

Holocene dinoflagellate cysts from fjords of western Vancouver Island (British Columbia, Canada)

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Abstract

Forty-six surface sediment samples from 16 coastal inlets of western Vancouver Island and two shallow bays of the Broughton Archipelago NE of the island were investigated for dinoflagellate cysts and other palynomorphs. Well preserved and abundant dinoflagellate cyst assemblages have been recovered and a total of 43 cyst types of three orders were identified.

Cyst assemblages were dominated by *Operculodinium centrocarpum* sensu Wall & Dale 1966, *Spiniferites* spp. and *Brigantedinium* spp. Total dinoflagellate cyst concentrations vary two orders of magnitude between 7,279 and 918,584 cysts.g⁻¹ of dry sediment, with the highest values observed in samples from Tofino Inlet. As expected, cyst concentrations and assemblage diversity yielded higher values in the western Vancouver Island inlets, compared to the shallow bays of the Broughton Archipelago where the values were the lowest. Tofino Inlet had the highest abundance of *O. centrocarpum* sensu Wall & Dale 1966, whereas Neroutos Inlet samples were characterized by high concentrations of Arcellacean testate amoeba. Cysts of autotrophic dinoflagellates dominate in the southern inlets where the waters are warmer and less cloud cover is present; whereas, heterotrophic species increase in importance towards the north. Sedimentary biogenic silica concentrations were measured at each studied site and we find rather weak correlation to the total cyst concentrations.

Cysts of the potentially toxic dinoflagellate *Alexandrium* spp. were found in most of the samples with the highest abundance in the Kyuquot and Quatsino Sounds. Process length variation of *O. centrocarpum* sensu Wall & Dale 1966 are measured and significantly correlate with sea water density when considered in a regional context.

The dinoflagellate cyst assemblages and their distributions are related to both regional environmental parameters determined by latitude (e.g. sea surface temperature, salinity, upwelling, cloud cover), and local properties of the inlets themselves (e.g. sill depth, runoff, anthropogenic influence).

A 10m core has been obtained from Tahsish Inlet in the Kyoquot Sound, where surface sediment samples indicated high modern productivity. Radiocarbon dating indicates a bottom age of ~10ka. The dinoflagellate cyst record is being studied at centennial resolution in order to reveal Holocene climatic change in the NE Pacific realm.