

## Sea-Ice Motion and Stratification of Polar Oceans

Alvarinho J. Luis, M. K. Dash, K. N. Babu, and N. Sharma  
National Centre for Antarctic and Ocean Research,  
Headland Sada, Vasco-da-Gama, Goa 403804, India  
\*Email: [alvluis@yahoo.com](mailto:alvluis@yahoo.com)

Polar oceans are the major heat sink of the great global heat engine. It drives the major thermohaline circulation of the world oceans. Abrupt climate change (i.e. glaciation during later part of Pliocene) is associated with stratification of the polar ocean (Sigman et al., 2004). Redistribution of fresh water in the sea-ice system is localized to the Polar Regions under stratified ocean conditions. This stratification, caused by increase in salinity due to ejection of brines in the Arctic/ Antarctic Sea, is partly responsible for the reduction in convection which leads to the maintenance of the thick perennial sea-ice cover, and is important in meridional overturning circulation.

The proposed study attempts to study the sea-ice dynamics and the formation of stratified layer in the Arctic/ Antarctic Sea. To study the sea-ice (perennial and seasonal) motion a dynamic – thermodynamic sea-ice model will be incorporated. The sea-ice model will be coupled with the ocean model (for example, FRAM) to study the stratification in the Arctic/ Antarctic Sea. Remote sensing data derived from the QuikSCAT will be utilized to map the sea-ice trajectories. Icesat and Cryosat data will be used for the study of the areal extent and the elevation of the sea-ice field. The model-derived, sea-ice motion vectors will be validated with that derived from drifting buoys and satellites. Stratification will be studied by employing data from ARGOS deployed in the high latitude regions and from the in situ observations achieved from these regions. Since the data to be utilized will be drawn from International satellites, this research endeavour will be a collaborative project with multinational institutions and laboratories.

This study will enhance our understanding of the processes and complex dynamics of sea-ice motions and their impact on polar ocean stratification and global ocean circulation. We expect participation in this project from different countries for sharing the experience and results.

Reference: Sigman, D. M., S. L. Jaccard, and G. H. Haug (2004): Polar Ocean stratification in a cold climate, *Nature*, 428, 59-63.