

Hydrographic section along 57°E in the South Indian Ocean

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Antarctic Circumpolar Current (ACC) in the Southern Ocean flows through several ‘choke points’, where its meridional displacement is restricted by topographic features. In the Southeast Indian Ocean, there are two choke points; Conrad Rise and Kerguelen Plateau. Inbetween, the ACC shows vigorous variations including fronts and eddies. This is a remote and logistically difficult region and hardly observed except for some pioneering work by French oceanographers (e.g. Park and Gamberoni, 1997). In the 2019/20 season, we performed an eddy-resolving hydrographic survey of a new World Ocean circulation Experiment designated section, I07S, nominally along 57°E from mid-latitude to the Antarctica coast.

The salinity sections shows a remarkable front at 43°S, which indicates a sinking of salinity minimum, representing the Antarctic Intermediate Water. This is, by definition, the Subantarctic Front. The front is accompanied by a second front-like feature in the north around 38°S and a subsurface high salinity patch at 44°S. A cross examination with satellite altimeter indicates a vigorous mesoscale to submesoscale activity, which rekindles the classical question of a front is a mixer or barrier (Bower et al., 1985).

About 150 km from the Antarctica coast, the section has been observed by the same group in the 2012/13 season. The comparison shows an isopyccal warming of Circumpolar Deep Water and cooling/freshening of Antarctic Bottom Water (AABW) underneath. The rebound of AABW freshening apparently propagating eastward from the Ross Sea (Aoki et al., 2020) have not arrived to this section.

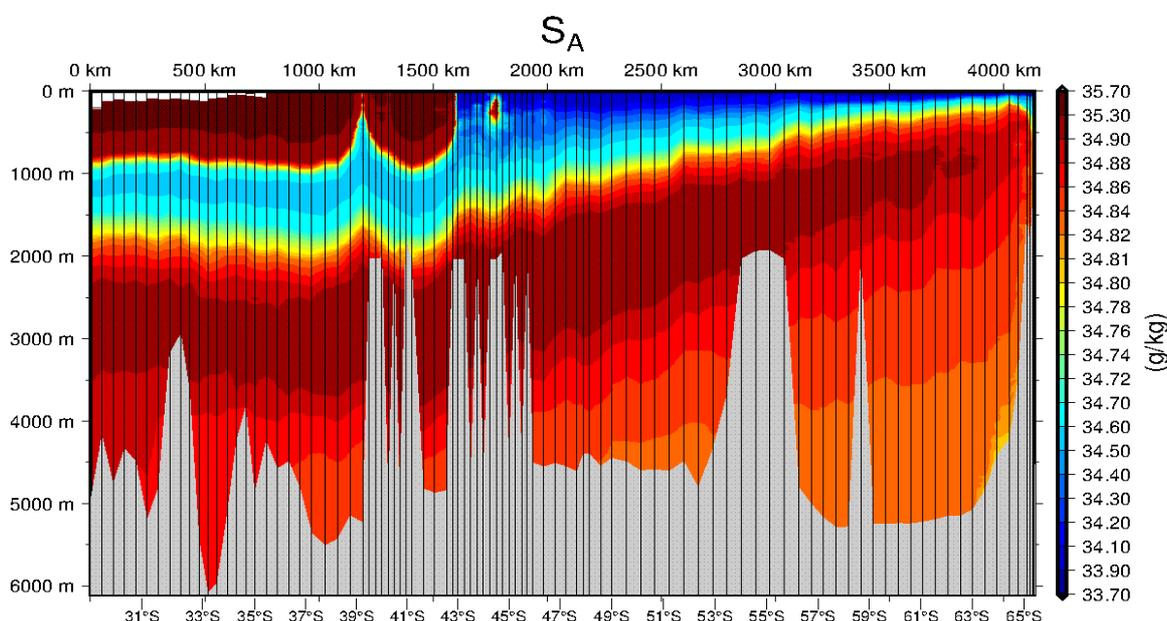


Figure 1. Absolute salinity along the hydrographic section I07S

References

- Aoki, S. et al., reversal of freshening trend of Antarctic Bottom Water in the Australian-Antarctic Basin during 2010s, Scientific Reports, 10, DOI:10.1038/s41598-020-71290-6, 2020.
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- Park, Y.-H. and L. Gamberoni, Cross-frontal exchange of Antarctic Intermediate Water and Antarctic Bottom Water in the Crozet Basin, *Deep-Sea Research II*, 44(5), 963-986, 1997.