



FORAMINIFERAL EVIDENCE OF SUBAQUEOUS DEBRIS FLOWS AT ODP SITE 1033 (LEG 169S), SAANICH INLET, VANCOUVER ISLAND, CANADA

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ABSTRACT

The foraminiferal faunas of 150 Holocene-latest Pleistocene samples from ODP Site 1033 (Leg 169 S), Saanich Inlet, were quantified. Sediments of this anoxic inlet in southern Vancouver Island, British Columbia consist of varved clays interbedded with slightly coarser massive layers. The 25 species of benthic foraminifera found were predominantly shallow water, calcareous forms, although a few planktic foraminifera and rare arcellaceans, as well as deeper water dysoxic benthic forms were also recorded. Most samples contained an impoverished fauna (average of 25 to 30 individuals), but massive layers contained statistically higher numbers and diversity of foraminifera than varves. A high proportion (> 50 %) of the foraminiferal fauna in the massive units were also found to be either damaged or broken. Such a high proportion of broken/damaged foraminifera along with the presence of arcellaceans in the massive layers lend credence to the hypothesis that they were transported from well oxygenated shallower, and nearshore parts of the inlet and deposited on the anoxic bottom of Saanich Inlet during subaqueous debris flows. Subaqueous debris flows in the inlet are induced by both seismic and non-seismic events. The varved sediments also contain broken specimens of foraminifera. Although intact benthic foraminifera within the varves are typical forms capable of withstanding dysoxic conditions and appear to be autochthonous, broken specimens are mostly shallow water types requiring higher levels of oxygen. They are transported to the deeper anoxic parts of the inlet during spring freshet along with mineral rich silt. It is difficult to distinguish between seismic and non-seismic debris flows as few recorded earthquakes in the region have been conclusively linked with massive layers.

Key words: Cascadia, Foraminifera, Varves, Anoxic, Paleoseismicity, Debris Flow