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The grounding-zone wedge inventory on the Amundsen Sea Embayment shelf, West Antarctica: formation processes and significance for establishing reliable post-LGM retreat chronologies

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Grounding-zone wedges (GZW) have been mapped on the sea floor in various sectors of formerly glaciated continental shelf around Antarctica. In most cases, these wedges record periods of grounding-line stillstands during ice-sheet retreat following the Last Glacial Maximum (∼26-19 ka BP). The presence of GZWs along the axis of a palaeo-ice stream trough therefore indicates a style of episodic retreat of the grounding line from its LGM to modern position. However, information about their composition and internal structure is sparse, and precise chronological constraints for both the onset and duration of stillstands they represent are still lacking. Consequently, the role of grounding-zone wedge formation in modulating post-LGM ice-sheet retreat cannot be reliably quantified. This information is vital, however, for calculating reliable retreat rates during the past, which are essential for evaluating and understanding the significance of modern retreat rates.
Here we present the currently known inventory of GZWs on the continental shelf of the Amundsen Sea Embayment (ASE), West Antarctica, and introduce newly acquired data from one particular middle shelf GZW revealing the first information of its internal structure and composition. We will also discuss geological preconditions at the ice sheet bed that led to GZW formation. Furthermore, we will present our approach to i) reliably date the onset of GZW development, and ii) constrain the duration of these stillstands, including better estimations for subglacial sediment delivery rates. This knowledge will help refine available post-LGM retreat chronologies, which, in turn, serve as a basis for validating and improving ice-sheet models in an area where these are urgently needed.