

Future Earth and Seismology

SATAKE, Kenji^{1*}

¹Earthquake Research Institute, U. Tokyo

Future Earth is an international and collaborate research program toward sustainable Earth environment. Here I will compare it with seismology and discuss their roles for the society. The most important feature of the Future Earth program is to promote collaboration with various stakeholders beyond academia in order to understand the environmental changes with natural and anthropogenic origins, to provide knowledge necessary for global developments, and to transform towards sustainable societies. The Japan's roles is expected in Asia, which has the largest population in the world and where the environmental and societal changes are rapidly happening.

For the environmental changes in Asia, natural hazards, both meteorological and geological, cannot be neglected. The 2004 Indian Ocean tsunami, caused by the Sumatra-Andaman earthquake (M 9.1), resulted about 230,000 casualties in more than ten countries around the Indian Ocean. The disaster was attributed to the lack of expectation of such a giant (M⁹) earthquake, tsunami warning system, knowledge and preparedness for tsunamis in the governments and citizens. In the last ten years, three regional tsunami warning centers were established in India, Indonesia and Australia, and they issue tsunami warning typically within 5 minutes of large earthquakes. In addition, studies of past tsunami deposits have indicated that a tsunami similar to the 2004 event occurred several hundred years ago. Environmental changes such as global warming or sea level changes are slow and long-lasting, while changes due to hazards are more rapid and short-term. Although different approaches seem to have been taken for these changes, future potential natural hazards must be considered for sustainable developments, hence long-term forecast of earthquakes and tsunami would be important.

After the 2011 Tohoku earthquake, the Seismological Society of Japan has formed a special committee, held several symposia, and published monographs. The main discussion points are why the 2011 Tohoku earthquake could not be forecasted, how the Society should be involved in national policies, what was lacking for disaster prevention, and how to transfer seismological knowledge in schools or media. A claim has been made that earthquake forecast is a trans-science issue, which cannot be answered by science. A new national project "Earthquake and Volcano Hazards and Observation Research Program" started in 2014, based on an official proposal to the government, emphasizes multi-disciplinary and inter-disciplinary researches and invited researchers from various disciplines such as history or archaeology.

Again, the unique aspect of Future Earth program is an inter-disciplinary research with natural, social, engineering and human sciences, and trans-disciplinary approaches involving various stakeholders beyond academia. It was proposed to co-design the research project and co-produce the results with society. Such interactions with society are common with seismology.

Keywords: Future Earth, seismology, relation with society, inter-disciplinarity, trans-disciplinarity