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Effects of the 29 September 2009 tsunami on the Western Samoan coasts

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The Samoa islands are located between 169.5°W to 172.9°W and at about 14°S. The main islands are Savaii, Upolu and Tutuila. The islands lay on the Pacific Plate, are of volcanic origin, rise sharply from the seafloor from depths of about 4000 m and are surrounded by smaller islands that are usually coral atolls. Upolu and Savaii are part of the Western Samoa while the Tutuila Island is an American territory. A regional tsunami was triggered on September the 29th 2009 by an offshore earthquake with Mw=8.1 and epicentre located at about 190 km south of Samoa, near the subduction zone between the Pacific and the Australian Plate. The tsunami waves struck severely the islands of Upolu, Manono and Savaii in Western Samoa, and their effects were also observed in Tutuila, Niuatoputapu in northern Tonga, Wallis and Funtuna. A few weeks after the event, a post tsunami field survey was organised by the UNESCO with the cooperation of the University of South Pacific and The Australian Tsunami Research Centre. The field survey had several tasks, including building damage assessment and measurement of tsunami run-ups and inundation along the Western Samoa coast. In this work, measured values of run-up and inundation along some land profiles are shown. The values vary from 0.7 to 6.5 meters, being the most affected zone the south east coast. The measurements have been taken using levelling procedures performed by the UNIBO-INGV team. Damage building assessment was also performed by the team, retrieving information of some structures such as type of material used, age of the structure, degree of exposure to the waves, content of damage and water depth when there were watermarks available.