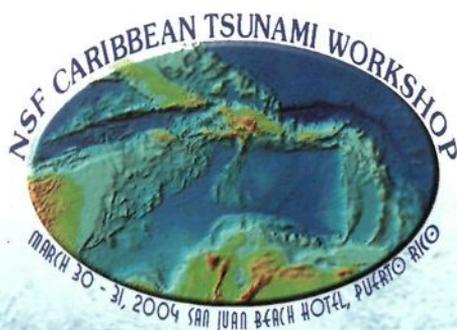
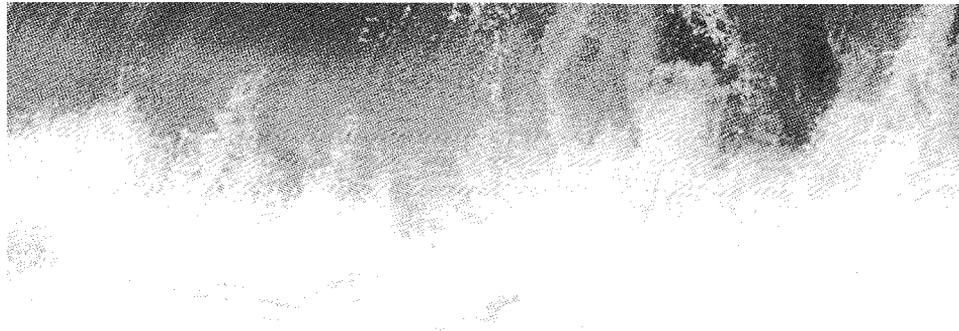


Caribbean **Tsunami Hazard**



Aurelio Mercado-Irizarry • Philip Liu

Editors

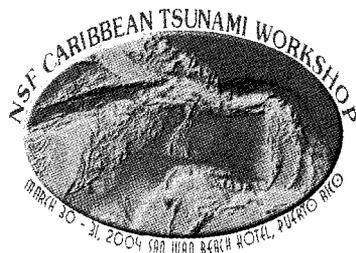


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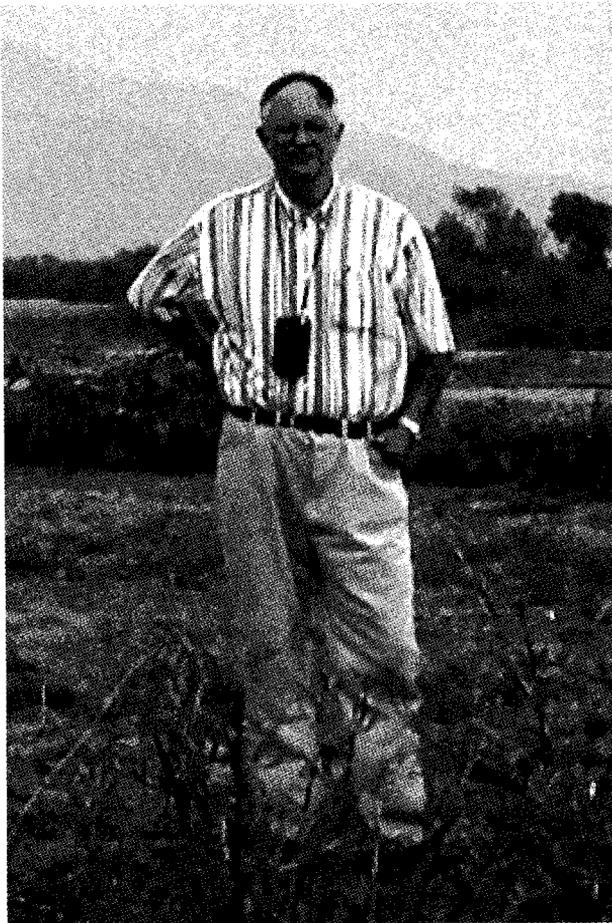
We would like to dedicate this workshop and its

proceedings to

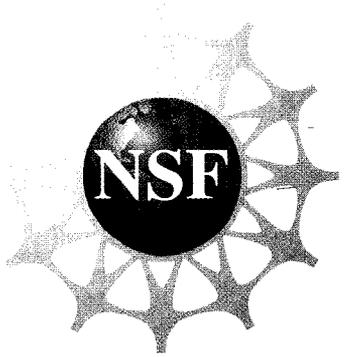
Mr. James (Jim) Lander

for his contribution to raising tsunami

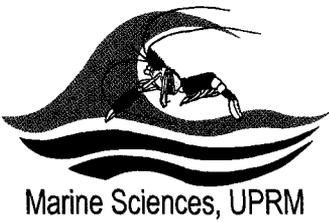
awareness in the Caribbean



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Preface

Because of its climate and natural beauty, the Caribbean region coastal population is growing at a very fast pace. Everyone who lives in this region is fully aware of the hurricane threat and is, to a great extent, prepared for dealing with the hurricane hazard. On the contrary, most of the people living in this region are not informed of what has been accurately described as "the forgotten hazard", which is the tsunami. According to Lander *et al.* (2002)¹, since 1498 there have been twenty-seven verified true tsunamis and an additional nine as "very likely true tsunamis". In the past 136 years there have been three destructive tsunamis in the northeastern Caribbean, the last one being in 1946. In the Caribbean Sea region the potential sources for tsunami generation include earthquakes, sub-aerial and submarine landslides and underwater volcanic explosions. And, as described in these proceedings, it seems as if the tsunami risk is underrated if based on just these historical events.

This workshop follows a very successful 1997 Caribbean Tsunami Workshop, which was sponsored by the University of Puerto Rico Sea Grant Program. The 1997 workshop led to an increase in awareness and research funding for this latent hazard, but mainly in the island of Puerto Rico and, mostly, for earthquake generated tsunamis. Seven years later, it is the main objective of this workshop to inform the international tsunami community of this hazard in the Caribbean Sea and the diversity of tsunami generating sources in the region. At the same time, we hope this workshop will serve as a motivation for the tsunami modeling community to apply their skills and knowledge in addressing the multiple regional tsunami threats which, in combination with the huge increase in coastal development, present a very worrisome scenario. We aim to bring into the limelight these threats so that more islands in the Caribbean will become involved in tsunami hazard and mitigation. The fact that the last destructive tsunami occurred in 1946 is of serious concern for the regional emergency response authorities because of the complacency that this lack of frequent occurrences might have created. Finally, it is another goal to continue discussions for the establishment of a Regional Tsunami Warning Center in the Caribbean.

To achieve the objectives, the workshop was planned as follows:

- Presentations of the nature of the tsunami generation sources in the Caribbean region.
- Presentation of paleotsunami studies showing the geophysical evidence of past tsunamis, earthquakes, landslides, and volcanic explosions.

¹ LANDER, J. F., WHITESIDE, L. S. and LOCKRIDGE, P. A., 2002. A brief history of tsunamis in the Caribbean. *Science of Tsunami Hazards*, 20(2), 57-94.

- Presentations of past and on-going efforts in addressing the Caribbean tsunami hazard from the different potential sources.
- Presentations of recent Caribbean-related programs and research capable of addressing the potential impacts of the tsunami hazard in the Caribbean region.
- Presentations on national and international tsunami efforts and their potential role in the Caribbean
- Discussions on future action items. This might include future modeling efforts, data requirements (topography, bathymetry), the establishment of a warehouse for Caribbean geophysical data, and potential funding sources.

The activity started with Maul's presentation of the need for a Caribbean tsunami warning system, and his proposal has been presented to the Intergovernmental Oceanographic Commission of UNESCO. Then it was time to present where the hazard lies, by reviews of the potential tsunami causes in the region. McCann presented an overview of the earthquake and submarine landslide-induced tsunami threat and the potential location of their sources. The submarine landslide threat was also addressed by ten Brink *et al.*, while Pararas-Carayannis presented a very comprehensive discussion of the tsunami threat brought about by the active volcanoes present at the Lesser Antilles islands, due to both subaerial and submarine landslides. Sigurdsson *et al.* discussed recent observations of the Kick'em Jenny submarine volcano, which typically has been associated with the possibility of an underwater explosion-induced tsunami, but the observations also add the possibility of the future threat of a tsunami by flank collapse as the volcano continues to grow. Related with Kick'em Jenny, Gisler *et al.* presented their results of a sophisticated numerical 3-D compressible hydro code (used for asteroid impacts simulations), confirming that an explosion from the volcano would present only a local hazard, not a regional one, as has been the concern for many years. Yalciner *et al.*, compared the tsunami history of the Caribbean and Mediterranean Seas regions.

Moya/Mercado and Kelletat/Scheffers presented their results of paleotsunami studies in the region. The first study was concentrated on the island of Puerto Rico, where sedimentary layers were associated with the 1918 tsunami and two pre-historical ones. The second study was carried out at the islands of Barbados, St. Martin and Anguilla and concluded "that the real tsunami risk in the Intra Americas Seas for the population and in particular for all infrastructure and investments in the local economics is certainly higher than hitherto noticed." Related with the issue of tsunami deposits, Yeh made a presentation of a model used to predict wave forces in the runup zone.

Mercado *et al.*, von Hillebrandt/Huérfino and Mendoza/Huérfino talked about their work in the Puerto Rico Tsunami Warning and Mitigation Program (<http://poseidon.uprm.edu>), involving flood mapping, education and