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Evidence of meltwater pulses into the North Pacific over the last 20ka due to the decay of Kamchatka Glaciers and Cordilleran Ice Sheet

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Abstract

Glaciers, one of basic elements of climate system, play a crucial role in shaping global climate and regional environment. Combined with the published $\delta^{18}O$ of *Neogloboquadrina pachyderma* (sin) (Nps), the data in this study show the impact of glacier decay on surface hydrography. Light peaks in $\delta^{18}O$ Nps of one sediment core retrieved from the NW Pacific, after ice volume correction for water oxygen isotopic composition ($\delta^{18}O\ Nps_{gwc}$), are referred to correspond to the melting-pulse events during the decay of Kamchatka glaciers. These events are synchronous with the sub-millennial scale warming in the Northern Hemisphere during the Greenland Interstadial 1. On the other hand, the influence of the Kamchatka Glacier decay on surface hydrography is limited to the adjoined area of the Kamchatka River Estuary. In contrast, the $\delta^{18}O\ Nps_{gwc}$ data from the North Pacific show that the effect of Cordilleran Ice Sheet (CIS) decay are remarkable in the Gulf of Alaska, the NE Pacific and the Bering Sea. Specifically, the CIS melting water results in a stronger surface stratification and thus the salinity and density decrease in the surface water of NE Pacific and the eastern Bering Sea. Moreover, this process causes an expansion of the oxygen minimum zone by limiting the ventilation down to intermediate depths, and acts also to give an explanation for the coeval formation of laminated sediments. Here, our data indicate the main role of the CIS melting water in controlling the North Pacific surface and intermediate hydrographic conditions by changing vertical ocean stratification.

1. Introduction

The ice sheets of the Northern and Southern Hemispheres are important elements of the Earth's climate system. Their dynamics are essential in explaining the climate change and also