



## **Dense water production in the Larsen Ice Shelf region**

Mathias van Caspel (1), Michael Schröder (1), Oliver Huhn (2), and Hartmut Hellmer (1)

(1) Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, (2) Institute for Environmental Physics, University of Bremen, Germany

Dense water flowing out from the Weddell Sea significantly contributes to Antarctic Bottom Water (AABW). The relative importance of two dense water formation sites in the Weddell Sea, the continental shelves in front of Ronne-Filchner Ice Shelf and Larsen Ice Shelf, remains unclear. Measurements made in summer 2012/2013 during Polarstern cruise ANT XXIX-3 add evidence to the importance of the western source region. During the cruise, three sections were made perpendicular to the continental slope of the northwestern Weddell Sea. Visual inspection of temperature and salinity data suggest that the dense water found in the troughs in front of Larsen A and B mixes with slope waters and sinks down the continental slope to form a fresher type of Weddell Sea Deep Water. This hypothesis was tested using the Optimum Multiparameter Analysis with three source water types, Larsen A/B dense Water (LABW), Warm Deep Water (WDW) and Weddell Sea Bottom Water (WSBW) and potential temperature, salinity, oxygen, and mass as conservative parameters. The majority of the slope waters were reproduced with this setting but the densest bottom water sampled during the cruise at ~1200m and ~1800m depth. To overcome this, a fourth source water type, representing very dense water observed in front of Larsen C (LCW) during summer 2004/2005 (ISPOL), was added. The mixture of Larsen waters - LABW and LCW - and the water masses coming from the south - WDW and WSBW - increases the thickness of the dense layer on the continental slope that can cross the ridges confining the northwestern Weddell Sea. Since this process occurs next to the outflow areas, changes in the thermohaline properties or in the production rates may have an impact on the global thermohaline circulation.