[JJ] Evening Poster | S (Solid Earth Sciences) | S-TT Technology & Techniques

[S-TT51]Creating future of solid Earth science with high performance computing (HPC)

convener:Takane Hori(R&D Center for Earthquake and Tsunami, Japan Agency for Marine-Earth Science and Technology), Yuji Yagi(Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba), Katsuhiko Shiomi(国立研究開発法人防災科学技術研究所)

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Due to the development in computer science and computational science, large-scale or many times forward simulations and/or inversion analyses have become available recently. In solid Earth science, large-scale seismic wave propagation and crustal deformation with high fidelity model based on high resolution observation data have been demonstrated; uncertainty in crustal deformation caused by material properties and structures can be investigated based on many-time calculations for different material properties and structures; fault slip inversion analyses for non-Gaussian error distribution, etc. Thus, we will invite researchers who are facing problems in forward simulations and inversion analyses and discuss how to solve such problems by the collaboration between computer &computational sciences and solid Earth science. We are welcome submission by the researchers who are interested in this scope, especially students and young researchers.

[STT51-P02]Toward tsunami damage prediction based on high performance computing

*Ryoichiro Agata[1], Tsuyoshi Ichimura[2], Takane Hori[1] (1.Japan Agency for Marine-Earth Science and Technology, 2.The University of Tokyo)

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Tsunami damage prediction is important in making the tsunami disaster prevention plan in the coastal area. In general, tsunami damage prediction is based on three processes: 1. Setting a fault rupture model based on past earthquake, 2. Computation of crustal deformation due to the fault rupture model in an elastic body of homogeneous half-space, 3. Calculation of tsunami using two-dimensional shallow water approximation with the computed crustal deformation as input. In this study, we aim to upgrade each of these components that are necessary for the predictions by simulation methods based on techniques of high performance computing. In 1, we extract fault rupture scenario from a physical simulation of earthquake generation in the target region. Thanks to the improvement of the calculation method (e.g, Hyodo et al. 2016), such a physical simulation is applicable to a large-scale earthquake that causes a large tsunami. 2, we introduce the crustal deformation calculation based on the more realistic three-dimensional inhomogeneous elastic structure by using the finite element method. With the fast calculation method for finite element modeling of elastic deformation developed by Ichimura et al. (2016), it is possible to calculate crustal deformation in a necessary high resolution for calculation of tsunami sources. 3, in collaboration with tsunami researchers, we are considering introducing calculations based on the three-dimensional particle method where detailed calculations such as upstream calculations in urban areas are necessary.

We have succeeded in calculating the crustal deformation by replacing the process 1 and 2 as above in the case assuming a Nankai Trough large earthquake. In the presentation, we will discuss the progress of 3 as well as present examples of applications in other regions.

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