

## **Numerical Simulations of the 2004 Indian Ocean Tsunami – Runup and Inundation**

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The 2004 Indian Ocean tsunami flooded a huge area in the surrounding countries, especially in Indonesia, Thailand and Sri Lanka, and caused enormous loss of human lives and properties. In this paper, tsunami inundation in Trincomalee, Sri Lanka and Northern Banda Aceh, Indonesia were simulated by using high-resolution topographical/bathymetric data. Numerical simulations are based on non-linear shallow-water equations in the targeted coastal zones and linear shallow –water equations in the ocean basin. The grid resolution in coastal zones is much finer than that in the ocean basin and the nested grid system is dynamically coupled. A fairly good match is obtained for the calculated tsunami heights and inundations and the field measurements, observations and the reported damage areas. The numerical results show that the local bathymetry/topography characteristics and bottom friction play important roles in coastal inundation. On the other hand, numerical simulations further indicate that although nonlinearity becomes very important in many aspects when waves approach the shore, its influence on inundation is very small in the regions investigated. Finally, no significant differences in inundation and runup are observed from the numerical results based on either an impulsive fault model or a transient fault model.