

S13

Southern Ocean: Supplementary Materials

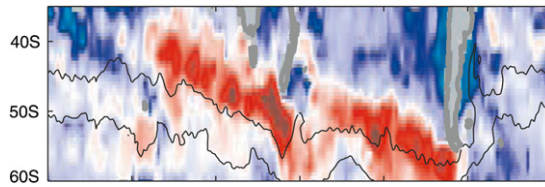


FIGURE S13.1 Mixed layer thickness in the southern hemisphere in late winter (September), based on Argo float profiles (depth that is 0.03 kg m^{-3} denser than the surface value). *Source: From Dong, Gille, Sprintall, and Talley (2008).*

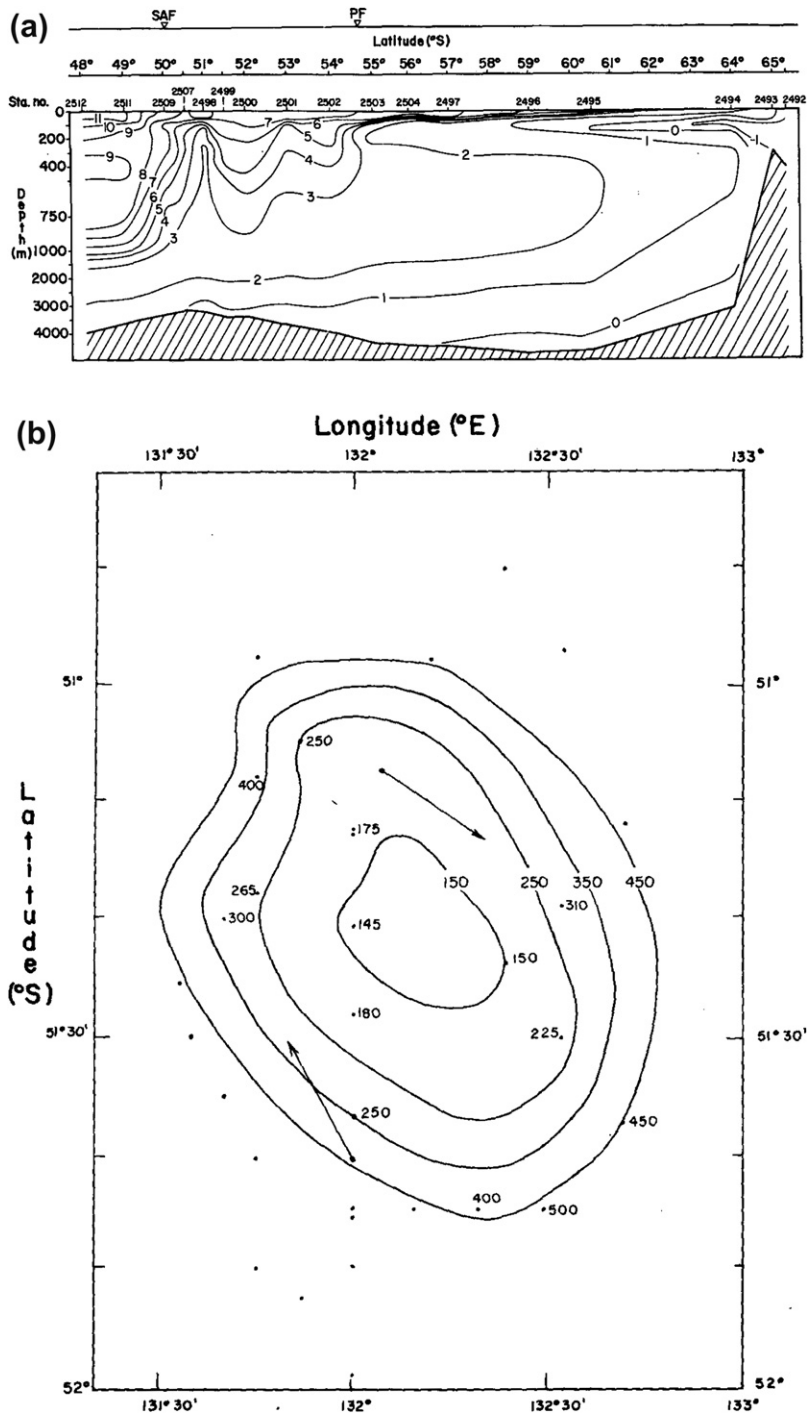


FIGURE S13.2 Cyclonic eddy just south of the SAF at 132°E. (a) Temperature section along 132°E in 1977. (b) Depth of the 3.5°C isotherm; arrows are the ship drift. Source: From Savchenko, Emery, and Vladimirov (1978).

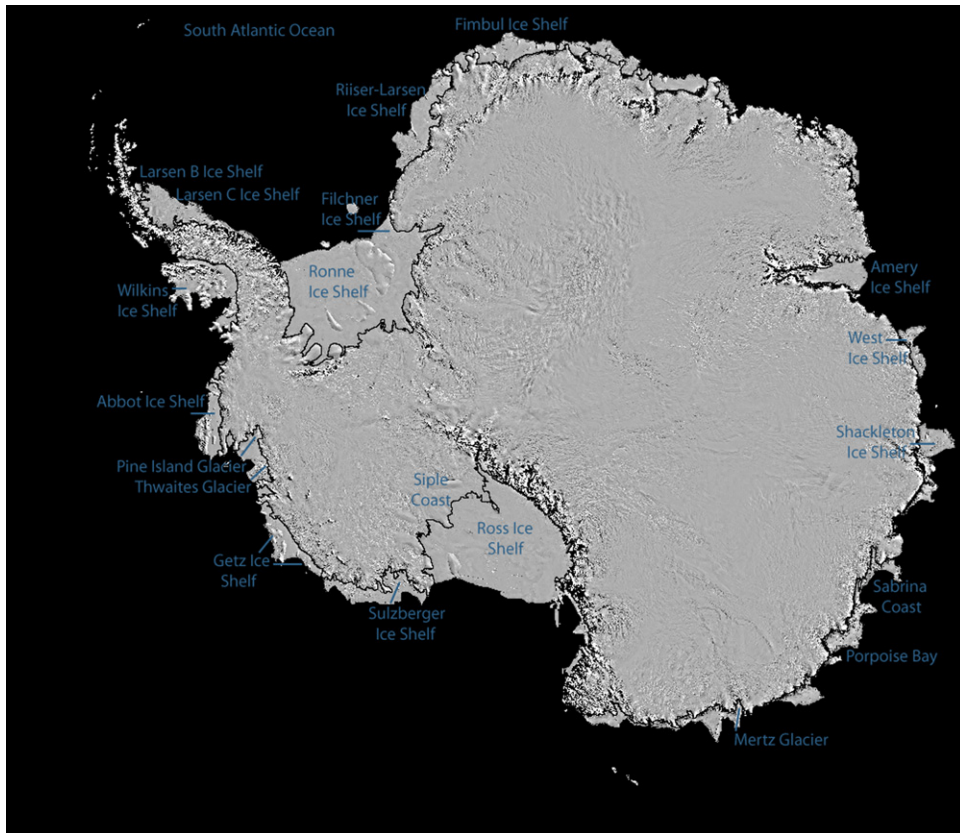


FIGURE S13.3 Antarctic ice shelves that are monitored using satellite imagery. *Source: From NSIDC (2009c).*

TABLE S13.2 Southern Ocean Water Masses

| Water Mass and Acronym | Location | Characteristic Properties | Source |
|---|--|---|---|
| Subantarctic Surface Water (SASW) | Surface north of the SAF | Warm, salty | Local |
| Subantarctic Mode Water (SAMW) | Upper ocean north of the SAF | Vertical thickness maximum | Thick mixed layers just north of the SAF |
| Antarctic Surface Water (ASW) | Surface layer south of the PF | Cold, fresh, extends down to temperature minimum ("Winter Water") at the top of the CDW | Local |
| Continental Shelf Water | Surface to the shelf bottom | Freezing temperature, density of AABW | Properties set by sea ice formation. |
| Antarctic Intermediate Water (AAIW) | North of the SAF at 500–1500 m depth | Vertical salinity minimum | Fresh surface water north of the SAF around the Drake Passage |
| Upper Circumpolar Deep Water (UCDW) | Throughout the Southern Ocean, at 200 to 1700 m depth | Vertical oxygen minimum | Pacific and Indian Deep Waters provide the oxygen minimum |
| Lower Circumpolar Deep Water (LCDW) | Throughout the Southern Ocean, at 200 to 4000 m depth | Vertical salinity maximum | North Atlantic Deep Water provides the salinity maximum |
| Antarctic Bottom Water (AABW) | Throughout the Southern Ocean, near-bottom layer that spreads north from the ACC | Cold, dense, relatively fresh bottom layer | Dense shelf waters formed by brine rejection |
| Weddell Sea Deep Water (WSDW) | Weddell Sea, most of the water column | Cold, dense, thick layer between the CDW above and the bottom water below | Mixture of CDW and dense shelf waters formed by brine rejection |
| Weddell Sea, Ross Sea and Adélie Land Bottom Water (WSBW, RSBW, ALBW) | Weddell Sea, Ross Sea, coast of Adélie Land, bottom | Cold, densest bottom layers | Densest shelf waters formed in these seas |

References

- Dong, S., Gille, S., Sprintall, J., Talley, L., 2008. Southern Ocean mixed-layer depth from Argo float profiles. *J. Geophys. Res.* 113, C06013. doi:10.1029/2006JC004051.
- NSIDC, 2009c. Images of Antarctic Ice Shelves. National Snow and Ice Data Center. http://nsidc.org/data/iceshelves_images/index.html (accessed 3.5.09).
- Savchenko, V.G., Emery, W.J., Vladimirov, O.A., 1978. A cyclonic eddy in the Antarctic Circumpolar Current south of Australia: results of Soviet-American observations aboard the R/V Professor Zubov. *J. Phys. Oceanogr.* 8, 825–837.