



## **Rapid thinning of Langfjordjøkelen in northern Norway.**

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The Norwegian glaciers span over large distances and cover different climatic regimes. In order to gain knowledge of glaciers in the northernmost parts of Norway, mass balance investigations began in 1989 on an east facing outlet of the maritime plateau glacier Langfjordjøkelen. The mass balance measurements reveal a large annual mass turnover in the same order as at the maritime glaciers located much farther south in Norway. The mean summer balance (-3.0 m w.e.) exceeds the mean winter balance (2.2 m w.e.) resulting in a deficit of -0.78 m w.e./a. for the period 1989-2005. The mass deficit of Langfjordjøkelen is in contrast to the maritime glaciers farther south which experienced mass surplus in the same period. Most of the mass loss of Langfjordjøkelen has occurred over the last nine years (1997-2005). In the period 1989-1995 the glacier has a slightly negative mass balance, while all the other observed glaciers in mainland Norway had a transient mass surplus. Length change measurements began in 1998 and show a mean annual retreat of more than 30 m. The recent increased thinning and retreat of Langfjordjøkelen is stronger than observed for any other glacier in mainland Norway. Mass balance correlates poorly between Langfjordjøkelen and glaciers in Svalbard. In mainland Norway the glacier correlates best with the maritime glaciers, however, the correlation is too low to use for reconstruction of the mass balance back in time. Instead, a simple model estimating mass balance from upper-air meteorological data was calibrated between 1989 and 1999 and used to reconstruct the balance back to 1948. Model error is comparable to uncertainty in mass balance measurements. The reconstructed series from 1948 until 1989 reveal an average balance of 0.6 m w.e./a. Volume change calculated from comparison of maps in 1966 and 1994 suggest thinning and retreat of the glacier in this period, but overestimates the mass deficit compared to the results from the upper air model in the same period.