

Nuclear power plants in the seismic Japanese Islands and earthquake science

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The Japanese Earth science community is considered to have liability for having allowed the Genpatsu Shinsai (an earthquake-nuclear combined disaster; Ishibashi, 1997) to occur due to the severe accident of TEPCO's (Tokyo Electric Power Co., Inc.) Fukushima Dai-ichi nuclear power plant caused by the gigantic off-Tohoku earthquake (M 9.0) of March 11, 2011. In this presentation, I review how earthquake science, a part of Earth science, had been taking part in nuclear power plants in the seismic Japanese Islands before the Fukushima Genpatsu Shinsai, and discuss what it should do in relation to NPPs from now on.

Earthquake scientists, as natural scientists, may consider that they need not be involved in social practical matters such as NPPs, man-made islands, the linear Shinkansen, and so on, even though the seismic safety of these facilities is essentially based on the outcome of earthquake science. However, since we cannot ignore the aspect of disaster science, earthquake scientists should be active in examining problems with seismic and tsunamic safety of these facilities (which are serious factors of earthquake disaster!), sharing them, and explaining them to the public if necessary. Especially, in case of NPPs, from the viewpoint that the site condition is the first step for ensuring safety, it is a matter of course that earthquake science is concerned about the safety of NPPs in the seismic archipelago and has responsibility to questions of citizens. Because social problems tend to have political coloring, many scientists may think that they should not be involved in such matters in order to keep political neutrality. However, as Ishibashi (2000) pointed out, to pretend neutrality by being silence brings about a rather clear political effect (if seismologists say nothing about the problem of NPPs and earthquakes, it almost equals that existing NPPs are safe against any quakes).

I skip the details in this abstract, but in brief, Japanese earthquake science as a whole had not been eager in providing the latest knowledge of earthquakes and tsunamis in and around the Japanese Islands to the nuclear development community and in disseminating seismically dangerous factors of NPPs in Japan to the public, before the Fukushima Genpatsu Shinsai. And, although limited experts had been captured in "an atomic energy irregularity" and decreased the safety of NPPs by underestimating active faults, assumed earthquakes, design-basis earthquake ground motions, and tsunamis, the earthquake science community had not paid attention to the situation. Regardless of opinions for or against NPPs, such efforts as above should have been pursued as the social responsibility of science. At present, after we experienced the nightmarish Genpatsu Shinsai, the Japanese society lacks yet proper understanding of natural phenomena such as earthquakes, tsunamis, volcanic eruptions, weather disturbances, and landslides which are basic conditions for NPPs safety. Therefore, the Earth science community needs to make every effort to disseminate the latest knowledge.

In addition, the fundamental problem that is inseparable from the use of NPPs is the disposal of spent nuclear fuels. In Japan, at present, spent fuels are to be reprocessed and resulting high-level radioactive wastes are to be dealt with by geological disposal. However, the scientific possibility (safety during coming 100,000 years) of geological disposal in the Japanese Islands, an active mobile belt, is still open to investigation. In September, 2012, Science Council of Japan proposed a radical review of the geological disposal policy to Japan Atomic Energy Commission. It may be appropriate to set up a standing investigation committee in this Japan Geoscience Union in order to discuss whether the safety of geological disposal is guaranteed in Japan (although a session on geological disposal has been continued in the JpGU annual meeting since 2000, it basically assumes the enforcement).

Keywords: nuclear power plant, Japanese Islands, safety, Earth science, earthquake, geological disposal