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

Grounding-zone wedges (GZW) have been mapped on many of the formerly glaciated continental shelves around Antarctica. These GZW's record periods of grounding-line (GL) stillstand during general ice-sheet retreat following the Last Glacial Maximum (LGM; 26-19 ka BP; kiloyears before present). The presence of GZWs along the axis of a palaeo-ice stream trough therefore indicates a style of episodic GL retreat during the migration from its initial position at the LGM to its modern position. However, precise chronological constraints for both the onset and duration of these stillstands are still lacking. Consequently, the role of GZW formation in modulating post-LGM ice-sheet retreat, and therefore ice-sheet stability cannot be reliably quantified. Additionaly, this information is also vital for calculating reliable retreat rates during the past, which are essential for evaluating and understanding the significance of modern very high retreat rates of glaciers draining into the Amundsen Sea Embayment.

Formation processes

- **GZWs**
  - Initiation through the decrease in ice flow velocity during full-glacial conditions.
  - GL retreats slower through the "bottle-neck" and thus accumulates subglacial till.
  - Subsequent till accumulation produces a normal bed gradient, and may in turn further stabilize the ice sheet's GL.

Formation of GZWs:

1. **Inter-ice stream ridge (cold-based)**
2. **Ice stream (wet-based)**
3. **Seafloor**
4. **MSGLs**
5. **Rearmed moraine**
6. **Bottle-neck topography**
7. **Subglacial geology**
8. **Glacial dating**

- **GZWs**
  - Distal GL: fine-grained microfossils/ICP.
  - Proximal GL: destratified microfossils.
  - Subglacial consolidation: massive diamict.

GZWs are critical for understanding the evolution of GL retreat.

Conclusions: This knowledge will help refine available post-LGM retreat chronologies, which, in turn, serve as a basis for a better calibration of ice-sheet models.