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Subglacial and glacimarine bedforms on the continental shelf of the SE Weddell Sea, Antarctica: New findings from hydroacoustic data acquired during RV "Polarstern" expedition PS96 (2015/2016)

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The glacial history of the continental shelf in the southern Weddell Sea, Antarctica, is poorly known. Sparse multibeam data collected on previous expeditions from the outer, middle and inner shelf parts of Filchner Trough and along the Filchner-Ronne Ice Shelf front revealed the presence of subglacial bedforms in the Filchner, Ronne and Hughes bathymetric troughs, while highly consolidated diamictons recovered in cores elsewhere from the Weddell Sea shelf were classified as subglacial tills. These findings were interpreted as evidence for the widespread presence of grounded ice both in the troughs and on shallower shelf banks during the younger geological past, probably at the Last Glacial Maximum (LGM; ca. 19-23 ka BP). In contrast, cosmogenic surface exposure ages of erratics collected from nunataks in the hinterland of the Weddell Sea embayment indicated that the LGM ice sheet could not have been thick enough to cause its grounding in the deeper parts of the Filchner and Ronne palaeo-ice stream troughs. Resolving these contradicting reconstructions is crucial, however, for a correct estimation of the ice volume stored in Antarctica during the LGM and for deciphering whether the Antarctic Ice Sheet was the main contributor for the rapid, drastic global sea-level rise of meltwater pulse 1A (MWP-1a; ca. 14.5 ka BP) during the last deglaciation.

In order to solve this problem multibeam swath bathymetry data (*ATLAS Hydrosweep DS3*), acoustic subbottom profiles (*ATLAS Parasound P-70*) and marine sediment cores were collected from the East and West Antarctic continental shelves in the southern Weddell Sea during RV "Polarstern" expedition PS96 in Dec 2015-Feb 2016. Despite severe sea-ice conditions that hampered multibeam surveys and coring operations a previously unknown grounding zone wedge (GZW) within the outer shelf part of Filchner Trough could be mapped and sampled with two gravity cores. Morphology and acoustic stratigraphy of the GZW suggest that this feature marks the maximum extent of the Filchner palaeo-ice stream at the LGM rather than the position of a grounding-line stillstand during ice stream retreat from the shelf edge. In addition, hydroacoustic data and seabed images (*Ocean Floor Observation System*) acquired from other areas of the continental shelf reveal the strong control of seabed substrate and tidal currents on the orientation and shape of iceberg furrows. Here we present a collection of the new geomorphological and geological data and discuss their significance for bedform genesis and Antarctic Ice Sheet history.