

## **My Earth science educator story – Yoshisuke Kumano**

### **What I did, why I did it and what happened**



#### **My childhood**

I was born into a family whose business was selling fish to hotels, hospitals, sushi-bars, and the general public in Sendai, Japan. So ever since elementary school, I have visited the fish market with my father, encountering many different kinds of fish, gastropods, snails, bivalves, and so on.

#### **Geological research at middle school**

When I was at a middle school, I was the leading student of the tennis club where the coach was the science teacher at the middle school. His name was Mr. Yoshiaki Katoh and he had graduated from the earth science education course in the Faculty of Education, Tohoku University in Sendai, Japan. He loved earth sciences and educated many students and guided many group research projects in Paleontology, Meteorology, and Astronomy with the middle school students. Many interesting earth science research projects were produced by the middle school and many of these gained national level prizes around the year 1970. We discovered changes in climate during the Tertiary period in the Sendai region, Japan, with accompanying evidence of species change. We won the special Prize of the Governor of Miyagi Prefecture.

#### **From high school to college**

I went on to Sendai Second High School (Sendai Niko) where I became chair of the earth science club. We conducted many field surveys and many shooting star observations. Many of the students went on to enter the Faculty of Science at Tohoku University, however, I went to teacher training college, the so-called, Miyagi University of Education. My major was in earth sciences. I was lucky to be a member of the study group of Prof. Koichiro Masuda (1927–2013), a paleontologist. He encouraged me to continue my studies at Macalester College in the USA, with Japanese governmental funding. Macalester College was one of the greatest private liberal arts college in the US. My major was in geology for one year. One of my unforgettable memories was the month-long geological field trip through California, New Mexico, and Texas. After I returned to Japan, I carried out geological mapping of an area of 3 km by 4 km of Jurassic rocks. My new findings included the identification of the geological ages of the rocks on fossil evidence; these included one *Inoceramus*, one *Ammonoidea* and part of trunk of *Gymnospermae*. I also collected many kinds of igneous rock, prepared thin sections and identified them using a polarized microscope. I recorded geophysical phenomena and all together conducted a total of 60 days of outdoor fieldwork.

#### **The University of Tsukuba and Meikei High School**

Prof. Koichiro Masuda recommended that I should go to the Univ. of Tsukuba to study for the master's degree in science education; this was the central department in science education for science educational policy in Japan. Here I met several important Professors; Dr. Ichi Yoshimoto, Dr. Tsuneo Takano, Dr. Namio Nagasu, Dr. Kagetaka Watanabe, Dr. Manabu Kobayashi and Dr. Kazuhiko Nakayama who were the science

education policy-makers for the Science, National Course of Study for Japan. Here I discovered that research in science education, including in the earth sciences, aided the prosperity of our country, Japan. I learned a lot at the University of Tsukuba in the fields of science education and earth sciences.

After graduation from the Master's Course in Science Education, I became a science teacher at Komaba Attached School for one year and later at Meikei High School for eleven further years. I developed many interesting ideas in science education. One of the innovations was carrying out field surveys as the part of school events for 8<sup>th</sup> and 10<sup>th</sup> grade students. Science lessons were connected with the three-day field survey activities, together with science and social studies. At that time, with great help from the Principal, Mr. Minoru Okamoto, I developed an astronomical observatory with a grant of 0.25 million US dollars, and my astronomy club undertook many observations. We also ran many geological field trips with geology club students to study geoscience all across Japan. It is not surprising that most of these students became space and geoscientists or medical doctors, including the Japanese Astronaut, Mr. Akihiko Hoshide, NAOJ, Dr. Seiichi Sakamoto (Tsukukoma Graduates), AIST, Dr. Hiroshi Satoh Japan Geological survey, Dr. Teruki Oikawa, Meteorological Research Institute, Dr. Akihiko Murata and so on.

### **PhD program at the University of Iowa**

When I was science teacher, I was always seeking study abroad. I was lucky to pass the Fulbright Program competition for PhD students and moved to the University of Iowa (UI) with my family, supported by government grants. My major was in science education and minor was in geology. It took me four years to complete my dissertation in science education. My academic advisors were Prof. Robert E. Yager and Prof. John Penick who were renowned as the greatest founders of research into science education in the US. Many of the graduates educated at the science education center at the UI

became Professors in science education across the world! I took many courses in geology and paleontology from Dr. Brian F. Glenister, the ammonoid specialist, and others. I took part in many geological field trips around Iowa State, rich in so many Paleozoic fossils!!



Special Lecture to High School Students, 2014.

### **The researcher's life at Shizuoka University, especially in geoscience education**

I was accepted as a full time lecturer at Shizuoka University in 1993, Associate Professor from 1995, and Professor from 2005. This is my twenty fourth year as a science education researcher. One of the Emeritus Professors of Shizuoka University, Dr. Akira Tokuyama, asked me to attend the international geoscience education conference, GeoSciEd II, in Hawaii, where I met many geoscience educators from across the world for the first time. However, I have to mention a most important person, Dr. Victor Mayer from Ohio State University. Dr. Mayer visited Japan several times and Shizuoka University in particular, and together we wrote a paper submitted to "*Science Education*" in the UK in 1999.

One of the highlights of my professional life was the development of the National Course of Study for middle school science in Japan, from 2003 to 2009. After that many groups approached me about innovation in science education in my country, Japan. At the same time, we began the annual International Earth Science Olympiads (IESO), too. This year (2016), we will be holding the first IESO in Japan, at Mie Prefecture!! At the same time I was supporting Energy and

Environmental Education as the President of Japan's Association of Energy & Environmental Education (2011-2017). We are in regular communication with all sorts of energy companies, such as those using oil, natural gas, coal, methane hydrate, returnable energy sources and fission and fusion energy sources. In another initiative, I have been developing Earth and Space Education in partnership with Prof. Saito at Kyoto University. I am currently evaluating all my research from the perspectives of STEM education.

I am most appreciative of all the people who have communicated with me and guided me on the many wonderful journeys of my life. My adventure will continue for 100 years. I am looking forward over my next 40 years to meeting many old friends new friends in space and earth science. (I should add that I have many other science education stories, but in this review, I have focussed mainly on earth science education).



Mt. Fuji from close to Shizuoka University.

## References

Yoshisuke Kumano (1993). Implementation of STS Instruction in Meikei High School - Problems and Realities of Pilot Japanese STS Approach -, The Journal of Science Education in Japan, September Vol. 17, No. 3, 1993, 115-124.

Victor J. Mayer & Yoshisuke Kumano(1999). The Role of System Science in Future School Curricula, Studies in Science Education, Vol.34, 1999, 71-91.

Suzuki Midori, Yoshisuke Kumano, & Robert Yager,(2000) Assessing Science Literacy of the Students; Modeling upon "Six Domains of Science", Journal of Science Education in Japan, Vol.24, No.3, November 2000, 139-150.

Yoshisuke KUMANO, Kotaro ODA, Akinori Saitoh(2014), Effectiveness on Geo-Science Education using 3 Dimension Screen with Satellite Data-The Development and Analysis of Geoscience Educational Program: Dagik Earth -, International Conference on Geoscience Education, September 6, 2014, University of Hyderabad, Hyderabad, INDIA

Yoshisuke KUMANO, Masakata GOTO(2016), Issues Concerning Scientific Processes in Science Lessons Involving Outdoor and Indoor Activities: A Comparative Study of Scientific Processes in Japanese Science Classes and the Chronological Development of Scientific Processes in the US through NGSS, Bulletin of the FACULTY OF EDUCATION SHIZUOKA UNIVERSITY, Educational Research Series No.47, Mar.2,016, 93-104.

*Yoshisuke Kumano, aged 60, Graduate School of Science & Technology, Graduate School of Education, Shizuoka University, Japan, May 2016, kumano.yoshisuke@shizuoka.ac.jp*