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Large-scale tsunami modeling in the Nankai trough implemented on the K computer

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The recent great tsunamis caused horrible wide-spread disasters along the coast. It reminds us the importance of high-speed and accurate tsunami inundation modeling which should be useful in residential evacuations, rescue operations, and following measurements. Therefore in this study, we implemented large-scale tsunami calculations looking enviously at a real-time tsunami predicting for a large area with high spatial resolution by using the K computer in Japan. We used our new parallelized tsunami code, JAGURS (Baba et al, 2013), which solves either the linear or nonlinear shallow water equations by a finite difference method with a variable nesting algorism. The three nesting grid layers were used in this study to efficiently increase spatial resolution in the target region. The dimension of the finest layer gridded by each 2/9 arcsec (about 5m) spacing is about 140 km by 100 km that includes Tosa Bay on the Pacific coast of Southwestern Japan, where the great subduction zone earthquake is anticipated to occur. In this case, the total number of the grids needed was going to be about 670 million. By a test run on the 5184 nodes of the K computer, it took 7.5 hours to calculate tsunami propagation of 5 hours in the Nankai trough with time step of 0.01 sec. But any performance tuning for the K computer was still not made on the present code. Especially reduction of communications between the nesting grids would be needed. We are going to continue to improve the code making for the best use of the K computer.

Keywords: Tsunami, Large-scale computation, Nankai Trough, K computer