Numerical simulation of long-period ground motion generated from intraplate earthquakes around Ibaraki and Fukushima prefectures ~ Part III

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[Introduction] After the occurrence of 2011 Tohoku-Oki earthquake, phenomena of long period ground motion have been observed at seismic observation stations around the coastal region of Ibaraki prefecture for the occurrence of shallow depth intra-plate earthquakes (including 2011 Fukushima-ken Hamadori Earthquake) around Ibaraki and Fukushima prefectures. Before the occurrence of Tohoku earthquake, there was little noticeable intraplate large earthquake, and physical characteristics of generation of long-period ground motion mostly remained unclear. Therefore, better understanding nature of generation of long-period ground motion and improving seismic wave propagation around this region are very important for evaluating ground motion around the coastal region of Ibaraki prefecture. They will also lead to more reasonable evaluation of earthquake-proof safety of important infrastructures and subsurface structure around this region.

[Previous studies] In our previous studies, for achieving more accurate evaluation of seismic wave ground motion of intra-earthquakes around the coastal region of Ibaraki prefecture (strong motion, long-period ground motion, and etc), the 3-D underground structure model, which fairly explains phenomena of long-period ground motion, has been reconstructed by using postseismic events of 2011 Hamadori Earthquake. For optimizing the 3D underground structure model, we used seismic observation stations of KIK-net and Japan Atomic Energy Agency around this region. The result showed that optimized 3D structure model could better explain the generation of long-period ground motion around this region, and suggested that they are generally originated from the regional-scale characteristics of basement structure beneath intra region. Furthermore, based the finite element method using on the structure model, we performed seismic wave propagation simulation of intraplate earthquakes (moderate scale of point source, M<6.0), and try to forward-model the long-period ground motion being generated during propagation thorough the inhomogeneous underground structure. Preliminary results were presented in the 2015 JPGU and 2016 JPGU.

[What we will show in this presentation] This presentation introduces the updated results our research as follows; (1) Validation tests of the 3-D underground structure model for large-scale earthquakes with finite fault model setting. We analyze several models of 2011 Hamadori Earthquake. (2) We also analyze several specific propagation properties. These include amplitude fluctuations possibly affected by source-station azimuth, source depth, specific frequency band, and so on.

Keywords: 3D structure, Seismic wave propagation, Hamadori Earthquake

