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A role for icebergs in the 8.2 ka climate event

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We investigate the potential role of icebergs in the 8.2 ka climate event, using a coupled climate model equipped with an iceberg component. First, we evaluate the effect of a large iceberg discharge originating from the decaying Laurentide ice sheet on ocean circulation, compared to a release of an identical volume of freshwater alone. Our results show that a large iceberg discharge facilitates sea-ice growth as a result of lower SSTs induced by latent heat of melting. This causes an 8% increased sea-ice cover, 5% stronger reduction in North Atlantic Deep Water production and 1ºC lower temperature in Greenland. Second, we use the model to investigate the effect of a hypothetical two-stage lake drainage, which is suggested by several investigators to have triggered the 8.2 ka climate event. To account for the final collapse of the ice-dam holding the Laurentide Lakes we accompany the secondary freshwater pulse in one scenario with a fast 5-year iceberg discharge and in a second scenario with a slow 100-year iceberg discharge. Our experiments show that a two-stage lake drainage accompanied by the collapsing ice-dam could explain the anomalies observed around the 8.2 ka climate event in various climate records. Our results suggest a potential role for icebergs in the 8.2 ka climate event and illustrate the importance of latent heat of melting in the simulation of climate events that involve icebergs. Our two-stage lake drainage experiments provide a framework in the discussion of a two-stage lake drainage and ice sheet collapse.