



Modelling the Lazarev Sea: An Inverse Approach to Determining Mass Transport

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The Lazarev Sea is the deep water gateway to the Weddell Sea, with the topographic constraints of Maud Rise and Astrid Ridge having a noticeable impact upon the distribution of the hydrographic properties of the Warm Deep Water. The Lazarev Sea Krill Experiment (LAKRIS) cruises conducted by the RV Polarstern between 2004 and 2008 provide a suitable density of CTD sections to detect the variable hydrographic properties of the region. These patterns highlight key circulation features including a jet on the northern flank of Maud Rise, the Taylor column above the rise, and the apparent pooling of Warm Deep Water to the south-west of the rise.

We are developing an inverse box-model in order to infer the circulation of a given region using CTD data from cruises with multiple parallel sections: providing a grid of data. The model is based upon the multiple linear regression of mass conservation and Duhem–Margules equations for all of the boxes in the grid, where each box is composed of four neighbouring stations. The regression provides an estimate of the mass transport across each neighbouring station pair face and for a specified number of layers. The model is currently set-up to use the density data from the LAKRIS cruises, but could be adapted for other parameters, regions and programmes.

We aim to evaluate the robustness of our approach in determining the general and localised transport of large ocean areas such as the Lazarev Sea and consequently use all available data to quantify the circulation of the Lazarev Sea during the different seasons during which the LAKRIS campaign was conducted.