

Evolution of late Cenozoic Antarctic Ice on the Central Basin of the Ross Sea, Antarctica

Jong Kuk Hong¹, Sookwan Kim¹, Laura De Santis²

¹Korea Polar Research Institute, Incheon, Korea

²Instituto Nazionale di Oceanografia e di Geofisica Sperimentale-OGS, Trieste, Italy

In the austral summer of 2012/2013 and 2014/2015, Korea Polar Research Institute (KOPRI) has conducted multichannel seismic (MCS) survey in the Central Basin of the Ross Sea, Antarctica. One of the objectives of the survey is to support for the IODP 751 proposal by providing site survey data for drilling safety. In addition, new seismic profiles are expected to provide unknown sedimentary features in the slope of the Central Basin. The aim of the study is to reconstruct the paleo-depositional environment, based on the seismic stratigraphy from the outer shelf to lower slope of the Central Basin (west of the Iselin Bank), from mid Miocene to the present. Because the Ross Sea is one of the main glacial drainage outlets of the Antarctic Ice Sheet (AIS), the reconstruction will help a better understanding of the evolution of the Antarctic Ice Sheet (AIS). For extensive interpretation, we combined MCS data collected by KOPRI and the Italian Antarctic research program (PNRA). We also included MCS data stored in the Antarctic Seismic Data Library System (SDLS).

For the interpretation, major ANTOSTRAT seismic horizons in the inner shelf of the Ross Sea were extended to the continental slope and rise. The seismic grid was used for seismic sequence mapping (1) to reconstruct paleo-bathymetry at RSU4 (mid-late Miocene) and RSU2 (late Pliocene-early Pleistocene) times and (2) to calculate sedimentation rates since RSU4 time. The seismic profiles in the slope of the Central Basin show well-stratified aggradational sedimentary sequence from the outer shelf to the lower slope between RSU4 and RSU2 horizons. Above RSU2 horizon, prograding wedges developed in the outer shelf and upper slope. Sediment drift features are well developed along the slope of the Central Basin. The paleo-bathymetry at RSU4 and RSU2 appears to be similar to present-day topography. Paleo-shelf break and depocenter at the mouth of Joides Basin migrated basinward throughout the mid-late Cenozoic time. The preliminary results of this study document the advance of the AIS over the shelf edge of the Central Basin region after RSU2 time. Abrupt change of seismic facies above RSU2 at the mouth of Joides Basin may imply that the depositional environment changed due to a variation of ice regime in the Ross Sea after late Pliocene-early Pleistocene. Bottom water activities since mid Cenozoic (above RSU4) time formed the sediment drift features in the Central Basin. Bottom current pathway seems to be similar to modern general circulation.

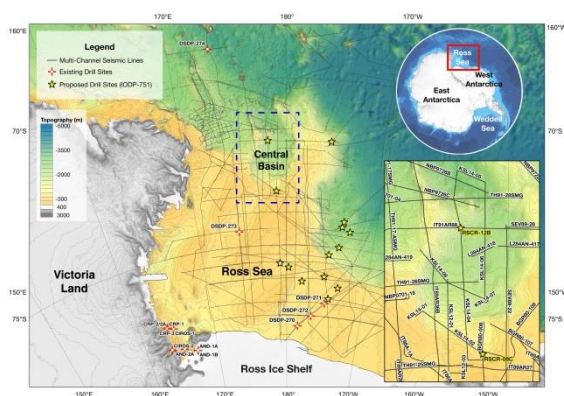


Figure 1. Location map of the study area, the Central basin

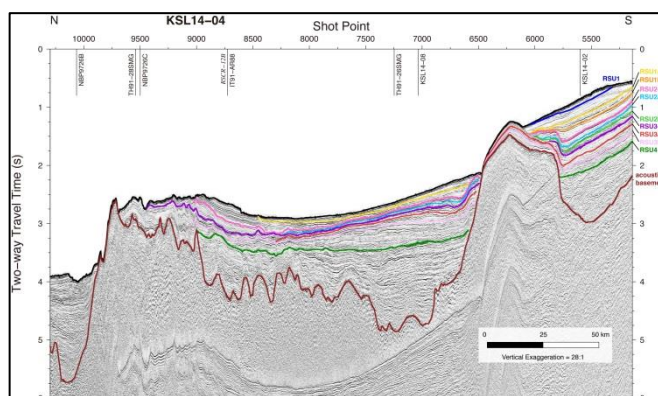


Figure 2. Stacked section of KSL14-04 with interpretation