

Tsunami hazard in Wallis and Futuna

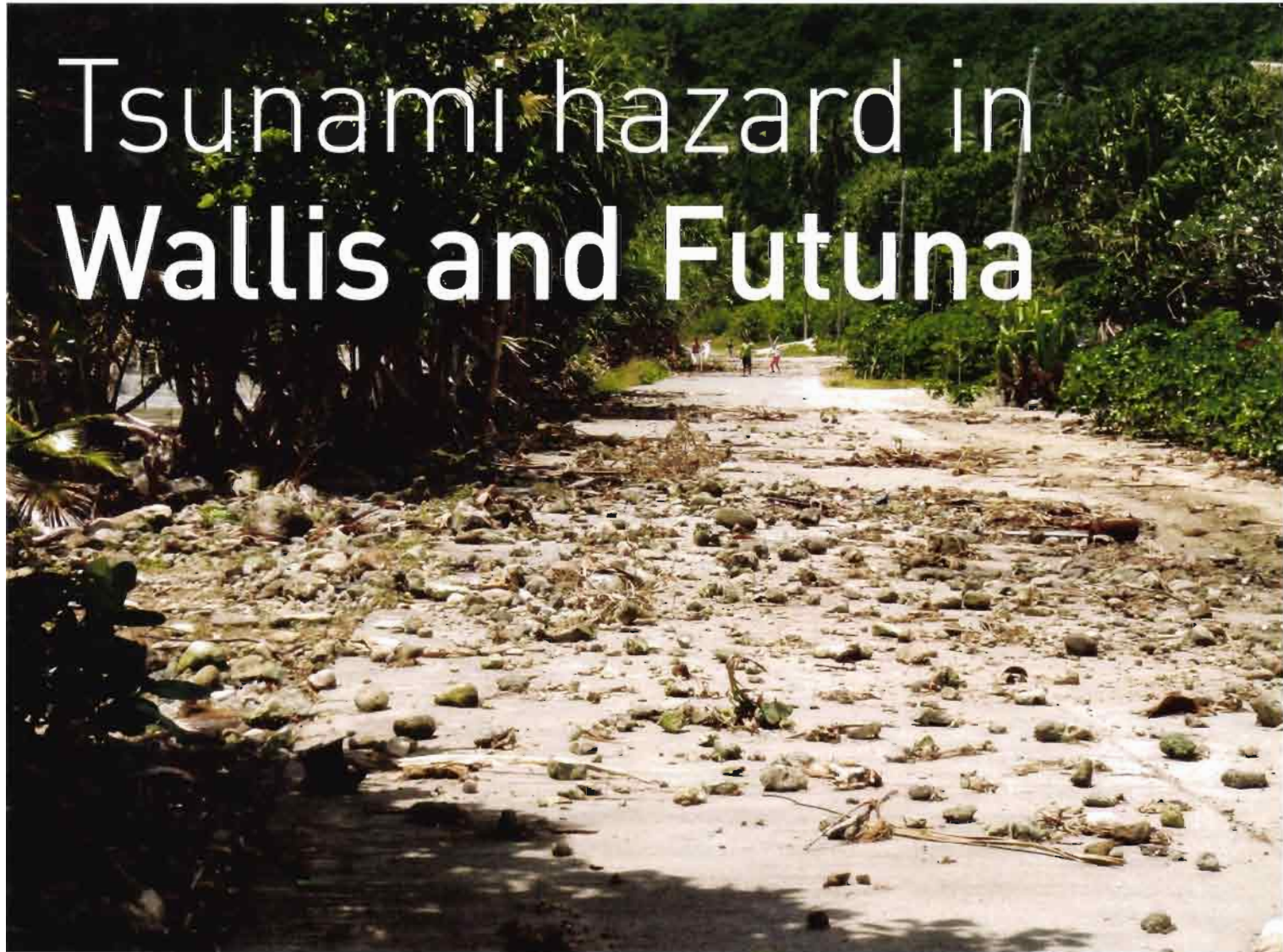


Figure 1: Beach debris on the Route Territoriale RT1 at Poi, east coast Futuna, following the 29 September 2009 Tsunami. (Mme Hasser, Futuna)

This information on tsunami hazard in Wallis and Futuna has been prepared by the National Institute of Water and Atmospheric Research (NIWA) in New Zealand, Institut de Recherche pour le Développement (IRD), the University of New South Wales, and the Secretariat of the Pacific Community Applied Science and Technology Division (SPC-SOPAC).

Could Wallis and Futuna experience a tsunami?

Yes. Tsunamis affected Futuna in 1993 and 2009. The 29 September 2009 Tonga-Samoa earthquake and tsunami (see figure 1) was the last significant event, and a stark warning of the power and potential impact of tsunamis in the region. The tsunami struck Futuna at 7.00am. Some inundation occurred but, fortunately, the effect on the islands was minimal. Other tsunamis are likely to have impacted Wallis and Futuna in the past.



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Which part of the Pacific could generate tsunamis that would affect Wallis and Futuna?

Fourteen possible sources of tsunamis with the potential to impact Wallis and Futuna have been identified (see figure 2). Computer models have estimated the size of tsunami waves around Wallis and Futuna from each source. The most likely sources of tsunami hazard in Wallis and Futuna are:

- Pacific-wide tsunamis: specifically from the Kuril region, Chile and south Peru. Tsunamis from Japan and the Aleutian and Cascade regions are unlikely to significantly affect Wallis and Futuna
- regional tsunamis: Tonga Trench and central Vanuatu back-arc
- local tsunamis: south Futuna.

The computer models predict that tsunamis generated by a full rupture of the Tonga Trench would have the strongest impact on both islands. In Wallis, the second-strongest impact is likely to be from a tsunami originating in the Kuril Trench. In Futuna, the second-strongest impact is likely to be from a locally generated tsunami (see figure 2 inset). The risk of significant damage is greater for Futuna than Wallis, as the reef around Wallis provides a large degree of protection.

How much warning time would Wallis and Futuna receive?

The time between an undersea earthquake and the arrival of any associated tsunami in Wallis and Futuna varies according to the earthquake's location. Little or no warning would be received for a regionally or locally sourced event, other than possibly the earthquake shaking or sea withdrawal. The table in figure 3 shows estimated arrival times and durations of tsunamis from the various earthquake sources.

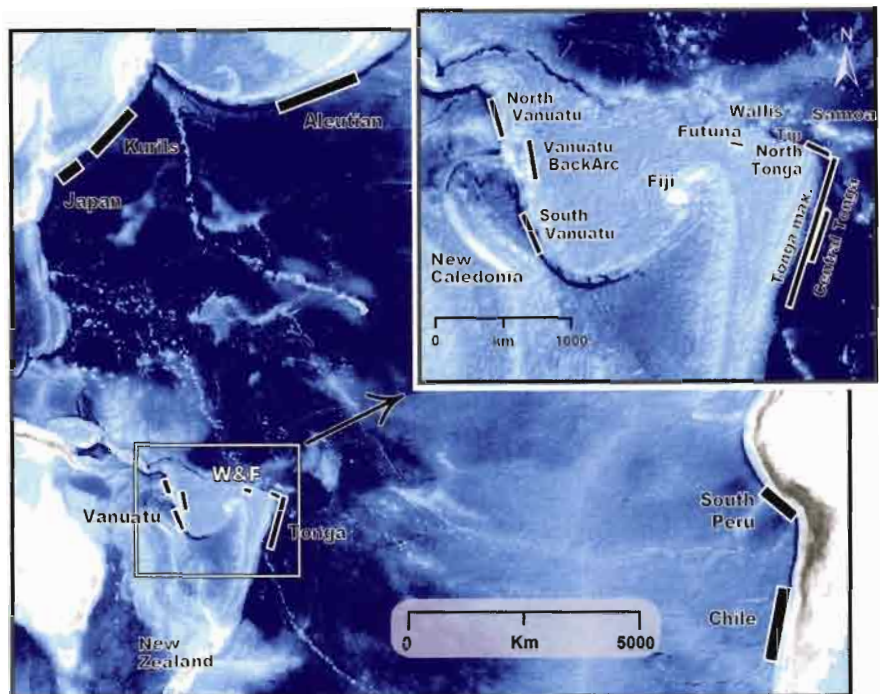


Figure 2: Tsunami sources (length and position are indicative) around the Pacific Ocean capable of generating damaging tsunamis in Wallis and Futuna.

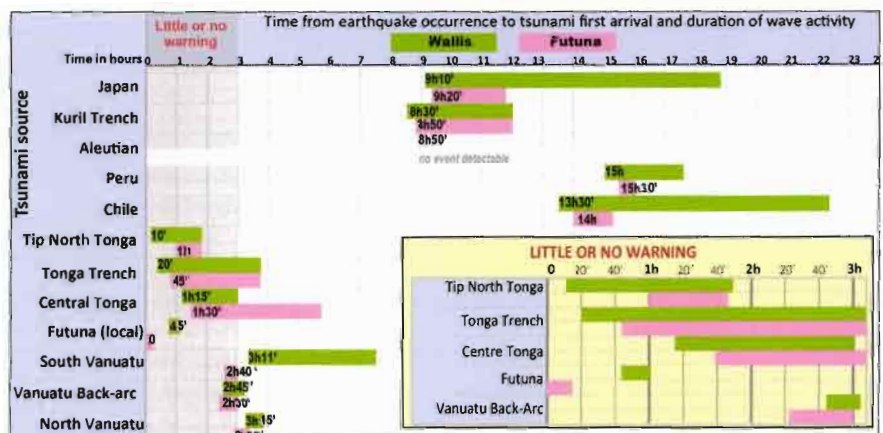


Figure 3: Estimated time of arrival of tsunami and duration of tsunami activity from all modelled sources.

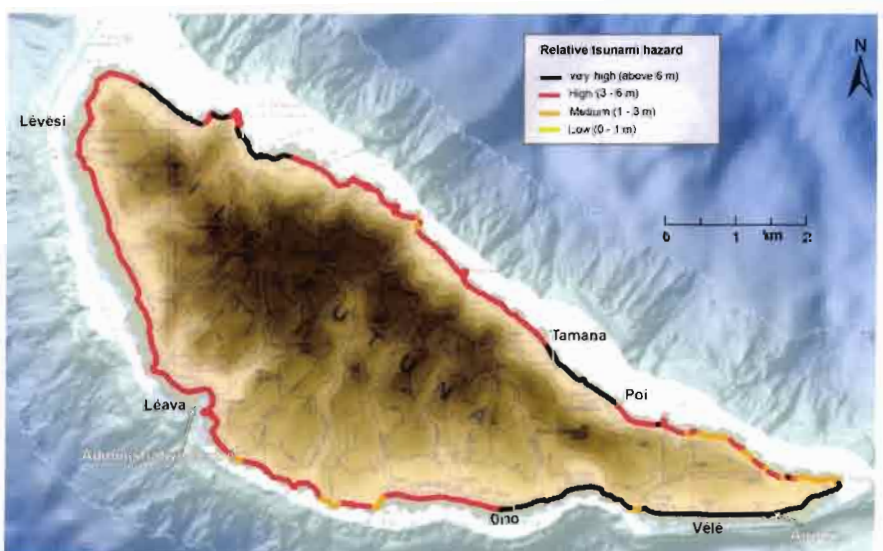


Figure 4: Relative tsunami hazard at Futuna from the estimated likely maximum wave height.

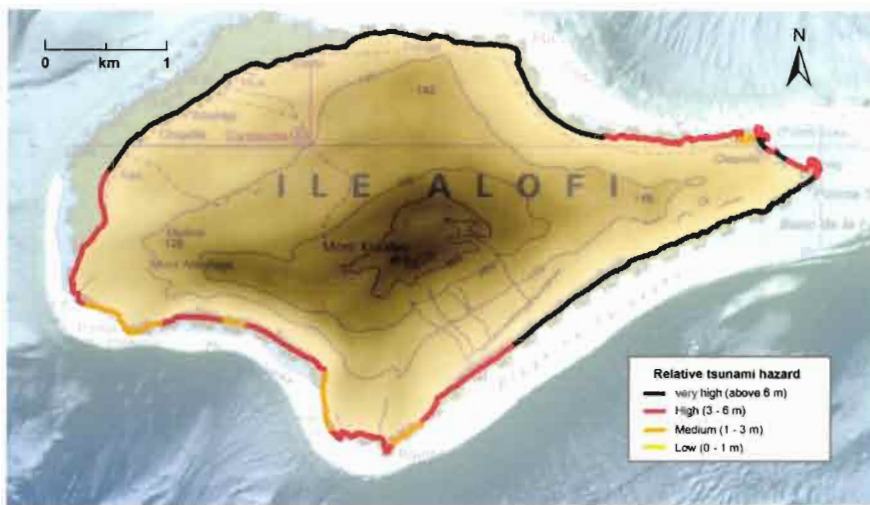


Figure 5: Relative tsunami hazard in Alofi from the estimated likely maximum wave height.

Where would people and infrastructure be in danger from a tsunami?

The computer models suggest the largest waves are likely to affect the coastline between Futuna and Alofi (see figures 4 and 5). The strait between Alofi and Futuna tends to focus tsunami waves, which results in higher waves in the area of Vélé – with the potential to flood the airport runway.

The populated areas along the south, north and east coasts of Futuna and the uninhabited southeast coast of Alofi are also prone to significant inundation. Following any tsunami warning, the beach and immediate shoreline margins should be avoided and cleared immediately.

Tsunami inundation in Wallis is most significant on the outer reef islands. Uvéa is less prone to inundation, although the modelling indicates that taro fields in Tapa and Falaleu, the meeting place and harbour facilities in Mata'Ututu are at most significant risk (see figure 6).

What can we do with this information?

Much of the Wallis and Futuna population lives just a few metres above sea level. It should be assumed that all coastal areas below 5 metres above sea level face some risk of tsunami inundation.

The essential message is: **if an earthquake is felt strongly or if the sea is abnormally and quickly withdrawing, move immediately to higher ground.**

This project has been carried out to help Wallis and Futuna develop emergency responses in the form of community preparedness and evacuation plans. This could include tsunami warning procedures and community-developed evacuation routes and shelters.

In addition, the work could help inform future land-use planning and the location of critical community facilities such as the hospital. Such planning needs to incorporate an understanding of tsunami inundation and other potential natural hazard impacts.

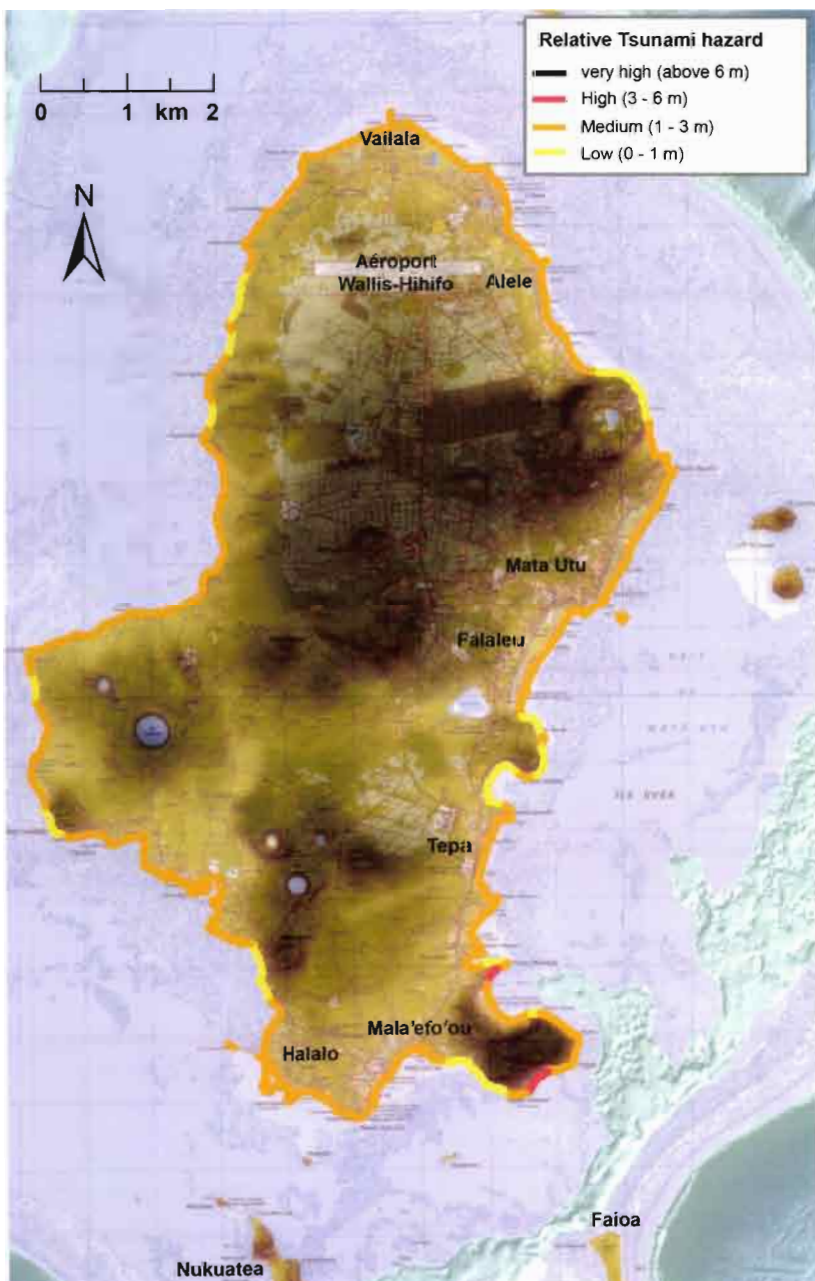


Figure 6: Relative tsunami hazard in Wallis from the estimated likely maximum wave height.



About the tsunami work in Wallis and Futuna

Work on understanding past tsunamis that have affected Wallis and Futuna has been ongoing for a number of years involving the National Institute of Water and Atmospheric Research (NIWA) in New Zealand, Institut de Recherche pour le Développement (IRD) in New Caledonia, and University of New South Wales, in Sydney.

These activities have looked for evidence of past tsunami inundation at the territory, identified and characterised potential tsunami-generating earthquakes around the Pacific, and used sophisticated computer models to assess which earthquake sources would propagate tsunamis towards Wallis and Futuna, how large the tsunamis would be and how long it would take for them to arrive.

This work complements the vulnerability study conducted by the Institut Géographique National.

The present study is funded by the EU EDF 9-C Envelope project to support Disaster Risk Reduction in Pacific EU Overseas Countries and Territories, the Pacific Fund of the French Ministry of Foreign and European Affairs, and NIWA.

What are the limitations of the present study?

The best data available at the time of the study has been used. The modelling is sufficiently robust to identify relative areas of tsunami hazard around Wallis and Futuna to help support evacuation planning. However, more accurate bathymetric data in the very near coastal zone (<10 m water depth) and topographic data of the coastal fringe would enable

better refinement of inundation extent and depth estimates. The extent of the tsunami inundation shown on the maps should be treated as indicative only.

This study considers only tsunami hazard, it does not assess the potential impact of tsunami inundation on people, development and infrastructure in Wallis and Futuna. Nor does the assessment consider the likely occurrence of such tsunami events. This would require additional work.

How can more information be obtained?

For more information on tsunami hazard and risks in Wallis and Futuna contact:

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