Journal 25

Friday
1. 042200Z February 05
2. Position: Lat: 60-00.0S, LONG: 150-00.0W
3. Course: On Station
4. Speed: 10.3 kts
5. Distance: 120.0 NM
6. Steaming Time: 11H 36M
7. Station Time: 12H 24M
8. Fuel: 3,137 gals
9. Sky: St, Ns 8
10. Wind: 240-T, 28 Kts
11. Sea: 240-T, 4-6 Ft
12. Swell: 250-T, 9-12 Ft
13. Barometer: 975.3 mb
14. Temperature: Air: 4.3 C, Sea: 1.7 C
15. Equipment Status: Normal
16. Comments: Iceberg abeam at 041306Z 59-17S 150-12W, 041920Z 59-51S 150-02w.

MASTER, R/V *ROGER REVELLE*

More icebergs and, boy, are they getting big…..still looking for penguins though! It is getting much colder. Mustang suits are getting popular!

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Michelle, one of the deck crew and one of the new icebergs!

More on some of the sampling data that was collected on the last cruise and that we are looking at for this cruise:

Oxygen, Silicate, and Nitrate sections

The dissolved oxygen section is useful to better understand ventilation (high oxygens are shown in purple; lows in yellow). Cold surface waters can absorb more oxygen than warm waters can, so surface oxygen concentrations are highest in the polar regions.

The surface waters in the Nordic Seas (not shown) have at times, in some winters, convected to the bottom in the Greenland Sea, carrying with them the high oxygen concentrations typical of cold surface waters. So within the Nordic Seas and Arctic Ocean, the entire water column exhibits high concentrations of dissolved oxygen. When this water spills over the Greenland-Scotland Ridge into the North Atlantic (north end of A16 Atlantic section), it carries its high oxygen concentrations into the deep North Atlantic. There, with other high oxygen dense waters (mostly from the Labrador Sea) and mixed-in bottom waters of Antarctic origin, it forms the huge mass of high-oxygen North Atlantic Deep Water. This water spreads south into the South Atlantic and contributes high oxygen and high salinity to the Antarctic circumpolar region, traceable even to the South Pacific (note on the salinity section the very deep tongue of slightly higher salinity water — the lighter blue color — in the far South Pacific). The North Atlantic Deep Water thus refreshes or ventilates nearly the entire deep World Ocean layer from about 1500-3000 meters.

But note the near-bottom tongues of dense water extending into the Atlantic and Pacific from the Antarctic. Although the Antarctic upper-layer waters are as a whole relatively fresh, due partly to Atlantic influence, some are saltier than others and when they get very cold they can become quite dense. These spread north so that much of the abyssal World Ocean is filled from the densest available Antarctic waters. The intermediate waters from the Antarctic regions are very important ventilators at their levels of the oceans, too.

Where phytoplankton thrive, the surface waters can become very low in nutrients and very high in oxygen. Underneath, where organic matter raining down out of the productive layer to layers where there is no light for photosynthesis, decay of this matter yields re-dissolved nutrients and uses up dissolved oxygen in the process. So subsurface waters under and/or downstream from some productive regions can become very high in nutrients and very low (near zero concentrations in some cases) in dissolved oxygen. Siliceous organisms thrive in cold waters and so are more common in the polar regions where their exoskeletons rain out of the upper layer to re-dissolve underneath or to join the sediment, which also re-dissolves into the ocean waters.

It is no surprise to oceanographers that nutrient concentrations are highest in the deep North Pacific. The large proportion of siliceous organisms there and the high productivity of some North Pacific regions combine to generate a huge silicate "tongue" in and extending south from the deep North Pacific.

The North Atlantic is very different: though it exhibits some deep nutrient enrichment, it is well ventilated by high oxygen, low nutrient surface waters convecting deep in the Nordic Seas and overflowing the Greenland-Scotland submarine ridge. Therefore average nutrient concentrations in the North Atlantic Deep Water are much lower than in the deep

Pacific Ocean. As the dense northern waters spread south, their nutrient concentrations increase by regeneration and by mixing with Southern source waters.