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Geotechnical Analyses of Submarine Landslides in Glacial Marine Sediment, Northeast Gulf of Alaska

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ABSTRACT[1]

Glaciation is the most important process contributing sediment to the northeast Gulf of Alaska. Large sediment failures within the Holocene glacial-marine sediment of the Continental Shelf have been identified on slopes as gentle as 0.5°. The major offshore processes responsible for sediment failure in the Gulf of Alaska are earthquake and storm-wave loading coupled with cyclic shear strength degradation. A normalized soil parameter (NSP) approach can yield shear strength parameters that are somewhat independent of coring disturbance by normalizing these parameters by appropriate consolidation stresses. The NSP approach also appears capable of aiding in the extrapolation of surficial sediment properties to the subsurface. Laboratory tests using the NSP approach, supplemented with in-place vane shear data, reveal that for these glacial-marine sediments, clayey silt with a natural water content between 35 percent and 45 percent is most susceptible to cylic loading. Cores that contain more of this susceptible clayey silt roughly correlate with locations of sediment failure features. A simplified analysis shows that, in water depths shallower than 35 m, maximum storm waves would produce shearing stresses greater than stresses induced by maximum earthquakes. In deeper water, earthquakes would produce greater stresses. Differences in failure morphology are difficult to relate to advanced geotechnical parameters but likely relate to observed variations in plasticity, slope, angle, water depth, or variations in consolidation state.

[1]1983, *in* Molnia, Bruce F., ed., Glacial-Marine Sedimentation: New York, Plenum Publishing Corporation, p. 146–184.