Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

G01-01 Room:202 Time:May 20 09:00-09:15

Changes in building stone industry after the second world war in Japan

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Building stone industry in Japan first occurred following the introduction of western style buildings and houses to Japan. This study explored into the official statistical data to find evidence about the change in the structure of the building stone industry in Japan. The used data are mainly the import and export of stones and stone products, and the data concerning the numbers of quarries or relevant factories in Japan. It was clear that the Japan's official data are not enough to display the long-term industrial changes, so some books and articles concerning several building stone firms were also explored to reconstruct the full image of the Japanese stone industry in the old days.

Keywords: building stone, tomb stone, import, official data

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Disk-recording seismographs developed by J. A. Ewing

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James Alfred Ewing (1855-1935) made various improvements to the horizontal seismograph developed in 1880 by him. He also designed a vertical seismograph of which idea had been given by Thomas Gray (1850-1908), however, did not complete the instrument until his leave from Japan in 1883. The disk-recording seismographs were used at the Tokyo (Imperial) University in two decades probably because of an advantage in rigid recording surface, although handling of the disk was troublesome and arc-like records were complex. Nevertheless these instruments were not quite constructed by sophisticated technology at that time, reproduction of the instruments is not so easy at present. In Japan of 1880s who did manufactured the seismographs?; what components of the instruments were available domestically? Curiously, seismographs in the 1880s and the1990s were not installed dampers, although some scientists claimed damping mechanism should be attached to such instruments. The early worker might have though the seismic wave did not include long period components and use of pendulums of appropriate period was sufficient for observation of earthquakes.

Keywords: J.A.Ewing, early seismographs

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A few remarks on Alfred Wegener (1880-1930)and Edmund Naumann(1854-1927)

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This year 2012 is the 100th anniversary of the Continental Drift Theory proposed by Alfred Wagener (1880-1930). In the book of 'die Entestehung der Kontinente und Ozeane', there is description of Japanese Island Arc and Fossa Magna proposed by Edmund Naumann (1854-1927).

As Naumann was the first professor of Geology of the University of Tokyo, many historians made research on the biography of Naumann. But many things such as the site of Dresden Polytechnic in the time of Naumann attended, the name of first wife of Naumann, and so on were left as unknown. A few remarks on biography of Naumann at present will be delivered

Keywords: Naumann, Wegener, Fossa Magna

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Why was the view that faulting causes earthquakes rejected inJapan

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Nowadays most earth scientists believe that most earthquakes are the result of faulting. But until the early nineteen-sixties, a controversy lasted over the question whether faulting was the cause of earthquake or faulting was the result of the earthquake in Japan. Although the theory that a double couple force causes a fault had been presented in the early nineteen-thirties and the theory could explain observation data satisfactorily, the view that earth block movements or subterranean magma movements causes earthquakes were more popular.

The reason why the view that faulting causes earthquakes had not been accepted would be thought that a double couple theory did not explain the origin of a double couple force bringing about faulting. The advent of the seafloor spreading hypothesis changed the situation, because the hypothesis could explain the origin of a double couple force. It owes to the seafloor spreading hypothesis that the double couple theory had been accepted in Japan.

Keywords: faulting, block movement, magma, double couple, seafloor spreading

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Collecting Materials for the Study of Contemporary History of Earth Science in Japan

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More than sixty years having passed since the end of World War II, it is noteworthy that the study of history of geoscience has increasingly attracted scientists and historians these days (Editorial Committee of History of Geosciences in Japan 2008-2010, One Hundred Years of the Researches of Geophysics in Kyoto University 2010-2011, Working Group of Japanese INHIGEO Members 2011). Unfortunately, however, we have much concern about the lack of systematic attempts to collect and store the memories and records for historical researches, which otherwise in many cases may be scattered or seriously damaged.

In order to advance the study, we have started collecting the historical data such as official documents, conference reports, private notes at various meetings and lectures, written messages, manuscripts and oral histories of geoscientists. These are temporarily classified into two: the one is about the history of universities and institutions, for example the department of Earth Sciences of Nagoya University; and the other is about individual scientists such as the late professor Akiho Miyashiro (1920-2008).

Nagoya University established the Department of ”Earth Sciences” in 1949, which naming was the first case in the old educational system of the national universities in Japan. Basic idea of ”earth sciences” had been discussed among the professors of the School of Science during and after WWII. The educational program was entirely invented, which included not only geology but also geochemistry and geophysics. After half a century later, however, new trend of science forced the department to be changed into more advanced form of investigation and education in 1996, now called as the Department of Earth and Planetary Sciences. Thus we suppose the collecting historical materials of the department would contribute to establish the institutional history of the science in post-war Japan.

As for the history of earth science itself, we should pay attention to the works of Miyashiro, who gave the most significant influence upon Japanese geologists not only in the field of metamorphic petrology but also in the global geology covering plate tectonics. The materials we have collected include a) private letters communicated by Miyashiro in Albany with his Japanese friends, b) unpublished drafts on the history of geology in Japan, and c) books in his own library concerning philosophy of science, history of geology and so on. These are grouped as information from four stages: 1) around 1980 when he worked for editing and publishing the IWANAMI KOZA for Earth Sciences in 16 volumes, 2) 1994-96 when he wrote a series of the essays entitled ”What is Geology?” in Japanese magazine for science, 3) around 1998 when he published his book KAGAKU KAKUMEI TOWA NANIKA [What is Scientific Revolutions?] and 4) the latest stage when he wrote the history of geological societies in Japan. We believe this small step would contribute to understand the life and work of the famous erudite geologist, avoiding triumphalism, in the contemporary history.

Based on these materials, we will be able to clarify the contemporary history of earth science in Japan. As is reported at the last meeting of the JpGU (Aoki and Kuramoto 2011), our research group named ’CHES (Contemporary History of Earth Science)’ consisting of geologists, geochemists, geophysicists, philosophers and historians would cultivate the future programs of the science not only in its academic form but in the educational system and ultimately render some service to our society in general.

Keywords: history of earth science, Showa post-war period, Nagoya University, Akiho Miyashiro, collecting materials

Japan Geoscience Union Meeting 2012
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G01-06 Room:202 Time:May 20 10:15-10:30

Archiving Historical Materials of Earth Science: A Case of the Research on Seitaro Tsuboi Materials

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Today, the society has become more dependent on science and technology. It is therefore essentially necessary to study about them. History of Science (HoS) is a discipline that evaluates how science and technology work from historical viewpoint. It is needless to say that collecting and analyzing historical materials are inevitable to conduct HoS researches. However, there is a great difficulty in handling such materials of recent times, too many materials to evaluate.

The author has studied history of geology of modern Japan, and one of the main subject is a geologist Seitaro Tsuboi, who had greatly influenced geology in Japan. Shogoro Tsuboi, one of the first Japanese anthropologists, was his father, and their materials have been collected and archived by Multi-media and Socio-information Studies Archive, University of Tokyo. The author has studied the materials since 2011.The author introduces the latest findings from the study of them.

Keywords: History of Geology, Archive, Seitaro Tsuboi

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Observing Geodesists?: Cultural Anthropology on Geoscience

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Anthropology of science, which appears in 1970s against a background of Kuhn's theory of scientific revolution, extended the targets of anthropology into laboratories, which are highly "modern" field ever since. The mission of this discipline is to understand the unique characteristics and anthropological meanings of scientific activities through describing them "thickly".

The speaker is fieldworking on a geodesy laboratory since June 2010. The central aim of my research is to answer the following question: "why can scientific accomplishment be accumulated, though scientific researches are driven by each scientists's interest?"

In this presentation, the speaker will focus on the practice of inversion analysis, which is one of the most important practices in geodesy. The speaker divide the inversion practice into two phases. The first phase is called "measurement", the practice of collecting semiotic data through operating machines with operating instructions. The second phase is called "operation", the practice to process the data which is collected by "measurement" and to understand the natural phenomena such as earthquake and eruption.

While it seems that "measurement" is a strictly normative activity that is controlled by operating instructions, "operation" seems unrestricted practice though some aspects are routined. To understand the seemingly disorganized activity, the speaker will prescribe "operation" as semiotic operational sequence which consists of

"calculation of measured value", "correction" and "analysis". And then the speaker will define the practice of "interpretation", which creates a brand new sequence and attach into the existing sequence.

The main focus of this presentation is to examine the characteristics of "interpretation". Is "Interpretation" in geodesy, as the word implies, subjective? Or, as conventionally we thought, do scientists (geodesists) make a "objective" knowledge of the world by the practice of "interpretation"? In this presentation, emphasizing the importance of "drawing" of data, the speaker will explain the process that the "interpretation" of a geodesist takes the validity.

Through these argument, the speaker will suggest the cosmology of measurement science. It is neither the activity that tries to get the objective knowledge about the world, nor the practice that totally depends upon the scientists subjectivity. Such cosmology will contribute to understand what science is for human.

Keywords: Anthropology of Science and Technology, Geodesy, Measurement Science, Cultural Anthropology, Science, Technology and Society, Science Studies

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Senior High School Course ”Basic Science” for Learning Meta-science

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Senior High School Course ”Basic Science” for Learning Meta-science will be argued.

Keywords: Basic Science, History of Science, Meta-science

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From philosophy of science to science of science - A casestudy on earth science

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According to Turchin(2003) which advocates historical dynamics, some discpline becomes mature science when qualitative (verbal) analysis develops into quantitative (mathematical) analysis. There are some examples to testfy this: Newtonian dynamics, synthesis in evolution theory. Then, as we turn to the philosophy of earth science, each study puts forward qualitative analysis based on the results of New Philosophy of Science during 1960s to 1970s (Frankel 1988, LeGrand 1988, Stewart 1990, Inkpen 2005). After that, this field seems to have been stagnant and so we need to develop more experimental efforts.

In this presentation, we start from Laudan & Donovan (1988) (Scrutinizing Science : Empirical Studies of Scientific Change, Kluwer) and try to consider how to turn philosophical theses into mathematical models and test them against empirical findings. First problem which faces us is that, in contrast to historical dynamics, we lack statistical data in history of science. For example, in historical dynamics the data on imperial expansion/contraction are available, while such data and indexes are not yet available in history of science.

Moreoever, we have the problem on what we count as scientific growth. A representative index is the increasing number of journals and papers. However, this analysis (scientometrics) is rather external as opposed to internal examination of science, thus is different from making philosophy of science itself science. Another promissing hypothesis is, science is problem-solving acticity, and therefore its growth can be measured by the increasing number of problems. This presentation discusses what problems await us in this line of thinking.

Keywords: philosophy of science, history of science, geoscience, science of science

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From earth science to earth and planetary science as multidisciplinary fields

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One of the most important mission of the philosophy of earth and planetary science is to understand the history on how the earth and planetary sciences have emerged from the earth sciences and its sociological background and dynamism of scientific thought. In other words, this issue may be what the earth science is and also what the earth and planetary science is. In a popular scenario (Marvin 2002), the earth and planetary science had begun to emerge through the application of the methods of earth sciences for the Moon during the great Apollo program. This scenario probably captures some truth, but there remains another question that “the earth science” here covers not the entire earth sciences but a part mainly of solid earth sciences.

Some earlier specific fields of earth and planetary science already dealt with the Moon and planets in the same way as the Earth significantly prior to the beginning of the space age. For example, Sir Jeffereys (1891-1989), famous for his pioneering work obtaining the seismic velocity structure of the Earth, had also studied on the interior of the Moon and the Saturn’s rings at the early 20th century. The *Geophysical International Journal* (1922-present), in which many epoch-making classic articles on the earth’s internal structure were published, were originally the supplement of a journal of Royal Astronomical Society, suggesting that many of scientists treated the Earth as a celestial body at that time. In the field of geochemistry, the idea recognizing the meteorites as a primitive materials providing crucial reference to understand the terrestrial materials was also put forward in the early 20th century (Goldschmidt, 1938). The journal *Geochimica and Cosmochimica Acta*, which treated equivalently the geochemistry and cosmochemistry, was first published in 1950 earlier than the beginning of space age. These trends may be the seeds for the modern earth and planetary sciences.

The establishment of modern earth and planetary sciences may be closely related with the building consensus of the earth sciences as a multidisciplinary field. The program of International Geophysical Year (1957-58), which organized cooperative searches covering the solid earth sciences, atmosphere-ocean sciences and the space physics, played a significant role in making linkage among previously-independent research fields about the Earth. This program, originally proposed by Van Allen, had been backuped by the development of space vehicle technology, which in fact provided the first artificial satellites Sputnik 1 and Explorer 1.

During the same era, the planetary sciences came to be clearly defined as another multidisciplinary field. It is noteworthy that this was not only based on the space programs but also was dependent on the remarkable findings in the neighboring research fields such as the establishment of the theory of stellar formation and evolution, accumulation of the global knowledge of the Earth, and the construction of molecular genetics. In the preface of *Icarus*, the journal first published in 1962 by American Astronomical Society, we find the following statement in the first paragraph:“It stands, above all, as a tribute to the new interdisciplinary science of the solar system–which is emerging to claim its own identity at the cross-roads of the allied disciplines of astronomy, geology, geophysics, meteorology, geochemistry, plasma physics, and biology–and a recognition of its anticipated importance in the years to come.” This put emphasis on this new scientific field to be characterized by its multidisciplinary nature. The ensuing achievements of planetary exploration programs seem to have just embodied this discipline associated with the development of the theory of planetary formation.

Keywords: philosophy of science, history of science, earth and planetary science, multidisciplinary field