The Framework of the Geo-history in Seventeenth-Century Theories of the Earth and Its Implication

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I have published the book *Transformation of the Conception of Geocosmos: From Descartes to Leibniz*, which dealt with the development of the theories of Earth during the seventeenth century (Yamada, 2017). Unfortunately, however, I could not explain adequately the framework for description of earth history that emerged in the period and contributed to the geological thinking. First, Descartes presented a visual model of the cosmogony, in which Earth evolved into layered structure. But without the interpretation of fossils Descartes' model lacked a 'history'. On the other hand, Steno's methodology of analyzing the solids within solids revealed the principles for reconstructing the earth history. Steno admitted three kinds of rocks which consisted of mountains, hills and plains respectively. The method was succeeded by Italian scholars as 'Stenonian heritage' and made a tradition of stratigraphy. For example, Giovanni Alduino surveyed northern Italy and established four units *ordini*, though he did not use *Quarternary* (Vaccari, 2006). Lastly, Leibniz synthesized the idea of Descartes and that of Steno, recognizing the distinction between proto-earth (*incunabula*) and geological time. He also suggested that plant fossils indicated changes of environment, claiming that the history of nature compensated the history of human. Thus, although the long 'deep time' was not yet emerged, we recognize the fundamental framework for describing earth history, including human history and its environments, around the end of the seventeenth century.

Reference:
Vaccari, Ezio, "The "classification" of mountains in eighteenth century Italy and the lithostratigraphic theory of Giovanni Arduino (1714-1795)," *Geological Society of America Special Paper* 411 (2006), 156-177.
Yamada, Toshihiro, *Jiokosumosu no henyo: Dekaruto kara Raipunittsu made no chikyu-ron* [*Transformation of the Conception of Geocosmos: From Descartes to Leibniz*] (Keiso Syobo, 2017).

Keywords: geo-history, Stenonian heritage, Gottfried Leibniz, Giovannni Arduino, history of geology

The Edmund Naumann documents in the Gotha Research Library at the University of Erfurt

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In the field of the history of science, archival materials are as important sources of information as published materials. This presentation aims to introduce new archival materials on Edmund Naumann who is hailed as the founding father of geology in Japan. The already known archival materials on Edmund Naumann are those held by the National Archives of Japan and the Archives of the University of Munich. The former is related to Naumann's career as an academic advisor to the Meiji Government. The latter is concerned with his doctorate and habilitation from and his career as a Privatdozent at the University of Munich. The new archival materials are deposited in the Gotha Research Library at the University of Erfurt. They consist of handwritten and typed letters, postcards, manuscript maps and so on, most of which were sent to the Justus Perthes Geographische Anstalt based in Gotha, one of the leading geographical publishing houses in the world from the late nineteenth to early twentieth century. Especially, Justus Perthes was famous for its academic journal dedicated to geography in its broadest sense, *Petermanns Geographische Mitteilungen*. Both Alfred Wegener's theory of continental drift and Vladimir Koeppen's scheme of climate classification appeared first in *Petermanns Geographische Mitteilungen*, and Edmund Naumann also contributed several papers to this journal. The enterprises of Justus Perthes and its successor in Gotha came to an end in 1992. The University of Erfurt took over the remaining books, periodicals, maps, and archival materials and renamed them as the "Perthes collection." The Edmund Naumann documents are also included in this collection and they need to be scrutinized closely and thoroughly in the near future.

Keywords: history of geoscience, history of geography, archival materials, Perthes collection, Petermanns Geographische Mitteilungen, cartography

Geological philosophy and consciousness of Tatsuro Matsumoto (1): His contributions to acceptance of plate tectonics in Japan

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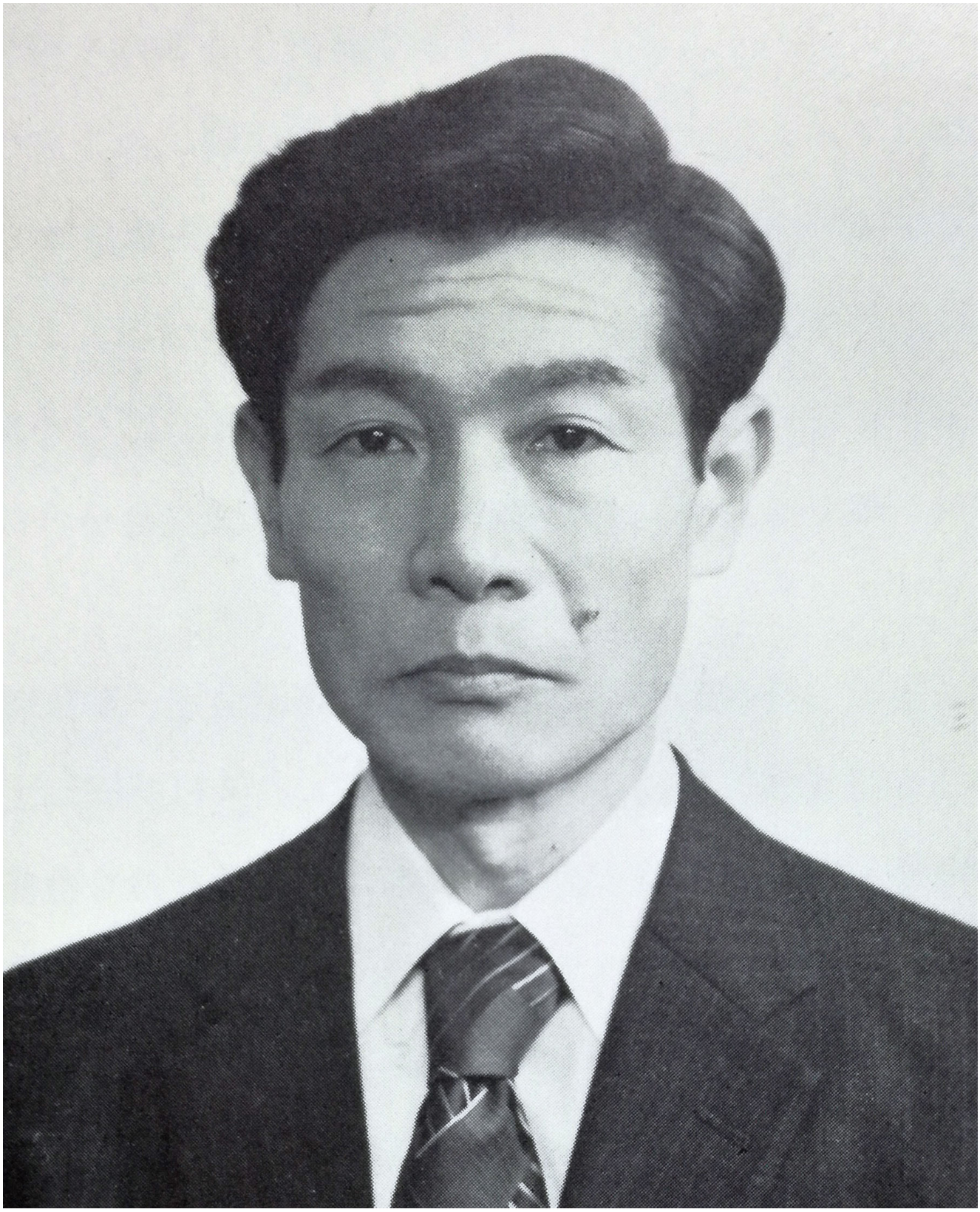
Tatsuro Matsumoto (1913 –2009) academically and mentally furthered Japanese earth science through his ca. 70 year’s research activities. His academic contributions were mainly stratigraphy and paleontology but multidisciplinary. His substantial contributions however have been forgotten by Japanese earth scientists, since he focused his research on Mesozoic paleontology after his retirement from Kyushu University (KU) at 1977. From 1967 to 1977, the stratigraphy group of KU supervised by Matsumoto played an essential role in the introduction of the plate tectonics (PT) theory to the geology field of Japan. On the other hand, Shoji Ijiri, Matsumoto’s classmate at Tokyo Imperial University (TIU), negative to PT, got PhD from KU at 1949. Matsumoto was skeptical about the Sakawa orogenic cycle of Teichi Kobayashi, Matsumoto’s senior at TIU. Thus, understanding of geological philosophy and consciousness of Matsumoto is important for our understanding of history of Japanese earth science and appropriate geological methodology.
Matsumoto supervised adoptation of PT at the stratigraphy group of KU. He started to contend with issues of geosyncline at 1964. He organized a research group “Comprehensive studies of geosyncline sediments” from 1967 –1969. Many young researches attended to it. Achievements of this project were published in two memoirs of the GSJ (Matsumoto, 1968; Matumoto & Kanmera, 1971). Matsumoto (1972) mentioned his espousal of PT and pointed out that PT could not explain the Cretaceous large granitic magmatism in East Asia at that stage. In this year, Matsumoto’s colleagues, Kanmera and Okada, attended an international symposium of geosynclinals processes at Madison. Takashi Sakai was given an assignment “review of global orogenic belts” from Matsumoto when he enrolled into the graduate school of KU at 1974. Sakai and Kanmera started to present researches of the Nichinan Group in the Shimanto Belt at 1975, which escalated developments of the accretion theory in Japan.
Japanese geologists other than Matsumoto tended to assume a tectonic force from the Eurasian continent when they explained tectonic evolution of Japan. The introduction of accretion model to the Shimanto was also a paradigm shift of the tectonic agent from the continent to the ocean. Matsumoto had proposed the Tsuhima-Goto fault in 1940’s as a tectonic domain boundary between Japan and main Eurasian continent based on the research of Tushima (Matsumoto, 1969). Matsumoto (1961) pointed out the straight line configuration of the Hokusatu bend, the twill-weave disturbance of Nichinan and the northwestern margin of the Shikoku Basin around Kyusu. He also suggested that the Shikoku Basin would have been formed in the early to middle Miocene. These insights of Matsumoto were bases of the adoptation of PT at KU. KU adopted PT not as a trendy a prior model but a posteriori model which can explain geological features of Kyushu. Matsumoto therefore was the driving force of adoptation of PT in Japan at the initial stage.

Keywords: Matsumoto, Tatusro, plate tectonics, accretion model, historical geology



The Father of National Meteorological Services in Japan: An Weather Observer Henry Batson Joyner –England, Japan, and Brazil –

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Henry Batson Joyner was born on July 9th, 1839 as eldest son of Henry St. John Joyner, of Northwick, (abt 1810–1882) Harrow, England. The father, St. John Joyner was a tenant farmer, occupying 1000 acres of land and also he was a dedicated citizen weather observer. He send regular reports and some reports about remarkable events by request from the meteorologist George James Symons (1838-1900) who published "British Rainfall". Some of St. John's reports were published in "Symons's Monthly Meteorological Magazine" (MM) also published by Symons.
Batson served as an engineer of railways and a resident engineer of a town in England to 1870, in which year he left England to take up an appointment under the Imperial Government of Japan, being employed first in the Public Works Department, in the construction of the earliest railway in Japan. He carried meteorological instruments including a raingauge and a thermometer, presented by English donors and performed volunteer weather observation at Tokyo for two years and send reports to England. They were also published in MM. After that he got a chance to establish the national meteorological service of Japan. He trained and instructed the native students in a thorough knowledge of that science and laid the solid basis on which the service system was built up. This led to the prosperity of the later Central Meteorological Observatory of Japan, today's Japan Meteorological Agency.
He left Japan in 1877, and after a short stay in England, proceeded at the latter end of 1878 to Sao Paulo, Brazil as Engineer in-Chief for the planning and construction of the extensive water supply and sewerage system of the city. He also performed weather observation there for five years and send data tables to Meteorological Office, England. But it didn't lead the national meteorological service of Brazil. Further studies about the details of the observation, including the instruments, the siting, supporters, should be needed
On the completion of his works as Engineer in-Chief in May 1884, he returned to England hoping to recruit his somewhat impaired health, but got worse and died on the 23rd of November. Observation data tables of five years are stored in the National Meteorological Library and Archive of Met Office United Kingdom. Summary of the observation at Sao Paulo was published in "Quarterly Journal of the Royal Meteorological Society" after his death. He was buried in Kensal Green Cemetery, London.

Keywords: Henry Batson Joyner, history of meteorology, National Meteorological Services in Japan, oyatoi gaikokujin

Histories of Climate Change Research in Japan

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I will review researches about climate change in Japan from 1890 to 1980.

Keywords: climmate change, global warming, carbon dioxide

Comparison and visualization of cultures by academic disciplines

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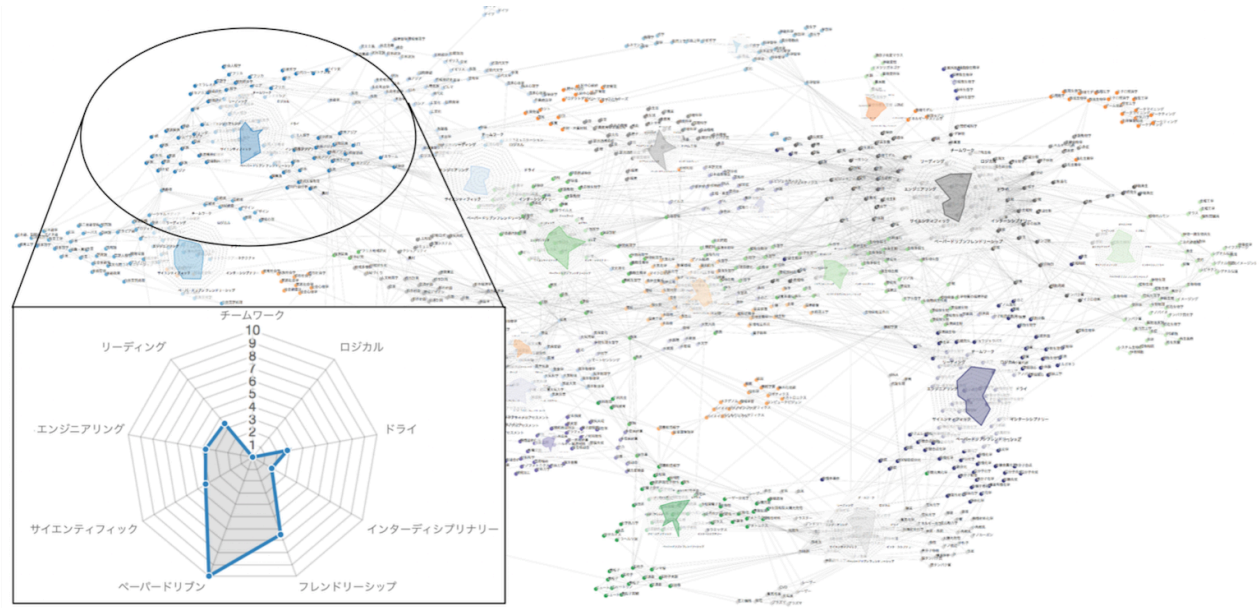
As society getting complex and academic disciplines getting divided, social issues become difficult to be solved by a single academic discipline only. Interdisciplinary studies, i.e. fusion and cooperation of multiple academic disciplines, become much popular under such situation of our society. In interdisciplinary studies, it is important that researchers in different academic disciplines understand each other’ s values and cultures, which stays quite difficult for the most of researchers. In order to promote the mutual understanding among different academic disciplines, we analyze the result of a survey asking researcher's academic philosophy and behavioral features, find research communities and extract their cultural characteristics. We visualize the result of the analysis as a network with charts that represent academic disciplines' cultures. We believe that our system makes it easier to compare academic disciplines' cultures and helps researchers in different community understand each other.

This work is supported by the Collaboration Research Program of IDEAS, Chubu University IDEAS201608.

Keywords: Interdscipline studies, Academic collaboration



Psychosomatic human ability and mind climate

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1. Significance of the project and subjects so far addressed

At the beginning of the “mind climate” study project (abbr. *MC*), an earth scientist and a western culture specialist built up the idea of the project as a development of their long activity in what they named “the science of philosophy of science”. They had started an inquiry how consensus can be attained across borders among strongly segmented natural sciences. A multidisciplinary team was then gathered on the basis of the philosophy of science.

There was another hidden objective. As Lindsey, A.D. pointed out, preparatory abundant discussion is necessary prior to agreements, or rather, discussion is much more substantial for democracy than the attained consensus itself. This is serious for us Japanese because there is terrible lack of discussion through almost all academic communities.

As we repeated the meeting, we became noticing that the range of the scientific logics was questionable. Here is where feedbacks from philosophy or other humanities are desirable. Philosophers and other humanities specialists have so far developed various technical terms that are useful for examination of the quality of logics.

Some time was dedicated to generic arguments. But any results derived from generic discussion remain generic. Accordingly; our *MC* study has to introduce specific contents earlier.

2. Psychosomatic dimension

MC is very chronic: human minds need to be viewed as a result of the evolution process of lives. (This is explaining why the *MC* plan was first raised by the earth scientists.) Up to now, we discussed about several matters like the tacit dimension , and the imprinting. All these phenomena designate human psychosomatic function, which is the result of the evolution of human bodies.

Above all, the phenomenon called “emergence” is important. During the long career as an engineering researcher, the author had a lot many chances to observe closely the human activity in the real world, finding that the real world was being completely controlled by competent experts, and that every genuine expert had a remarkable core of ability, emergence.

When an expert faces a problem, emergence starts. This process does not draw solutions from any "sort and merge" or any other sequential manners, and yet quickly outputs apparently suitable responses at once. In contrast, standard scientific analyses must first fragment the problem into elements, and solve them sequentially one by one. But even if all solutions are got, synthesis of them into a whole solution is difficult, or in many cases impossible. (Every scientist would acknowledge this.) Logical methods are thus of no use in the struggle for existence where agile reactions are vital: we realize that the development of the emergence mechanism has been a key to survival.

This is performed in the flesh underneath the consciousness. Emergence occurs solely when we input signals into the flesh: *i.e.*, logics have no relevance. This is easily seen in case of sports and performance arts. But in case of legal profession or medicine as examples of brainworks, too, labored enormous quantity of memory becomes mature, i.e. fully integrated, only through the psychosomatic processing. The human psychosomatic ability covers several substantial facets of personality including the sense of justice and taste, which are more profound than logical matters. Many scientists are not prepared for this kind of subjects, but *MC* study will not be allowed to skip them.

Finally, let us see one ongoing study. In case of writings about the Japanese *MC*, foreign authors have a significant merit, less biasedness or multitude of points of view. This principle will work for Japanese

authors, too. If they have firm belief on a world religion like Christianity or Islam, they are eligible as foreigners. Two books written by different strict Japanese Protestants are being read paralleled. They argued two different situations of the politics of one identical Japanese medieval regime, which was a brand-new samurai regime. It took over the government from a preceding aristocracy. It then met very big societal changes of an exceptional magnitude within the Japanese history. Such a great pressure is expected to surface some deep structure of Japanese *MC*.
Acknowledgement This work was supported by the Collaboration Research Program (IDEAS201608) of Chubu University.

Keywords: mind climate, emergent behavior, psychosomaticity

Towards the better interdisciplinary collaborations 1

*Fuki Ueno[1], Riichiro Hira[10], Satoru Sugita[8], Naoki Miyano[2], Minao Kukita[3], Yoshinari Hayashi[4], Hidenori Nakamura[6], Yuko Murakami[5], Hiromichi Fukui[8], Hiromichi Higashihara[7], Shigenori Maruyama[9], Mineo Kumazawa[3]

1. Chukyo University, 2. Kyoto University, 3. Nagoya University, 4. Kansai University, 5. Tohoku University, 6. Toyama Prefectural University, 7. National Research Institute for Earth Science and Disaster Resilience, 8. Chubu University, 9. Tokyo Institute of Technology, 10. University of North Carolina at Chapel Hill

It is widely recognized that highly-qualified research requires interdisciplinary cooperation. Another widely known fact is social agreement (collective knowledge) is often observed in geoscience, where aggregates multiple fields from physics, biology, natural resource, environment, society, and governments. Most researchers have experienced the difficulty, while a few have considered and analyzed its dynamics and mechanism. We claim that most interdisciplinary conflicts are caused not by evidence (data and logic) but by other factors, which hardly are logically described by aesthetic sense, intention, morality, world views. The non-logical systems have been constructed as survival strategies for environmental adoption and have evolved to complex systems. We need to clarify how those non-logical systems effect on our decision making in order to propose a theory of collective agreement. Moreover, they are artifacts which demand responsibilities of human beings. We thus call the artifacts as backgrounds of decision making "mind climate (MC)" and will scientifically analyze them.
Our current work is to formulate a three-layered MC model: (1) physical: geography and climate, (2) biological: genetics, epigenesis, and physiology, and (3) social: imprinting, culture, religions, education and policies. Those layers intricately form MC. Scientists already have working on (1) and (2), whereas most areas of (3) are open. This paper will classify MC formulations and possible effects on individuals and groups of researchers.
Moreover, we propose solutions of discoordination of transdisciplinary activities, such as dialogue as life-long education, school education, and self-reflection.
This work is supported by the Collaboration Research Program of IDEAS, Chubu University IDEAS201608.

Keywords: Mind climate, Decision making, Inter-discipline Communications

Developmental rule of complex science

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Through the extensive compilation of research history for the last 500 years in natural science, the evolution of complex science can be summarized into three periods. These are: (1) Period of Description, (2) Period of Classification, and finally (3) Period of Systematization. Regarding biology, the first period (Period of Description) lasted a long time, following the binominal nomenclature by Carl von Linne (1707-1778). Afterwards, the distribution of animals and plants was classified over the world, and Ernst Haeckel (1834-1919) proposed the phylogenetic tree of life. Charles Darwin (1809-1882) also speculated the evolution of life which is generally known as the Period of Systematization. Now in 21st century, a similar cycle is on-going in gene-level research, which includes (1) cataloging the kinds of genes and composing organisms including prokaryotes and Eukaryotes), (2) classifying a large database of genes), and (3) the development of a model to discuss the origin and evolution of life. This cycle is common in any natural science field. In the case of planetary science, (1) a catalog of planetary bodies was created by Copernicus and Brahe in the 16th century, followed by (2) classification performed by Galileo in the 17th century, and later (3) systematization done by Galileo and Kepler in the 17th century. And now, the second cycle is underway with an ever-growing catalog of exoplanets beginning with the initial discovery in 1995 and now totaling more than 6,000. In the case of Earth Science, the first descriptive period was the cataloging of Earth’ s surface geology, which continued over 500 years. The classification of on-land geology by 1945 resulted in the geosynclinal-development model, with ocean geology being left until 1965. In 1968, immediately after the classification of ocean-floor geology and geophysics, the theory of plate tectonics was proposed. And then, classification of geologic units between ocean and continent had been achieved.

Keywords: complex science, Period of Description, Period of Classification, Period of Systematization

Meaning of life from the cosmological viewpoint

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As we survey the literature on the meaning of life, a theme which looks so “philosophical”, we find that the arguer explicitly or implicitly appeals to cosmology. For example, T. Nagel, a famous philosopher who argues for the meaninglessness of life, concludes that both at the micro-level (the happiness of individuals, etc.) and macro-level (prosperity of human beings, advancement of civilizations and cultures, etc.) life is meaningless. The ultimate grounds he gives are that “eventually the solar system will cool or the universe will wind down or collapse, and all trace of your efforts will vanish.” (Nagel 1979; 1987) On the other hand, some cosmologists argue for the meaningfulness of organism or life as a philosophical consequence of contemporary cosmology. This talk will re-examine the cosmological assumptions and the argument structure of the type of nihilism which Nagel et. al advocate.

Keywords: philosophy of earth and planetary science, philosophy of science, philosophy

How does political philosophy contribute to the policy controversy concerning space exploration?

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Since space exploration (especially, manned space exploration) requires huge resources, it has been discussed whether governments should conduct space exploration programs as public enterprises or not. In this controversy, people mention a wide variety of considerations concerning space exploration such as cost-effectiveness of manned space exploration programs, value of big science, historical significance of human's expansion into outer space, and so on. The question how these considerations could relate to justifiability of public funding of space exploration belongs to the research field of political philosophy. In particular, the answer depends on theories of 'distributive justice' (i.e. the issue of just allocation of resources). However, almost no participant in the above controversy have referred to political philosophy. In this talk, I discuss what morals we can get about the political issue of justifiability of public funding of space exploration by reference to theories of distributive justice in political philosophy. Especially, I try to show what kinds of rationales could justify public funding of space exploration on the basis of a political theory called 'liberalism', which claims that governments must respect individuals' liberty.

Keywords: space exploration, space policy, political philosophy, space ethics

Interdisciplinarity in Geosciences: Maximizing societal impact through research-outreach-teaching synergy

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Geoscientists use a wide range of scientific skills and knowledge, from physical sciences to computer science, and from life sciences to engineering, to study a myriad of phenomena involving the planet Earth. Interfaces between geosciences, social sciences and humanities subjects have become increasingly important and offer many new possibilities in research and education. In this presentation, I will first examine the idea of interdisciplinarity in geosciences, taking into account both the nature and practice of interdisciplinarity (e.g., Repko, 2011). By analyzing how interdisciplinary knowledge in geosciences is critical to solving global problems, I will then discuss its implications for research-outreach-teaching synergy with illustrative examples from a collection of recent studies across the world (Tong, 2014a and 2014b). Finally, I will put forward the case of building communities of practice across research and education, with close partnerships between geoscientists at different stages of their careers. I will argue why building such partnerships and communities is crucial to maximizing the societal impact of geosciences as an interdisciplinary endeavor.

References

Repko, A.F. (2011). Interdisciplinary Research: Process and Theory. SAGE Publications.

Tong, V.C.H. (ed.) (2014a). Geoscience Research and Education: Teaching at Universities, Springer.

Tong, V.C.H. (ed.) (2014b). Geoscience Research and Outreach: Schools and Public Engagement, Springer.

Keywords: Interdisciplinarity, Societal impact, communities of practice

The day after "the acceptance of the Plate Tectonics theory"

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1. O-hara Business College

Tomari (2008) concluded that acceptance of the theory of plate tectonics (PT) by the field of geology in Japan was around the year 1986, approximately 10 years behind the fields of seismology and geophysics. As one of the grounds for this, Tomari cited the curve of the increase in the frequency of use of "plate words" among the keywords of presentations of the Seismological Society of Japan and Geological Society of Japan. By contrast, Shibasaki (2011) questioned whether this comparison could be explained by the concept of "field" as defined by Bourdieu and not the timing of acceptance of PT theory. Moreover, Chiba (2016) demonstrated that in response to this question by Shibasaki, we can explain the comparison by Tomari concerning differences in geological and geophysical methods/terminology.
The present study compares the literature of regional geology since 1986, in which the geological field of Japan is indicated to have accepted PT theory, concerning what sort of characteristics are seen in studies that clearly deny PT theory, those that do not use "pate words" in the description, and those that conversely attempt to use "plate words." It can be said that the principal aim of regional geology is to describe the geology and structure of a specific area and further aims to clarify the history of structural development of the area (naturally, this does not exclude the possible establishment of applications to resources/environment or general theories concerning geological phenomena or further targets). Therefore, it is possible that the description of researchers may be an influenced by the regional geological status, which is the main field. It is possible that individual geologists have controlled the process of acceptance of PT theory.
Following the "science wars" in the 1990s, especially the Sokal affair, it has been said that "science is co-produced from nature and society" (Andrew Pickering, 1995, etc.). Tomari (2008) clarified the so-called social aspect of the process of PT theory acceptance as a scientific affair in Japan. Interesting problems still remain unsolved regarding the aspect of "interactions of nature and researchers." This presentation aims to discuss the relationship between the field as a research subject of geologists and the process of acceptance of PT theory.

Keywords: The Acceptace of the Plate Tectonics Theory , The History of the Earth Sciences , Science, Technology and Society

Citizen-led Environmental Governance: Collective Decision Making, Science Communication, and Mind-Climate

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For effective collective decision making on the future of global environment and contemporary humans, it is required to deal with complex knowledge of science and technology in its interface with society that comprises of diverse actors (stakeholders) and sectors (production areas of industry, government, academia, civil society, and military). The current presentation reports a dialogue experiment among citizens and between citizens and experts, for citizens to take part in environmental governance as a sovereign, from the viewpoint of science communication, focusing on post-Fukushima energy and environmental issues in Japan (in particular high-level radioactive waste). It argues the necessity of taking into account of emotions and value systems (priority of multiple values) as well as reasons, in dialogue and decision making, because of not only complexity of science and technology but also diversity of viewpoints and interest in society. It also illustrates the relation with autonomy and spontaneousness. Moreover, it discusses the role of human beings' propensity to irrationality ("mind-climate") towards adaptable management of global environment including society, with emergence.

Keywords: environmental governance, science communication, "mind-climate"

A Proposal of Activating History, Theory and Social Demands of the Earth and Planetary Sciences

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Earth and Planetary Science, once used to be called Chi-gaku (Geo-science), has been rapidly evolving to relate closely with a variety of research fields (physics, astronomy, biology, environments etc). Now STS (Science, Technology and Society) is a trio from which we Homo sapiens can never be escaped. In our research program DEEP (Decoding Earth's Evolution Program; 1995~8), we have listed a set of seven big events in the Earth's History to be tackled with as the science research target. The first big event is the formation of the Earth and planets in this Solar system. The seventh event among them was the emergence of scientific exploration by a human being to start exploring the history and destination of the Earth and the Universe. Such a statement was criticized of too much extreme view. However, the actual history of science runs faster than people feels. A new research organization WPI-ELSI (Earth Life Science Institute) was launched (Maruyama, 2012), and its aggressive activities had started to push evolving the research fields of our interests. We are changing and so is the science and the associated technology. Under such a situation, we recognize the necessity of the three essential elements: (1) 'Theory of Science' to understand science itself on the basis of science, (2) 'History of Science' to learn from our own past experience with science, and (3) 'Future of Science', with which we Homo sapiens has "our own destination to survival continuation of both our life and its cultural valuables created so far".
Whereas there is not any logical reason at all to the three factors in the above, we intuitively demand us those three by means of developing the better science, simply because we do not know anything better and potential than science to understand this World. In other words, we are in the position to design and create a desirable hybrid of 'Homo sapiens and Science' as a consequence of our past history in this World.
Logic is an essential key in science, whereas a human being is influenced mostly by emotion. Whereas emotion itself is quite difficult to observe, so called 'mind climate' appears as such a phenomenon that could be observed and measured by means of science method much easily once research investment is made. Our preliminary study on the and it could be related to social behaviors of human beings. Mind climate has not been science terminology. Consequently, we propose the scientific study of the mind climate, so as to be manageable with ethical way.
This work is supported by the Collaboration Research Program of IDEAS, Chubu University IDEAS201608.

A review of studies on “Mind Climate”

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1. Chukyo University

Mind Climate (MC) encompasses aesthetic sense, intentionality, values, morality, ethics, worldview, and the environment which be creating those. This concept is alike a tacit knowledge, mass psychology, and group thinking, is the main topic in social psychology, and a cultural psychology. However, MC is different from others in the observable range. MC overview a history of the earth and homo sapiens is the study including a physical environment such as geography, biology and ecology such as gene and epigenetics, and a social human environment promoting culture climate. Ueno & Kumazawa, etc. are trying to understand MC using method called science. They proposed a model for the formation process of MC, classification, and relevancy, but individual detail inside the model is not clear.
In this presentation, we will review various research which related to physical environment, biology and ecological environment and a social human environment in the model. In the physical environment, we introduce the influence of climate and topography and concerning about environmental determinism. In the biology and ecology, we summarize the influence of genetics and epigenesist on human’s nature, personality. In the social human environment, we introduce the influence of imprinting phenomenon, custom, and region, etc. and attempt to add detail to the model.
This work is supported by the Collaboration Research Program of IDEAS, Chubu University IDEAS201608.

Keywords: Mind Climate, Environmentalism, Genetic determinism, Religious, Cultural psychology

Research on Ore and Mineral Specimens in the Edo Period, from Iwami Ginzan Silver Mine, Japan

*Ishibashi Takashi[1], Ken Ito[2], Nakano Yoshifumi[3], Fujiwara Yutaka[3], Watanabe Katsunori[2]

1. Masutomi Museum of Geocience, 2. The Meseum of Osaka University, 3. Iwami Silvermine Museum

The ore and mineral specimens from the Iwami Ginzan Silver Mine in the Edo period were found in Omori, Ohda City, Shimane Prefecture, Japan. Currently, there are 58 ore specimens in the Iwami Silvermine Museum, out of which 24 are wrapped in paper. The wrapping paper contains information pertaining to the name of ore or minerals from the Edo period, place of sampling, sampler, date of collection, and quality. The ore specimens mined in the Edo period are rare and thus valuable. The specimens of this study are very rare cases with ancient document information that are accompanied by academic values such as historical materials and cultural properties, which is considered highly valuable. These ore specimens were analyzed using X-ray powder diffractometry (XRD), energy-dispersive X-ray spectroscopy (EDS), and scanning electron microscopy (SEM). As a result, silver ore minerals such as native silver, argentite (acanthite), and tetrahedrite were found. We thoroughly read the old document to verify it.

In the early Edo period, Japan produced a large amount of gold and silver and used these abundant resources for trade. Japan's silver production accounted for approximately one-third of the worldwide production in the 16th and 17th centuries, and majority of Japan's production occurred at the Iwami Ginzan Silver Mine. Silver production at the Iwami Ginzan Silver Mine was one of the largest in the world during the time. However, only few silver ores, produced from this mine in the Edo period, are said to currently exist because of the heavy restriction and control on silver ores by the Tokugawa Shogunate of Japan.

The ore specimens introduced in this research were collected by the Takahashi family who was the “Yamashi” (manager) of Iwami Ginzan Silver Mine. It is presumed that the ores were mined later in the Edo period. The specimen is contained in a wooden box with a length of 31.2 cm, a breadth of 21.5 cm, and 4.0 cm from top to bottom. The box, stacked in three tiers, is internally partitioned into meshes (6 ×4) with a side of 4.3 cm. In this specimen group, various ores with high historical and cultural property value, including the high-quality silver ore “fukuishi” (the ore containing native silver), are collected.

This study suggests that these traditional ore and mineral specimens will provide a significant clue in clarifying the situations and methods of silver production in the Iwami Ginzan Silver Mine in the Edo period.

Keywords: Iwami Ginzan Silver Mine, ore specimens, mineral, silver, the Edo Period, Shimane

Natural disaster research archived in records in Kamo-wake-ikazuchi shrine (Kamigamo-shrine)

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Historical documents archived in shrines include natural disasters such as earthquakes and floods, and astronomical phenomena such as low latitude aurora and comets. Especially in the shrines of Kyoto, records can be reversed long, and the same phenomenon is often recorded in many shrines in parallel. By combining with current knowledge these old records can be valuable scientific data before modern scientific observations. What kind of natural phenomena is the recorded situation in light of the current knowledge and how each person of the time realized the situation, what kind of reaction did it respond to it and how It is possible to clarify whether they corresponded (such as relief and prayer). In addition to data as a natural science, this may be used as a data of science and technology sociology theory in terms of the record of the relationship between nature at the time and society.
The company diary (Kamigamo Shrine) 's diary ("Hinamiki"), which is currently conducting the survey, is a continuous record and continuous record over the 247 years from 1665 to 1911. Earthquakes, floods, low-latitude aurora, crime, and other events that people recognized as abnormal at that time are noted. Last fiscal year, we started using surveys such as photographing partial historical documents by utilizing the catalog of published books. Looking at the records of Kamigamo Shrine about the aurora witnessed in various parts of Japan in 1770, the discussion as to whether the people around the temple company gather or pray should continue until midnight, before the rare phenomenon we, people nowaday can see how people responded.
By investigating the relationship between other phenomena such as earthquakes and prayers, it is possible to see in detail the nature view at the time and its transition, including the magnitude of the phenomenon, by discussing it. Approaches from both historical and natural sciences are essential. Historical materials of shrines in Kyoto are huge, and it is impossible for all researchers to decipher just the company diary of Kamigamo Shrine. As a means to solve this problem, decryption by citizen participation can be considered. Such efforts are not only fusion of different fields among researchers, but also from the viewpoint of citizen science, fusion with citizens is effective, so that we can use these records as material of research about the relationship between the present science, technology, academia and citizens, not only in the past but also in present.

Keywords: natural disaster, archives

The Development of Space Geodetic Technologies and The Transformation of the 'Form of Life' of Researchers

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After 1980s, space geodetic technologies drastically changed the environment of researchers. These technologies, such as VLBI, SLR, GPS, SAR, GRACE and GOCE, have enabaled researchers to acquire gravity and deformation data semi-automatically. On the other hand, they allowed resarchers to study without any observations by themselves. In this paper, I will discuss the relationship between the development of observational technologies and the transformation of research style of researchers.

Keywords: Artificial Satellite, Geodesy, Research Style

Proving method by Abduction of *New stationary cosmology* in astrophysics.*(Describe the Earth-centered Redshift and isotropic background radiation, Neither Expansion nor Creation)*

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1. SEED SCIENCE Lab.

A new stationary universe[1] (neither expansion nor substance creation) can explain the red-shift of the earth-center and isotropic background radiation.
Why is redshift shifted farther away from Earth, although Earth is not in Center of Universe?
Why can we explain the undetectable expansion on the Earth with distant light?
<< Explanation of Red-shift >>
Steady universe that can explain the global red shift and isotropic background radiation.In 1929, Edwin Hubble proposes that there is a proportional relationship between the nebula distance from the earth and the red-shifting. That rule is called Hubble's Law.The speed of the galaxy can be represented mathematically, v = H ×d (1)

Where V (velocity) is the outward velocity in the radial direction of the galaxy and d (distance) is the distance from the earth to the galaxy.The Hubble constant H is H = + 500 to 560 km / sec / million / sec. 1929 to 1931. Recent values are 72 ±4 km / sec / million / secs.
<<Expansion universe hypothesis>>
According to Friedman's hypothesis, if the observation result is interpreted as Doppler effect only, it can be interpreted as an exercise in which the galactic outer nebula is expanding in the gravitational field equation.(A. Einstein)
In order to reproduce the red shift, the farther away from the center of the earth the source galaxy needs to retreat at high speed. In Newtonian mechanics, the inertial motion can only sustain constant velocity linear motion, so the outer space needs to continue to expand.Even if the reason for expansion is unknown, the red shift can be reproduced.There is no explanation as to why the value of the red shift is observed to increase as far as the Earth, mainly for the Earth, and why it is observed.It is said that the universe is expanding from observation results.It was because quantum mechanics was incomplete.Therefore, after explaining the interpretation of the red shift with the Doppler effect, it is a flower of various cosmology.

<< 1. Constant Universe Hypothesis of Quantum Red Shift[1] >>
Considering the law of conservation of energy and $E = h \cdot \nu$, the wavelength is shifted by α^2 times at a position α times the distance Rs at which the wavelength is started to be shifted after being diluted.
In addition, a redshift at the center of the earth (observation point) is also observed. Even if the universe is not inflated, a new stationary cosmology that can explain Hubble's red shift can be completed.

< < 2. Description of background radiation> >
If the universe is closed, background radiation can also be explained by frequency shift from the opposite side of the energy preserving universe.
If space is closed, 3 ˚K isotropic background radiation can also be explained by dilution of average energy by Lambert's law of the average star (the sun).
<< 3 Reason why the universe does not collapse, New interpretation of inertial mass >>

Furthermore, the inertial mass is a Mach dynamics interpretation, mass reaction against the resultant force (gravitational force) of all the universe, which is also the reason why the total mass of the universe does not collapse to a single point.

<< Unified interpretation by abduction >>

In Abu Da Kyung there is a need to be able to explain the current situation. Furthermore, if you can explain another current situation (isotropic background radiation), the truth will increase more. In this way, since it can be interpreted uniformly by the new stationary space hypothesis, ***there is no need for expanding the outer space, and there is no need to exercise in the distant universe. There is also no need for the quasar to move beyond the speed of light.***

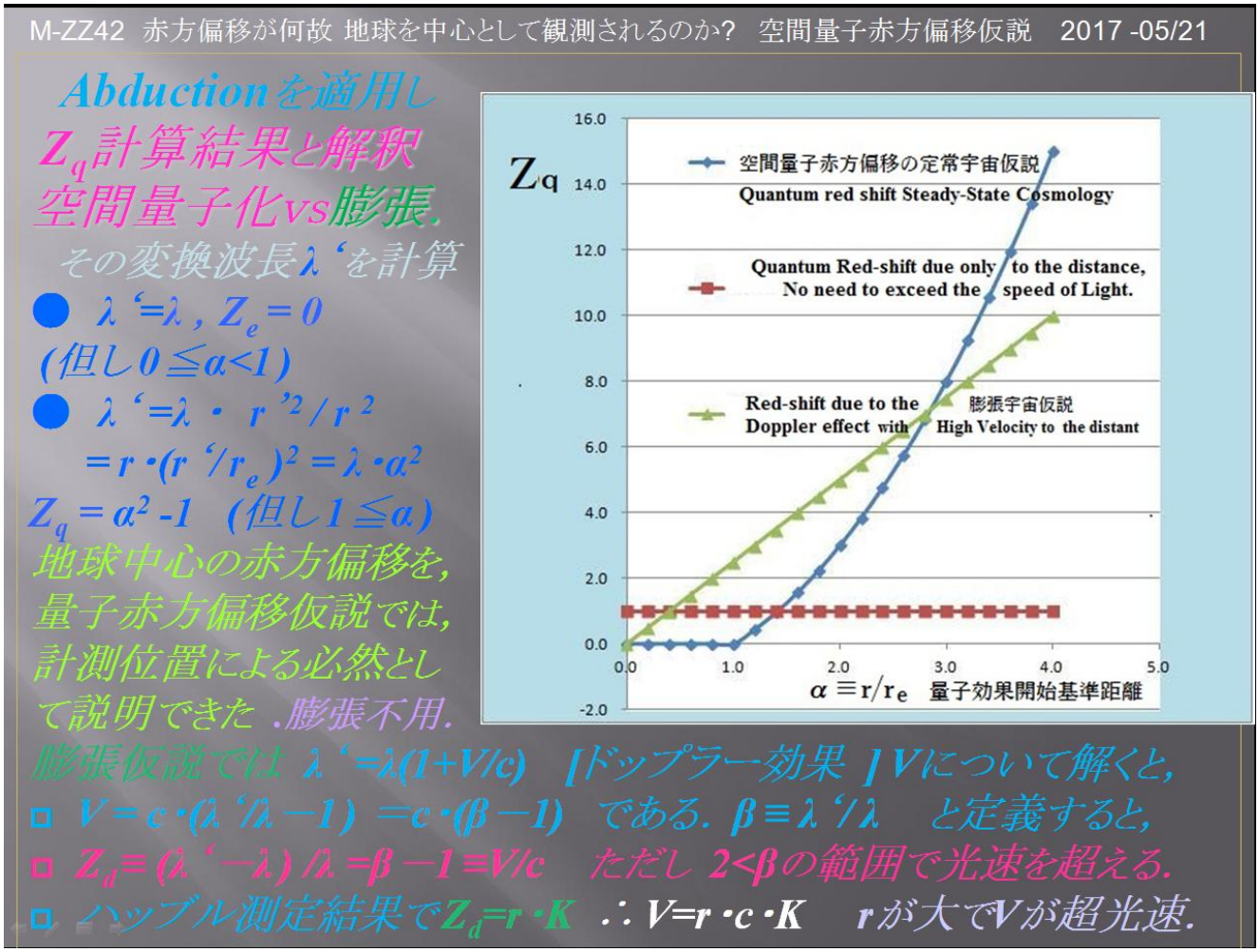
I wonder if energy is necessary for the space to expand.

Since the space does not expand, a new mechanism is unnecessary.

Observation results of the universe are difficult to explain either by induction or by deduction.Being able to propose a reasonable hypothesis that can explain it unifiedly helps explore the truth in abduction.

[1]Space Quantum Red Shift Hypothesis and New Theory of Non-Expansion Universe AKIRA TANEKO.

Keywords: Proving method by Abduction of stationary universe., Collapse of the Expansion Universe Hypothesis, The mystery of redshift that Earth is the center, Mystery of isotropic background radiation



Proof method of origin in space physics by abduction, at the past before the earth and life are formed.
(Earth ·large red spot ·asteroid belt ·moon ·deep ocean floor ·plate tectonics ·life),
It is the best way to unifyly explore all origins.

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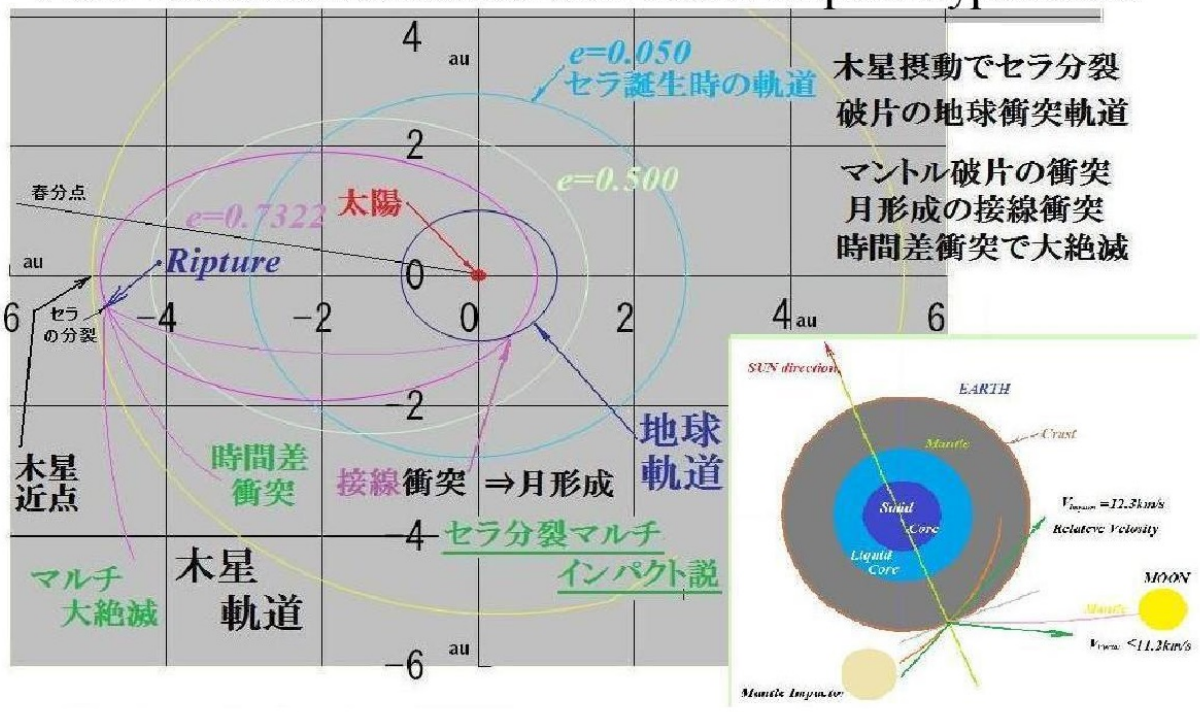
Proof method of origin in space physics by abduction, at the past before the earth and life are formed.(Earth ·Jupiter Large Red Spot ·Asteroid belt ·Moon ·Deep ocean floor ·Plate tectonics ·Life)
It is difficult to prove the Origin of the earth and Life with Induction and Deduction, and demonstration can not be realized even with unknown initial conditions.In cosmology and geophysics, there is a need to approach the origin before the birth of mankind, and the time machine is not realized now, so the method was sought.

However, ***Aabduction (Creative inference) can prove its origin.***In the origins of the solar system, the origins of the earth and the origin of life, there is a present situation as a result of a one time origin and evolution.When the hypothesis is correct, you can explain all the results in a unified way.However, in the case of the wrong hypothesis, only a part of the results can be explained, and **a new contradiction arises that a new mystery will be born.**
In other words, even a single source and evolution can be verified with multiple items with the same initial conditions and progress of evolution, so it is perfect verification that you can explain multiple items in a unified way.Conversely, the good or bad of the hypothesis can be verified immediately.
Naturally, the hypothesis needs to be physically meaningful and evolution occurs according to scientific laws.

When verifying "multi impact hypothesis" by abduction it was able to verify uniformly with the following items.
"The origin of the deep oceanic crustal deep ocean occupying 70% of the earth's surface area, the origins of the moon, the density difference of the front and the back of the moon the origin of the mystery of the eccentricity, the core eccentricity of the earth Origin, origin of plate tectonics and boundary cracks, origin of plate movement, origin of movement direction change, origin of tilt axis tilt from Earth's revolution surface, origin of asteroid belt, origin of differentiated asteroid, origin of Jupiter great red spot, Origin of differentiated meteorite, Origin where core-mantle ratio of Mercury is double of Earth-type planet, reasons why Antarctica does not move, origin of Kimberlite pipe, origin of arcuate archipelago and back arc basin, origin of plate mutual submergence , The species extinction is the origin of repeated species "
It is the best way to unifyly explore all origins.

Keywords: Proof method of origin by abduction, Earth •large red spot •asteroid belt •moon •deep ocean floor •plate tectonics •life , the best way to unifyly explore all origins

The Origin of The Moon and The deep sea floor bottom and Plate-Tectonics elucidated with Multi-Impact Hypothesis.



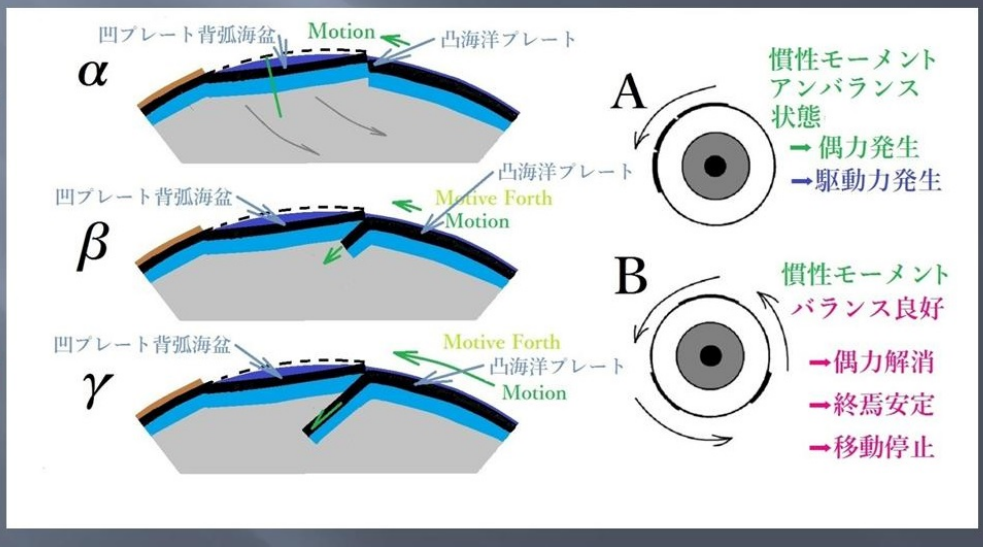
O8-08 The Origin of the Deep Ocean Floor and the Plate-Tectonics, Elucidation of the Driving Force, The Origin of the Moon and the Earth Deep Ocean Floor with Multi-Impact Hypothesis *2016 9-14*

8. プレートの駆動力,同じ密度のプレートが上下に重なる理由

8.1. プレートの駆動力は謎であった. ①.マントル対流仮説(.ホームズ)
②.前引き,後押し仮説 ③.リソスフェア厚さ傾斜仮説 ④.プリューム仮説
⑤. 慣性モーメントアンバランス解消偶力説 (本仮説) 偏芯の解消偶力.
マルチインパクト仮説で地殻プレートが図Aの状態⇒図Bの均質安定状態.

8.2. 同じ密度のプレートが他方の下に潜り込んで,海溝と和達・ベニオフ帯を形成するメカニズムの謎も有った. 衝突剥離時のアイソスタシーで凹海盆 α.

が形成された.
凸プレートと,凹プレートが押し合うと,凸プレートが折れ曲がって,凹プレートの下に潜り込む. β.
更に深く和達・ベニオフ帯を形成して,地震発生面に成る.



Transactional Carbon Accounting

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Accounting for the effects of anthropogenic changes in carbon flux within the earth's critical zone will be a major, fundamental challenge to address carbon-driven climate change. As a scalar path-function measure of equivalent inorganic carbon emissions, CO_2e is a necessary but insufficient metric for global carbon management. We propose a new, comprehensive strategy for fiscal accounting of anthropogenic changes in carbon flux that employs a vector, state-function, temporal metric applied to each microeconomic transaction[i], forming the basis of a transactional accounting system.
Simply stated, the proposed metric is a measure of the temporal velocity of carbon in the critical zone toward sinks such as the atmosphere and oceans, reflecting how we employ a carbon flux temporal differential to achieve a carbon-based energy differential.
This accounting methodology allows for a granular, more detailed analysis of carbon-related anthropogenic activity within a broader, more comprehensive overall framework for all such activities at all levels of the economy. In turn, the methodology promotes a more detailed macroeconomic assessment of carbon, such as in international trade flows.
A simple electrical circuit can demonstrate the vector, state-function, temporal carbon metric. The total resistance of multiple resistors in *series* is simply the sum of the individual resistors. For resistors in *parallel*, however, the total resistance is determined by adding together the inverse of the resistance, or conductance, of each of the individual parallel circuits. The inverse of the total conductance is then the total resistance of all the parallel circuits.

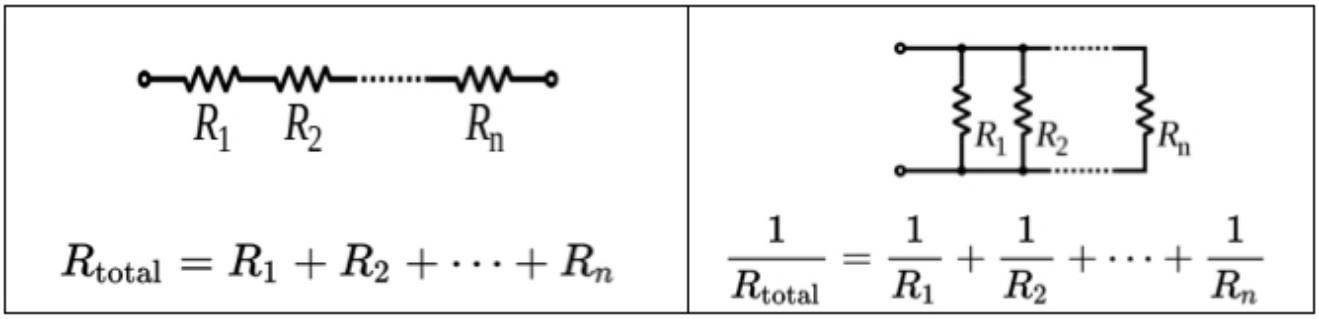
(insert Resistors.jpg image here)

[ii]
Electrical conductance is a simile for carbon flux in that we may add parallel carbon circuits, or flux, together to determine the total carbon flux to or from a carbon pool or sink. Until now, however, a simile for electrical resistance to describe the temporal (series) resistance of the flow (or flux) carbon toward a pool or sink has not existed.
A new term is needed to capture the conceptual inverse of carbon flux; a proposal for such a term is 'obdurance', represented by the Greek lowercase letter omicron (**o**). As a temporal metric, the unit for obdurance is time, preferably years. Whereas electrical resistance is a measure of how much opposition there is to the passage of electrons[iii], carbon obdurance is a measure of how much temporal opposition there is to the passage of carbon atoms from one state or sink in the critical zone toward the atmosphere and oceans. A convenient way to make fractional changes in obdurance equivalent is to take the logarithm of the obdurance to convert it to a proposed new property, 'carbon quality', represented by 'cq':
carbon quality (cq) = $\log_{10}$(obdurance) = $\log_{10}(o)$
The electrical circuit metaphor may provide further insights and tools to help apply transactional carbon accounting at each incremental step in the anthropogenic carbon cycle for managing anthropogenic carbon-driven climate change.

Application of the temporal carbon metric would result in a closer correlation between the behavior of carbon in the critical zone and the temporal consumption of carbon by the global economic engine.

[i] A transaction is a business event that has a monetary impact on an entity's financial statements and is recorded as an entry in its accounting records. Bragg, Steven. "Transaction Definition - AccountingTools." Definition - AccountingTools. AccountingTools, 2017. Web. 15 Feb. 2017.
[ii] Wikipedia contributors. "Series and parallel circuits." *Wikipedia, The Free Encyclopedia*. Wikipedia, The Free Encyclopedia, 12 Feb. 2017. Web. 15 Feb. 2017.
[iii] Parejo, Juan Carlos. "Resistance and Ohm Law." Petervaldivia. Www.petervaldivia.com, 2015. Web. 15 Feb. 2017.

Keywords: Vector, State-function, Temporal, Economics, Metric, Circuits



Discovery of the List of Fossil Localities in Japan(1884)

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The List of Fossil Localities in Japan(1884) was discovered in the Library of Geological Institute, the University of Tokyo. It includes 360 fossil localities. Some of the names of geologic ages, fossils and stones are different from modern usages. Some are written in Chinese, and some names of fossil are old term used in Edo Era. It shows the efforts of Japanese paleontologists of that days.

Keywords: The Geo1ogical Society of Japan, fossil locality, 1884

