

Biogenic opal changes at the Kamchatka Strait in the Bering Sea since the last glaciation

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The subarctic Pacific is known as a high biological productivity region mainly by diatoms. Particularly the central and eastern parts of the subarctic Pacific are high nutrient low chlorophyll (HNLC) regions. In the HNLC regions, lack of micronutrients such as iron regulate phytoplankton productivity despite of macronutrient availability such as nitrate, phosphate and silicate. Modern oceanographic observation has revealed dissolved iron transportation from the Okhotsk Sea to the western subarctic Pacific through intermediate water. Biological productivity in the subarctic Pacific was markedly low during the last glacial. Since the last glacial termination, the productivity in the subarctic Pacific increased but considerable regional differences were observed. In this study, biogenic opal content in KST-2A-PC obtained from the Kamchatka Strait was measured to understand changes in diatom production in the western Bering Sea. The biological opal content in KST-2A-PC showed gradual increase since the last glaciation without deglacial peak. This pattern was not similar to the central and eastern Bering Sea but similar to the Okhotsk Sea. The peaks of biological productivity at the southern, eastern, and northern Bering Sea and north open Pacific during the last deglaciation were influenced by increasing of supply in macronutrients which came from deep water and/or from continental shelves following the rise of sea level. However, Macronutrients had been consumed completely before reaching the western Bering Sea, so, in the last deglaciation, there were no peak of biological productivity at the western Bering Sea and in the Okhotsk Sea. Since Holocene, supply of macronutrients from deep sea and dissolved Fe from the Okhotsk Sea transported by intermediate water was increased, which caused increasing of biological productivity in the north Pacific marginal seas. Changes of utilization efficiency in macronutrients indicate that it was in the period from the last deglaciation to Holocene that macronutrients as regulatory factor of biological productivity were replaced with dissolved Fe, thus HNLC regions were formed.

Keywords: The Bering Sea, The last glaciation, Biological productivity