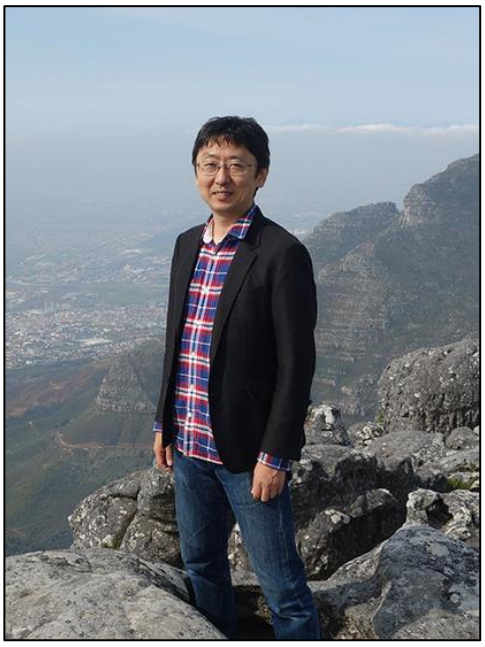
My Earth science educator story – Takashi Sawaguchi
What I did, why I did it and what happened


On the Table Mountain, Cape Town, 2016.

Dreaming to be a scientist in my childhood

I do not remember when I first became interested in science during my childhood, but I grew up surrounded by science materials. One of these was a monthly science magazine that regularly arrived in the post, which included an appendix of small home science experiments. I became completely absorbed in these handicraft experiments. I used to go to a science museum near my home town, Yokohama City, to play in hands-on exhibitions and to enjoy the planetarium every month too. I became a member of the radio ham club at the science museum. In the mid-1980s, when I was a junior high school student, I became addicted to 8 bit microcomputers. At that time, neither "Windows" nor "Macintosh" existed, I learned "BASIC" programing by myself, creating a simple character-based game like "Mastermind". My summer holiday homework was simulating the trajectory pattern of balls thrown at different angles on the screen. From this time onward, my dream was to become a scientist.

At that time my uncle died of cancer. He had been fluent in English and Arabic, and had stayed in Saudi Arabia for a long period, to expand his business in the Middle East. His adventurous life story was fascinating and I always looked forward to his visits to my house. He told fascinating stories of being a university student too. The university where he spent more than four years and graduated from, was Waseda University, one of Tokyo's private universities. I decided to go to Waseda University too.

Studying Geology and Pedagogy at Waseda University (1990 ~ 2002)

In 1990, I was lucky enough to be accepted into the School of Education at Waseda University. As part of the orientation for new students, seven professors, of geochemistry, mineralogy, mining geology, sedimentology, paleontology, petrology and structural geology, introduced their scientific interests and highlighted the significance of geology. To be honest, I was more interested in physics and wished to study geophysics at first, but geology soon took over my interests. After three years of studying geology, I visited my supervisor, Prof. Hideo Takagi who was a structural geologist, to discuss my graduate thesis theme. He showed me a greenish hand specimen and said; "This is a sample of mantle peridotite. I have been working on mylonites of crustal rocks along large tectonic fault zones myself. But most Japanese geologists have not yet paid much attention to the mylonites of 'peridotites'. The deformation microstructures of peridotite mylonites in Japan are still unknown." I responded, "I will try to do this". This was just the starting point of my research as a structural geologist.

As an undergraduate student majoring in geology, I also took courses in pedagogy, educational psychology, and other related subjects, gaining a certificate for teaching

in junior/senior high schools. When I was a senior student, I taught geology to high school students at my *alma mater*, in a four-week teaching practice. Mr. Yukio Wada, who was not only a geology teacher but also my home room teacher, gave me lots of advice and suggestions. This was when I first saw the fun of teaching geology to students.

Field Survey of pseudotachylites at a height of 4,200m in Nepal Himalayas, 1997.

Field work in Hokkaido

I studied peridotite mylonites in the Horoman peridotite complex, one of the alpine-type peridotite massifs in the Hidaka metamorphic belt, Hokkaido, northern Japan. This complex was important to petrologists because of its fresh peridotite (weak serpentinization had preserved the original olivine grains). The 4th International Lherzolite conference and field trips were held in there in 2002.

Field trip to the Horoman peridotite complex during the 4th International Lherzolite Conference, Hokkaido, 2002.

Hokkaido, my adopted hometown, is a precious wilderness area and my fieldwork required me to be wary of wild bears in their native surroundings. In order to collect rock samples for structural analysis, we needed oriented blocks of at least 10x10x10cm in size, so that the kinematic foliation and lineation could be measured in the re-oriented sample in the laboratory. The density of peridotites reaches 3.3gcm^{-3}, and so one hand specimen weighs 3kg. Ten specimens (30kg in total!!!) were just too heavy for me to carry. I spent up to five months a year field mapping across mountains and rivers, struggling against gravity. Based on the geological and structural maps of the Horoman peridotite complex, drawn through all this hard work, I was able to defend my PhD dissertation in 2001. This discussed the relationships between the tectonic history of collision in Hokkaido island and the emplacement process of the Alpine-type peridotite massifs. The results were published in *Tectonophysics* and other related papers (Sawaguchi, 2004). Mount Apoi, which is composed of the peridotites, has been certified as an UNESCO Global Geopark since 2015.

Teaching web technology at Sony Institute of Higher Education (2004 ~ 2010)

In the Japanese Junior/Senior high school national curriculum, produced by the Ministry of Education, science is divided into four categories; Physics, Chemistry, Biology and Earth Science. Earth science includes astronomy, climatology and geology. Earth science is not a popular choice of Japanese high school students, and so there was little opportunity of employment as a new Earth science teacher. In the mid-1990s when I was a graduate student, it was a dawn of the internet. I learned World Wide Web (WWW) technology and network engineering by myself. I was also familiar with Adobe Illustrator and Photoshop and so could draw figures in my research papers. I taught web programming and designing to students at several vocational schools as a part-time lecturer for two years. In 2004, I gained tenure as a

lecturer in the Department of Informatics and Media Technology in the Sony Institute of Higher Education. So, my first tenured position was not as a geologist but a web-programing teacher. You may wonder how a geologist could become a lecturer of informatics. I later asked the Dean of the Department why I had been selected as a lecturer. He said, “ICT technology changes very fast. Professors must update their knowledge regularly. I know you are a geologist, but you have already changed once in your career, so you can change again. That’s why we welcome you to our faculty”. I had been teaching web programing and designing for six years.

Field survey under the deep Indian Ocean (-2,420m) in the submersible research vessel, “*Shinkai 6500*”, 2006.

Teaching geoscience to students at Toyo University (2010 ~ present)

In 2010, I moved to Toyo University, one of the largest universities in Japan, with 11 faculties, 44 departments and over 30,000 students, as an associate professor, teaching Earth science AGAIN! I usually give three to four Earth science lectures a week, with 300 students in each class, and I am thinking about how to actively involve students in my lectures. Most students have their own smartphones, and I have introduced the interactive web applications I have developed, in lectures on the intuitive understanding of the Earth.

New technology and new pedagogy in geoscience

I have three different backgrounds to my career, “pedagogy”, “geology” and “web technology“. Looking back, I can see how all experience builds the cornerstones of life, including the hard times of straying into darker paths as a graduate student or post-doc. With the innovation of personal-computers, multi-touch devices and the internet in recent years, the world has become a smaller place and new technology has dramatically changed our lives. We are standing on the cutting edge of innovation such as Augmented Reality(AR), Virtual Reality (VR), Internet of Things (IoT), Open Data Science, Virtual Field Trips, holograms, and so on. I hope to contribute to the geoscience education community by applying these new technologies to a new pedagogy of geoscience education.

Takashi Sawaguchi, aged 45, Tokyo, November 2016, tsawa@toyo.jp

References

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