Variations in Ice Sheet Dynamics along the Amundsen Sea and Bellingshausen Sea West Antarctic Ice Sheet margin

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Abstract

Modern global warming and their possible contribution to sea level rise and flooding of low lying coastal areas has moved both Antarctic and Greenland ice sheets into the focus of public and scientific interest. Research has concentrated on reconstructing the dynamics of the ice sheets in order to understand their vulnerability to a changing climate by collecting multi-disciplinary data and numerical simulations. Synchronous changes in ice sheet extent along its margin are often assumed. The study presented here analyses the regional and chronological appearance, distribution, and modification of sedimentary features and structures identified at the slope and rise off the West Antarctic Ice Sheet margin to test whether this assumption is correct. In general, a synchronous West Antarctic Ice Sheet dynamic is not supported by the analysis presented here but rather a West-East trend with an early Miocene ice advance in the Amundsen Sea, while a glacial advance in the Bellingshausen Sea occurs only post-15 Ma. For the Bellingshausen Sea a stronger variability in environmental energy is observed indicating stronger variability in ice extent. The dominance of down-/along-slope sediment transport is on opposing trends between the two seas, which also reflects the advance/retreat of the local ice sheet and thus an increase/decrease in sediment input from the continent and a modification in intensity and relocation of the bottom currents' pathways. A possible reason for this may be the local geology (hinterland and basal), basal geomorphology, and the geometry of the local ice sheets.