

Did Icebergs Drive Major Climate Changes During the Last Ice Age?

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The purpose of this research is to investigate whether icebergs influenced the ocean's circulation and contributed to significant climate changes during the last Ice Age. Previous studies have suggested that iceberg discharge from surrounding ice sheets introduced large volumes of freshwater into sensitive deep-water production locations in the North Atlantic Ocean, potentially altering ocean circulation and influencing regional and global climate. This research focused on the sequence of events approximately 40-50 thousand years ago in the central North Atlantic Ocean, utilizing a sediment core VM 30-100 PC recovered from the Mid-Atlantic Ridge. We quantified the abundance of ice-rafted debris (IRD) as an indicator of the presence of icebergs in the core sample from every cm at depths from 150-200 cm. In addition to IRD counting, we determined the relative abundance and stable oxygen isotope ratios ($\delta^{18}\text{O}$) in the microfossil shells of the polar foraminifera species *Neogloboquadrina pachyderma* (*N. pachy*) as indicators of the surface ocean's conditions during that time. By detecting an increase in $\delta^{18}\text{O}$ values over time it will indicate a decrease in ocean temperature, which we expect to correspond with a large abundance of *N. pachy*. Once IRD counting is completed, graphing the IRD concentration over depth will reveal periods of significant iceberg presence. By comparing the relative abundance of IRD and *N. pachy* in the samples, and by observing the $\delta^{18}\text{O}$ data, we aim to determine whether iceberg discharge preceded changes in ocean circulation or if sea-surface conditions shifted beforehand. Our hypothesis is that icebergs appeared first and disrupted ocean circulation, leading to subsequent changes in sea-surface conditions. This research will provide insight into the cause and sequence of natural variability in the climate system. We believe that there is a strong possibility that iceberg discharges played a crucial role in altering ocean circulation, thus driving significant climatic changes and contributing to the onset of the last Ice Age.