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Numerical Modelling of King George Island ice cap, Antarctic Peninsula, Antarctica

Thiago Dias dos Santos (1), Jefferson Cardia Simões (2,1), Philippe Remy Bernard Devloo (1), and Mathieu Morlighem (3)

(1) Department of Structures, School of Civil Engineering, Architecture and Urban Design, University of Campinas - UNICAMP, Brazil (santos.td@gmail.com), (2) Polar and Climate Center, Geosciences Institute, Federal University of Rio Grande do Sul - UFRGS, Brazil, (3) Department of Earth System Science, University of California, Irvine - UCI, USA

Glaciers in King George Island (KGI), located in the marginal sea-ice zone north of the Antarctic Peninsula, are widely dominated by maritime climate and have experienced a fast air temperature increase over the last decades (2.5 C in 50 years). In the same period, these glaciers have undergone rapid ice front retreat, thinning, and an increase in surface melt. The Lange Glacier, a fast tidewater glacier situated in the Admiralty Bay, KGI southern coast, has shown the most significant response, retreating at least 1 km since 1956 losing its floating part. Although recent field observations indicate non-predominant changes in the ice-ocean margin and surface velocity, it is not clear whether this glacier is stationary or adjusting to new climate conditions. Here we build a numerical model to investigate the dynamic and future response of Lange Glacier under climate scenarios. Ice thickness, bed topography and surface velocity in situ measurements are obtained from the most recent published data, as well as climate variables. The transient and stress equations of ice flow are solved through the Ice Sheet System Model (ISSM) and the model is calibrated using basal friction inversion. Model projections are carried out through local climate forecasting using statistical regression. Preliminary results indicate that the ice cap is almost entirely temperate at its base, with extensive regions of low basal drag. The sensibility and future of King George ice cap under climate scenarios are also evaluated and discussed.