

Risk of landslide-generated tsunamis for the coast of British Columbia and Alaska

by

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Abstract

Many coastal areas of British Columbia and Alaska are characterized by thick lobes of unstable sediment perched on steep coastal or underwater slopes. We discuss the geotechnical, oceanographic, and tectonic risk factors that pre-condition a particular region to submarine and subaerial landslides or slumps. We then present an effective generalized finite-difference numerical model which can be used to simulate tsunamis generated by the combined submarine and subaerial components of the landslide. The landslide is treated as an incompressible, isotropic, viscous fluid rather than as a rigid body. The model incorporates real bottom topography and assumes the long-wave approximation for both the surface waves and the slide. Applications include the tsunami of November 3, 1994 in Skagway Harbor, Alaska (for which there is good geotechnical and oceanic data) and the possible failures of large unstable sediment accumulations on the Fraser River delta front in southern Strait of Georgia and in Malaspina Strait which separates Texada Island from the mainland of British Columbia. Results from numerical simulations of the slide behaviour and the associated tsunami waves are presented along with animations of the temporal evolution of slide and wave fields.