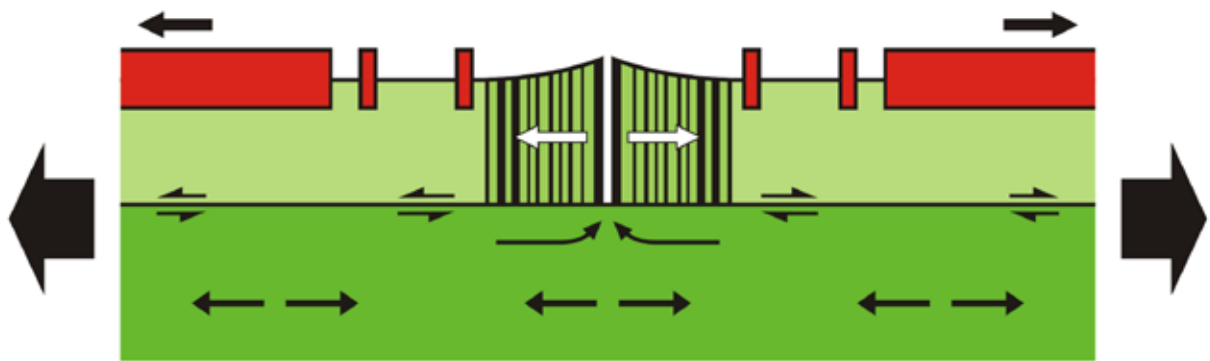


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Development of the oceans as a manifestation of the expansion of the Earth



Katowice 1985
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The front cover of the volume in which the original paper was published



Introduction (2014)

The present paper is a report from my lecture given on 17 April, 1981 at Roztoka near the Polish tourist centre Zakopane in the Tatra Mts.

It was a result of an inefficient communist system that the report was published only in 1985.

The lecture was given at the annual Eastern conference of the Field School of Geologists of the Silesian University. The Earth Science Faculty of the University is situated in Sosnowiec near Katowice – the capital of Upper Silesia.

I had not planned to put the paper on my Expanding Earth website. But some increasing controversies about spreading of the ocean floor (see introduction to www.wrocgeolab.pl/circle.pdf) caused it to be important (specifically its section 5), solving the most significant of these controversies concerning the presence of microcontinents within oceanic lithosphere. So I decided to present it in a new digital version. But that was not enough so I am going to write a new paper on spreading where these controversies would be entirely explained.

The original 1985 paper was published in Polish:

Rozwój oceanów jako przejaw ekspansji Ziemi.

Geologia nr 8. Uniwersytet Śląski, Katowice, s. 109-114.

That is:

Development of the oceans as a manifestation of the expansion of the Earth.

Geology no. 8. The Silesian University, Katowice, p. 109-114.

The figures were originally black-and-white. Now the figures are coloured and improved together with their explanations. Several subtitles were added as well as a list of contents and the cover of original volume in which the paper was published. Contemporary footnotes were introduced and marked by a current date.

Jan Koziar
August, 2014

Acknowledgment

I wish to thank Professor Cliff Ollier for English correction of my translation of the original paper and the introduction.

Contents

1. Spreading of the ocean floor
2. Contradiction between spreading of the ocean floor and the hypothesis of mantle convection currents
3. Elongation of mid-oceanic ridges
4. Coherent model of the development of the Central and South Atlantic on an expanding Earth
5. Wilson's incoherent model of development of the South Atlantic on a non-expanding Earth
6. General seaward pulling of the lithosphere of continental margins
7. Expanding Earth solves contradictions in geotectonics
8. The expanding Pacific
9. Land-bridge interpretation of the expanding Pacific
10. Evolutionary character of Earth's expansion
11. Arguments against the expanding Earth
12. Final remarks

1. Spreading of the ocean floor

The biggest achievement of the contemporary geotectonics is a discovery and proving of a gigantic process of the spreading of the oceanic lithosphere which occurs at mid-oceanic ridges. The process can be treated as a manifestation of the expansion of the whole globe, as it was seen by the authors of the theory of spreading – Carey (1958) and Heezen (1960)¹, or it can be combined with the hypothesis of a non-expanding Earth (Dietz, 1961; Hess, 1962; Le Pichon, 1968). The latter option leads to the attempts of dynamical explanation of the spreading by the hypothesis of convection currents in the mantle of the Earth and to the mature form of the hypothesis of the non-expanding Earth, that is, to the plate tectonics paradigm.

Combining the process of the spreading with the hypothesis of convection currents has caused the great popularity of the second option. This situation has taken place despite the fact that plate tectonics itself is not compatible with the hypothesis of mantle convection currents, and that there is no decisive argument against the expanding Earth.

2. Contradiction between spreading of the ocean floor and the hypothesis of mantle convection currents

The basic contradiction between plate tectonics and hypothesis of convection in the Earth's mantle lies in migration of oceanic ridges relative to their basement. So, an oceanic ridge would have to “pull” its convection current (Heezen, 1962; Bielowsov, 1968).

Other contradiction consists in the existence of ascending branches of assumed convection currents not matched by any descending branch. This situation excludes convection cells and indicates only diapirism connected with general tension. Examples of such systems are the Mid-Atlantic Ridge, East African Rifts and the Carlsberg Ridge.

3. Elongation of mid-oceanic ridges

The ridges around Africa and Antarctica move away of these continents and elongate themselves. So they copy in larger scale the outlines of these continents.

This obvious tectonic feature of our globe can be explained only by radial stretching of the deep basement (Carey, 1958; Heezen, 1960), which is tantamount to the expansion of the Earth². The radial stretching of the basement is also visible in a dense system of tensional fissures perpendicular to the ridges.

There are no attempts to explain the elongation of the oceanic ridges in the hypothesis of plate tectonics: the problem is simply ignored.

¹ See www.wrocgeolab.pl/priorit.pdf (2014).

² See www.wrocgeolab.pl/floor.pdf (2014).

4. Coherent model of the development of the Central and South Atlantic on an expanding Earth

Radial stretching of the basement explains not only elongation of the Mid-Atlantic Ridge but also southward displacement of the junction point of Walvis and Rio Grande ridges (Fig. 1 – my own interpretation).

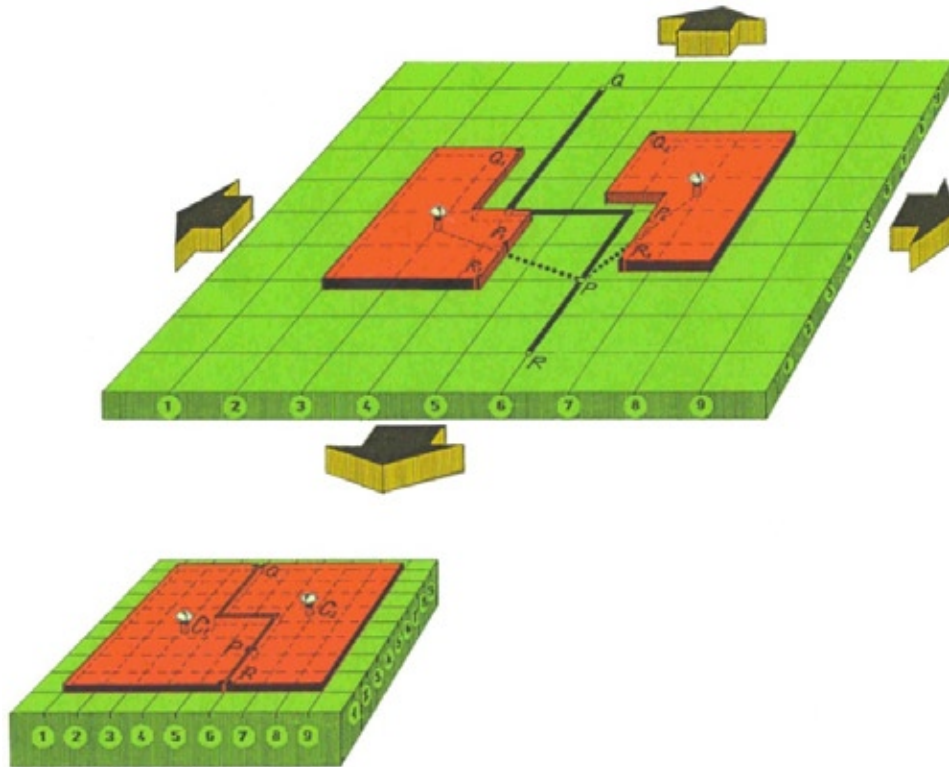


Fig. 1. The expanding Earth model of the development of the Central and South Atlantic

C_1, C_2 – points of the plates (of South America and Africa respectively) that do not change their co-ordinates in respect to the basement (the constant points of transformation);

$Q_1, Q_2, P_1, P_2, R_1, R_2$ – points changing their coordinates in respect to the basement (variable points of transformation)³.

The model explains coherently three features: moving apart of Africa and South America, elongation of the Mid-Atlantic Ridge and the southward displacement of the junction point of Walvis and Rio Grande ridges⁴

5. Wilson's incoherent model of the development of the South Atlantic on a non-expanding Earth

Wilson (1965) assumes not explained southward movement of the deep basement, besides not applicable convection current (see former remarks), trying to explain the development of the South Atlantic (Fig. 2).

³ The more detailed explanation is in: Koziar (1994; www.wrocgeolab.pl/plates.pdf) – 2014.

⁴ See also: www.wrocgeolab.pl/floor.pdf (2014)

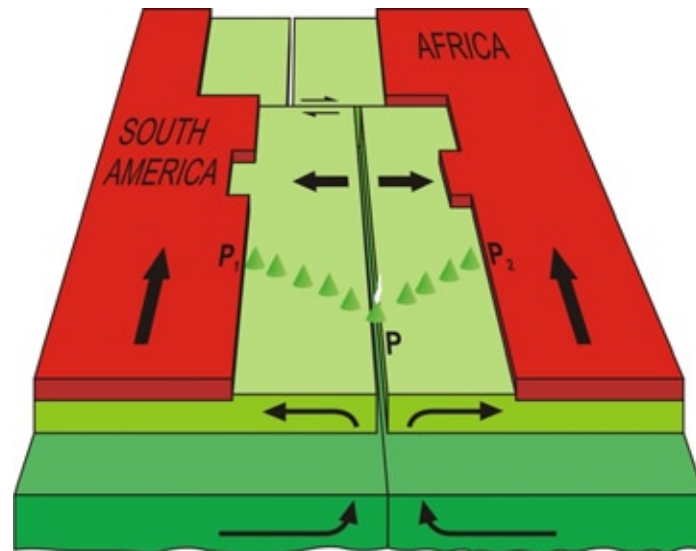


Fig. 2. Wilson's (1965) model of the development of the South Atlantic
The model introduces ad hoc southern movement of deep basement in order to explain the southward displacement of the junction point of Walvis and Rio Grande ridges. Apart from that, the model does not explain elongation of the Mid-Atlantic Ridge

6. General seaward pulling of the lithosphere of continental margins

Independently of the relations presented above, the Earth's expansion results also from the development of the oceanic lithosphere with so-called quiet magnetic field, adjacent to continental margins. This lithosphere differs from that with distinct magnetic stripes by the presence of micro-continents. The latter indicate the process of the origin of the lithosphere different than spreading, since the micro-continents cannot originate at spreading centres.

The existence of such kind of lithosphere is contradictory to plate tectonics, according to which all oceanic lithosphere should originate in the process of spreading. The contradiction appears more distinctly from analysis of the movement of the micro-continents which all are moving away from the continents. So the oceanic lithosphere is pulled away from the continents⁵.

This process together with the spreading at oceanic ridges is tantamount to global stretching of the lithosphere (Fig. 3), which means – to the expansion of the Earth.

⁵ As it appeared, the “quiet magnetic field” was connected with the Cretaceous megachron of normal magnetic field beyond which it was possible to correlate older magnetic strips generated by spreading. Nevertheless around continental margins are wide zones of stretched continental crust which together with evident tearing and moving away of fragments of this crust indicates the general process of pulling away the oceanic lithosphere from continental margins. To explain the magnetic stripes between micro-continents and between them and continental margins plate tectonics developed a concept of “jumping spreading”. It is a correct solution but also contradictory to non-expanding Earth while being in harmony with an expanding Earth. I showed it at criticism of mantle convection currents concept (see www.wrocgeolab.pl/lectures.pdf lecture 6 section V subsection 9. (2014).

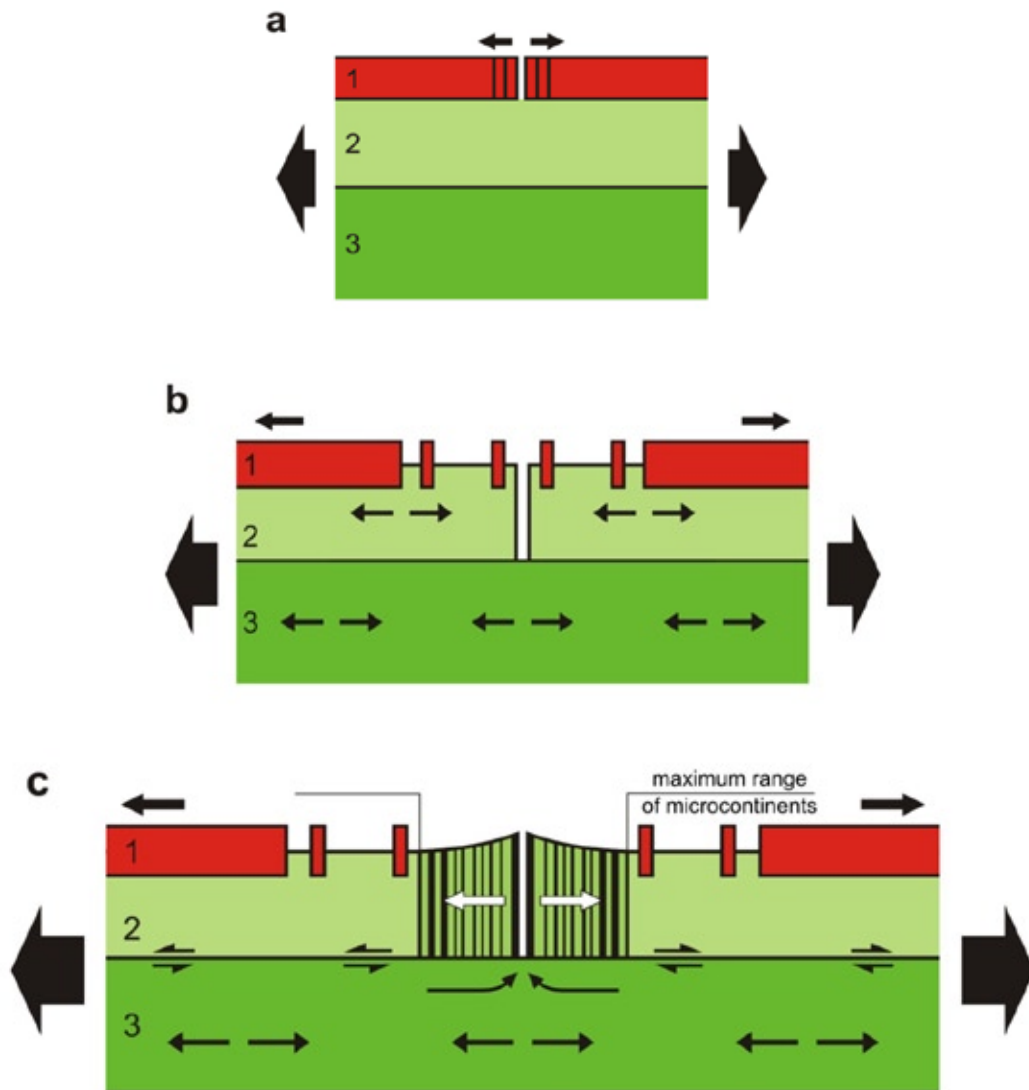


Fig. 3. Model of stretching of the lithosphere and sublithospheric mantle

1 – continental crust (exaggerated), 2 – lithospheric mantle,
3 – upper part of sublithospheric mantle (asthenosphere)

a, b, c – the whole lithosphere and sublithospheric upper mantle are under growing tension

a – Beginning of rifting of brittle continental crust. Ductile lithospheric mantle and asthenosphere is only stretched

b – Continental crust is still rifted and is divided into continents and micro-continents. Lithospheric mantle is only stretched, producing a non-spreading mafic sea-floor. Finally it begins to be rifted too, losing its continuity

c – Discontinuity of lithospheric mantle reaches very deep and the gap between opposite parts of this ruptured mantle must be isostatically filled by mobilised asthenosphere. The spreading stage starts and lithospheric plates are created. The plates are now stretched minimally and move apart as rigid structures by spreading at oceanic ridges. Sublithospheric mantle is still stretched. As a consequence the differential movement appears between the lithosphere and asthenosphere which is highest at the edges of the neighboring plates. The asthenospheric component of this shear movement is headed to the spreading axis and is in accordance with the filling of the rift by asthenospheric material (bent up arrows).

Vertical stripes in Fig. 3c mean simplified vertical slices of growing plate. Do not confuse them with sheeted dykes complex

7. Expanding Earth solves contradictions in geotectonics ⁶

The model presented in Fig. 3, solves (independently of problems discussed above) two fundamental geotectonic contradictions:

- a. The contradiction between mobilism and fixism in relation to autochthonic position of continents at least to the depth of 400 km. In plate tectonics assumptions, this fact is contradictory to spreading and the solution of this contradiction itself leads to the expansion of the Earth.
- b. The contradiction between land-bridge theory and the theory of the permanency of the oceans. Wegener solved this contradiction only for the Atlantic and Indian Ocean by the introduction of dilatational development of these oceans. Expanding Earth removes the contradiction on a global scale including the Pacific. According to so-called extensionism, developed in the framework of the land-bridge theory, continental crust covered the whole Earth till the end of the Palaeozoic (Fig. 3a). So, it can be said, that expansion of the Earth accomplishes globally the innovative Wegener's idea of dilatational development of the oceans.

8. The expanding Pacific ⁷

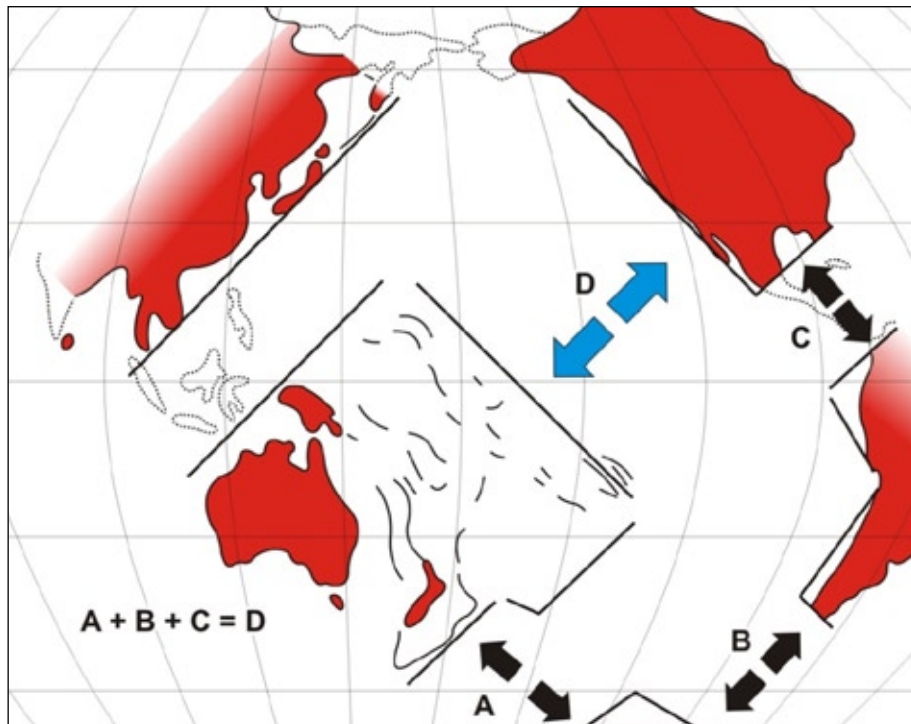
Dilatational, progressive development of the Pacific can be demonstrated, independently of all the problems discussed earlier, by Carey's test (Carey, 1958, 1976) and so expansion of the Earth can be demonstrated in another way.

Plate tectonics, following the Wegener solution, treats the Pacific as a regressive structure compensating breaking up of Pangaea. The hypothetical contraction of the Pacific is, in this concept a result of supplementing of mobilism with the hypothesis of a non-expanding Earth. The problem: contraction or expansion of the Pacific?, between expanding Earth and plate tectonics can be reduced, according to Carey, to shortening or elongation of the circum-Pacific zone. In fact it is enough to consider only a part of the Pacific perimeter (Fig. 4).

Carey analyzed the circum-Pacific zone in 1958, not having later plate tectonics reconstructions which agree with A, B and C dilatations between continents presented in Fig. 4. So expansion of the Earth results from the findings of plate tectonics itself. Thus the latter not only does not correspond with reality but is also internally contradicted.

⁶ The expanding Earth solves contradictions in geotectonics over a much wider range – see my lecture 2: www.wrocgeolab.pl/lectures.pdf (2014).

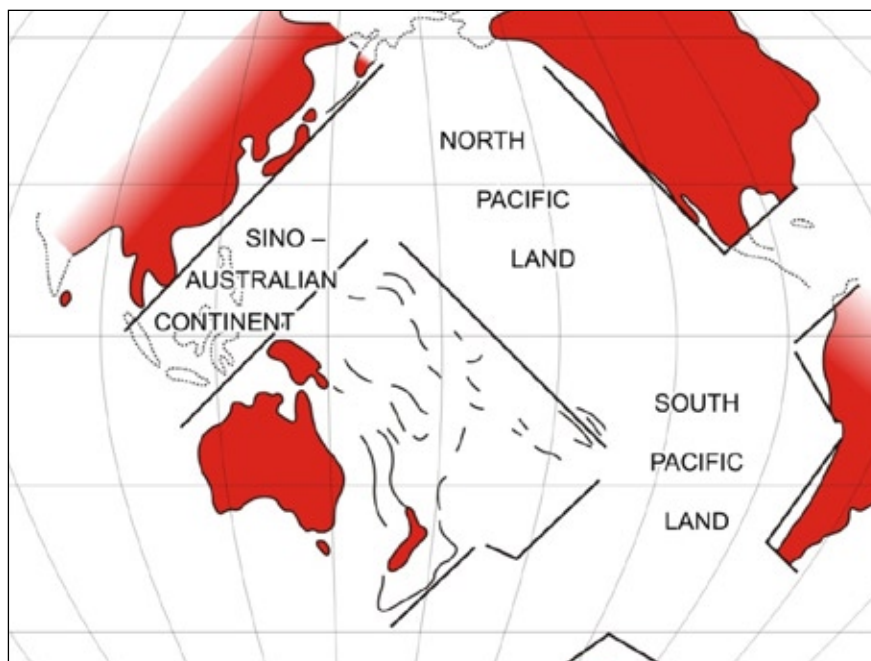
⁷ See also my later (1993) paper: www.wrocgeolab.pl/Pacific.pdf (2014).



*Fig. 4. The proof of the expansion of the Pacific.
Dilatation D results from the recorded and indisputable dilatations A, B and C*

9. Land-bridge interpretation of the expanding Pacific

We can also remember classical hypothetical land bridges in the Pacific (Fig. 5). Their comprehensive documentation was done by Gregory (1930).



*Fig. 5. Classic land bridges in the Pacific.
According to Wegener's solution Pacific's land bridges have to be replaced by dilatations and direct contact of the present continents*

The Pacific land bridges correspond thoroughly with the result of Carey's test (Fig. 4) which explains them in Wegener's way.

10. Evolutionary character of Earth expansion

It should be mentioned that expansion of the Earth is an evolutionary process in which individual stages of development are new and unrepeatable. For example the oceanic ridges appears for the first time in the Late Cretaceous⁸ and the epoch of extensionism⁹ ended definitely at the beginning of Mesozoic.

11. Arguments against the expanding Earth

There were only two more reasoned arguments put forward against the expanding Earth.

The first is by Le Pichon (1968) who reasoned that on an expanding Earth the lack of consumption of the oceanic lithosphere in hypothetical subduction zones would cause excessive elongation of equatorial radius in relation to the polar one. But Le Pichon did not take into account meridional elongation of oceanic ridges¹⁰. So, trying to prove the correctness of plate tectonics he started from plate tectonics assumptions, as was pointed out by Carey (1976).

The second argument is based on the result of palaeomagnetic tests by Ward's (1963) method (McElhinny, Taylor and Stevenson 1978). The method is wrong as Carey (1976) pointed out, and always gives the constant radius of the Earth for any data. The results obtained by Van Hilten (1963) using the simple Egyed's (1961) method of palaeomagnetic triangulations and obeying correct geotectonic assumption (combination of data only inside of cratons) proved the expansion of the Earth.

12. Final remarks

The delivered lecture, and even more its summary, did not exhaust all the topics connected with the expanding Earth which coincide perforce with all more important topics of the geotectonics.

The analyses of the following problems lead independently to the expansion of the Earth:

⁸ This interpretation was connected with my old understanding of the character of the "quiet magnetic field" (see footnote 1). So the first appearance of oceanic ridges should be shifted a little back in time. However the oceanic basins appeared really for the first time in the beginning of the Mesozoic era as was already recorded by the land-bridge theory. (2014).

⁹ The epoch when continental lithosphere covered the entire Earth (2014).

¹⁰ See for more detailed explanation ww.wrocgeolab.pl/circle.pdf section 20a (2014).

1. hypothesis of subduction¹¹
2. development of fold belts¹²
3. development of continents

Some of these topics were demonstrated by the present author in other lectures.

Attempts at correct reconstructions of the lithosphere indicate the necessity of using bigger curvature of the Earth (i.e. Carey 1958, 1976). This means also the expansion of the Earth.

Reconstructions based on the hypothesis of the non-expanding Earth have not made significant progress since Wegener's time.

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¹¹ See www.wrocgeolab.pl/margins1.pdf and www.wrocgeolab.pl/margins2.pdf (2014).

¹² See www.wrocgeolab.pl/Carpathians.pdf and www.wrocgeolab.pl/lectures.pdf lectures 13 and 14 (2014).

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