

Geometry, mass balance and climate change response of Langjökull ice cap

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The geometry of the surface and bed of Langjökull, Iceland, was constructed from GPS and radio-echo surveys in 1997. The mass balance of the ice cap was measured from 1996-1997 to 2004-2005 and linked to climatic variables recorded in automatic weather stations on the glacier every summer since yr 2001, and to the records of the Hveravellir meteorological station east of the ice cap. A degree-day mass balance model was calibrated against stake observations of winter and summer balance on the glacier for 1997 to 2004. We used the mass balance model, coupled to a 3-D ice flow model, to simulate the evolution of Langjökull, over the next two centuries in response to a prescribed climate change scenario for Iceland (the Nordic CWE project). The volume of ice is predicted to decrease by half in 150 yrs and the glacier will have disappeared within 200 yrs. Runoff will increase until the close of the 21st century but decrease thereafter.