

The slump origin of the 1998 Papua New Guinea tsunami

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Received 17 November 2000; accepted 12 January 2001

The origin of the Papua New Guinea tsunami that killed over 2100 people on 17 July 1998 has remained controversial, since dislocation sources based on the parent earthquake fail to model its exceptional run-up amplitude; generation of tsunamis by submarine mass failure has been considered a rare phenomenon and has aroused virtually no attention in terms of tsunami hazard mitigation. We report on recently acquired high-resolution seismic reflection data which yield new images of a large underwater slump, coincident with photographic and bathymetric evidence of the same feature, suspected of having generated the tsunami. *T*-phase records from an unblocked hydrophone at Wake Island provide new evidence for the timing of the slump. A novel tsunami simulation technique, merging geological data with geotechnical and hydrodynamic modelling, reproduces the observed tsunami amplitude and timing in a manner consistent with eyewitness accounts. Submarine mass failure is predicted based on fundamental geological and geotechnical information.

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1. Introduction

On 17 July 1998, a tsunami struck the area of Sissano Lagoon, Sandaun Province, Papua New Guinea (PNG), *ca.* 20 min after a nearby magnitude 7 earthquake, which took place at 08:49 GMT (18:49 local time). A 25 km segment of the Northwestern PNG coastline, home to at least 10 000 people, was swept clean by ocean waves averaging 10 m in height (figure 1), with over 2100 people killed during the tsunami or