The Carolinas Section of the
Association of Environmental & Engineering Geologists
Presents

The 2008 Jahns Distinguished Lecturer,
Dr. John J. Clague
Simon Fraser University
Burnaby, British Columbia

supported by the Association of Environmental & Engineering Geologists and the Geological Society of America

Presentation:
Tsunamis- Stealth Killers

3:30 PM
Monday, April 14, 2008

1220 Jordan Addition
North Carolina State University
Raleigh, North Carolina

The Association of Environmental & Engineering Geologists and the Engineering Geology Division of the Geological Society of America jointly established the Richard H. Jahns Distinguished Lectureship in 1988 to commemorate Jahns and to promote student awareness of engineering geology through a series of lectures offered at various locations around the country throughout the year. Richard H. Jahns (1915-1983) was an engineering geologist who had a diverse and distinguished career in academia, consulting, and government.

Dr. Clague's resumé

Dr. Clague received an A.B. degree from Occidental College in 1967, an M.A. degree in Geology from the University of California at Berkeley, and his Ph.D. in Geology from the University of British Columbia in 1973. He worked as a research scientist for the Geological Survey of Canada from 1974 until 1998 and then accepted an academic appointment at Simon Fraser University (SFU) in Burnaby, British Columbia. He is currently Professor and Canada Research Chair in Natural Hazard Research at SFU and is the director of SFU's Centre for Natural Hazard Research. Dr. Clague is a Fellow of the Royal Society of Canada, Past-President of the International Union of Quaternary Research (INQUA), and a former President of the Geological Association of Canada. He has received several professional awards, including the Logan and E.R.W. Neale medals of the Geological Association of Canada, the Bancroft Award of the Royal Society of Canada, and the Burwell Award of GSA's Engineering Geology Division. He has been a member of the Geological Society of America since 1970.

Dr. Clague and his graduate students conduct research on a variety of natural hazards, including earthquakes, tsunamis, landslides, and floods. They also are documenting effects of Holocene climate change on glaciers, vegetation, and geomorphic processes in the mountains of western North America. Dr. Clague has authored or co-authored over 250 journal papers on these and other subjects in 40 different journals. His other major professional interest is earth science education. Dr. Clague has given countless public lectures, has written two general interest books on geology, and is co-author of a textbook on natural hazards.

Abstract

Tsunamis are body waves generated by abrupt vertical displacement of the seafloor or lake floor by earthquakes or volcanic eruptions. They can also be produced by landslides or, much more rarely, by asteroid impacts. Tsunamis generated by submarine earthquakes (the most common source) travel at subsonic speed across the ocean surface. In the open ocean the waves are generally only a few centimeters high, but as they approach shore they rapidly grow in height and then rapidly surge onshore. Unlike seismic tsunamis, the waves created by terrestrial or submarine sediment failures, whether triggered by earthquakes or not, have only a local impact.

The main sources of destructive tsunamis in the twentieth century have been earthquakes at subduction zones bordering the Pacific and Indian oceans. In December 2004, a tsunami triggered by the second largest earthquake in history produced wave run-ups to 30 m asl along coasts bordering the Indian Ocean, killing almost 200,000 people. In 1896, waves up to 35 m high struck the east coast of Japan, smashing more than 100,000 houses and drowning 27,000 people.

Landslides that plunge into the sea, or that occur on the ocean floor, can also produce tsunamis. The 1964 Alaska earthquake triggered a large submarine slump near Valdez, Alaska, that produced a local tsunami. The tsunami destroyed waterfront facilities, much of the fishing fleet, and claimed 30 lives, nearly 25 percent of all the casualties of the earthquake. The 1929 Grand Banks earthquake triggered a huge submarine landslide that severed sea floor telecommunication cables far out into the Atlantic and produced a tsunami that inundated the east coast of Burin Peninsula in Newfoundland, killing 27 people. However, the most spectacular landslide-triggered tsunami of the twentieth century occurred on July 10, 1958, at Lituya Bay, Alaska. A strong earthquake triggered a rockslide on a steep slope high above the head of the bay. The rockslide plunged into the bay and displaced a huge mass of seawater that raced up the opposite valley wall to an elevation of 525 m, completely destroying the forest in its path. In four minutes, a 30-m-high wave surged 11 km to the mouth of the bay, where it swept away two fishing boats anchored just inside a low forested spit. Remarkably, the crew of one of the boats survived and told a harrowing tale of their boat being swept over the tops of trees, across the spit towards the open Pacific Ocean.