



A coupled ocean-sea ice-iceberg model over the 20th Century: Iceberg flux at 48°N as a proxy for Greenland iceberg discharge

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We have used a coupled ocean-sea ice-iceberg model, the Fine Resolution Greenland and Labrador ocean model [1], to study the variation in, and trajectory of, icebergs over the twentieth century, focusing particularly on Greenland and surrounding areas. The model is forced with daily heat, freshwater and wind fluxes derived from the Twentieth Century Reanalysis Project [2]. We use the observed iceberg flux at 48°N off Newfoundland (I48N) from 1900 to 2008 [3] as a proxy for the variation in the calving rate of Greenland tidewater glaciers. Model I48N is calculated with both a variable and constant annual calving rate. The results show that ocean and atmosphere changes alone do not account for the variation in observed I48N and, allied analysis using non-linear systems modelling, suggests that this series can be used as a proxy for the interannual Greenland Ice Sheet iceberg discharge. Our models find that in the early decades of the twentieth century I48N was dominated by icebergs originating from south Greenland (below latitude 65°N) with west Greenland becoming the main source of I48N from the late 1930s onwards.

References

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3. D. L. Murphy (2011) <http://www.navcen.uscg.gov/?pageName=IIPIcebergCounts>