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Seasonal hydrography on the southern Weddell Sea continental shelf using seal tags

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To capture the austral summer to winter transition in water mass properties over the southern Weddell Sea continental shelf and slope region, 19 Weddell seals were tagged with miniaturized conductivity–temperature–depth sensors in February 2011. During the following 8 months the instruments yielded about 9000 temperature–salinity profiles from a previously undersampled area, and represents the first comprehensive wintertime hydrographic survey over the southern Weddell Sea continental shelf. This allows, for the first time, a description of the seasonality of warm intrusions onto the shelf, as well as the seasonal change in upper-ocean salinity. The data suggest a persistent inflow of modified Warm Deep Water (MWDW), although substantially weaker during winter. This is also corroborated by results from a mooring deployed at the shelf break between 2007 and 2009. Further south, close to the Filchner Ice Shelf, the seasonal hydrography is dominated by an upper-ocean (0–300 m) salinity increase of 0.31 and the development of a 500 m thick winter mixed layer. No clear seasonality is observed in the properties of the underlying Ice Shelf Water. We find that cross-shelf exchange of MWDW is related to seasonal changes in wind forcing, while the gradual increase in upper-ocean salinity is interpreted as being representative of the average ice production upstream on the continental shelf.