Geochemical Evidence for Late Holocene Paleoclimatic and Paleoceanographic Variability in Anoxic Basins, Seymour-Belize Inlet Complex, Central Coastal Mainland, British Columbia

Babalola, L.O, Patterson, R.T. and Prokoph, A.
Earth Sciences Department
Carleton University
Ottawa, Ontario
Canada

Stable ($\delta^{13}C$ and $\delta^{15}N$) isotope and trace element proxy data from two piston cores from Frederick Sound (FS) and Alison (ALS) Sound within the Seymour-Belize Inlet Complex (SBIC), British Columbia, were utilized to investigate regional variability in late Holocene paleoclimate and paleoceanography. The piston cores were predominantly composed of organic-rich mud/silt sediments mainly deposited as annually laminated and massive intervals interspersed by occasional slump and graded sediments.

The C_{org}/N_{total} ratios were high (12-50) indicating terrestrially derived organic matter. The enrichments of $\delta^{13}C$ (-26.5 to -24.4 ‰) in both the FS and ALS cores provide evidence that primary source of the organic matter in the SBIC has been terrestrial. The overall high concentrations of redox-sensitive elements (e.g. Cd, Cu, Mo, U, V, and Fe) and redox indices (e.g., U/Th, V/Cr, V/(V+Ni),V/Sc and (Cu+Mo)/Zn) in the cores are interpreted to indicate that bottom waters in the SBIC were characterized by low oxygen levels during the late Holocene. The similarity in geochemical proxy values between the laminated and homogeneous intervals indicate that both sediment types were deposited under similar suboxic to anoxic bottom water conditions.

The distribution of $\delta^{13}C$ and $\delta^{15}N$ stable isotopes, laminae thickness and foraminiferal species in the FS and ALS cores suggests that there were periodic alternations between cool/wet and cooler/dry climate conditions in the SBIC. A dramatic shift to heavier $\delta^{13}C$ and lighter $\delta^{15}N$ values at 3135 cal yr BP (FS core) and 2462 cal yr BP (ALS core), respectively, indicates a regime change to cooler/dry regional climate conditions corresponding to late Holocene Neoglacial advances in the Northeast Pacific region.

Time-series analysis of the organic matter proxies revealed the presence of PDO-like (34-67), Gleissberg (70-~140), and Suess (~150-250) solar cycles. These patterns were probably

derived from solar influences on long-term variability in jet stream flow, which impacted the Center of Actions (COA) of the regional Aleutian Low (AL) and North Pacific High (NPH) atmospheric circulation systems.. Variation in the strength and movement of the COA of the AL and NPH has a significant influence on regional climate patterns in the Northeast Pacific, which directly impacts sedimentation within the SIBC