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Simulating Heinrich event 1 with a coupled climate model including interactive icebergs

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During the last glacial, major abrupt climate events (Heinrich events) are associated with distinct fingerprints of ice rafted detritus (IRD) in marine sediment cores from the North Atlantic. These Heinrich events are therefore associated with the release of many icebergs into the North Atlantic Ocean. The fresh melt water associated with these icebergs might have triggered a (partial) "shut down" of the meridional overturning circulation, as has been illustrated in a number of "fresh water hosing" studies performed with coupled atmosphere-ocean models. In these studies the melting icebergs are simply represented by a huge amount of fresh water that is instantaneously dumped in the North Atlantic Ocean, thus neglecting several effects that could have had a significant effect on climate, such as the transport of icebergs from the source to the melting area and the heat flux that is involved in the iceberg melting. To analyse the impact of these effects, we present a study of Heinrich event 1, using a 3-dimensional climate model including interactive icebergs. These icebergs are driven by winds and ocean currents, and release fresh melt water to the local grid cell, while also absorbing the "latent heat" that is needed to melt the ice. Comparing two similar simulations, one with interactive icebergs and one with traditional freshwater hosing, we are able to show the importance of using a dynamical iceberg model for studying abrupt climate changes.