[JJ] Evening Poster | S (Solid Earth Sciences) | S-SS Seismology

[S-SS14]Strong Ground Motion and Earthquake Disaster

convener:Masayuki Kuriyama(Central Research Institute of Electric Power Industry)
Tue. May 22, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
Strong ground motion has social impacts as it induces earthquake disasters. We solicit contribution on any seismological topics related to strong ground motion that includes, but are not limited to, source processes, wave propagation, and site effects. We also welcome contribution on earthquake related disaster mitigation.

[SSS14-P02]Modeling of subsurface velocity structure from seismic bedrock to ground surface in Tokai region, central Japan – an example of Aichi and Shizuoka Pref.

*Atsushi Wakai[1], Shigeki Senna[1], Eriko Tani[2], Yoshiaki Inagaki[2], Hisanori Matsuyama[2], Hiroyuki Fujiwara[1]
(1.National Research Institute for Earth Science and Disaster Prevention, 2.OYO corporation)
Keywords:subsurface velocity structure, array microtremor, bore-hole, strong ground motion

1. Introduction

To sophisticate strong ground motion prediction, it is important to model subsurface velocity structure so that earthquake ground motions can be evaluated in broadband period from 0.1 s to 10 s. Therefore, it is indispensable to integrate shallow and deep velocity structure models which have ever constructed separately and to constructed subsurface velocity structure models so that earthquake observation records can be reproduced.

At present, we are modeling subsurface velocity structure in Kanto and Tokai region in the national project conducted by SIP (Cross-ministerial Strategic Innovation Promotion Program), “reinforcement of resilient disaster prevention and mitigation function” of Council for Science, Technology and innovation.

In this study, for Tokai region [Shizuoka, Gifu, Aichi, Mie pref.], shallow geological and soil structures were modeled based on bore-hole data which had ever been collected from local governments and so on. And then, by means of connecting the past deep velocity structure models to shallow ones, initial subsurface velocity structures were modeled from seismic bedrock to ground surface. In addition, the past deep velocity structure models were modified based on results of ordinary-sized array microtremor surveys in SIP. In this report, we’ll especially introduce contents of investigation on Aichi and Shizuoka pref.

2. Initial subsurface velocity structure model from seismic bedrock to ground surface

2.1 Shallow velocity structure model
Shallow velocity structures on the engineering basement were modeled in the following policies.
・ Aichi pref.: On the principal plain, Nobi, Okazaki and Toyohashi, comparing geological stratigraphy in each region, focused on the base surface of alluvium, boundary surface between the upper and lower part of Atsuta layer and the top surface of Tokai layers. And strata boundaries were modeled referring to the past subsurface structure maps and collected bore-hole data. Besides, based on bore-hole and PS logging

©Japan Geoscience Union

data, evaluating physical property values and engineering basement, shallow velocity structures were modeled.
・ Shizuoka pref.: Shallow velocity structure models were adopted as initial models, which had been constructed for strong ground motion prediction in the 4th earthquake damage estimates investigation by Shizuoka pref.

2.2 Deep velocity structure model
Deep velocity structures under engineering basement were modeled in the following policies.
・ Aichi pref.: Deep velocity structure models by Horikawa et al., 2008 were adopted as initial models. The S-wave velocity classification were simplified into all 11 layers.
・ Shizuoka pref.: J-SHIS models were adopted as initial models. They consist of layers which added the 2.1 km/s layer to velocity classification mentioned above. Because the 2.1 km/s layer can be thicker in the region. And each layer thickness was adjusted so that S-wave travel time cannot be changed.

3. Modification of deep velocity structure model based on results of ordinary-sized array microtremor surveys

Deep velocity structure models were modified at the target sites using the past PS logging data, the past array microtremor survey data and the ones obtained in SIP. And interpolated spatially by means of Kriging method, three-dimensional deep velocity structures were modeled. On some zones with a small number of investigation data in the geomorphological classification such as mountain, mountain footslope, hill, volcano, volcanic footslope and volcanic hill, velocity structures based on weathered layer classification which was added in modeling shallow velocity structures were adopted as tuning point of each velocity layer.

4. Summary

In the next step, shallow velocity structure models will be modified using results of a lot of miniature and irregular array microtremor surveys obtained in SIP. In addition, modified subsurface velocity structure models will be verified using moderate seismic records at strong-motion stations.

©Japan Geoscience Union