrocław Branch of

the Polish Geological Society in March 1978. After that, I was commissioned to give lectures on geotectonics for fourth year students on the initiative of Professor Marian Dumicz, director of our Institute at that time. It was the first course in geotectonics in our institute.

Some time after that, my former student Andrzej Muszyński presented (as a co-author) the tensional development of Mediterranean and Black Seas in Sofia (Bulgaria) at the international symposium on geotectonics of the Balkan Peninsula. The paper was published in the Reviews of the Bulgarian Geological Society (Koziar and Muszyński, 1980).

## **9. Analysis of contradictions among geotectonic hypotheses**

It was necessary to elaborate a comprehensive introduction to the general tensional development of the lithosphere and to show in it that the hitherto existing collection of geotectonic hypotheses is not a monolith that contradicts the expansion of the Earth. Just the opposite - contradictions among them lead to the expansion of the Earth. The need to extend the introduction resulted from the attitude of the listeners, already mentioned above, they believed that all that has not been presented, must contradict the expansion of the Earth.

Such idea of the introduction regarded its gradual development and extended studies of classical geology. It was very exciting to become acquainted in detail with old geological syntheses, as well as the broad horizon of their founders and the twisted paths of the geological thinking. The range of view was wider than today. The unfavourable changes in geotectonics come not only with progressive specialisation, as everywhere else, but also with the fact, that a synthesis of geotectonic considerations within the limits of plate tectonics is virtually impossible and so, fragmentation of the geological realm into unconnected parts is unavoidable for the theory.

The investigation of historical and more recent fundamentals of the geotectonics showed that for almost all more important problems two mutually contradictory hypotheses existed and that the solution of these contradiction is each time the expansion of the Earth. Simply, these are here model examples of Hegel triades, but the real development of a given geological structure or the Earth as a whole have nothing to do with them. The triades are developed only in our minds. The best example is the full solution by expanding Earth of the contradiction between the land bridge hypothesis and the hypothesis of permanency of the oceans (including the Pacific). Another one is the resolving of contradiction between fixism (stabilism) recording the deep rooting of the continents and mobilism recording their mutual drawing apart.

I discussed the contradictions between the geotectonic hypotheses (as usual) with my colleagues and one of the problems has been in its principles independently solved by Leszek Jamrozik. He studied the geology of Eastern Siberia (in the collection: *Geology of the transition zone from Asia to the Pacific Ocean* (Vasilkovski ed., 1968) and he met the hypothesis of basification applied there. He also noticed the contradiction between it and the classical theory of development of continents (the accretion theory). He interpreted

the destruction of continental lithosphere, visible there, by tension, and not by lowering, as the adherents of the hypothesis of basification did. This allowed him to resolve the contradiction between the two hypotheses while preserving their basic set of facts.

The analysis of geotectonic hypotheses and their mutual relations, as well as the model of tension – gravitational development of fold belts (which will be discussed further) lasted until June 1978. The text planned previously as an introduction expanded to an independent paper comprising more than 150 pages.

## **10. Tension – gravitational mechanism of fold belts**

### **a. Intra-continental fold belts**

The most difficult part of the analysis of geotectonic hypotheses was the theory of fold belts. Although it was possible to point out contradictions between different hypotheses and general way of their solutions, the detailed mechanism of origin of the fold belts was still hard to recognize. I was convinced that the right solution is given by the gravitation tectonics. However, it was difficult to find regions of sedimentation of series that later would be included into nappes. I tried to test different solutions while analysing almost all greater intracontinental fold belts. The turning point was my familiarization with the new data of the deep structure of the Pieniny klippen belt, that has been presented by Waław J. Sikora at the meeting of the Wrocław Branch of the Polish Geological Society in March, 1977. It turned out that the belt dips under the Slovak Massif. Therefore, the latter should be allochthonic and not migrate to the north like a micro-continent. So, it was clear, that the Slovak Massif is associated with the flysh nappes, especially with the upper one i.e. the Magura nappe, as one, coherent, gravitationally transported system. With such an interpretation, all objections against gravitational origin of the Beskids nappes fail, as they had been founded on the assumption of non-gravitational movement of the Slovak Massif. According to gravitational interpretation, the place where uplifting of the basement goes on and, simultaneously, a region where tectonically induced erosion occurs, would be the Pannonia Basin. Previously, a huge diapir of asthenosphere would have been present here. Thus, the north flysh geosyncline would be placed beneath the present position of the Slovak Massif. The analyses of other fold belts confirm this scheme. It can be briefly summarised as follows:

- **tearing of the lithosphere**
- **formation of geosynclines**
- **development of diapirism in the deepest eugeosynclines**
- **deep gravitational transport in the directions**
- **of miogeosynclines and foreland depressions**
- **degasification of apical part of a diapirs and its transformation into intermontane depression or sea basin with an oceanic crust**

The main mental barrier I dealt with before, consisted in traditionally too narrow, in the regional sense, treatment of the fold belt area. The reconstruction of the full mechanism of its gravitational tectogenesis became possible only after enclosing the intermontane depressions, adjacent to the fold belts from the back, into the entire fold belt structure.

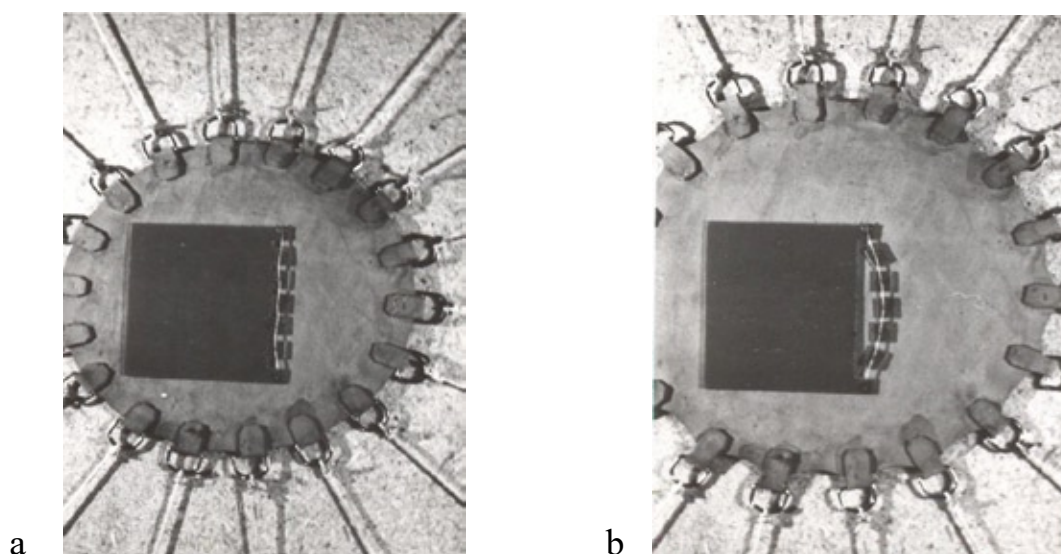
The tension – gravitational tectonics, being considered here, not only increases the size of the whole system of tectogenesis (in the regional sense) but also the range of allochthonism. As shown above, the Slovak Massif has to be considered as an allochthon and that is not the case according to the plate tectonics schemes. It makes a paradox, since I often met the statement that the very existence of nappes contradicts the expansion of the Earth.

It can be answered that on the contrary, only the tensional tectonics offers proper conditions for a simple and physically understandable mechanism of development of nappes. It is accomplished by adding to the theory the elements which are not treated as nappes by contemporary models of continental collision. It concerns (in general) all the so-called folding massifs, defined by plate tectonics as micro-continents.

## **b. Island arcs and active continental margins**

The integral problem of the theory of fold belts is the development of island arcs. The latter can be extracted, for investigative reasons, because of specific structure of the island arcs and because of specific data that are mainly results of analyses of natural earthquakes.

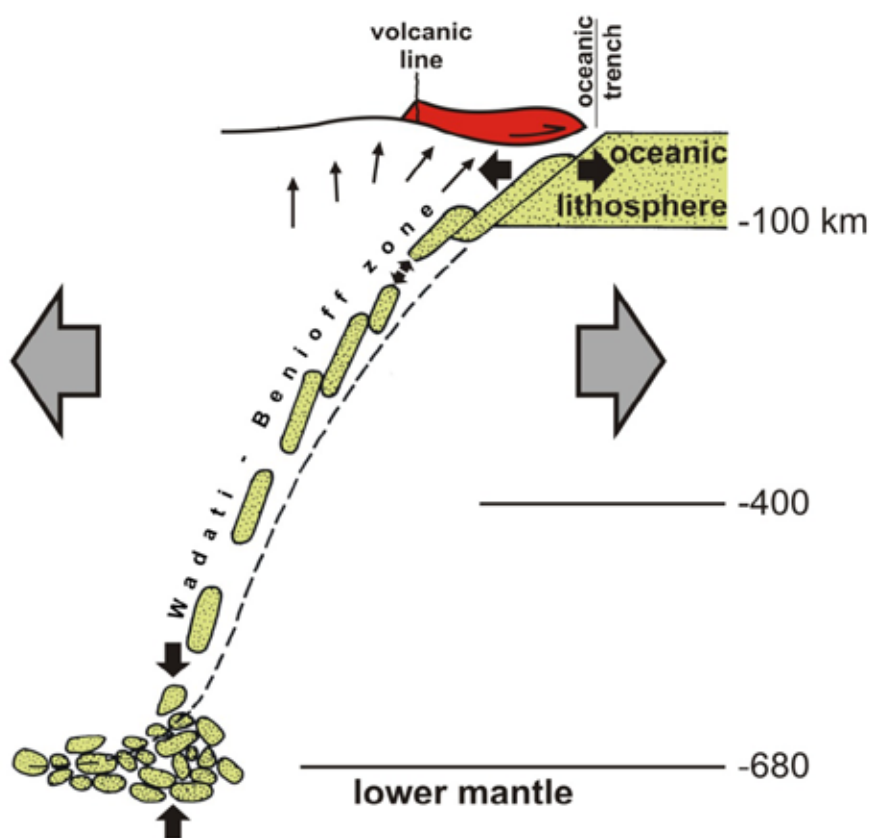
The development of the islands arcs is one of the crucial tests between theory of expanding Earth and plate tectonics. The islands arcs, as I have mentioned before, were ones of the first structures interpreted by me as tensional ones, well before I studied plate tectonics and the hypothesis of subduction. I made also a simple model of tearing away an arc from the continent (Fig. 12), which, however, did not explain the details.



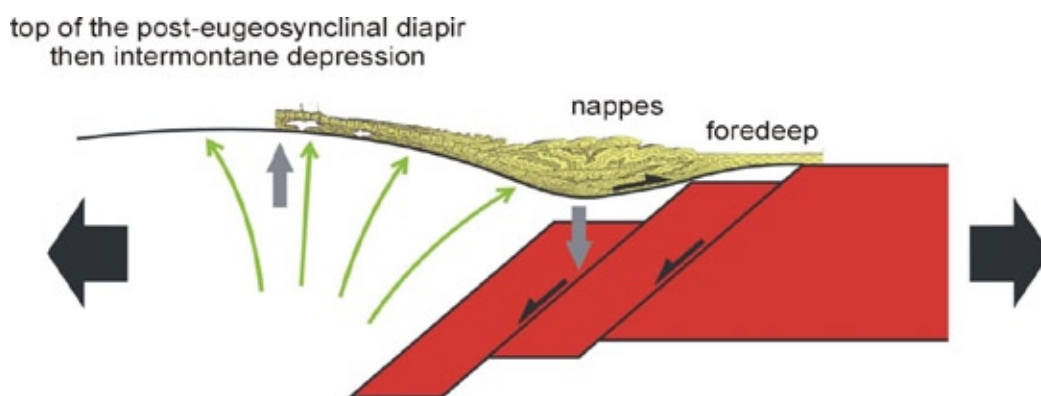
**Fig. 12.** Simple model of detachment of island arc from a continental margin in condition of isotropic stretching of basement; a – initial state, b – state after isotropic stretching of basement

The subduction model of island arcs is generally criticised by expansionists. Nevertheless, finding an alternative explanation in details, is not easy. A simple inversion of subduction can be taken into account. In such a way the question has been put by Chudinov (1981, 1984), who introduced the concept of eduction.

I analysed profoundly data proving the presence of cool and stiff oceanic lithosphere in the Wadati-Benioff zone. It was hard to call them into question. In turn, it seemed almost impossible to reconcile the data with the general stretching of the region. The key for solving the problem was given in the paper by Hasegawa et al. (1978), who discovered a double seismic zone under the Japanese Islands. I read it in autumn 1978 and the solutions could be found soon. Almost the same model (Fig. 13) as that of inland fold belts (Fig. 14), could be drawn. It also should be expected. However, the new model has been based on quite different data and it reached more deeply, up to the upper surface of the lower mantle.



**Fig. 13.** Tension – gravitational mechanism of island arc



**Fig. 14.** Tension – gravitational mechanism of intra-continental fold belt (Koziar and Jamrozik, 1985a<sup>28</sup>)

In these schemes, the primary and secondary tectogenesis are disclosed. Both have been distinguished by Haarmann (1930). However, the first one is here fairly different from those defined by Haarmann. Furthermore, both kinds of tectogenesis result from a more fundamental process, i.e. tearing of the lithosphere and stretching of the upper mantle. Such a more fundamental approach has not been taken into account by Haarmann.

The tension – gravitational model of island arcs was presented by me for the first time at the scientific meeting of our institute in December 1979. The subject was presented many times: by Leszek Jamrozik in Zwienigorod near Moscow (December 1990) and by me in Poznań (Poland, March 1991). Abstract of the lecture has been submitted for publication (Koziar and Jamrozik, 1991<sup>29</sup>).

## 11. Lectures on geotectonics

As already mentioned above, in spring 1978 I gave the lecture “Tensional development of the Mediterranean Sea” at the meeting of the Polish Geological Society in Wrocław. After the meeting, I have been asked to lecture on geotectonics for students. I did it in the academic years 1978/79 and 1979/80. The lectures allowed me to put material in a better order and to prepare a new one, mainly in the form of slides. I presented geotectonics trying to distinguish facts from hypotheses. The expansion of the Earth was, of course, presented at the lectures.

## 12. Beginnings of wider popularization of the expanding Earth

I was concentrating on lecturing and presentations during the years 1978 – 1982. In 1978 I presented the lecture on the Mediterranean Sea. In April 1979 I lectured

<sup>28</sup> See [www.wrocgeolab.pl/Carpathians.pdf](http://www.wrocgeolab.pl/Carpathians.pdf), p. 27. (2015)

<sup>29</sup> Already published: Tension–gravitational model of subduction. In: J. Skoczylas (ed.), Lecture summaries, vol. I. The Polish Geological Society – Poznań Branch and the Institute of Geology of the Adam Mickiewicz University in Poznań, Poznań, p. 34–39. (2015)

on “Theory of expansion of the ocean floor” in Zielona Góra (Lubusz Branch of the Polish Geological Society). At the same time the paper on tensional development of the Mediterranean and Black Seas was prepared together with Andrzej Muszyński. It was presented by Muszyński in Sofia (Bulgaria) at the international symposium concerning geotectonics of the Balkan Peninsula.

In December 1979 I presented in Wrocław “Reinterpretation of subduction hypothesis”. In spring 1980 I gave two lectures: “*Theory of expansion of oceanic floor*” and “*Hypothesis of expansion of the Earth and its connection with the Ambarcumian’s eruptive cosmological hypothesis*” at the meetings of the Wrocław Scientific Society. This took place due to the initiative of professor Józef Oberc and professor of theoretical physics Kazimierz Wojciechowski. The latter knew Dirac’s idea and personally met Pascual Jordan, who has been mentioned above. The listeners there were mainly physicists, by no means shocked or frightened by the problem of possible reasons of the expansion. Still in 1979 I have been invited to the Cracow Branch of the Polish Geological Society. The expansion of the Earth was popularized in Cracow by my former student Szczepan Porębski. The initiator of the invitation was Professor Wojciech Narębski. A set of four lectures has been proposed by me following the negative experience met with in Warsaw:

1. Development of the Pacific Ocean as a crucial test between hypothesis of expanding Earth and the plate tectonics
2. Reinterpretation of hypothesis of subduction
3. Geometrical model of Earth expansion in comparison with the model of new global tectonics
4. Review of arguments against the hypothesis of expansion of the Earth

The proposal was accepted and I could give the lectures in one day. Such a set of lectures turned out to be necessary. Immediately after the first lecture appeared the phenomenon mentioned above, i.e. the conviction of listeners that all apart from the considered topic contradicts the expansion of our globe. Consequently, the main attention has been paid to problems not touched on in the lecture. This tendency was so strong that even referring to the lectures, planned still the same day, has been considered as my attempt to escape from controversy. However, the following lectures saved the situation. At the end of the whole set it has been suggested that it would have been better to leave the whole discussion to the very end. The time of discussion was almost equal to the time of lectures. That was a rule at all lectures on expanding Earth (after the lecture aimed to the tensional development of the Mediterranean and Black Seas the discussion lasted till midnight).

### **13. Geological cognitive relativism**

The lectures in Cracow were the most complete presentation of the subject. The audience was large and the level of discussion was high. However, after the discussion

a peculiar conclusion was raised. Namely, one can appreciate the knowledge of subject, logic, ability of answering the questions and the power of the evidence of the new theory but the statement that the theory is true is unacceptable for a geologist. A geologist does not a priori believe in any theory. Probably such an approach resulted from the existence of the mentioned bundle of different geotectonic hypotheses that influenced several generations of geologists and as a result led to this peculiar scientific philosophy<sup>30</sup>.

## 14. Further popularization of the expanding Earth

In spring 1980 I lectured on the spreading theory for members of the Students Science Association of Geologists and in April 1981 I gave the presentation entitled “*Development of the oceans as a manifestation of the expansion of the Earth*” at Roztoka near Zakopane at a scientific session of the Institute of Geology of Silesian University (Koziar, 1985<sup>31</sup>). It was on an initiative of my former student Jerzy Żaba. In the first half of 1982, when I was already fully engaged in the underground activity<sup>32</sup>, I still gave three lectures at a meeting of the Students Science Association of Geologists in Wrocław.

## 15. Work on reconstruction of the lithosphere

The most time consuming and the least exposed part of my works on expanding Earth were regional studies and reconstructions of the lithosphere. I have been engaged in them from the very beginnings and they were a constant background of all other works. The subject is complicated and time consuming since it mainly concerns intra-continental reconstructions.

An argument can be met very often that the theory has not much to do with the real world and that the trials to prove it mean looking for facts that confirm assumptions and neglecting facts that contradict it. Just the opposite – the reconstructions of the lithosphere were tested by looking for contradictions. When I finally achieved certainty, it was only possible due to results of a whole series of trials and errors and not due to any joyful and uncontrolled creativity.

A good understanding of regional geology is of crucial importance for geotectonics. However, recently it has become an obstacle to speculations based on plate tectonics.

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<sup>30</sup> At this time I was unaware of disastrous impact of Kuhnian cognitive relativism on the science in general and on geology particularly. Thus I thought that the cognitive relativism was only an internal problem of geology emerging from its chronic inability to explain the internal driving mechanism of geological processes. After 2000 I demonstrated the problem at the first lecture of my course lectures for students ([www.wrocgeolab.pl/lectures.pdf](http://www.wrocgeolab.pl/lectures.pdf)). The topic was discussed in its first chapter “Main methodological rules” and its title was: “Acceptance of the possibility of the existence of a true solution (non-relativistic cognitive approach). (2015)

<sup>31</sup> [www.wrocgeolab.pl/oceans.pdf](http://www.wrocgeolab.pl/oceans.pdf) (2015)

<sup>32</sup> Activity in Solidarity movement after the imposition of martial law in Poland in December 13, 1981. (2015)



The very good basis for the reconstruction was a set of geological wall maps of different types and regions. Mainly due to Leszek Jamrozik we have brought a large collection of them to our Department of Physical Geology<sup>33</sup>.

Cramped condition in our department has become an important problem and only when I gained my own flat, the situation improved. I changed the flat into a geotectonic laboratory almost completely.

Most important for geotectonic reconstructions was the building of big geological globes in the scale of 1: 15 000 000 (85 cm in diameter). Maps for them have been brought from Russia. I had to make the spheres on my own. It was a very time-consuming task that began in the spring 1979. I made three spheres and only one was covered with maps. The other two were to be the globes on axes and stands. Only the first globe survived the perturbation of the period of martial law<sup>34</sup>.

Use of the big geological globe proved to be essential. In 1980 I found the connection of Africa with Antarctica (Koziar, 1991<sup>35</sup>) that was a key to global reconstruction. I have made the preliminary reconstruction in autumn 1980.

## **16. Work on the text**

### **“Reinterpretation of the theory of fold belts”**

I faced now the problem of more detailed elaboration of each subject. Previously, I wrote a general text consisting of two parts. The first part has been aimed at the geometrical model of the motion of lithospheric plates that has been mentioned above. The second one consisted of the analysis of geotectonic hypotheses, already emphasized. As a whole, it was pretty extensive and all the most important problems have been covered.

However, in terms of geology of the continents and active continental margins, it was too general. Preliminary investigation of the most important subjects was profitable for understanding the problem as a whole and for discussions. However, the previous text was not suitable for publication, all the more as I have obtained more detailed results. It was not only the problem of publication but also the problem of my Ph. D. thesis that had to be finished.

A clash between the necessity to get my doctorate and the research on expanding Earth was the only serious contradiction I met during the studies. Getting a doctorate in any field of expanding Earth was very difficult in the seventies in spite of the support from Professor Oberc and the friendly atmosphere in our institute.

Having the agreement of Professor Oberc, I choose for more detailed consideration as my Ph. D. thesis “Reinterpretation of the theory of fold belts”. The first part of it has been aimed at the active continental margins, the second one – at the inland fold belts.

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<sup>33</sup> They were mainly very good Russian geological maps of whole continents. (2015)

<sup>34</sup> See Supplement. Only at the turn of the 20<sup>th</sup> and 21<sup>st</sup> centuries I returned to this task and constructed some big globes with precisely marked oceanic isochrones. (2015)

<sup>35</sup> [www.wrocgeolab.pl/Gondwana.pdf](http://www.wrocgeolab.pl/Gondwana.pdf) (2015)

I started work in December 1980. The first part had already progressed quite well and finishing it was not difficult. However, the second one still required a renewed analysis of fold belts and making maps and schemes of their development. Additional theoretical problems appeared. The most important one was the origin of the so-called ophiolite sutures. According to the plate tectonics, such sutures are remnants of former oceans and indicators of hypothetical collision of continents. After detailed analysis it appeared that ophiolite sutures are former eugeosynclinal rifts that have been pressed together by a neighbouring diapir and that have been often separated from this diapir by a rigid block. The block becomes a folding massif during the tectogenesis. In other words – the “ophiolite sutures” is a former marginal part of eugeosynclinal system dominated by more developed (one reaching the stage of diapir) part of the system. For example, in the case of Ural Mts., the remnants of active folding eugeosyncline are hidden under the sedimentary cover of the West Siberian Lowland at present. There are several basic igneous rock zones which are well recognized today.

The active continental margins and inland fold belts are the only zones where one can expect compensation of expanding oceanic lithosphere, a process that occurs on a huge scale according to the plate tectonics. Proving dilatational development of the zones that is based on their analysis, and not on a priori global assumptions, excludes hypothetical compensation of spreading and leads to the conclusion that the Earth is expanding. The conclusion is a proof and not only a confirmation of the hypothesis, when we regard the direction of implication i.e. from facts to hypothesis (assumptions) and not in the opposite direction.

The proofs of expansion of the Earth are also conclusions on extensive development of the Pacific and extensive development of the whole Tethys zone, mentioned above.

These proofs were included in the paper in order to widen the range of evidence of Earth expansion. I enclosed also methodological remarks and the criticism of counterarguments against expansion. All that made the third part of the work.

Completion of the work has been interrupted by the imposition of martial law in Poland (December 13, 1981).

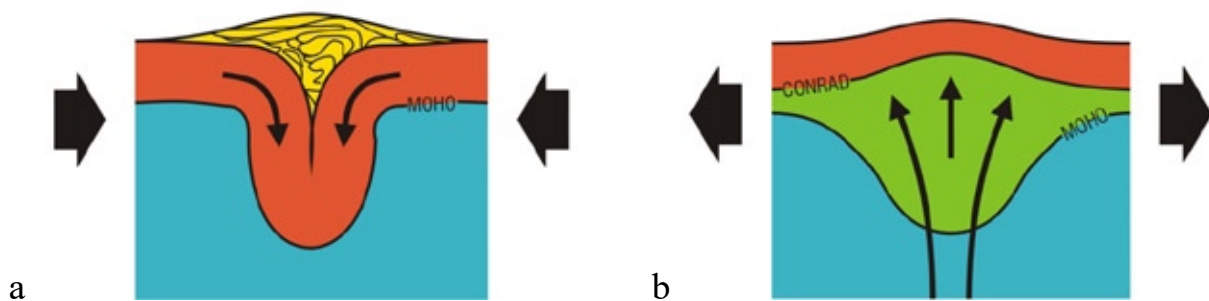
## **17. Between December 13 (1981) and “The Round Table”(1989)<sup>36</sup>**

The imposition of martial law in Poland in December 1980, the 13<sup>th</sup>, caused 6.5 year break in my work on expansion of the Earth. However, in that time almost all hitherto published papers appeared. They have been written either by myself, or together with co-authors or by other members of the Wrocław geological community who became engaged in expanding Earth.

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<sup>36</sup> Between the imposition of martial law and fall of the communism in Poland. “Round Table” (1989) – negotiations and agreement signed by representatives of the Polish authorities and selected opposition. (2015)

Intensive engagement in underground activity was my inner necessity. As long as it was possible I still worked in our Institute. However, at that time I could not focus on conceptual geological work on a larger scale. I have given only three lectures for Geology Students' Scientific Association. I also took part in work on one of the papers (Koziar et al. 1984) presenting results of the Island expedition organized by scientists and students of our Institute in 1981. I did not take part in the expedition, but many of the problems it has been aimed at, were closely connected to the expanding Earth. On Iceland, the island that lies directly on an oceanic ridge, unique deep seismic soundings have been carried out. It turned out that the Moho discontinuity creates there the same "root" as it does under the elevated fold belts. It had been already recognized, that the Moho does not follow supposed "granite root" (which, in fact, does not occur at all) under the elevated fold belts, but that it marks the lower limit of the so-called "basaltic pillow" that supports the elevated fold belts isostatically. Showing that the Moho is lowered under oceanic ridges is an evidence that it is (like the basaltic pillow itself) a tensional feature and that the Moho is a phase-transition discontinuity. The rules are simple: tearing of the lithosphere results in diapirism of the upper mantle. The diapirism leads to increase in temperature. In turn, higher temperature causes lowering of the Moho discontinuity. The relations and displacements of matter are there opposite to those proposed by the contraction model of a fold belt (Fig. 15). They overthrow the fundament of the model metaphorically and literally.



**Fig. 15.** Juxtaposition of recorded situation beneath oceanic ridge; a – with classic interpretation of the root of a fold belt, b – with real structure and origin of the root of a fold belt (Koziar and Jamrozik, 1985a<sup>37</sup>)

*At the end of September 1982, Władysław Frasyński, then the leader of Lower Silesia "Solidarity", wanted by police, lived in my flat. He was arrested in October, the 5<sup>th</sup>. Being out of my flat I heard television news about it. In such a way I avoided arresting, but my scientific materials and devices suffered.*

The following years were for me years of hiding from the police. Apart from that, this were years of hard full-day work on organization, publication, edition, studying and even construction (a printing machine).

At the end of hiding, I have been engaged into the problem of the economic democracy, especially the employee ownership. The work on this very important, but

<sup>37</sup> [www.wrocgeolab.pl/Carpathians.pdf](http://www.wrocgeolab.pl/Carpathians.pdf), p. 26. (2015)

quite neglected subject, was the reason why even one year after coming out of hiding (February 1989), I could hardly return to geology.

At the beginning of 1984, a possibility appeared to present a part of material aimed at the tension – gravitational model of fold belts and the tectonic reconstruction of the Carpathian Mts - at the 13<sup>th</sup> Congress of Carpatho – Balkan Geological Association that was going to take place in Cracow in September 1985. I agreed with Leszek Jamrozik, that we would present, as co-authors, the topic but he would lecture it and prepare for publication. It was the only way to continue the popularisation of the theory of the expanding Earth, though one of the authors was wanted by the communist police.

We started working on the subject together with Professor Józef Oberc in spring 1984. I remember the beautiful springtime day, we took the materials on an all-day long excursion along the Odra river and we discussed them in the shrubbery, somewhere near the village Brzezinka Średzka. I also remember the excellent cheese prepared by the Professor. The presentation never took place, but it was published in the proceedings of the conference (Koziar and Jamrozik, 1985a,b).

The next possibility to present the subject has appeared during the conference on alpine cycle on Polish territory, organized also in Cracow in March 1986. Again, it was necessary to prepare a lecture and a short text. This time Leszek Jamrozik could present only half of the lecture exceeding the allowed time. The text has been published (Jamrozik and Koziar, 1986) only in a short form and so, did not comprise several questions that were included in the entire lecture.

The problem of fold belts (in an abridged version – limited to the active continental margins) was again presented by Leszek Jamrozik in spring 1987 at the sessions of the Polish Geological Society in: Wrocław, Sosnowiec and Zakopane.

*Reassuming, all the works on the lectures mentioned above and papers that concerned problems elaborated formerly (before December 13, 1981) took me not more than 1 month of 6.5 years of hiding. I carried out no other geological investigation during that time. I am pointing it out particularly, since many persons supposed such activity. After possibility to come out of hiding (amnesty) and also earlier, it would be dishonest to my colleagues from the trade union “Solidarity”, who secured me a monthly maintenance. For that pay, but, certainly, not only for that reason, I should work on social affairs and so I did.*

*It would be also an organizational nonsense to concentrate on geology to a larger extent in the underground after 1984 amnesty. For such an activity the hiding was not necessary at all. Thus I was just entirely engaged in several social problems. The work on them required large amounts of materials which needed to be hidden and secured against revision and confiscation.*

In the middle eighties Professor Oberc engaged himself in the popularization of the theory of the expanding Earth. But even before, for a long time, he had included the problem in his lectures on physical geology. He presented the subject at the beginning

of the academic year 1985/86 at the inaugural lecture for students of the whole Faculty of Natural Sciences. The lecture entitled “*Earth – mobilism and expansion*” has been published (Oberc, 1985). He also tried to explain the development of the borders of Czech Massif by means of the expanding Earth theory using a gravitational model (Oberc, 1987). Earlier yet, another worker from our Institute, Professor Jerzy Don, tried to explain the development of West Sudety Mts. on the basis of the expanding Earth as well, as applying the “orange peel effect” of Van Hilten.

A lot has been done for popularization of the expanding Earth by our former student and now the Director of the Lower Silesian Branch of the Polish Geological Survey, Stefan Cwojdzinski, at that time. He started in geotectonics as a proponent of plate tectonics. However, he soon converted to the expanding Earth later and he developed a good knowledge of the subject. In April 1983, he gave a lecture “*Tectonics facing new geological and geophysical facts*” at the meeting of the Wrocław Branch of the Polish Geological Society. He supported the expanding Earth theory in that presentation. He emphasized also my contribution to the subject which gave me important moral support during my initial and most difficult period of hiding.

The next year a similar presentation has been given by Stefan Cwojdzinski at the Silesian University as well as the publication of the paper “*Where the geotectonics is going to?*” (Cwojdzinski, 1984) in which he pointed out the expanding Earth theory as a proper way of further development of geotectonics. Five years later he published an upgraded version (Cwojdzinski, 1989) of the paper, as a booklet.

## **18. In the Old and the New Building of the Institute of Geological Sciences**

As has been mentioned above, I came out of hiding in February 1989. In April the authorities of the Wrocław University restored me to my job. Continuation of the social engagement still delayed my professional work in geology for about one year. I only gave a lecture “Development of lithosphere as a manifestation of Earth expansion” at the meeting of the Wrocław Branch of the Polish Geological Society in February 1990.

The cramped room conditions at our Institute hampered my return to active professional work, too. The situation was improved after gaining by the Institute one floor in the building of the former communist regional authority. However, three months were needed to move into the new building. It was possible to begin the geological work only since August 1990, starting from the study of literature of the whole past decade.

Soon, we got in touch with expansionists from abroad. In 1987 Jerzy Don visited the known expansionist Klaus Vogel at Werdau (Saxony – in the former German Democratic Republic) – the author of the best global reconstructions (Vogel, 1983). He had heard already about our works in Wrocław. Leszek Jamrozik visited Vogel in September 1989. He met there also Johannes Pfeufer, another expansionist (from West

Germany). Klaus Vogel re-visited us together with his wife Eva-Maria in April 1990 and presented his reconstructions (terrelles).

Last year (1990) Leszek Jamrozik visited twice Moscow, where he met a proponent of the theory of expansion, a famous geologist (an academician) Eugene Milanovski and an expansionist, Yuri Chudinov. The latter visited us in December 1990 and gave two lectures at meetings of our Institute and the Lower Silesian Branch of the Polish Geological Survey.

Last year (1990), during the international geological conference in Germany, two of my colleagues: Ryszard Kryza and Andrzej Muszyński, have “discovered” that the known Czech tectonists Peter Rajlich supports the theory of expanding Earth, too. I met him in November 1990 in Wrocław. It turned out that he was very familiar with the expanding Earth theory and paradoxes produced by plate tectonics.

The lectures on the expanding Earth are still being given by the people from the Wrocław geological community. In December 1989, Stefan Cwojdzński presented “*Tectonics after 20 years – terranes, oroclinal, megashears*” (Cwojdzński, 1990) at the meeting of the Lower Silesian Branch of the Polish Geological Survey. One year later, in the same place, he gave a lecture: “*Tension and compression on expanding Earth*”.

In February 1990 in Wrocław and, again, in April the same year, in Cracow at the Academy of Mining and Metallurgy, I gave a lecture entitled: “*Development of lithosphere as a manifestation of Earth expansion*” that has already been mentioned. The next one was my lecture “*Theory of expansion of the ocean floor*” given in December 1990 for teachers from Opole District (Silesia).

The lecture “*Tension – gravitational model of subduction*” by me and Leszek Jamrozik has been given four times: in Moscow and Zvienigorod in December 1990 (lectured by Jamrozik), in Poznań (March 1990) and in Wrocław (April 1990) – the two last lectures were given by me.

In June 1991, a lecture “*Theory of expansion of the Earth*” has been given by me at the seminar of the Section of Applied Nuclear Physics of the Institute of Experimental Physics of Wrocław University.

Beyond the popularization, the basic works are still being continued. In April this year, during the lecture given at the meeting of the Wrocław Branch of the Polish Geological Society and entitled “*Development of Pacific*”, I have presented for the first time the reconstruction of the ocean, based on isochrons. In this volume, results of other works such as reconstruction of Gondwana<sup>38</sup>, as well as the paper by Stefan Cwojdzński “*Decreasing of the curvature of the surface of expanding Earth as one of possible causes of tectogenesis*” have been presented.

Continuation and subsequent finishing of works on topics that are still being analysed, particularly the new rules of the movement of the plates of the lithosphere, are planned.

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<sup>38</sup> [www.wrocgeolab.pl/Gondwana.pdf](http://www.wrocgeolab.pl/Gondwana.pdf) (2015)

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<sup>40</sup> Already published. (2015)

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## SUPPLEMENT (2015)



1:15 million scale globe (85 cm diameter) made by me in 1979 of paper glued on an inflated soccer bladder. On its sites: Professor Cliff Ollier and his wife Janetta. The photo was made in 2005 in the office of Professor Józef Oberc



One of ten of my modern globes made at the turn of 1990s and 2000s. The globes were made on regular plastic spheres and mounted on stands. The main tectonic features were drawn on them. The third person is Dr Antonina Pacholska. The photo was made in 2005 in our Geological Museum