Geophysical Research Abstracts, Vol. 8, 09175, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09175

Dating submarine mass failures and relationships to tsunami generation: the use of multibeam bathymetry and seabed images, examples from the Pacific and Indian Oceans

D. R. Tappin (1), Paul Tyler (2), K. Moran (3), Jon Copley (2) and G. McMurtry

(1) British Geological Survey, Nottingham, NG12 5GG, England

(2) University of Southampton, Southampton, England

(2) University of Rhode Island, Narragansett, RI 02882, United States

(4) University of Hawaii, SOEST, Hawaii, USA

The potential tsunami threat from submarine mass failures (SMF) has been known since the late 19^{th} century, but it was not until 1998 when a tsunami off the north coast of Papua New Guinea (PNG) killed over 2,000 people, that the real danger was at last fully recognised. The result was a wake up call to coastal communities worldwide. In December 2004 a Great earthquake in the East Indian Ocean resulted in a catastrophic tsunami that devastated adjacent shores. Whereas the earthquake was the primary cause of the tsunami, local runups of 30-35 m on Sumatra, in combination with the available maps of seabed morphology, was suggestive of an additional contribution from submarine landslides located off northern Sumatra.

In the instance of PNG the cause of the tsunami was initially controversial. This was because of a number of reasons: the tsunami threat from SMF was unrecognised; and the necessary mathematical models to reproduce the tsunami propagation from a submarine slump were not available. Another important aspect of the use of he acquired dataset in identification of the tsunami source mechanism was the application of the multibeam bathymetry in combination with seabed photographic images acquired from Remote and Manned submersible vehicles. The integration of these two technologies provided a powerful tool for mapping the seabed almost akin to mapping on land.

Identifying and mapping the seabed and sub-seabed is one aspect of the new methodologies that is utilised mainly by earth scientist for mapping form and structure. An additional and

increasingly applicable tool is the utilisation of marine life to constrain the timing of events, based on knowledge of the growth of sessile megafauna. Growth rates of marine life are increasingly better understood and this, together with their relationships to seabed structures imaged both remotely using multibeam and directly with video and still photographs, is providing a powerful method of determining when events such as SMF take place.

This contribution, using examples from the research carried out on tsunamis in PNG in 1998 and the Indian Ocean in 2005, demonstrates how dating of seabed movement has contributed to a better understanding of tsunami generation in the instances quoted.