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PLATE TECTONICS A theory founded on circular arguments



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The former title of this brochure was **"Falsification of the Eulerian motions** of lithospheric plates: Supplement". However, after a less than a year since Internet publication of the brochure, I decided to change its title to the one that better reflects its content, i.e. **"Plate tectonics: A theory founded on** circular arguments".

J. Koziar, March 2018

Introduction

After publishing the full text of the congressional *Falsification of the Eulerian motions of lithospheric plates* in the Polish Geological Bulletin (2016, no. 466), I started to prepare its digital version, available now at: www.wrocgeolab.pl/falsification2.pdf.

I judged that it would be good if the published text will be supplied with some additional explanations both in historical and methodical aspects. This is necessary because numerous supporters of plate tectonics know nothing about expanding Earth and almost nothing about the starting point, assumptions and structure of their accepted paradigm. The explanations were dispersed in my other publications but it was necessary to present them in some range and together after the full text of *Falsification* ... Initially I planned to append the remarks to the main text. However the additional text grew so voluminous that at last it deserves to be a separate brochure, available now at: www.wrocgeolab.pl/falsification3.pdf. Of course it should be read together with the former brochure and in the second order.

Because the basic feature of plate tectonics is its circular argumentative structure (circularity), an appropriate picture was chosen for the front cover of this brochure.

J. Koziar, June 2017

Many thanks to Steven Athearn for improving my English of the original version of this text.

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I. Some historical remarks connected with contemporary geotectonics

1. Sea floor spreading and the expansion of the Earth

At the end of the 1950s, two discoverers of sea floor spreading, Samuel W. Carey and Bruce C. Heezen, connected the discovery with the enormous expansion of the Earth (see www.wrocgeolab.pl/priority.pdf). Carey also delivered the first proofs of the expansion: the Pacific Paradox (growth of the Pacific) and the lengthening of plate borders. But the very phenomenon which disclosed the expansion to him there were artificial "gaping gores" which appeared at the attempts of reconstructions of the lithosphere on the present-size Earth. Such gaping gores are crucial to the problem presented in the former paper.

2. Blind alley of geology

Then geology was directed into a blind alley first by Robert Dietz and Harry Hess at the beginning of the 1960s and subsequently, at the end of the decade, by Jason Morgan, Dan McKenzie and Xavier Le Pichon. These latter authors are considered the "founding fathers" of plate tectonics.

The first authors connected the spreading of the ocean floor with hypothesis of convection currents and, of course, subduction of the ocean floor.

The second group of authors founded geotectonics (and almost all geology) on Euler's theorem, imposing Eulerian motion on all lithospheric plates. However the authors who first introduced the theorem to geotectonics where E.C. Bullard, J.E. Everett and A.G. Smith (1965) in their computer attempt of reconstruction of the Atlantic (Bullard's fit) – see the next paragraph.

Each of these groups of authors have based their concepts on the constantsize-Earth assumption without bothering to prove it, apart from one attempted proof by Le Pichon. However a careful analysis of his "proof" actually supports one of several independent values of the annual growth of the Earth radius – circa 2.5 cm/year (see: www.wrocgeolab.pl/circle.pdf).

In the frame of plate tectonics several models have been constructed on its unproved assumption (first of all just the Eulerian plate motions and a model of subduction). These models began to play role of real processes, apparently confirming the starting assumption. However in this way plate tectonics developed only its very structure of a circular arguments (vicious circle) theory. The topic will be developed in the paragraph II.9 and part III.

3. Atlantic fit is Bullard's fit or Carey's fit? A real story of introduction of Euler's theorem to geology

The "Atlantic fit" is a geometrical fit of the borders of continents on both sides of the Atlantic Ocean. This fit was noted by many authors since the 16th century. But only Wegener used it (together with other arguments) for elaboration of the fully scientific theory of the opening of this ocean. However, as is known, Wegener's theory was rejected in the 1930s. The person most responsible for the rejection was the prestigious British mathematician, physicist, astrophysicist and geophysicist Harold Jeffreys. His main argument against Wegener's theory was the lack of convincing explanation of the cause of the mutually moving apart of the continents. By the way – after years – this moving appeared true (as a phenomenon) and causal criticism is methodically wrong. But this way of criticism became very popular in geology and is now the main argument against the expanding Earth.

However Jeffreys also pointed at alleged lack of a good fit between Africa and South America. In 1933 Carey made precise spherical reconstruction of the South Atlantic and knew that Jeffreys was wrong. Let us quote Carey himself (1988; p. 102):

In 1929 appeared Sir Harold Jeffreys's prestigious book, The Earth – quite the most authoritative treatise ever on the physics of the earth, following the tradition of Osmund Fisher and Lord Kelvin. However, Jeffreys was completely opposed to Wegener hypothesis, and in regard to the alleged fit of South America into the angle of Africa, he wrote:

"On a moment's examination of the globe, this is seen to be really a misfit by almost 15°. The coast along the arms could not be brought within hundreds of kilometers of each other without distortion. The width of the shallow margins of the oceans lend no support to the idea that the forms have been greatly altered by denudation and deposition".

And again Carey:

From many "moments" of accurate examination of this question, that I had done, I knew this statement to be incorrect. I considered that the matter was rather trivial, that the true position would be generally realized, and that this criticism would fade away. But Jeffreys's prestige was so great that most workers accepted his pronouncement as final. Jeffreys repeated the statement in the second edition of his book in 1952, and to rub salt on the wound. Dr. George Martin Lees (my former chief in the Anglo-Persian Oil Company), in his 1953 presidential address to the Geological Society of London, listed this as one of his three crucial reasons for rejecting the Wegener hypothesis. So I sent Lees my stereographic projections of two decades earlier, together with the comparisons I had made on the spherical table (Fig. 11), proving that Jeffreys's statement was false. I added that 'whether the continental drift hypothesis be true or false, this argument should never be used against it again.' I asked Lee to arrange publication of this rebuttal, which he did.

When I went to England in the summer of 1960 as Tasmanian delegate to the third centenary of the Royal Society, Sir Edward Bullard invited me to lunch to discuss the Atlantic fit, which he then repeated with the aid of computer. The Atlantic match has since been known as the "Bullard fit" and adopted generally.

As I reported in the former brochure, the mathematical basis for Bullard et al.'s computer reconstruction of the Atlantic Ocean was Euler's theorem. Above is the real story of the introduction of this theorem into geology.

4. "North American geology has never been the same since"

In the aftermath of 1956 Hobart Symposium, Carey was invited to the USA by Chester Longwell as a visiting professor "to stir the American pot". His visit was realized in 1959-1960 academic year and started at Yale University, the stronghold of American fixism. Then Carey gave lectures in many other places (also in Canada) and was very successful at reanimating mobilism in North America. Here's how he relates it (p. 118):

In Yale I delivered complete courses in structural geology and global tectonics. But I also lectured in many other American universities, mostly under the American Geological Institute Visiting International Scientist Program: Brown, Columbia, Harvard, Wesleyan University, Lehigh, Princeton, Duke, North Carolina, Louisiana State. St. Louis, University of Cincinnati, and Ohio State, as well as Toronto, Western Ontario, McGill, Calgary, and British Columbia in Canada. As with Mathew's sower, some, some seeds did fall on fertile soil and took root, only to be choked off later when subduction weeds grew rank. /..../

Professor Walter H. Bucher, the patriarch of American tectonicists, who had been stung by my heresies, invited me to confront him in a debate at Columbia. The Schermerhorn Theater was packed as geologists and geophysicist gathered from far afield, and a most memorable night resulted. Geophysicists and geochemists marshaled behind the ghost of Kelvin to reject as really impossible the geological assault, and withdrew checked, but not mated.

Apart from Yale, my deepest involvement was with Princeton where I lectured several times in late 1959 and early 1960, including discussion of oroclines, the paleomagnetic evidence of large intercontinental movements, and ocean-floor growth by repeated insertion of paired slices at the mid-oceanic ridges as detailed in the Hobart Symposium. /.../

The campaign culminated with a special session on continental drift sponsored by the Society of Economic Paleontologists and Mineralogists at the annual meeting of the American Association of Petroleum Geologists at Atlantic City on April 25, 1960. I was lead speaker, and with me on the panel were Keith Runcorn, Ken Caster, and William Gussow. The hall was packed, even the aisles and the walls. After the formal papers from the panel, the questions and discussion continued until long after midnight with few if any leaving, until the chairman had to terminate the meeting.

Carey reported also that years later one of the witnesses of these events (John Rodgers) commented, that after them "*North American geology has never been the same since*" (p. 118).

Carey really did break through American fixism and American geology changed but not in the correct direction, pointed by him.

5. Misleading role of paleomagnetic tests

The first paleomagnetic tests on possible changes of the Earth's radius were formulated by the Hungarian geophysicist and expansionists Laszlo Egyed in 1960 and 1961. The tests led to whole series of misinterpretations and discussions described by me in another paper (Koziar, 1991; www.wrocgeolab.pl/research.pdf) in a chapter under the same title as this paragraph. The most fatal impact on the perception of the expanding Earth resulted from the introduction of Ward's erroneous method in 1963. Carey (1976) and independently Chudinov (1984) demonstrated that this method always shows constant Earth radius independently of data. However plate tectonicists ignored this result, being already convinced that the Earth is not expanding.

6. Some strange circumstances at the starting point of the plate tectonics

The real founding father of plate tectonics is Jason Morgan. However the first published paper on it was by Dan P. McKenzie (and Robert L. Parker, who played only a secondary role, developing oblique Mercator nets). How did this happen?

Some interesting light on the circumstances of the birth of plate tectonics has been thrown by Le Pichon's 1991 paper, written almost a quarter of century after the crucial year 1967.

Morgan presented his elaborated concept of plate tectonics in April 1967 at the meeting of the American Geophysical Union (AGU), attended also by Le Pichon. His lecture drew little attention from the audience, including Le Pichon, who only became involved in the idea after reading the manuscript which Morgan sent after his lecture to about ten persons. Le Pichon himself started to work on this concept only later with full consciousness of Morgan's priority and began cooperate with him directly from early September 1967. Morgan sent his manuscript also to H. William Menard, an outstanding investigator of the Pacific Ocean, from the University of California (the Scripps Institution of Oceanography). The manuscript did not make much impression on Menard either. On the contrary, he discussed it critically with his students.

McKenzie attended the AGU meeting too and the session with Morgan's scheduled lecture. However, by his account, he left the session just before Morgan's talk. In June 1967 McKenzie joined the Scripps Institution, where Morgan's concept was already known, and started to work on plate tectonics inspired only (as he insisted) by Bullard *et al.*'s 1965 paper, mentioned above.

Le Pichon wrote (p. 4):

It is astonishing that Mc Kenzie¹ twice so nearly missed the opportunity to learn about Morgan's model. The first occasion was when he left the room just before Morgan's talk on April 17. The second occasion was when Bill Menard, who had received the extended outline of the April communication in late April, failed to mention it to Mc Kenzie although they "talked a great deal" together "about plate tectonics" (quote

¹ Le Pichon's spelling of McKenzie's name.

from the letter of Mc Kenzie)² and although Morgan's "manuscript had circulated among Menard's students" and had been "discussed" by them (quote from the book of Menard).

Morgan started to prepare his manuscript for publication and next sent it to the Journal of Geophysical Research at the end of August 1967. The JGR sent the manuscript for review to Menard who received it at the beginning of September and showed it to McKenzie. They agreed that McKenzie should write up his version quickly and publish it.

McKenzie wrote (in Le Pichon's paper, p. 3):

I had talked a great deal to Bill Menard about plate tectonics and had convinced him that it worked for the Pacific. JGR sent him Jason (Morgan)'s paper to referee and, I suspect because of our conversation, he was very critical of it when he showed it to me. I asked him what I should do and he said to go ahead and publish, which we [together with R.L. Parker – JK] did as everyone knows.

Of course, everyone knows their publication but not its background, until Le Pichon's 1991 paper. And even after that, a group of people knowing and remembering Le Pichon's paper is very small.

After the mentioned talk with Menard, McKenzie and Parker wrote quickly a short paper on plate tectonics applying it to the Pacific, and sent it to Nature. Meanwhile Menard delayed reviewing Morgan's paper (which, by the way, was better than McKenzie and Parker's) until the latter was published in Nature on December 30, 1967. Then Morgan's paper had to be accepted by JGR and published, but only in March 1968.

In this way McKenzie gained priority in plate tectonics.

The role of Menard in this story is rather clear. The paper by McKenzie and Parker was ascribed to his institution and increased its prestige. Of course it was dishonest but is pretty common in today's market economy of science.

The whole story has a still more astonishing aspect, pointed out by Le Pichon. He wrote (p. 4):

To me, the most surprising part of it is that Mc Kenzie confined himself do discussing the plate kinematics of the Pacific-America plate boundary based on earthquake fault plane solutions and did not consider the kinematics of the Atlantic ridge. In the equatorial Atlantic, good

² Parantheses by Le Pichon.

data on transform faults (Heezen and Tharp, 1965) and on earth-quake fault plane solutions (Sykes, 1967) were available and the opening of the Atlantic Ocean is the subject of the fit of Bullard et al. (1965) which gave the initial intuition to Mc Kenzie.

A simple explanation of this "most surprising part" of the story is that otherwise McKenzie's model would not differ much from Morgan's and the thesis of an independent origin of the former would be quite unbelievable. Even so, it remains unbelievable after Le Pichon's description of the inception of plate tectonics. Le Pichon commented on the story in a very diplomatic way, which is understandable as he is one the of the three "founding fathers" of plate tectonics. However I have no reason to follow his way.

There is also another very meaningful fact. Neither Morgan nor Le Pichon cited McKenzie and Parker's paper from the end of 1967 in their subsequent, fundamental 1968 papers on plate tectonics. This is despite the fact that both of these founding fathers knew very well the paper of the "first" founding father.

Two important conclusions arise from the story.

- 1. Without unhealthy rivalry, the founding fathers of plate tectonics would be more able to understand its falseness. Morgan and Le Pichon cooperated mutually correctly, but McKenzie not. After publication of McKenzie and Parker's paper, Morgan's paper was published urgently, probably without careful reviewing. Had there been full cooperation of all Founding Fathers, acting without useless hurry, they might have been able to find a fault in Morgan's procedure of "proving" the alleged correctness of the Eulerian motions of lithospheric plates.
- 2. It is very good in science if a discovery is made by two or more independent discoverers. It is especially important in case when the discovery is tentative and requires subsequent justifications. In this situation independence of discoverers speaks for the objectivity of the discovery. In the case of plate tectonics such independent discovery of its fundamentals is more apparent than real. What in fact are rather negative circumstances surrounding its origins pretend to be positive ones.

II. Some methodological remarks connected with contemporary geotectonics

1. Assumptional fundament of plate tectonics

This fundament is not the Euler theorem but, as mentioned at the beginning, the constant-size-Earth assumption. Morgan and McKenzie adopted the assumption tacitly and only Le Pichon did so explicitly. But it was only an episode of openness and only at the starting point of plate tectonics. Let Le Pichon speak (1968; p. 3674):

If we assume that the earth is spherical and that the length of its radius does not change with time, we can then proceed to the complete determination of the movement of the major crustal blocks relative to each other.

And other quotation (p. 3673):

If the earth is not expanding, there should be other boundaries of crustal blocks along which surface crust is shortened or destroyed.

This reasoning exerts deep and negative impression on today's students, opening their eyes on the real character of plate tectonics. So praise be to Le Pichon for stating it clearly. Le Pichon is also alone in having attempted to prove the assumption but without much success (see the mentioned paper: www.wrocgeolab.pl/circle.pdf). The other two founding fathers did not mention this assumption at all. Nor did they care about proving it. Plate tectonicists are also extremely resistant against all proofs of the expansion of the Earth. They simply do not understand what is being talked about. Both phenomena result from today's understanding of every scientific theory as a so called "paradigm". This problem is discussed in paragraphs II. 4-5, while beneath the proofs of the expansion of the Earth are enumerated.

2. Factual fundament of expanding Earth

The fundament is not based on assumptions but on proofs of expansion. They are listed beneath.

- 1. Growth of the Pacific (Carey's test), Carey (1958, 1976)
- 2. Elongation of plate boundaries, Carey (1958, 1976)
- 3. Mutual moving apart of hot spots, Stewart (1976)

- 4. Deep mantle roots of plates, Carey (1983), Kremp (1990)
- 5. Carey's "gaping gores" (artificial openings at underestimated curvature of the globe), Carey (1958), Van Hilten (1963)
- 6. Carey's Arctic Paradox, Carey (1976)
- 7. Ripper's and Perin's growing perimeters of the Earth, Ripper (1970); Perrin (1992, 2003).

All these proofs are independent. They start from quite different facts and all prove the same process – the enormous expansion of the Earth. Thereby they also prove, in very different ways, the fallacy of the base assumption of plate tectonics, that is its not-expanding-Earth assumption.

All these proofs have been invented by other authors. I am only trying to give them more elaborated form and put them together, Koziar (2004; www.wrocgeolab.pl/handbook.pdf, 2014a; www.wrocgeolab.pl/circle.pdf, and present paper).

For good understanding these proofs (and proofs as such) it is necessary to distinguish between a <u>proof</u> and only a <u>confirmation</u> of a hypothesis

3. Difference between confirmation and proof of a hypothesis

The difference depends on the direction of logical implication between a hypothesis and a fact.

a. Confirmation of a hypothesis

If a fact results from a hypothesis (Fig. 1a) then the fact only confirms the hypothesis.



Fig. 1. Confirmation of a hypothesis (explanation in text)

The fact can also results from other hypotheses (Fig. 1b) and they all are confirmed by it. By the same token, the fact does not prove any one of them. The hypotheses are only sufficient conditions of the fact.

b. Proof of a hypothesis

If a hypothesis results from a fact (Fig. 2a) then the fact proves the hypothesis.



Fig. 2. Proving of a hypothesis (explanation in text)

By the direction of implication the fact eliminates all other hypotheses (Fig. 2b) and in that the proof consists. The hypothesis becomes the necessary condition of the fact and in the real world the hypothesis becomes also a fact (Fig. 2c). On the rule of mutual implications the fact and the hypothesis becomes mutually unequivocal.

In the preceding paragraph it was shown that the expansion of the Earth results from quite different facts. Thus each time it is a proof and all the proofs are mutually independent.

Each proof of the expanding Earth has the structure given in Fig. 2c. In all the proofs the expanding Earth is the implication of different facts as also a fact.

Now, I will demonstrate why the proofs of the expanding Earth are not very effective in today's not very scientific practice.

4. Problem of cognitive relativism. The concept of a paradigm

From Newton's time up to Einstein's scientists believed that Newton's dynamics is true. Then it appeared that Einstein's theories describe the real world better. It meant that Newton's dynamics was not true in an absolute sense. Shortly after Einstein's achievements Niels Bohr treated the quantum dynamics similarly as Andreas Osjander treated the Heliocentric System in the introduction to the first edition of the Copernicus work

"De Revolutionibus ...":

there is no need for these hypotheses to be true, or even to be at all like the truth; rather one thing is sufficient for them – they should yield calculations which agree with the observations.³

These important changes led to conclusions that an absolute truth does not exist or if even does, it is unavailable. In other words the changes led to cognitive relativism. Then they led to modern theories of the development of science. The two most important were elaborated by Carl Popper (1963) and Thomas Kuhn (1962). They differ in details⁴ but the main idea is the same. According to each author a given theory is only better or worse than any other (applied to the same problem) <u>but never true</u>. So no theory can be proved, whereas every one can by falsified.

Kuhn introduced the term "paradigm" which is not very precise and can be applied to both: a concrete theory in a chain of false theories and the whole mental culture connected with it. We will apply the term only to theories in Popper-Kuhnian chains of false theories, though Popper himself did not use it.

A very harmful effect results for science from the concept of the paradigm and its unjustified (see the next paragraph) application to all scientific theories. Because allegedly no theory can be proved, so every procedure of proving a given theory is some forbidden and unintelligible activity. It can be understood as only a procedure of deception.

In normal (not relative) science and practical activity (for example criminology) the more proofs the better. In Popper-Kuhnian science the more proofs the worse. The Greek's three proofs of the sphericity of the Earth should be understood as only a threefold fraud. Seven proofs of the expansion of the Earth, presented above, should be understood as a sevenfold fraud.

³ C. Popper's (2002, p. 131) translation.

⁴ Popper claims for very quick falsification of every theory. Kuhn is more merciful, seeing some benefits of them. Popper's infinite sequence of false theories leads after all to the truth which is however unavailable. Kuhn's sequence is divergent. Both authors were Darwinists in different sense. Popper's fierce falsification of the worse theories is a Darwinian fight for life of better theories. Kuhn's sequences of false theories do not lead to the truth similarly as Darwinian evolution does not lead to any definite goal.

This is an important reason why the quoted proofs of the expansion of the Earth made almost no impact on geologists, infected by cognitive relativism. I have met even with the opinion that the proofs of Earth expansion are only "informatics noise" or "models" or that they will certainly be falsified by some facts discovered in the future. Thus they can be treated as already falsified.

The infection was transmitted to geology mainly via plate tectonics theory which announced itself as a paradigm. Thus I decided to falsify this paradigm in this paper, because the language of falsification is more understandable today for many geologists, than the language of proving anything.

5. Expanding Earth and a majority of scientific theories are not paradigms

In fact, majority of scientific theories are not paradigms and can be proved forever. I lectured this problem at my Institute in 2006 and recently (March 2017) at the National Geological Institute Lower Silesian Branch. The lecture was entitled: *On the contact of geology and defective philosophy. A problem of cognitive relativism.*

The crucial rescue operation from the total relativism in science is to distinguish two kinds of theories:

1. Theories which formulate laws which rule some phenomena

2. Theories which predict or prove the existence of some phenomena

Both Kuhn and Popper elaborated their cognitive relativism on the cases of the first kind of theories and maybe theories of this kind correspond to the sequences of paradigms.

A quite different situation arises with theories of the second kind which are more numerous and should be ranked in the first place in science. The theses of such theories can be well proven and become indisputable facts. We have a tendency to forget that before we got to know a given fact in a theoretical way, there had been just a theory which let us to know it.

Such a theory was the ancient Greeks' theory of a spherical shape of the Earth in time when the flat Earth theory had ruled. Ancient Greeks proved the shape, using universally known three proofs. They are now taught in elementary schools and the fact is indisputable – this is not a paradigm. In astronomy examples are: the Heliocentric System and the existence of the planet Neptune, theoretically predicted (no paradigms). In physics

examples are: atmospheric pressure, the mutual attraction of all bodies, electricity, the atomic structure of matter, electromagnetic waves, the transformation of matter into energy (the existence of nuclear energy). In chemistry all elements, predicted by Mendeleyev's table. In biology: the existence of pathogenic bacteria, predicted and proved by Ludwig Pasteur, the double helix as a genetic code carrier. In geology (geophysics): the Earth as a magnet, glaciations, nappes, inversions of polarity of geomagnetic field, transform faults, spreading of the ocean floor. There are numerous examples of such theories and they constitute a core of the science and our practical life based on science.

The same kind of theory (but at the stage of theory) is now the expanding Earth theory, based on the earlier given seven proofs, which must be treated seriously.

The second kind of theories, though fundamental in science, are not attractive for philosophers who have a tendency to ignore them. Certainly Kuhn and Popper acted in this way. They both applied conclusions, developed on the basis of the first group of theories, to theories as such, causing an extreme mess in the cognitive approach to science. Within this mess it is possible to label the proofs of the expansion of the Earth as "models" or "informatics noise" (as mentioned earlier). Drowning in cognitive nihilism, we can equally well label the Greek's proofs of the spherical Earth in this way.

I have my own rich practical experience in the topic, as a person working on and discussing the expanding Earth over more than four decades. The experience also concerns the broad spectrum of the pathology in science which has resulted from the widespread cognitive relativism.

6. Return to classic scientific principle of testing theories

According to the Popper view, the demarcation line between science and non-science within the world of theories is, that scientific theory has to be only falsifiable, not verifiable. From this view a strange conclusion arises that the Ptolemaic theory was scientific but the Copernican theory not. Of course at the start the Heliocentric System was falsifiable but also <u>verifiable</u>. What is more, the latter procedure was conducted successfully and the former procedure became pointless. The Heliocentric System (as a pure geometric and kinetic system) at the turn of 17th century ended its old life as a theory and began a new existence as a fact.

Thus we must return to the classical principle that <u>scientific</u> theory must be <u>testable</u> which means that it is falsifiable as well as <u>verifiable</u>. The principle is applicable to all theories of the second type. Many of them were falsified in the past but many were verified and serve us as indisputable facts marking a wonderful progress in science.

Expanding Earth is a theory of the second kind and as such it can be verified (proved as a fact), which I demonstrate in this paper and the others quoted.

Popper wrote in the introduction to his first English edition (1959) of "The Logic of Scientific Discovery" that from the very beginning the cognitive theory was inspired by the hope that it would not only allow us to understand the knowledge better but also would help us to push it forward.

It must be concluded that Popper's (and Kuhn's) contribution to cognitive relativism has blocked the progress in science and the result is that many opponents of Earth expansion locate themselves in the non-science side of demarcation line between science and non-science.

7. Expanding Earth as the end of the sequence of false geotectonic theories and the solution of their mutual contradictions

Geotectonics is an extreme example of the sequence of false geoteconic theories. But this sequence does not lead to cognitive relativism but to the firm true geotectonic solution. The most important of the theories can be sorted in three groups:

- a. theories of development of oceans
- b. theories of development of continents
- c. mobilism and fixism

The theories form, within each group, contradictory pairs and the solution of the contradictions between them is each time the expansion of the Earth.

factual bases are wrongly explained. The expanding Earth rejects these wrong explanations and joins the bases in a coherent whole. It will be shown briefly below how this works for the first and the third group.

In the first group there is the land-bridge theory and the theory of the permanency of oceans. The first found, on the basis of paleontological and sedimentological data, that all oceans (together with the Pacific) are young, that is Meso-Cenozoic. The theory tried to explain this fact by the sinking of continental crust in the locations of today's oceans (false explanation). The theory of permanency of the oceans, based on the firm basis of isostasy which found that continental crust cannot sink in a much denser basement, concluded that the oceans have existed from the beginning of the Earth (false explanation). Wegener partly solved this contradiction by assuming a pulling apart of continental lithosphere instead its sinking. In this way he explained even better the basis of the land-bridge theory, avoiding its wrong interpretation. He also avoided the reservation from geophysicists side and their wrong explanation. However Wegener was inconsistent. He applied his revolutionary solution only to the Atlantic and the Indian Ocean. Its consequent application also to the Pacific means huge expansion of the Earth.

In the third groups is mobilism which found that continents move apart horizontally relative to each other and fixism which found that they stay in place relatively to their very deep basement. The only solution of this contradiction is the expanding Earth.

This was in a nutshell explanation of the problem. I devoted to it the whole lecture (see: www.wrocgeolab.pl/lectures.pdf, lecture 2). The topic is also mentioned in my other brochure www.wrocgeolab.pl/research.pdf, paragraph 9).

Thomas Kuhn wrote in the preface to Copernican Revolution (p. viii):

I am myself quite certain that the techniques developed by historians of ideas can produce a kind of understanding that science will receive in no other way.

However Kuhnian historical approach led him to cognitive relativism. Quite the opposite, historical and logical analysis of the sequences of geotectonic theories leads us to a firm and unequivocal fact – the expansion of the Earth. The fact obtained in this way is also proved by several direct proofs as was pointed out earlier.

8. Plate tectonics as a paradigm, trying to shape geology like quantum mechanics

a. The story of the process

In the founding papers of plate tectonics the paradigm concept and the quantum mechanics style was not much present. But these were developing

with time. Allan Cox made these connections, in a most spectacular way, in 1973. The author reprinted a collection of fundamental plate tectonic papers in his book, grouped them thematically and supplied each group with his own introduction. He presented very well the philosophy of the new discipline in his explanations.

Cox was a devoted adherent of Kuhn's cognitive concept. The first chapter of his book is fittingly entitled: "Paradigm of plate tectonics". Such an understanding of plate tectonics has become common in the following years.

In the chapter "Geometry of plate tectonics" Cox presented a wellelaborated axiomatic system of plate tectonics, quite in the style of quantum mechanics. It consists of **2 postulates, 3 definitions and 3 theorems**.

But the system omits the most important postulate of plate tectonics – that the Earth is not expanding, leaving it as a tacit (secret) assumption. That is why I call it an **incomplete axiomatic system**. The system is quoted below (Cox, 1973, p. 40-42).

b. Incomplete, officially presented axiomatic system of plate tectonics

• Definition 1, plates.

The lithosphere, defined as the rigid outer shell of the earth (roughly 100 km thick), is divided by a network of boundaries into separate blocks which are termed "plates."

Definition 2, boundaries.

Boundaries are lines separating plates. Boundaries are of three types.

a. Ridges, where two plates are diverging, permitting the upwelling of magma that creates new lithosphere. (The direction of relative motion of the two plates does not need to be perpendicular to the ridge.)

b. *Trenches* or *sinks*, where two plates are converging, with one plate moving beneath the other eventually to be absorbed into the mantle, or "destroyed." (The direction of relative motion of the two plates does not need to be perpendicular to the trench.).

c. Transform faults, where two plates are moving tangential to each other. Lithosphere is neither created nor destroyed. The direction of relative

motion of the two plates is exactly parallel to the fault.

Postulate I. The plates are internally rigid but are uncoupled from each other. At their boundaries two plates may pull apart or slip one beneath the other, but within the plates there is no deformation.

• Definition 3, pole of relative motion.

The pole of relative motion between two plates is the unique point on the globe that does not move relative to either of the two plates. (Strictly speaking, each pole has an antipodal point on the opposite side of the globe.). The pole may be visualized as a pivot point about which the two plates rotate relative to each other.

Postulate 2. The pole of relative motion between a pair of plates remains fixed relative to the two plates for long periods of time.

The following theorems follow from Postulate 2.

Theorem 1. Transform faults between two plates lie along segments of concentric small circles centered on the pole of relative motion of the two plates.

Theorem 2. The pole of relative motion for two plates may be found by constructing perpendiculars to local segments of transform faults. The common intersection of the perpendiculars is the pole.

Theorem 3. The width W of new lithosphere formed adjacent to a given interval of time decreases from a maximum width W_0 at an arc distance $A = 90^\circ$ from the pole of relative motion to zero width at the pole itself. Quantitatively, $W = W_0 \sin A$ where A is the arc distance from the pole to the point of observation and W is the width of new lithosphere measured parallel to the direction of relative motion between the two plates.

If we add the missing assumption (postulate), the system becomes full and real.

c. Full and real axiomatic system of plate tectonics⁵

This system comprises 3 postulates, 3 definitions and 3 theorems (3x3). It is presented below. My supplements are in **bold red**.

Postulate 1. The Earth is not expanding (basic, false and tacit postulate of plate tectonics).

⁵ Formulated and commented by me (J. K.).

• Definition 1, plates.

The lithosphere, defined as the rigid outer shell of the earth (roughly 100 km thick), is divided by a network of boundaries into separate blocks which are termed "plates."

• Definition 2, boundaries.

Boundaries are lines separating the plates. Boundaries are of three types.

a. Ridges, where two plates are diverging, permitting the upwelling of magma that creates new lithosphere. (The direction of relative motion of the two plates does not need to be perpendicular to the ridge.).

The following *Definition 2b* results from the *Postulate 1* and does not agree with reality.

b. Trenches or sinks, where two plates are converging, with one plate moving beneath the other eventually to be absorbed into the mantle, or "destroyed". (The direction of relative motion of the two plates does not need to be perpendicular to the trench.).

c. Transform faults, where two plates are moving tangential to each other. Lithosphere is neither created nor destroyed. The direction of relative motion of the two plates is exactly parallel to the fault.

The phrase in the following Postulate 2 "*slip one beneath the other*" results from *Postulate 1* and does not agree with reality.

Postulate 2. The plates are internally rigid but are uncoupled from each other. At their boundaries two plates may pull apart or slip one beneath the other, but within the plates there is no deformation.

The whole final section results from the *Postulate 1* and does not agree with reality.

• Definition 3, pole of relative motion.

The pole of relative motion between two plates is the unique point on the globe that does not move relative to either of the two plates. (Strictly speaking, each pole has an antipodal point on the opposite side of the globe.) The pole may be visualized as a pivot point about which the two plates rotate relative to each other.

Postulate 3. The pole of relative motion between a pair of plates remains fixed relative to the two plates for long periods of time.

The following theorems follow from Postulate 2.

Theorem 1. Transform faults between two plates lie along segments of concentric small circles centered on the pole of relative motion of the two plates.

Theorem 2. The pole of relative motion for two plates may be found by constructing perpendiculars to local segments of transform faults. The common intersection of the perpendiculars is the pole.

Theorem 3. The width W of new lithosphère lithosphere formed adjacent to a given interval of time decreases from a maximum width W_0 at an arc distance $A = 90^\circ$ from the pole of relative motion to zero width at the pole itself. Quantitatively, $W = W_0 \sin A$ where A is the arc distance from the pole to the point of observation and W is the width of new lithosphere measured parallel to the direction of relative motion between the two plates.

That above is the essence of plate tectonics false paradigm.

d. Reduction of plate tectonics to the non-expanding-Earth theory

Disclosing the main postulate of plate tectonics allows us to reduce it from the rather complicated form of paradigm to simply **non-expanding-Earth theory**, which is a theory of the mentioned second type i.e. it can be true or false in absolute sense. The theory is in a simple contradictory relation with the expanding Earth as its negation. Thus every proof of the second is falsification of the first.

9. Circular arguments – a methodological bungle of plate tectonics

a. Principle of circular argument

A circular argument is a mistaken way of reasoning and has a simple structure (Fig. 3).



Fig. 3. The principle of circular argument

b. Principle of multi-storey circular argument

A multi-storey circular argument occurs when on the first conclusion the second conclusion is built which is to prove the first (Fig. 4).



Fig. 4. The principle of multi-storey circular argument

Plate tectonics consists of several multi-storey circular arguments which will be demonstrated in chapter III.

The top floor of a multi-storey circular argument is treated in such a structure as also a proof of the basic assumption (Fig. 5). In plate tectonics this is the non-expanding-Earth assumption.



Fig. 5. "Proof" of the basic assumption by the top floor of the multi-storey circular argument

c. Plate tectonics as a system of multiple circular arguments

As was mentioned in paragraph I.2, plate tectonics constructed several false models on the basis of its false fundamental non-expanding-Earth assumption which were then equated with reality and treated as proofs of the assumption. Its multiply circular structure is presented by Fig. 6. It also consists of some storey circular arguments.



Fig. 6. Plate tectonics multiple circular arguments based on non-expanding-Earth assumption

Otherwise the concept of a paradigm rejects the institution of "proof". In fact however plate tectonicists have treated their circular arguments as "proofs". Thus I follow this custom putting only the term "proof" in inverted commas. Only the proofs of the expanding Earth are treated by them consequently according to principles of cognitive relativism, i.e. they are ignored. This is a great logical inconsistency of plate tectonics.

Because the false models of plate tectonics are derived from the same false assumption, they are mutually coherent and this became the main argument in favor of plate tectonics. In this way this false theory has attained remarkable longevity.

The specific circular arguments of plate tectonics, twelve in number, will be demonstrated in the next chapter.

III. Plate tectonics in a space of circular arguments

In 1974 McKenzie and Parker published a paper entitled "*Plate tectonics in* ω space". The ω (omega) space is of course the space of Euler vectors deduced from the non-expanding–Earth assumption. The paper is a good example of making almost theoretical physics from geology. In fact however, plate tectonics found itself in the space of circular arguments.

Below we enumerate these circular arguments. Some of them were discussed in the former paper. The topic was also discussed in www.wrocgeolab.pl/Carpathians.pdf p. 45 under a title: *Plate tectonics – a theory on the wheels of circular arguments*.

The first two circular arguments use Euler's theorem, which is a false model for the Earth, deduced from the false non expanding-Earth assumption.

1. Space geodesy "proof" of the non-expanding-Earth

The problem is demonstrated in chapter 14 of the earlier brochure: *An attempt of rejection the expanding Earth using Eulerian calculations – a circular argument* (p. 117).

2. Alleged balance of the Earth's surface area as a "proof" of the non-expanding Earth and thus converging plates

In the "omega space" all increments and decrements of the lithosphere must be balanced according to Euler's theorem. Thus divergent motions of plates must be compensated by their convergent movement. This balance follows on the deeper level from the non-expanding-Earth assumption. Thus, pointing to this balance as a proof of the non-expanding-Earth hypothesis (see Dziewoński, 1999) is a circular argument (see page 164 of the main text).

3. Relative shrinking of plates on the expanding basement or how expanding Earth helps plate tectonics to make circular arguments

When the expansion of Earth takes place but is not being taken into account (neglected) then all plates seem to be relatively and apparently shrinking. The relation is explained in my paper (Koziar, 2011) *Expanding Earth and Space Geodesy (extended abstract)* www.wrocgeolab.pl/geodesy1.pdf, in two chapters (4) *Blinov's principle* and (5) *Blinov's principle demonstrated on a plate lying on an expanding basement with an expanding geodetic graticule*. The fictitious process is recorded by space geodesy and interpreted as converging motion of plates. This apparent converging movement confirms non-expanding-Earth assumption on the basis of a circular argument.

4. Subduction model of island arcs and active continental margins as a "proof" of non-expanding-Earth

In September 1968 Bryan Isacks, Jack Oliver and Lynn R. Sykes published what is perhaps the most important paper for plate tectonics: *Seismology and the New Global Tectonics*. In this paper the model of subduction was presented in compatibility with the "new global tectonics" – that is with plate tectonics. Within a few years subduction became the most famous process of plate tectonics. Laymen often do not even know about spreading and oceanic ridges but about subduction they do. Subduction came to be treated as a fact and as such as a "proof" of converging plates, as the most important specific feature of the plate tectonics. However such proof has also the character of a circular argument. Let us remind ourselves of Le Pichon's way of thinking:

If the earth is not expanding, there should be other boundaries of crustal blocks along which surface crust is shortened or destroyed.

The three authors wrote on page 5866:

If crustal material is to descend into the mantle, the island arcs are suspect as sites of the sinks.

The descending material in the sense of plate tectonics is a fact for them. The only problem was to build a proper model and this was done by the authors. The model implies that the whole Pacific plate moves against East Asia and Australasia. However it quickly turned out that all island arcs of the west Pacific migrate in opposite direction (see figures below).



Fig. 7. Tearing away of the Pacific plate from Asia continent (on the basis of figure by Faure and Natalin – 1992, arrows JK)

The figures are made by plate tectonicists Faure and Natalin (1992), the arrows are put by me. The process was recognized much earlier by D.E. Karig already in 1971. The fact did not shake plate tectonics, no alarm bells rang, and the paradigm rushed ahead unperturbed. The situation is a good example of the often unhealthy superior treatment of an a priori assumption over facts visible to the naked eye.

Other facts were no less striking. Among these are: a tensional regime in oceanic trenches as recorded by seismic analysis, normal fault deformation of oceanic plates beneath them and beneath the frontal part of island arcs, and much lower thickness of the Wadati – Benioff zone than thickness of oceanic plate. All these determine the mechanism of deformation as in Fig. 8b. However Isacks et al. (1968) chose the mechanism as in Fig. 8a, which is determined by an a priori non-expanding-Earth assumption.



Fig. 8. Juxtaposition of two types of deformation of oceanic plate at oceanic trenches,
a) determined by an a priori non-expanding-Earth assumption,
b) determined by facts

Another astonishing interpretation was made by the above authors in regard to mechanism of "tsunami" earthquakes beneath frontal parts of islands arcs and active continental margins. They are as in Fig. 9a. The sinking of lithosphere at oceanic trenches and its upwelling at vicinity of volcanic lines determine a gravitational transport of the whole island arc ocean-ward and its overthrust on oceanic lithosphere (Fig. 9c). However the authors arbitrarily chose underthrusting of oceanic lithosphere under an island arc according to the a priori non-expanding-Earth assumption and subduction implicated by the latter.



Fig. 9. Mechanical relations of island arc relative to oceanic plate (explanation in text)

The mentioned geological facts are not the only ones but are the most important for building a sketchy but proper scheme of the whole mechanism working at island arcs and active continental margins (Fig. 10; Koziar, 2003; www.wrocgeolab.pl/margins2.pdf and www.wrocgeolab.pl/margins2a.pdf.



Fig. 10. Sketchy scheme of tectonic mechanism working at island arcs and continental margins (Koziar, 2003)

Recently I elaborated a more detailed version (see figures below). The version was presented on the XIX Meeting of the Society of Geologists Alumni of Wrocław University held on 28 January 2017 at Wrocław University and will be the subject of a subsequent brochure. Here there is no space for a detailed explanation.





Fig. 11. Tension-diapiric-gravitational development of island arcs. The detailed mechanism

5. Subduction model of seismic conductivity of the Wadati-Benioff zone as a "proof" of subduction

Isacks et al. (1968) recorded a high seismic conductivity of the Wadati-Benioff zone against extremely low conductivity below marginal sea (above the zone) and low conductivity in ocean direction (beneath the zone)–Fig. 12.



Fig. 12. High seismic conductivity of the Wadati-Benioff zone against its surrounding, interpreted according subduction concept (Barazangi & Isacks, 1971)

This convinced them correctly that the cold and brittle oceanic lithosphere is present inside the zone. However they interpreted the fact onesidedly based on subduction model (Fig. 8a) which in turn is based on the non-expanding-Earth assumption. Thus the subduction model of high seismic conductivity of the Wadati-Banioff zone is a circular argument relative to subduction and a multi-storey circular argument in relation to non-expanding-Earth assumption.

It is clear that the tensional (divergent) mechanism of island arc (Fig. 8b) also explains the presence of lithosphere material in the Wadati-Benioff zone and thus the high seismic conductivity of the latter. Even if sinking lithospheric material is not continuous its movement produces laminar structure inside the zone. The structure is parallel to the zone itself causing its good acoustic conductivity.

6. Subduction model of contamination of andesitic magma by oceanic lithosphere material as a "proof" of subduction

Andesitic magma in island arcs and active continental margins is contaminated by oceanic lithosphere material. This is treated by plate tectonicists, especially in petrology discipline, as a proof of subduction. But it seems as a proof only if one assumes that the subduction model of the presence of oceanic material in the Wadati-Bernioff zone is true. In fact the reasoning has a circular structure. Relative to the non-expanding-Earth assumption it is a multi-storey circular argument as in the previous case.

7. Subduction model of UHP metamorphism as a "proof" of subduction

Since about three decades continental rocks with UHP metamorphism have being found and interpreted as a product of a very deep subduction to even 200 km. It is supposed that subsequently they are returned to the Earth surface (exhumed) by significant buoyancy of continental crust. The process is even labeled "go to hell, and come back to heaven" (Yang et al. 2011).

It is worth to mention that at the beginning of the concept of subduction the continental lithosphere was excluded from the concept simply because of its high buoyancy. Today, the assumed <u>continental</u> subduction becomes one of the main "proofs" of subduction as such. In some regions the total volume of continental lithosphere, supposed to have been pushed to extreme depths and then recovered, is gigantic. A prime example is the long 4 thousand km zone from the Kazakh block (Kokchetav Masiff) up to east China (Sulu UHP Terrane) along which UHP metamorphosed rocks are found. The zone is called Central Asian Orogenic Belt (CAOB). The volume of supposedly exhumed continental material there, is approximately 1.6 x10⁶ km³ (Dobrzhinetskaya and Faryad, 2011).

However plate tectonicists themselves admit that their paradigm is unable to explain the origin of intracontinental fold belts. Except that, alleged subduction of continental lithosphere rules out the last resort for plate tectonics driving mechanism, that is the hybrid *ridge-push-slab-pull* concept.

The fundament of petrologists' faith in UHP subduction is opinion that UHP conditions are impossible at shallow parts of lithosphere. However they are possible. Of course significant overpressure is impossible on regional scale because in this case the whole region would be uplifted. However on a local scale rocks are resistant to overpressure and the shallower the better.

It can be calculated that in a normal, undeformed granite body an UHP overpressure of 5 GPa (150 km of lithostatic pressure) can be achieved at a depth of 22 m in a cavern of 2 m in diameter. The same overpressure can be achieved at a depth of 5 km in a cavern (hydraulic trap) of circa half kilometer in diameter (Koziar, 2017).

The overpressure may be of hydraulic or mechanical origin. The first can be illustrated by the model of an inverted Pascal barrel (Fig. 13; Koziar, 2009). The second by anvils model at transpression sections of faults (Fig. 14; Koziar, 2017).

Local generation of overpressure well explains isolated occurrences of small UHPM bodies surrounded by rocks of lower grade of metamorphism. In the subduction UHP model such situation is quite incomprehensible.

The mechanical overpressure explains also well the lenticular form of UHPM bodies (see above figure) and their frequent occurrence in tectonic mélange. Both mechanisms explain well the rapid decompression which is shallow and in situ. Plate tectonics interpretation is strange rapid transport from extreme depth to the Earth surface.



Fig. 13. Inverted Pascal barrel demonstrating origin of hydraulic overpressre in lithosphere (Koziar, 2009)



Fig. 14. Anvil-press mechanism generating mechanical overpressure at transpression sections of fault (Koziar, 2017)

The mechanical overpressure applies well to the mentioned Asian UHP zone, because it lies within sustained zone of general dextral transtension between Angara Block in the North and India Block together with South China Block in the South. Within such a zone several local transpressions could occur.

The subduction model of UHPM can be only treated as a proof of subduction if one believes that only subduction can explain this metamorphism. But it is not true. Thus in fact it is the "proof" of circular argument principle. Once again, it is a multi-storey circular argument.

8. Subduction model of fold belts as a "proof" of alleged closing and closed oceans

In 1970 John F. Dewey and John M. Bird published one more fundamental for plate tectonics paper entitled *Mountain Belts and the New Global Tectonics*. In the first sentence of the abstract a clear circular argument is presented supporting plate tectonics (p. 2625):

Analysis of the sedimentary, volcanic, structural and metamorphic chronology in mountain belts, and consideration of the implication of the new global tectonics (plate tectonics), strongly indicate that mountain belts are a consequence of plate evolution (bold JK).

This sentence is a wonderful example of circular argument, which is superimposed on the concept of subduction creating a multi-storey circular argument built on the non-expanding-Earth assumption.

In fact fold belts are tensional-diapiric-gravitational origin as was correctly recognized by S.W. Carey (see www.wrocgeolab.pl/Carpathians.pdf). The tensional mechanism of fold belts is not deduced from an assumption of the expansion. Thus it proves the expansion in the proper way (avoiding a circular argument).

9. Subduction model of ophiolites sutures as a "proof" of the alleged closed oceans

Ophiolites as specific series of rocks were recognized by Steinmann (1905), long before plate tectonics appeared. They were interpreted as eugeosynclinal series and eugeosynclinals themselves as long, deep and **narrow** basins, not oceans.

The eugeosynclinal itself, together with the whole geosynclinals system turned out to be of tensional origin in spite of early speculative interpretations done on the basis of the theory of contraction of the Earth and the collisional aspect of Wegener's theory (Argand, 1916). The change happened in 1940s and 1950s, starting with Güntzler-Seifert's paper (1941) and finished by Trümphy's one (1958). Argand's compressional cordilleras turned out to be horsts separated by grabens which together determine a tensional regime. As such, the eugeosynclinal is a deep rift reaching down to a simatic basement. They can be initial oceans or parts of frozen tensional-diapiricgravitational fold belts which proves the expansion of the Earth (see preceding paragraph). In plate tectonics, the ophiolites are built in the Dewey and Bird scheme and became a "proof" of the "closed oceans" but only on the principle of circular argument as a top element of an extreme multi-storey circular argument (Fig. 15).



Fig. 15. Ophiolite sutures as traces of closed oceans on the top floor of a multi-storey circular argument

As such they became a favorite argument of petrologists against the expanding Earth.

The tension-diapiric-gravitational origin of ophiolites sutures are explained in www.wrocgeolab.pl/Carpathians.pdf, in paragraphs:

- 1. Scheme of the development of a fold belt based on the example of the Carpathians Mts,
- 3. Scheme of tension diapir gravitational development of an ophiolite suture (with analogy to the Carpathian Pieniny Klippen Zone)
- 4. Tension diapir gravitational development of an ophiolite suture, shown on the Zagros Mts. example (pages 36-40).

10. Paleomagnetic "proofs" of the alleged closed oceans

Paleomagnetism had played a negative role, undermining the expansion of the Earth as was shown in the paragraph I. 5. Then it was used to prove the alleged process of the closing of oceans. However this supposed proof is based on circular argument. I had pointed that out in my paper (Koziar, 2006). However it is not yet translated into English so I extract a relevant part in what follows. In Fig. 16 a the smaller Earth is presented with a rigid plate which is only slightly stretched during expansion. At the edges of the plate two magnetic vectors of the contemporary magnetic field are recorded in the rocks.



Fig. 16. Incorrect paleographic reconstruction resulting from incorrect paleomagnetic method (explanation in text)

The inclinations of these vectors determine contemporary central angle (α_{paleo}) of the two sites. After expansion of the Earth up to today's size (Fig. 16 b) the real central angle is reduced (α_{recent}) but the recorded angle not, and now a much bigger distance on the Earth's surface corresponds with it. The plate tectonicists, not seeing expansion, conclude that the two sites (vectors) had to converge. Then they look for some lineament which can be interpreted as a suture representing the closed ocean (again Fig. 16b). Then they disrupt the plate and create this fictitious ocean (again Fig. 16c). Then they insist that the ocean has been closed, what was allegedly precisely proved. However the "proof" is based on an a priori assumption not on a real fact. Then, if they insist that the closed oceans are "proofs" of the non-expanding Earth, the circularity is complete.

11. Terranes as an extreme multi-storey circular argument "proving" plate tectonics

Alleged closing oceans are one of the plate tectonics phantoms introduced to geology within its main circular argument. However on this phantom another circular argument was built and other phantoms appeared (the second generation of phantoms). These are so called terranes. They are treated by plate tectonicists as facts and are the most ubiquitous "proofs" of their paradigm because all continents are to be so called "amalgamation" of terranes.

In my paper "*Terranes or geology in Wonderland*" (Koziar, 2006), which is not yet translated to English, I explained how this concept was built and then I reinterpreted two big areas of apparent terranes to a very simple geology. These areas are: Pacific rim and Tethys zone. Both areas are victims of the concept of closing oceans. The Pacific is to be a closing ocean the Tethys zone is to be a trace after a closed ocean.

Beneath, I demonstrate how this bizarre concept of terranes was build on the examples of the Southern Atlantic and Pacific oceans. The first is my *ad absurdum* example. The second is an analogical example created and treated seriously by plate tectonicists.

As we now correctly know, the Southern Atlantic came into being by moving apart of Africa and South America (Fig. 17a)



Fig. 17. On the basis of figure by Tarbuck and Lutgens (1988). Explanation in text

Two (now separated) regions of occurrence of Triasic land reptile Mesosaurus point out (among others) such an interpretation. So we reconstruct the region correctly as in Fig. 17b.

However let us suppose that on the basis of an a priori assumption we are firmly convinced that the South Atlantic is a closing ocean (Fig. 18a).



Fig. 18. On the basis of figure by Tarbuck and Lutgens (1988). Explanation in text

Thus we are compelled to do some very strange interpretation. Namely, we must assume that now separate areas of occurrence of the reptiles were earlier together on one side of the closing Atlantic – for instance on South American side (Fig. 18b). Then we must assume that the today African part was transported to Africa through the "closing" Atlantic (Fig. 18c) in order to obtain its present position after "docking" (terrane concept term) in Africa (Fig. 18a).

The piece of land inside of "closing" Atlantic (Fig. 18c) is just a **terrane**.

The above interpretation is an obvious nonsense. However it is treated quite seriously in the Pacific Ocean. This ocean was, in time of land bridge theory, treated exactly as other oceans. It was young and of progressive development. Numerous land connections around it point this out. The young age of the Pacific basin was rejected on the basis of non-expanding-Earth hypothesis first in Wegener's theory, then in plate tectonics paradigm. So was rejected its progressive development. However the cross-Pacific connections stayed. For instance the whole North and Central American Cordilleras has an affinity to the East and South-east Asia. The situation was explained by Hughes (1975) in the frame of its shrinking Pacific (the phantom of first generation) by the phantom of second generation *i.e.* terrane (Fig. 18). Compare this figure with Fig. 18 b and c.



Fig. 19. Figures by Hughes (1975). Explanation in text

Later Hughes' single Cordillera terrane was replaced by about one hundred separate terranes.

However the Pacific is an opening ocean as are the others and so the bizarre terrane concept becomes groundless.

In Fig. 19 the terrane circular argument is developed on the closing-ocean circular argument, and this on the subduction circular argument, creating a second extreme multi-storey edifice of circular arguments (Fig. 20).



Fig. 20. Scheme of storey circular argument structure of terrane concept (explanation in text)

Terrane concept caused extreme damage of regional geology. The former approach of this discipline, consisted on finding connections between neighboring geological units. Today plate tectonicists interpreted majority of geological units as mutually alien terranes, separated in past by broad (now closed) oceans. The majority of boundaries between geological units are to be traces after closed oceans of which the total surface areas is to be hundred folds greater than the surface area of the Earth. Geology lost its sense. Fortunately it restores its sense on the expanding Earth.

12. Plate tectonics models of driving mechanism as a "proof" of plate tectonics

a. Empirical versus causal implication

New phenomena can be implicated on empirical (logical implication from facts) or causal way (physical implication from other phenomena). In the past many of them were recorded on empirical way and only then their causal explanations were found. Justifying a postulated new phenomenon by causal explanation while neglecting its empirical justification is methodologically flawed because one can explain one hypothesis by another one (Fig. 21) creating a quite artificial and false construction.



Fig. 21. At emphasizing of causal explanation it is easy to "prove" one hypothesis by another

Also a critique of some empirically well-justified new phenomenon on grounds of lack of a causal explanation (Fig. 22) is methodically wrong because such explanations many times were found only after a very long time. In many other cases, such explanations still have yet to be found, though the phenomena have become well established facts. Examples include: Earth's rotation around its axis, the origin of the Earth's magnetic field, polarity inversions of Earth magnetic field.



Fig. 22. Critique of some empirically justified new phenomenon (hypothesis) by lack its causal explanation is methodical fault

All these are upside down in plate tectonics paradigm (see the next paragraphs).

In the correct procedure of justifying a new phenomenon (hypothesis) by its empirical implication from facts, there are two possibilities:

1. The hypothesis is falsified and then the problem of its casual explanation disappears (Fig. 23).



Fig. 23. When the hypothesis is falsified the problem of its casual explanation disappears

2. either the hypothesis is verified (proved) and then the causal explanation should be found (Fig.24) though it is not necessary for understanding of the existence of the verified new fact itself.



Fig. 24. When the hypothesis is proved by empirical implication then the causal explanation should be found

In the second case the problem of causality is treated constructively and the direction of investigation is opposite to the direction of causal implication.

b. Convection currents mythology

At an embryonic stage of plate tectonics that is in the papers by Dietz (1961) and Hess (1962) the main objection against expanding Earth was lack of its casual explanation. On contrary, the main argument in favor of non-expanding-Earth hypothesis and subduction, implicated by the first, was its casual explanation, that is convection currents.

Convection currents made plate tectonics extremely popular. The schemes of rotating arrows in the mantle and subducting slab was enough "to understand" the paradigm. However the incompatibility of hypothetical convection currents with real structures was striking and at last convection currents were replaced by the so-called *ridge-push-slab-pull* mechanism.

c. Alleged ridge-push-slab-pull driving mechanism

This hypothetical mechanism assumes, that the horizontal part of a plate is driven toward an oceanic trench by gravitational "push" generated on the slope of an oceanic ridge and by gravitational "pull" generated by subducting (hanging) part of a plate. However the descending part off the slab is to be torn of (Fig. 25 .



Fig. 25. Tearing off oceanic plates at oceanic trenches excludes slab-pull mechanism (after Spence, 1977)

Thus it cannot pull the horizontal part of the plate. Let us assume however that it is not torn off and thus "pull force" works. Then the whole mechanism should be most effective where the oceanic ridge is high and the distance from the oceanic trench small. However this does not fit reality because the most effective motion (spreading) is there where the ridge is extremely low (vicinity of Easter Island) and the distance (to the Mariana Trench) is extremely big.

Let us now consider the north part of the Atlantic (Fig. 26).



Fig. 26. Tectonic relations which exclude ridge-push-slab-pull mechanism (explanations in text).

The ridge is very high there but its pushing force does not work because the surrounding continental edges have become detached from their parts (Greenland and Rockall block). This could mean that the pulling force at the opposite sides of the plates are extremely high. However at those locations are continental edges not descending slabs. Thus the slab-pull mechanism does not work there at all.

It must also be added that (as it was mentioned) recently the concept of subduction has culminated in the UHPM subduction. However this alleged enormous subduction of <u>continental</u> lithosphere of big buoyancy excludes the slab-pull mechanism, marking a big internal contradiction in the contemporary plate tectonics driving mechanism.

 $Evidently\ another\ force\ drives\ the\ plates\ -\ neither\ ridge-push-slab-pull\\ mechanism\ nor\ convection\ currents.$

Letuscite Le Pichon (1968, p. 3673): "However, if the earth is not expanding, what is the mechanism which results in this pattern of movements?".

d. Conclusions

It appears at last, that plate tectonics neither results empirically from facts nor causally from its driving mechanisms (Fig. 27).



Fig. 27. Plate tectonics as a theory resulted neither logically from facts nor causally (physicaly) from some processes

The only reason for its false driving mechanisms is the real spreading of oceanic lithosphere supplemented by false non-expanding-Earth assumption. Thus the plate tectonics driving mechanisms, which became a fundament of common faith in this paradigm, can be included to its numerous circular arguments.

IV. Synthesis of cognitive relativism with circularity of reasoning in plate tectonics mentality

In the geology, like in any other scientific discipline, facts can be divided into these of the first importance, the second importance, the third importance and so on (Fig. 28).

Hierarchy of importance Facts of the first importance Facts of the second importance Facts of the third importance ------

Fig. 28. Hierarchy of importance of facts in any scientific discipline

In geology, for example, the fact of first importance is the growth of the boundary of the African plate (Fig. 29) as well as the growth of boundaries of all other plates.

All seven proofs of the Earth expansion mentioned earlier are built on such facts of the first importance.



Fig. 29. Growth of the African plate's boundary as an example of geological fact of the first importance

In our understanding of any discipline we can find a contradiction between a fact of the first importance and a fact of lower importance (Fig. 30). The question arises which fact should be revised?



Fig. 30. Contradiction between fact of first importance and this of lower importance

In the first step, of course, the fact of lower importance should be revised as suspected being burdened by some false interpretation (Fig. 31).



Fig. 31. The fact of the lower importance should be suspected of being burdened by false interpretation

In plate tectonics facts of the lower importance are falsely interpreted on the base of a priori and false assumption of the non-expanding-Earth (Fig. 32).



Fig. 32. Falsely interpreted facts of lower importance (yellow rim) in plate tectonics

Falsely interpreted fact of the second importance in plate tectonics is, for example, ophiolite sutures as such, interpreted as an alleged traces of alleged closed ocean. Falsely interpreted facts of the third importance are all concrete regional interpretations of this kind of ophiolite sutures.

According to cognitive relativism it is enough to oppose to any theory a tiny fact in order to falsify it. Thus plate tectonicists, driven by this idea, oppose to any proof of the expanding Earth (based on the fact of the first importance), and all them together, any falsely interpreted fact of lower importance. However contradictory relations of these facts to the expanding Earth are generated by circularity based on false non-expanding-Earth assumption. Thus cognitive relativism joins into fatal ensemble with circularity of reasoning. Reasonable discussion with persons, thinking in this way, is impossible. The hope is in much open-minded persons not much trained in plate tectonics. Such persons exist and in quite satisfactory quantity. I ascertained about this during my long practice of lecturing on expanding Earth issues.

V. Conclusions

Plate tectonics is usually praised as the first geological theory which put harmoniously together many different geological facts, processes and disciplines. However this impression originates from a whole series of false models built on the same false assumption of non-expanding Earth. The veritable structure of plate tectonics is that of circular arguments.

In fact the real process which transforms geology into a compatible wholeness is expansion of the Earth. Verification of the expansion of the Earth starts from facts and the expansion is each time a conclusion not an assumption.

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