

History of the Arctic-Pacific oceanic interaction based on sediment records from the Chukchi-Alaskan margin

Leonid Polyak, Geoffrey Dipre, Seung-Il Nam, Masanobu Yamamoto, Kenta Suzuki, Emma Oti, Joseph Ortiz, & Anton Kuznetsov

polyak.1@osu.edu

Impacts of the Pacific oceanic and atmospheric system on the Arctic Ocean result in accelerated sea-ice retreat and related climate changes. Past records from the Pacific sector of the Arctic are key for understanding the history of these interactions. Sediment cores from the Chukchi-Alaskan margin give insights into this history from both long-term (Plio-Pleistocene), stratigraphically compressed records, and high resolution records of the last ~10 ka. The oldest, early Pliocene sediments indicate seasonal only sea ice, strong currents, and high water acidity, similar to expected future Arctic Ocean conditions. A pronounced change at ~5 Ma is interpreted as the onset of Pacific-Arctic throughflow via the Bering Strait (BS). Early Quaternary deposits atop a Pliocene unconformity indicate stepwise sea-ice expansion and growth of ice sheets culminating in a major climatic shift during the Mid-Pleistocene Transition, ~0.8 Ma. Younger Quaternary sediments show glacial cyclicity controls and mostly perennial sea-ice conditions. More recent records are relevant for tracking modern climate variability. A depocenter at the Alaskan margin provides high resolution records for sediment delivery by the Alaskan Coastal Current originating from the Bering Sea and controlled by the Aleutian Low (AL) pressure center. Results from the last several centuries indicate a persistent role of the AL in the BS inflow and a complex interaction of its different branches. More proxy studies are underway to reconstruct the history of this circulation system and its relationship with sea ice extent.