Was the submarine landslide which caused the 1998 Papua New Guinea tsunami detectable by a seismograph?

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The 1988 Papua New Guinea tsunami caused casualties over 2,200(Tappin 2008). The tsunami higher than 10 m followed an earthquakes of Mw 7.0. It is considered that the tsunami was caused by a submarine landslide because the tsunami was higher than that expected for an earthquake of magnitude 7, the tsunami generation was estimated about 10 minutes after the earthquake, and submarine topography which seemed to have been related to the landslide was identified (e.g., Tappin et al., 1999). Tsunami caused by an ordinary earthquake can be aware of before its arrival by seismic analysis. In the case of the 1988 Papua New Guinea tsunami, it was impossible to prepare for the tsunami only by the ordinary seismic analysis. Here we discuss possibility of detecting landslides with seismic method.
Watts et al. (2003) estimated the landslide which could caused the 1998 tsunami at the length of 4.5km, the width of 5km, and the thickness of 760m. The mass was considered to have slumped on a slope of 12 degree dip with characteristic time of 32 seconds. The force causing the landslide was gravity. The friction and drag of water decelerated the mass. It is considered that the mass was being held with the static friction, and it dropped to dynamic friction when the mass started to slide. The ground was considered to be subject to the force change between the static and dynamic frictions.
The force is estimated at
$(\rho 1-\rho 2)Va$,
where ρ1 is the density of the ground mass (2.15X10^3kg/m^3), ρ2 the density of the water (1.0X10^3kg/m^3), V volume of the mass (4,500mX5,000mX760m), a the initial acceleration (0.36m/s^2). It turn out to be 7X10^12N. The force by the collapse of Mt. Saint Helens in 1980 was estimated at 2.6X10^12N (Kanamori et al., 1984). The force by the drain-back at Mt. Mihara in Izu-Oshima in 1987 was estimated at 4X10^11N (Takeo, 1990). For the case of the Papua New Guinea event, similar order of force could act on the ground. If a single force of 7X10^12N and source time duration of 30 seconds was applied, it is expected that some seismic records would have been recognized at PMG station (900 km from the event) under a condition of no other seismic source. However the seismic wave by the earthquake was larger than the expected amplitude, and no clear long-period trace was recognized on the seismic record.

Keywords: tsunami by landslide, seismic record, 1998 Papua New Guinea tsunami

