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Glacier mass balance modeling on the King George Island ice cap, Antarctica

The Antarctic Peninsula is amongst the fastest warming places on Earth and further temperature increase is to be expected. It has undergone rapid environmental changes in the past decades. Exceptional rates of surface air temperature increases (2.5K in 50 years) are concurrent with retreating glacier fronts, an increase in melt areas, surface lowering and rapid retreat, break-up and disintegration of ice shelves.

For King George Island we have compiled a unique data set comprising long-term time series of weather data, direct measurements of evaporation on the inland ice cap, repeat measurements of surface lowering at different locations on KGI, and time series of multi-sensor satellite imagery ranging back to 1988 with considerable denser acquisitions since the launch of the ERS-1 SAR sensor (1991) until today. It allows for the identification of melt patterns and bare ice areas during summer.

These data allow us to considerably advance previous studies to work towards a long-term mass balance model for the King George Island ice cap that is calibrated and validated with independent data sources. The Bellingshausen climate data allows us to drive a mass balance model and analyze the impacts of the climatic changes during the last 4 decades.