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Holocene palynomorph records since the last deglaciation from the Chukchi Sea shelf sediments, western Arctic Ocean

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Organic-walled microscopic organisms in marine sediments such as dinoflagellate cysts, pollen, spores and freshwater algae from the Chukchi Sea shelf sediment document spatial and temporal variations in the paleoenvironmental history in relation to regional climatic changes during the Holocene. The records presented here are derived from a sediment core from the shallow shelf of the Chukchi Sea in the western Arctic (core ARA02B/01A-GC), a site which allows us to assess the timing of the Bering Strait opening and its influence over the regional environmental system during the last post glacial interval. The sediment core contains a rich concentration of terrestrially derived pollen and spores, indicating considerable changes in vegetation over the catchment area including the territories of both North America (Alaska and Northern Canadian Arctic) and Northern Siberia (Chukotka peninsula and Northern East-Siberian coast) during the last 10 kyr BP. We speculate that the palynomorphs were predominantly supplied from eroded shelf sediments during intervals of extensive sea-ice coverage, while they were carried to the shelves by large rivers (Yukon, Mackenzie and Siberian rivers) and then transferred by oceanic currents during low sea-ice coverage intervals. In particular, the percentage ratio between tree-herb pollen and spores, and the algae Pediastrum in the palynomorph assemblages represent significant changes in the western Arctic vegetation associated with freshwater inputs, including increased forest vegetation between $\sim$8 and 4 kyr BP, a climatic optimum at $\sim$5 kyr BP and a termination of the low sea-ice interval at $\sim$3 kyr BP. In parallel, marine palynomorphs (dinoflagellate cysts) document significant changes in the marine environments, typically for a prominent increase in dinoflagellate cyst concentrations as well as total organic carbon and nitrogen contents since ca. 8 kyr BP suggesting increased nutrient inputs and marine productivity in the study area. Our palynomorph proxy records illustrate the complexity of interactions between land-ocean and atmospheric systems, highlighting the need for high-resolution records for a better understanding of the western Arctic climate system.