

The giant tsunami had been forecasted, but not been included in disaster design

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Following the forecast of tsunami issued by the Earthquake Research Committee (ERC) of the Headquarters for Earthquake Research Promotion, Tokyo Electric Power Company (TEPCO) had estimated the height of tsunami as 15.7m at the southern part of the Fukushima No.1 nuclear plant, but had taken no measure by the time the giant March 11 tsunami flooded the site as high as 11.5-15.5m (Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company (ICAFNPSTEPSCO), 2011). The forecast by ERC is scientific and if it had been included in disaster design, it would have significantly reduced the number of dead and missing. One of the reasons why the forecast was ignored would be *idee fixe* that a large earthquake shall not occur where no large quake has been recorded. The government's misjudgment caused the massive loss of lives and the serious nuclear accident.

The long-term forecast that a tsunami earthquake as large as the 1896 Meiji Sanriku event has chances of occurring anywhere along the Japan Trench was issued in July 2002 (ERC, 2002). On the other hand in May, TEPCO calculated the design height of tsunami as 5.7m at Fukushima No.1 nuclear plant following Tsunami Evaluation Subcommittee of the Japan Society of Civil Engineers' Nuclear Civil Engineering Committee (2002). The design earthquake that causes the tsunami is a quake off Fukushima Prefecture. For tsunami evaluation, the seismic province map (Hagiwara, 1991) is suggested to use for unexpected events, but the map itself is based on the previous seismicity and was ineffective to raise the design height. The design was eventually determined by the highest recorded, which is closely related to the fixed idea. After the forecast of tsunami earthquake by ERC, TEPCO did not take any measure. In 2008, TEPCO examined the forecast and calculated the height of tsunami at Fukushima No.1 site as high as 15.7m but thought such a high tsunami never really takes place and took no measure (ICAFNPSTEPSCO, 2011).

Central Disaster Management Council set up in 2003 a technical investigation committee on trench-type earthquakes in the vicinity of the Japan Trench and the Chishima (Kurile) Trench. The committee selected three earthquakes, an earthquake off northern Sanriku coast, an earthquake off Miyagi Prefecture, and the Meiji Sanriku earthquake for tsunami damage forecast. These events are all located in the northern part of the vicinity of the Japan Trench and no measures against tsunami are taken in the central and southern part. Most of the lives are lost on the coast where the height of the March 11 tsunami exceeded more than twice that forecasted.

A long-term forecast of tsunami earthquakes is important for ERC because tsunami earthquakes caused severe damage in the vicinity of the Japan Trench (22,000 killed by the Meiji Sanriku earthquake and 5,000 by the 1611 Keicho Sanriku earthquake). Tanioka and Satake (1996) showed the Meiji Sanriku earthquake fault is close and parallel to the axis of the Japan Trench. Historical documents show evidence that both the Keicho Sanriku and the 1677 Empo Boso earthquakes are tsunami earthquakes and suggest their source areas are far off the coast, which is consistent with an idea that a tsunami earthquake takes place in a belt-like area along the Japan Trench. If the location of the 1896 Meiji Sanriku earthquake fault was well constrained, that source area would be assigned as an area of low probability of occurrence for tsunami earthquake because its repeat time was estimated as 530 years. However since it was not, the long-term forecast that a tsunami earthquake will take place anywhere in the belt was issued. Central Disaster Management Council considered a repeat of the 1896 Meiji Sanriku earthquake to the contrary. This is inappropriate decision from the seismological viewpoint, apparently affected by the fixed idea.

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