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# Field Survey and Numerical Simulations: A Review of the 1998 Papua New Guinea Tsunami

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*Abstract*—The Papua New Guinea (PNG) tsunami of 1998 is re-examined through a detailed review of the field survey as well as numerous numerical computations. The discussion of the field survey explores a number of possible misinterpretations of the recorded data. The survey data are then employed by a numerical model as a validation tool. A Boussinesq model and a nonlinear shallow water wave (NLSW) model are compared in order to quantify the effect of frequency dispersion on the landslide-generated tsunami. The numerical comparisons indicate that the NLSW model is a poor estimator of offshore wave heights. However, due to what appears to be depth-limited breaking seaward of Sissano spit, both numerical models are in agreement in the prediction of maximum water elevations at the overtopped spit. By comparing three different hot-start initial profiles of the tsunami wave, it is shown that the initial shape and orientation of the tsunami wave is secondary to the initial displaced water mass in regard to prediction of water elevations on the spit. These numerical results indicate that agreement between numerical prediction of runup values with field recorded values at PNG cannot be used to validate either a NLSW tsunami propagation model or a specific landslide tsunami hot-start initial condition. Finally, with the use of traditional tsunami codes, a new interpretation of the PNG runup measurements is presented.

**Key words:** Submarine landslide, runup, Boussinesq.

## *1. Introduction*

On July 17, 1998 at 08:49 GMT (18:49 local), an earthquake of $M \approx 7$ occurred near the Pacific coast of western Papua New Guinea. Shortly after the earthquake, a destructive tsunami caused extensive damage along the coast from the town of Aitape west to the region around Sissano Lagoon (see Fig. 1). In fact, the death toll was the worst from a tsunami in the past 50 years, with over 1000 persons killed by the tsunami waves. The exact causative mechanism of the tsunami has been the subject of considerable debate, although recently published works (i.e. Synolakis *et al.*, 2002) strongly indicate a slump source.

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