

Dynamic controls on the subarctic North Pacific productivity peak during the Bølling-Allerød

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Prominent maxima of biological productivity are recorded in both the Northwest and Northeast Pacific during the deglacial, interstadial Bølling-Allerød. These have been linked to a suite of differing causes and mechanisms, such as preservation effects, iron fertilization, riverine fluxes, upper ocean stratification and coastal upwelling. There is also widespread evidence for shifts in the subarctic Pacific ocean circulation during the deglaciation. However, while the dynamics of nutrient provision and limitation within the photic zone are certainly of high significance, the important role of physical circulation changes in the subsurface to deep ocean in replenishing nutrient supplies to the upper ocean, and of upper ocean temperature changes in fostering productivity peaks, remain largely unconstrained over the course of the last deglaciation.

Here, using an Earth System Model COSMOS, we conducted a simulation representing the climate transition from the Last Glacial Maximum to the Bølling-Allerød. In association with marine proxy evidence, we will discuss the deglacial evolution of the surface to deep ocean circulation and mixing in the North Pacific, and examine their respective roles in determining the upwelling of nutrients from deeper layers, along with the formation of the North Pacific Intermediate water.