Probabilistic Tsunami Hazard Assessment along Nankai Trough (2) Inclusion of source areas that ERC(2013) DID NOT showed

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Last year, Hirata et al. (2015, SSJ) and Korenaga et al.(2015,SSJ) showed PTHA along the Nankai Trough, based only on 15 earthquake source areas (ESAs) that Earthquake Research Committee(2013) exemplified in their report about long-term evaluation of the Nankai earthquake. Here we set additional dozens of ESAs, with various sizes and geometries, other than the 15 ESAs that ERC(2013) exemplified to make PTHA for the Nankai earthquake comprehensively. In this talk, we will show the outline of the comprehensive PTHA along the Nanaki Trough.

First we briefly review the long-term evaluation of the Nankai earthquake by ERC(2013); the committee considered the next Nankai earthquake will possibly show various fault geometry and location along the trough. They evaluated the size of the next event would be expected M8 to M9, and the occurrence probability for the next 30 years (starting from 2013/01/01) would be 60% to 70%. They divided the whole Nankai Trough with its vicinity into 18 sub-regions (6 segments along the trough and 3 segments normal to the trough) and exemplified 15 ESAs as possible combinations of 18 sub-regions.

For the comprehensive PTHA, we newly set 70 ESAs in addition of the previous 15 ESAs so that total of 85 ESAs are considered. By producing tens of faults models, with various slip distribution patterns, from each ESA, we obtain 2500 fault models in addition of previous more than 1400 fault models so that total of more than 3900 fault models are considered (Toyama et al.,2015, JpGU). To make PTHA, the occurrence probability of the next Nankai earthquake has to be distributed to possible 3900 earthquakes. In other words, we have to set weights on possible 3900 earthquakes. In this study, we follow the following concept;

(I) In the additional 70 ESAs, there are 28 ESAs whose along-trough extents span 3 and more segments along the trough prescribed by ERC(2013). Any of along-trough extents that 28 ESAs span is equal to or included by those of the previous 15 ESAs exemplified by ERC(2013). So we regard these 28 ESAs as the same group as the previous 15 ESAs. We classify 28 ESAs into two sub-groups; (a) earthquakes with their ESAs whose along-trough extent completely coincide with any of those of 15 ESAs, and (b) earthquakes with an ESA whose along-trough extent DOES NOT coincide with any of those of 15 ESAs. For earthquakes (fault models) with 28 ESAs which consist of (a) and (b), we redistribute 15 weights for the previous 15 ESAs, introduced in “National Seismic Hazard Map for Japan(2014)” by ERC(2014), by the following tentative rules. For earthquakes in sub-group (a), we assume that earthquakes on the previous 15 ESAs likely occur than those newly added in this study so that we set tentatively weight balance, (any of 15 ESAs) : (newly added ESA) =1 : 0.5. Moreover, we assume that earthquakes in sub-group (a) likely occur than those in sub-group (b) so that we set tentatively weight balance, sub-group (a) : sub-group (b) =1 : 0.5.

(II) Out of the additional 70 ESAs, there are 42 ESAs whose along-trough extents span 1 segment or 2 segments along the trough prescribed by ERC(2013). Nankai earthquakes on such small ESAs have never been known historically so that “National Seismic Hazard Map for Japan(2014)” by ERC(2014) did not give weights for earthquakes on 42 ESAs. So we decide to handle small earthquakes on 42 ESAs as background earthquakes and introduce weight balance like a Gutenberg-Richter relation. Note

that weight balances introduced above are nothing but tentative. If earthquake seismology progresses in the future, weight balance will likely be changed.

Construction of earthquake fault models with various pattern slip distribution and nonlinear tsunami calculation are the same as Toyama et al.(2015) and Hirata et al.(2015), respectively. In this talk, we will show probabilistic tsunami hazard curves at some coastal points and probabilistic coastal tsunami height map.

Keywords: probabilistic tsunami hazard assessment, tsunami, hazard, Nankai Trough

