

# Expected Role of High Performance Computing to Promote Earthquake Research

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Headquarters for Earthquake Research Promotion (HERP) has been led earthquake observation, measurement, surveys and research in Japan for 20 years since the first 10-year basic comprehensive policy for the promotion set in April 23, 1999. During this 20 years, nation-wide basic observation networks have been established such as MOWLAS and GEONET. The observation data from the networks provide us rich information beneath Japan and are used by world-wide researchers discovering new phenomena such as slow earthquakes. On the other hand, data analysis methods and models, which are assumed in the analyses, are rather simple and not enough to extract rich information from the data. The necessity of the 3D realistic structure model for the data analyses has become clearer recently because of the ocean bottom observation data, such as the postseismic deformation of the 2011 Tohoku earthquake. To construct realistic model for the complex subduction zone in Japan, where two plates are subducting, large scale high-fidelity models are required and high performance computing is necessary to calculate crustal deformation and/or seismic wave propagation with the realistic models. For the next 10 years, we expect that high-performance computing will play an intrinsic role to promote earthquake research through higher level data analyses with realistic 3D structure in and around Japan. This will lead us a new stage in earthquake science.

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