Field Survey of the 2004 Indian Ocean Tsunami Disaster

The MEXT Grant Tsunami Research Team (Japan)

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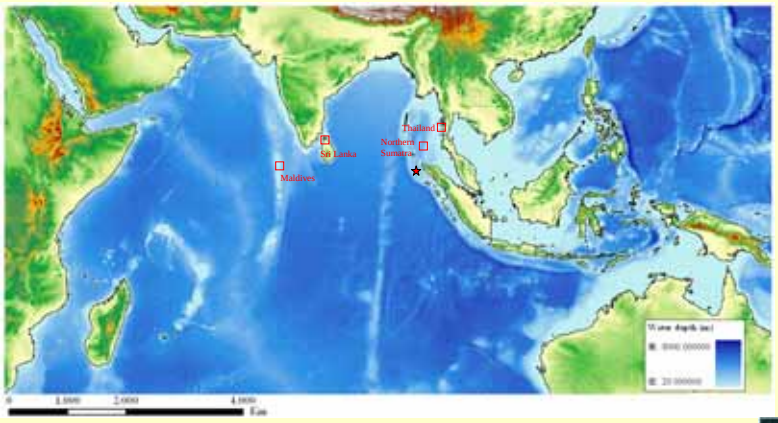
Overview

On December 26, 2004, 00:58 (UTC), 07:58 (Local Time, Indonesia), a great earthquake occurred off the west coast of northern Sumatra, Indonesia. The magnitude of this earthquake was 9.0 and this was the fourth largest earthquake in the world since 1900.

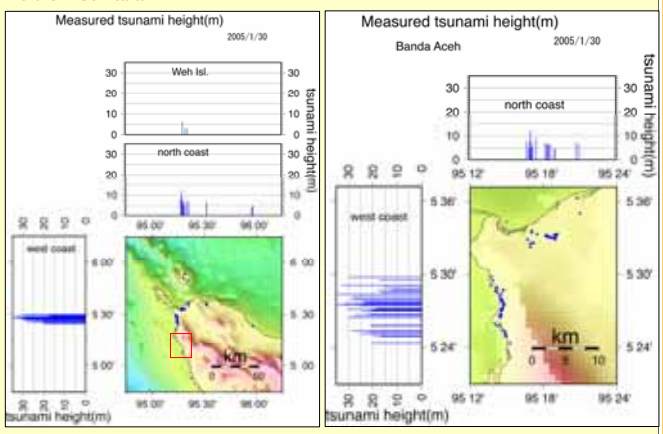
The tsunami accompanied with this earthquake propagated in the entire Indian Ocean and caused extensive and significant damage. The reported number of casualties are approximately 300,000 (230,000 killed in Indonesia by the earthquake and tsunami, at least more than 29,000 killed in Sri Lanka, more than 10,000 in India, more than 5,000 in Thailand, and 82 killed in Maldives by tsunamis) and more than 22,000 are still missing.

We deployed the tsunami survey team, partly supported by the MEXT grant, and surveyed the tsunami impact on the coastal zones within the Indian Ocean.

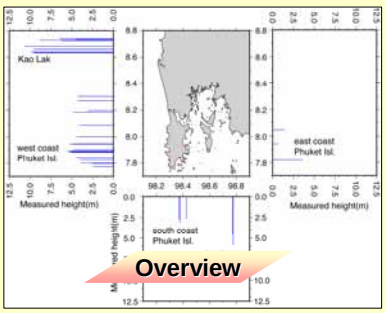
Topography of the Indian Ocean and the surveyed tsunami height



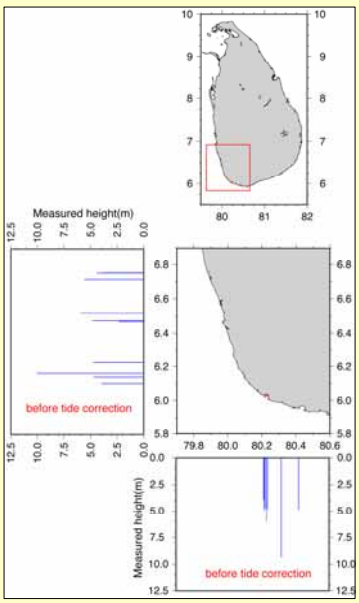
Northern Sumatra



Thailand

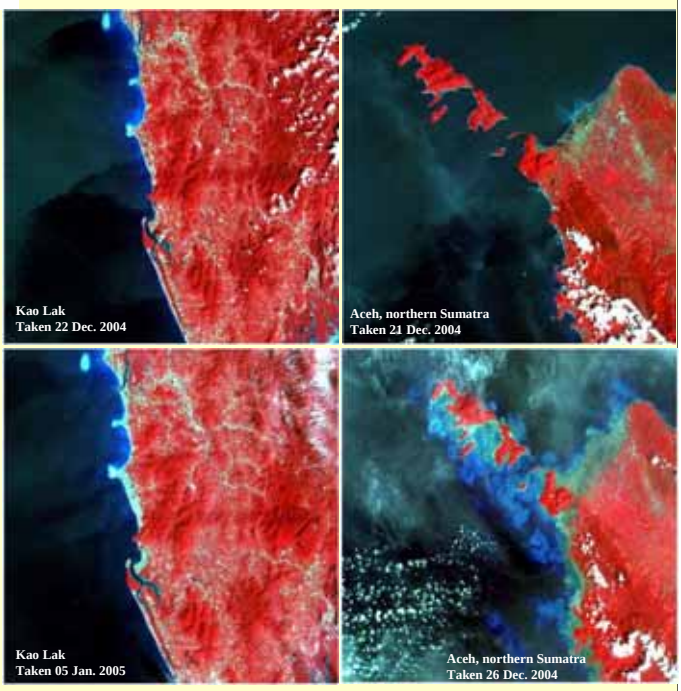


Southern Sri Lanka



Male, Maldives

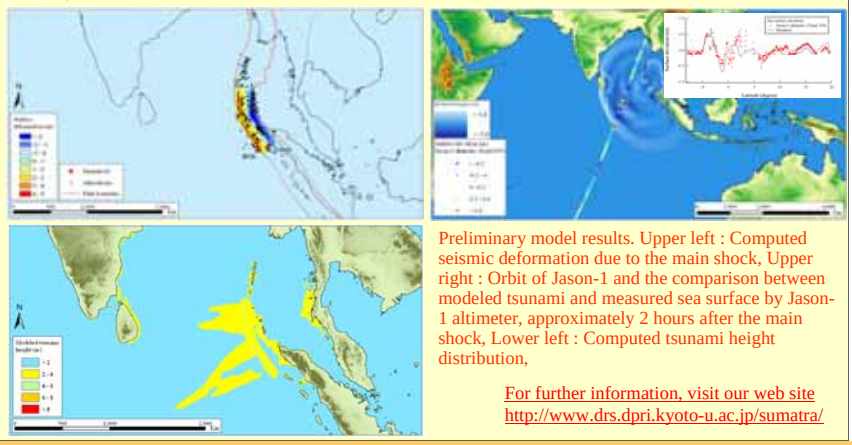
Preliminary measured tsunami height of the 2004 Indian Ocean tsunami. Tsunami attacked the entire coasts of the Indian Ocean. Especially, the coast of northern Sumatra, Sri Lanka, and Thailand were significantly damaged.



Satellite imagery of northern Sumatra, and Kao Lak, Thailand (SPOT).

Numerical Modeling of the Indian Ocean Tsunami

Focusing on comprehending the tsunami propagation characteristics in the Indian Ocean, the numerical modeling of tsunami is performed. The model is based on the linear shallow water equations of spherical co-ordinate system. We use the 2 arc-minute grids of bathymetry of ETOPO2, provided by the National Geophysical Data Center. The model results are verified by the observed tsunami records and Satellite altimetry data.



Preliminary model results. Upper left : Computed seismic deformation due to the main shock, Upper right : Orbit of Jason-1 and the comparison between modeled tsunami and measured sea surface by Jason-1 altimeter, approximately 2 hours after the main shock, Lower left : Computed tsunami height distribution,

For further information, visit our web site
http://www.drs.dpri.kyoto-u.ac.jp/sumatra/

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