[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-P03]Application of H-matrices method to the calculation of the post-seismic relaxation

*Makiko Ohtani[1], Kazuro Hirahara[2] (1.National institute of advanced industrial science and technology, 2.Graduate School of Sciences, Kyoto University)

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In SW Japan, the Philippine Sea plate subducts from the south and the large earthquakes around M (Magnitude) 8 repeatedly occur at the plate boundary along the Nankai Trough, called as Nankai/Tonankai earthquakes. Near the rupture area of these earthquakes, the active volcanoes lines such as Sakurajima volcano in the Kyushu and Mt. Fuji in the Tokai-Kanto regions. The eruption of Mt. Fuji in 1707, called as Hoei eruption, have occurred 49 days after the one of the series of Nankai/Tonankai earthquakes, 1707 Hoei earthquake (M8.4). It suggests that the stress perturbation by the large earthquake sometimes helps the volcanoes to erupt.

When we consider the post-seismic stress change after an earthquake, the effect of viscoelastic deformation of the crust will be important. Recently, a new method based on BIEM is proposed by *Barbot and Fialko* (2010) in which stress change due to an inelastic strain is calculated as the solution of the inhomogeneous Navier’s equation with equivalent body forces of the inelastic strain. Then, using the stress-strain greenfunction in an elastic medium, we can take into account the inelastic effect.

In this study, we employ their method to evaluate the stress change due to the Nankai/Tonankai earthquakes. Their method requires the computational cost and memory storage of $O(N^2)$, where N is the number of discretized cells of the inelastic medium. We reduce the computational cost by applying the fast computation method of H-matrices method. With H-matrices method, a dense matrix is divided into hierarchical structure of submatrices, and each submatrix is approximated to be low rank. When we divide the viscoelastic medium into N = 8,640 or 69,120 uniform cuboid cells and apply the H-matrices method, the required storage memory for the matrices of stress-strain greenfunction are reduced to 0.17 times or 0.05 times of those for the uncompressed original matrices with enough accuracy. In this study, using this method, we show the time development of the stress change at the volcanoes around the Nankai/Tonankai earthquakes, assuming the simple viscos structure. We also discuss the discretized cells and the accuracy for the stress calculation.