

## Geoscience and Environmental Science Education in High School

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In 2005 the Science Council of Japan was reorganized. As a result of this reorganization, communication between previously separate societies was increased and coordination of both research and education in geophysics, geology, mineralogy, geography and related fields was greatly improved.

Geoscience is in part concerned with the scientific understanding natural phenomena such as earthquakes, volcanoes, tsunamis and extreme weather like storm and flood damage which can lead to natural disasters. It is also concerned with the scientific clarification of the transport of matter and energy in the Earth and with the understanding the long and short term interactions between various systems operating in it: this study is vital for a proper understanding of environmental degradation, global warming and similar phenomena that accompany the rapidly increasing global population. Because of this the study of the newly defined fundamental field of geoscience is of vital importance if mankind is to construct a stable and enduring society and so to continue to survive on Earth.

Since its foundation the Japan Geoscience Union (JpGU) has of course worked to expand fundamental research –knowledge for its own sake –in the various fields that it covers. But it has also strongly encouraged practical research focusing on aiding society with the issues discussed in the previous paragraph. As part of that process JpGU has stressed the urgency of using elementary, secondary, higher and lifelong education to improve the average level of scientific literacy, and made a number of practical proposals as to how this might be achieved.

Upon its founding in 2005 the JpGU published “High school scientific literacy: a proposal concerning the establishment and content of compulsory subjects within the high school science curriculum” . In 2007 this proposal was made more concrete and released as “High school scientific literacy: a proposal for the selection of compulsory subjects within the high school science curriculum” . Both of these documents were submitted to the Japanese Central Council for Education.

The idea behind these proposals was to provide the general population with sufficient basic scientific knowledge about both geoscience and environmental science that they may understand the various natural disasters and environmental problems that face society, and thereby be able to live safely and with peace of mind. Further, this knowledge should join physics, chemistry, biology and geoscience as part of a new core curriculum of high school science. Since high school science education changed to a selective system, the vast majority of students who have chosen to continue science education have chosen not to study geoscience, which is the subject that currently deals with these issues, and as this has now been the case for quite some time we are now seeing a reduction in the number of specialist teachers and a lowering of scientific understanding of natural disasters and environmental issues amongst the general public.

Building on the lessons learnt from the 2011 Tohoku Earthquake and Tsunami the Science Council of Japan Geoscience Committee released a proposal entitled “Lessons to be learnt about the role of geoscience in society from the 2011 Tohoku earthquake, tsunami and subsequent release of radioactive material” , and this document again stressed the necessity of raising general scientific literacy and ensuring the necessary supply of teachers to do so.

The Science Council of Japan has held a comprehensive debate about science education, covering a number of fields including geoscience. Based on an analysis of the current situation, in February 2016 they produced a proposal entitled “The future direction of high school science education” , with the

goal of drastically strengthening the general scientific literacy of the Japanese population. This proposal aims to increase scientific literacy by advocating a “scientific foundations” course (provisional name) as part of a strengthened upper secondary education syllabus. After taking this course it is suggested that students will build on it by studying physics, chemistry, biology and geoscience, but the divisions between these four subjects should be reduced and soon removed entirely. In July 2016 the JpGU proposed that all subjects in the high school science curriculum be made obligatory.