

TSUNAMI ON 26 DECEMBER 2004: SPATIAL DISTRIBUTION OF TSUNAMI HEIGHT AND THE EXTENT OF INUNDATION IN SRI LANKA

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ABSTRACT

The coastal belt of Sri Lanka suffered massive loss of life and damage to property due to the tsunami unleashed by the great earthquake of 26 December 2004 in the Andaman–Sumatran subduction zone. However, it was clear in the immediate aftermath of the tsunami, that the extent of inundation and consequent damage along the affected coastline of Sri Lanka was not uniform: some areas suffered more damage, some less, and in certain other areas there was no damage at all. This means that the level of vulnerability of coastal communities for future events of tsunami exhibits considerable variation even along a short stretch of the shoreline. Such non-uniform distribution of potential tsunami threat could be due to many factors such as the local topography and the type of land use as well as the variations in the tsunami height owing to the travel path of the tsunami waves, the width of the continental shelf, the energy focusing effects, the shape of the coastline and the nearshore bathymetry. In this context, it is vital that we trace the evidence of maximum water levels left behind by the tsunami on 26 December 2004 as such data are invaluable to improve our understanding and predictive capability of tsunami threat for a given locality.

Accordingly, the present paper utilizes the results of an extensive field survey carried out by the author at 300 – 400 metre intervals in the north, east, south and west coasts of Sri Lanka as well as available data from other surveys to examine the spatial distribution of the extent of inundation and the tsunami heights around the affected parts of the country due to the tsunami of 26 December 2004.

The measurements suggest maximum tsunami heights of 3 m – 7 m along the north and east coasts, 3 m – 11 m on the south and south-west coasts, and 1.5 m – 6 m on the west coast. On the other hand, tsunami inundation had been significantly greater for most parts of the east and the south-east coastal areas than the south, south-west and the west coasts. This was partly owing to the fact that the east coast of Sri Lanka generally consists of low-lying, wide stretches of flat coastal lands compared to the rest of the country's coastal belt. Moreover, as the tsunami waves crashed almost head-on onto the east and south-east coasts, the velocity and hence the momentum of the tsunami induced surge flow could have been higher resulting in greater penetration along the east and south-east coasts than the south-west and the west coasts.

The paper examines in detail the effect of the topography, the type of land use and other factors on the extent of inundation.