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Contributions of Ice Shelf Water to the formation of Weddell Sea Bottom Water in front of Larsen Ice Shelf from recent helium and CFC observations

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Weddell Sea Deep and Bottom Water (WSDW/WSBW) are major precursors for the formation of Antarctic Bottom Water. Thus, the Weddell Sea is an important source and driver of the deep and cold branch of the global thermohaline circulation. Weddell Sea Bottom Water is formed by contributions of different shelf water types. One agent is Ice Shelf Water (ISW) formed by interaction with glacial ice. This process was frequently observed in front of the Filchner Ice Shelf and less pronounced at the Ronne Ice Shelf. However, the capability of the Larsen Ice Shelf to form Ice Shelf Water and subsequently to contribute to the formation of WSBW by this process is still under discussion.

During the ISPOL cruise in 2004/2005 RV Polarstern was drifting above the slope of the Antarctic Peninsula close to the Larsen C Ice Shelf. Samples of the stable tracers helium and neon and the transient chlorofluorocarbons (CFCs) where obtained additionally to hydrographic measurements. The area of sampling was enlarged towards the shelf by a helicopter deployed CTD and niskin bottle system. First results of these tracer and hydrographic observations will be presented and discussed. These measurements are compared to tracer observations from the late 90th further to the south in front of the Filchner/Ronne Ice Shelf and from two sections crossing the Weddell Gyre further downstream at the northern tip of the Antarctic Peninsula.

From these observations we got evidence that at the Larsen Ice Shelf a significant amount of Ice Shelf Water is present, most possible formed directly at the Larsen Ice Shelf and, thus, that Larsen is an additional source of Weddell Sea Bottom Water.