Geophysical Research Abstracts
Vol. 13, EGU2011-6812, 2011
EGU General Assembly 2011

An improved bathymetric compilation for the Bellingshausen Sea, Antarctica, to inform ice-sheet and ocean models

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The southern Bellingshausen Sea (SBS) is a rapidly-changing part of West Antarctica, where oceanic and atmospheric warming has led to the recent basal melting and break-up of the Wilkins ice shelf, the dynamic thinning of fringing glaciers, and sea-ice reduction. Accurate sea-floor morphology is vital for understanding the continued effects of each process upon changes within Antarctica's ice sheets. Here we present a new bathymetric grid for the SBS compiled from shipborne multibeam echo-sounder, spot-sounding and sub-ice measurements. The 1-km grid is the most detailed compilation for the SBS to-date, revealing large cross-shelf troughs, shallow banks, and deep inner-shelf basins that continue inland of coastal ice shelves. The troughs now serve as pathways which allow warm deep water to access the ice fronts in the SBS. Our dataset highlights areas lacking bathymetric constraint, as well as regions for further investigation, including the likely routes of palaeo-ice streams. The new compilation is a major improvement upon previous grids and will be a key dataset for incorporating into simulations of ocean circulation, ice-sheet change and history. It will also serve forecasts of ice stability and future sea-level contributions from ice loss in West Antarctica, required for the next IPCC assessment report in 2013.