Geophysical Research Abstracts
Vol. 14, EGU2012-9419, 2012
EGU General Assembly 2012

Efficient triangular adaptive meshes for tsunami simulations

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With improving technology and increased sensor density for accurate determination of tsunamogenic earthquake source parameters and consecutively uplift distribution, real-time simulations of even near-field tsunami hazard appears feasible in the near future. In order to support such efforts a new generation of tsunami models is currently under development. These models comprise adaptively refined meshes, in order to save computational resources (in areas of low wave activity) and still represent the inherently multi-scale behavior of a tsunami approaching coastal waters. So far, these methods have been based on oct-tree quadrilateral refinement.

The method introduced here is based on binary tree refinement on triangular grids. By utilizing the structure stemming from the refinement strategy, a very efficient method can be achieved, with a triangular mesh, able to accurately represent complex boundaries.