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Mass balance of the ice cap of King George Island, Antarctica

S. Palmer, A. Shepherd.

Institute of Geography, School of GeoSciences, University of Edinburgh, Drummond Street, Edinburgh, EH8 9XP, UK (s.j.palmer@sms.ed.ac.uk / Fax: +44 (0)1316502524 / Phone: +44 (0)1316502572)

Earth's ice caps are sensitive to changes in temperature and precipitation and, being widely distributed, can be used as indicators of regional and global climate change. Here we present a study of the mass balance of the ice cap of King George Island, Antarctica (62^{o}S, 58^{o}W). With an area of about 1400 km^2 and mean ice thickness of 100 m, the ice cap contains enough water to raise global mean sea level by about 0.4 mm (about 0.2% of sea level equivalent of Earth's 10^2 ice caps). King George Island has a relatively warm, maritime climate and precipitation rates are high, varying from 0.5 m year^{-1} at the margin to 2 m year^{-1} on the highest ground. Assuming surface parallel flow, we combine InSAR data from ascending and descending passes during the ERS tandem phase with a DEM produced from GPS surveys to map the surface velocity field of the ice cap. We show that the ice cap is drained by a mixture of tide water and land terminating glaciers and using InSAR velocities combined with ice thickness data, we estimate the total ice discharge. Finally, we compare our ice discharge estimates with accumulation estimates from stake measurements and ablation estimates from a degree-day model to assess the mass budget of the ice cap.