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Earthquake generation cycles and tsunami simulations providing possible scenarios for Turkey (Marmara sea) and Japan (Nankai trough and Japan trench)

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In order to obtain comprehensive earthquake and tsunami scenarios for disaster assessment, numerical simulations of earthquake generation cycles and resultant tsunami generations have been performed in Japan. The occurrence of the 2011 Tohoku earthquake has realized us the necessity to consider all the possible scenarios without preconceptions. We have performed large-scale numerical simulations using Earth Simulator and K-computer for earthquake generation cycles along the Nankai trough, southwest Japan, where megathrust earthquakes with some segments have sequentially occurred. We have succeeded to reproduce various rupture pattern seen in historical data and geological evidences (such as tsunami deposit) being consistent with GEONET data during interseismic period. Using the results of such earthquake generation cycle simulations, we performed tsunami generation, propagation and inundation simulation. In Turkey, tsunami simulation methods and tsunami scenario database have been developed. In the research project of SATREPS –Earthquake and tsunami disaster mitigation in the Marmara region and disaster education in Turkey, we are applying such earthquake generation cycle and tsunami simulations to the North Anatolian fault system to obtain possible earthquake scenarios and to improve tsunami scenario data base for Sea of Marmara. For the modeling of the fault system, we will use observation results by the earthquake source modeling group in this project to improve the existing models. The earthquake scenarios will be used also for strong motion predictions by the group of seismic characterization and damage prediction. We will visualize the simulation results for disaster education. Furthermore, we will contribute to improve semi-realtime earthquake analyses and tsunami forecasting. In the presentation, we will show some recent simulation results of earthquake generation cycles and tsunamis for Turkey (Marmara sea) and Japan (Nankai trough and Japan trench).
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