



March 2012

LOS ANGELES BASIN GEOLOGICAL SOCIETY MEETING ANNOUNCEMENT

March 22nd (Thursday) Mark R. Legg¹, Aggeliki Barberopoulou¹, Burak Uslu², Edison Gica², Geoffrey Legg¹, Costas Synolakis¹ USC Tsunami Research Center, Los Angeles, ²NOAA-PMEL & Univ. Washington/JISAO, Seattle, **will speak on:**

Tsunami Observations in Southern California: Catching the Wave!

Abstract

Tsunami hazards in southern California have been virtually ignored until the past decade following the 2004 Boxing Day earthquake and tsunami in the Indian Ocean. The reasoning had been that the offshore ridge-and-basin physiography of the California Continental Borderland would dissipate distant tsunami energy and local sources were insignificant due to the strike-slip fault character. Increased knowledge of offshore seismotectonics, advances in computational technology, and occurrence of several large subduction-related earthquakes and tsunamis around the Pacific Rim and Indian Ocean have produced a new appreciation of tsunami hazards. The recognition that these far-traveled waves can cause immense destruction and catastrophic loss-of-life spurred federal and state governments to evaluate tsunami hazards more thoroughly. To encourage and enhance this effort, Mother Nature has provided three great ($M > 8$) Pacific Rim earthquakes and basin-wide tsunamis that reached the U.S. West Coast and caused damage to ports and harbors in southern California (and one fatality in northern California). Our investigations of southern California tsunami hazards were aided by direct observations of these three tsunamis locally and by modeling their propagation across the Pacific Ocean. One of the most significant observations was that these events, particularly the 27 February, 2010, M8.8 Chile and 11 March, 2011,

M9.1 Japan (Tohoku) tsunamis persisted for more than four days. Too often, people along the coast head back into harm's way before the tsunami attack is finished – and many pay with their lives. Recognition of the persistence of “mega-tsunamis”, understanding the causes for their long duration, and predicting these effects in future events to prepare coastal areas and prevent disaster is a goal that we are close to achieving. Tsunami persistence results from “ringing” of the entire Pacific Ocean Basin, where extreme tsunami energy continues to slosh back-and-forth across the ocean basin for days following the initial triggering event. Propagation effects including refraction and reflection of tsunami wave energy by shallow water wave guides in the ocean basin and by major shallow ridges and continental margins with steep slopes refocuses late arrivals of tsunami energy pulses at distant shores including southern California. Local coastal and nearshore resonant effects add to this persistence by enhancing the local “ringing” with wave energy bouncing back-and-forth between coast and offshore islands and banks and within the harbors thought to be protected from the open ocean wave energy. Re-examination of historic records shows that previous “clusters” of mega-tsunamis also demonstrated this persistence including the major events in 1946, 1957, 1960, and 1964. One must consider the possibility that our North American sources at Alaska/Aleutians or even Cascadia may be primed and ready for

our next mega-tsunami of the Pacific Rim. The Eastern Aleutian source has been modeled and is recognized as posing the greatest threat to southern California of all Pacific Rim sources. FEMA and the U.S. Geological Survey are preparing a simulation of such an event to help the U.S. West Coast withstand such a scenario.

Speaker's Biography

Dr. Legg received a B.S. in Space Sciences & Mechanical Engineering from the Florida Institute of Technology in 1973. At F.I.T, he also studied Physical Oceanography for the M.S. program. Dr. Legg continued his graduate studies in Oceanography at the Scripps Institution of Oceanography, with a National Science Foundation Graduate Fellowship, where he received his M.S. in 1980. In 1985, Dr. Legg completed his Ph.D., Geological Sciences, at the University of California, Santa Barbara. His post-graduate research focused upon the geology and seismotectonics of the California Continental Borderland, with detailed studies of the inner borderland west of San Diego and northern Baja California. While a graduate student, Dr. Legg conducted earthquake hazard and risk analysis research for the J.H. Wiggins Company, and helped the California Division of Mines & Geology map faults and earthquakes in the borderland. After the Ph.D., Dr. Legg expanded his marine seismic exploration skills at the Amoco Tulsa Research Center. Since 1988, Dr. Legg returned to Southern California to continue his offshore faulting and earthquake hazards studies. Recent offshore faulting and earthquake research efforts have included submersible dives (Alvin, Turtle, and Delta) to study borderland faults directly, multibeam swath bathymetry mapping of seafloor structure, and acquisition, processing, and interpretation of MCS and single-channel seismic profiles throughout the borderland. He continues to educate the larger community regarding the seismic hazards of the borderland including the potential for locally-generated tsunamis through seminars and publication. Dr. Legg was awarded the 2002

EERI/FEMA Professional Fellowship to study southern California tsunami hazards with Professor Costas Synolakis at the USC Tsunami Research Center where Dr. Legg continues as a Research Associate. As President of Legg Geophysical, a small consulting firm that specializes in Earth Sciences and Risk Analysis, Dr. Legg is involved in many diverse projects relating to both natural and man-made hazards funded by both government and commercial agencies. He is also a participating scientist with the Southern California Earthquake Center, and adjunct professor at San Diego State University, and a Visiting Assistant Research Geophysicist at UC Santa Barbara. His collaboration with scientists at Cal State Long Beach, Oregon State University and UC Santa Barbara to produce more accurate maps of the Borderland bathymetry for fault and tectonic studies led to the discovery of the large crater structures to be discussed. Most recently, Dr. Legg's work focuses on obtaining high-resolution multichannel seismic reflection images of active tectonic structures in the California Continental Borderland, so that more accurate and precise understanding of the regional tectonic evolution and submarine earthquake hazards may be achieved.

Meeting Time, Place, Cost and Reservations

Time:

Thursday, March 22nd, 2012

Typical Meeting Agenda

Lunch Served: 11:30 AM to 12:00PM

Announcements: 11:45 AM to 12:00 PM

Guest Speaker: 12:00 PM to 12:30PM

Questions/Close: 12:30 PM to 12:45 PM

Place:

The Grand at Willow Street Conference Center located at 4101 East Willow Street, Long Beach, CA. (562-426-0555). Take Lakewood Boulevard south from the San Diego Freeway (405), turn west onto Willow Street and turn right onto Grand Avenue at the sign for the Center. Park free in the garage structure.

Cost:

Lunch and Speaker: \$20.00 with reservations,
\$25.00 without reservations
Students: \$5.00(Lunch and Speaker)

Meeting Reservations:

Make your reservations using our web site at www.labgs.org or by calling TawnyaHildabrandat(714) 454-7149 or emailing Tawnya_Hildabrand@oxy.com ; *Reservations made prior to Tuesday before the meeting are appreciated, but reservations made up to the day before the meeting will be honored.* As always, walk-ins are welcome.

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