

Silicoflagellate assemblages in the Okhotsk Sea during the interglacial periods

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Silicoflagellate is a phytoplankton with a skeleton of biogenic opal. There are two major genera for modern silicoflagellates: *Dictyocha* mainly dwelling in tropical to temperate regions and *Stephanocha* mainly dwelling in subarctic region. The *Dictyocha*/*Stephanocha* ratio has been used as a paleotemperature proxy. Earth's climate for the past 800,000 years is characterized by the glacial and interglacial cycles with a frequency of 100,000 years. Oxygen isotope ratios of benthic foraminifera mainly reflect continental ice-sheet volume fluctuations, lighter in the interglacials and heavier in the glacials. This fluctuation is called as Marine Isotope Stage (MIS), odd numbers correspond to interglacials and even numbers correspond to glacials. Among the interglacials, the oxygen isotope ratios were lighter than that of the present: MIS 5e (120,000 years ago), 9 (330,000 years ago), and 11 (400,000 years ago). Pollen assemblages in Lake El'gygytgyn sediment from the Far East Russia in the Arctic Circle indicates pronounced warming during MIS 11. Because atmospheric carbon dioxide concentrations during the past interglacials were comparable to the preindustrial level, it is important to know the status of warming climate during interglacials. The purpose of this study is to reconstruct sea-surface conditions of the Okhotsk Sea during the past interglacials based on silicoflagellate assemblages preserved in sediments. By comparing silicoflagellate assemblages during MIS 1, 5e, 9 and 11, we test the extent of warming during interglacials. The Okhotsk Sea is a marginal sea of the western North Pacific located south of Lake El'gygytgyn, known as southernmost sea-ice covered area in the Northern Hemisphere. A piston core YK07-12 PC-3B (water depth: 1049 m, core length: 14.09 m). Age model of core YK07-12 PC-3B is established by benthic foraminiferal oxygen isotope stratigraphy and the estimate bottom age is 450,000 years ago. Silicoflagellate assemblage analysis was performed by using sediment samples collected from sedimentary horizons corresponding to MIS 1, 5e, 9, and 11. For each interglacials, three samples from peaks of biogenic opal content, maximum calcium carbonate content and minimum benthic foraminiferal oxygen isotope ratio were picked up, consequently, a total of 12 samples were selected. 100 silicoflagellate specimens were counted for each slide under light microscope. Almost all encountered silicoflagellate species during core YK07-12 PC-3B microscopic observation were belonging to genus *Stephanocha*. During MIS 11, *Stephanocha speculum* (particularly, *S. speculum minuta*) was the most abundant silicoflagellate taxa. Because *Stephanocha speculum* is known as a representative silicoflagellate species in the subarctic Pacific dwelling cold and nutrient rich environments, this result indicates that there is no evidence of significant warming in the Okhotsk Sea during MIS 11. Another abundant silicoflagellate species in core YK07-12 PC-3B was *Stephanocha octangulata*, also known as subarctic taxa. This species was dominant during MIS 1 and 5e. Unique oceanic environments such as seasonal sea-ice coverage and influence of low salinity water originating from the Amur River may have influenced on the silicoflagellate assemblages of core YK07-12 PC-3B.