

# WHY DID THE LAURENTIDE ICE SHEET START TO BUILD UP AT 50 KA?

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## ABSTRACT

Climate change from the Eemian to the Last Glacial Maximum took place as undulating stepped transition induced by solar insolation. The growth and shrinkage pattern of continental glaciers in Northern Hemisphere was not consistent before reaching its maximum stage. At *ca.* 50 ka the Laurentide Ice Sheet started to expand rapidly at the expense of the Eurasian Ice Sheet, however this phenomenon could not be properly explained by any direct evidence yet despite various plausible scenarios by climate modeling. Here we first present the physical evidences from the Arctic pelagic glaciogenic sediments that the large input by glacial melting from the Eurasia region gradually freshened the Arctic Deep Water before 50 ka. At 50 ka during MIS 3 the outburst of glacial dammed-lake in Eurasia maximized the freshening. The freshened Arctic water invasion into the North Atlantic weakened the Gulf Stream intensity and shifted the formation position of the North Atlantic Deep Water, which resulted in the Laurentide Ice Sheet buildup.