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The Samoa tsunami of 29 September 2009: Field survey in American Samoa and preliminary modeling

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The Samoa tsunami of 29 September 2009 is the first one to result in significant destruction in that region in 92 years, and the first one to cause both structural damage and casualties on U.S. soil since 1964.
Following the event, an International Tsunami Survey Team was deployed and surveyed the inundation one week after the tsunami. Our results revealed run-up reaching 16.8 m in Poloa (West coast of Tutuila), and as much as 12 m on the North coast, which should have been in the lee of the tsunami. Inundation distances reached 496 m in the Leone district and 538 m in the harbor of Pago Pago. The latter was the site of significant amplification of the waves, from 3 m at its entrance to 9 m at its toe, with the waterfront district completely destroyed. The death toll on Tutuila (34) was contained thanks to a generally successful evacuation initiated at the community level by a population educated in tsuanmi hazards.
A numerical simulation was conducted in the immediate aftermath of the event based on the inversion of two DART buoy records for scaling factors of the FACTS pre-computed database. Even though the latter uses an inadequate subduction geometry, our results correctly described the areas of the major inundation – Leone and Pago Pago, and the large run-up amplitudes in the bays of the North Coast; they were used to prioritize the survey locations.