



## **Slip and the Indian Ocean Tsunami from GPS, altimeters and tide gauges**

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The Sumatra-Andaman Earthquake and the subsequent Indian Ocean Tsunami caused colossal devastation. Here we show that the GPS system in place at the time of the Sumatra-Andaman Earthquake could have been used to provide a reliable forecast of the Indian Ocean Tsunami within about 30 minutes of the earthquake. Understanding the distribution and timing of slip in such massive earthquakes and their potential to generate tsunamis is invaluable to the safety of coastal inhabitants. In this talk, a new analysis of data collected from ~60 Global Positioning System (GPS) sites is presented. These data are used in combination with different rupture plane geometries to model the slip along the fault interface during the Sumatra-Andaman Earthquake. From this analysis, vertical displacements of the Indian Ocean floor are derived and used to drive tsunami simulations using two recently developed unstructured mesh ocean models. The predicted tsunami is tested against independent satellite and coastal tide gauge data. We show how information from altimeters and tide gauges can be used to select the likely slip distribution along the fault. Our results suggest rapid slip along the fault and that the 9 minute propagation time of the rupture, through constructive interference of tsunami waves radiating first from the south and then from the north, strengthened the devastating tsunami in Southern India, Sri-Lanka and Thailand. We conclude that GPS data should be included as an important component of

future tsunami warning systems.