R/V Oceanus 380 Cruise Summary: Irminger Sea Circulation and Convection

George H. Tupper, Robert S. Pickart
Woods Hole Oceanographic Institution

Voyage 380 (leg IV) of R/V Oceanus was carried out from 8-20 August, 2002 in the Irminger Sea. This was the second cruise of the collaborative projects "Is LSW formed in the Irminger Basin?" (WHOI) and "LSW formation and variability in transport and mixing of ISOW and DSOW in the Irminger Basin" (LDEO). The main objectives of the cruise were (1) to occupy the Irminger Sea portion of the WOCE A1E section and (2) to recover the two profiling CTD moorings (MPs) deployed last year and launch their replacements. A secondary goal, weather and time permitting, was the re-occupation of one of the northern CTD lines done last year.

Brief Synopsis

The ship departed Reykjavik on 8 August, after a one-day delay due to a radar problem. At the test station it was discovered that the CTD pinger trace was not observable on the Knudsen echo-sounder display. Furthermore, the old PDR line scan recorder was not functioning properly. Hence we had to rely on the altimeter alone for guiding the CTD package to the bottom, which in the end was not a problem. The rosette, bottles, and associated CTD instrumentation worked well throughout the cruise. Due in part to the unusually good weather, we occupied the A1E stations as planned, as well a second CTD section across the boundary current farther to the north (Figure 1). This was a re-occupation of one of the lines done last year. In all but a few instances CFCs and dissolved oxygen were collected, and, with the exception of the shelf stations, lowered ADCP measurements were made.

Unfortunately, the mooring operation did not go as smoothly. The acoustic releases on the two MPs were part of a batch with a recently discovered machining defect (impacting more than our experiment). The problem causes the release to bind up under hydrostatic pressures greater than approximately 2000 db. We were hopeful that the releases on our moorings (1900 m and 2500 m depth, respectively) would work. The offshore mooring did in fact release, but not until several hours after the disable signal was sent. Presumably the anchor let go while we were doing a nearby CTD cast. We tracked down the mooring acoustically, recovered it, and then turned it around. The onshore MP was not recovered, as the acoustic release did not fire. We therefore deployed a replacement mooring roughly five miles to the east, in order to allow for a recovery attempt next summer.

Post-cruise Analysis

The post-cruise data processing and instrument check out has revealed that the onshore MP returned only a short time series (less than a month long). The glass flotation within the MP developed a leak and filled with seawater, greatly increasing the weight of the unit. This in turn put extra strain on the drive motor, which was unable to lift the MP off the bottom stop. Figure 2 shows some of the data that we did obtain. The T-S time series reveals the mid-depth layer of 1990s-vintage Labrador Sea Water (LSW) near 3.35°C, with significant variability higher in the water column (shallower than 500 m). As disappointing as our first deployment has been, this demonstrates that the MP effectively resolves the LSW signal, including its potential vorticity signature (which requires high vertical resolution).

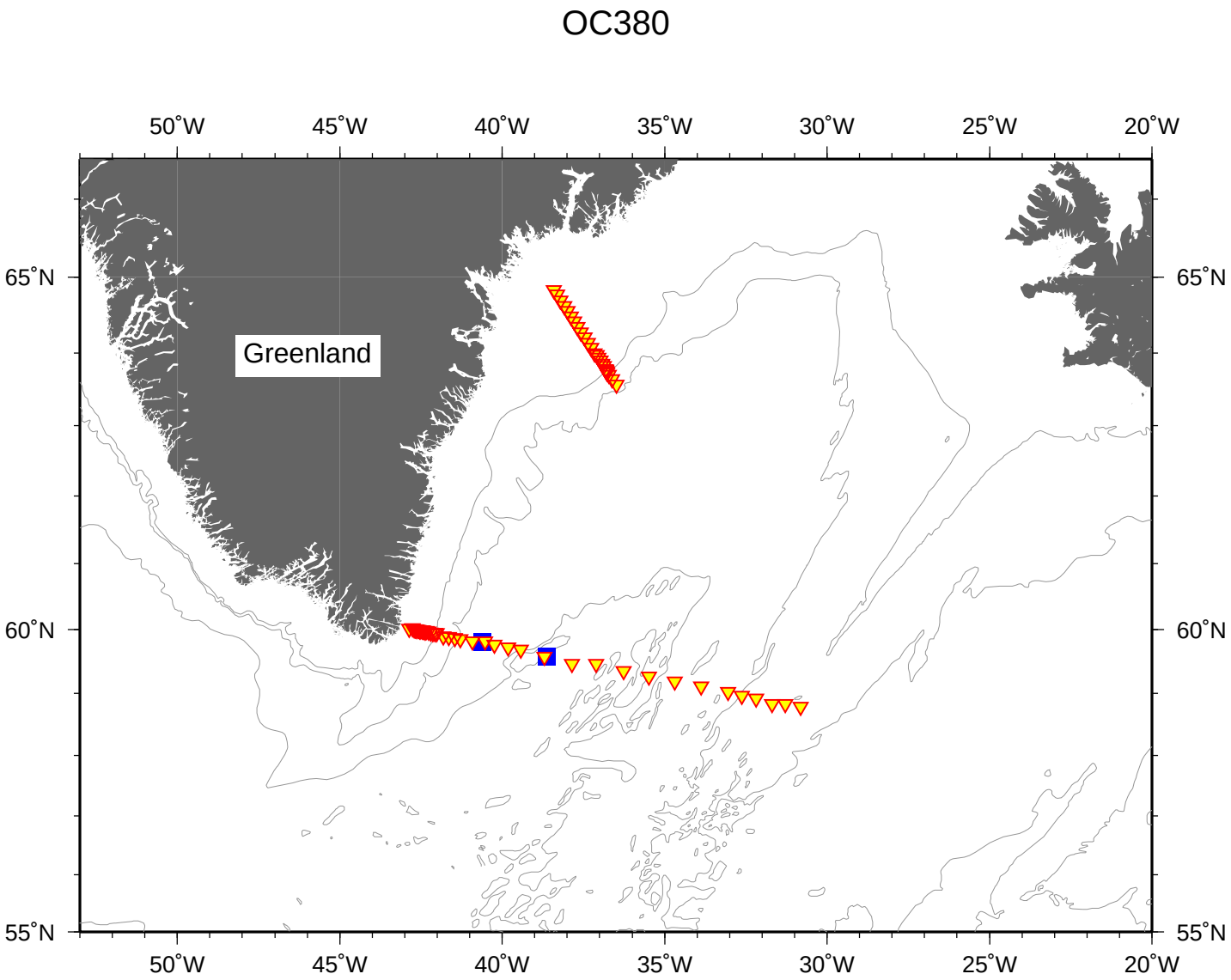

Figure 1: CTD stations occupied by R/V Oceanus 380 (inverted triangles) in August, 2002. The two moored profilers are denoted by the blue squares. The isobaths shown are 1000m, 2000m, and 3000m.

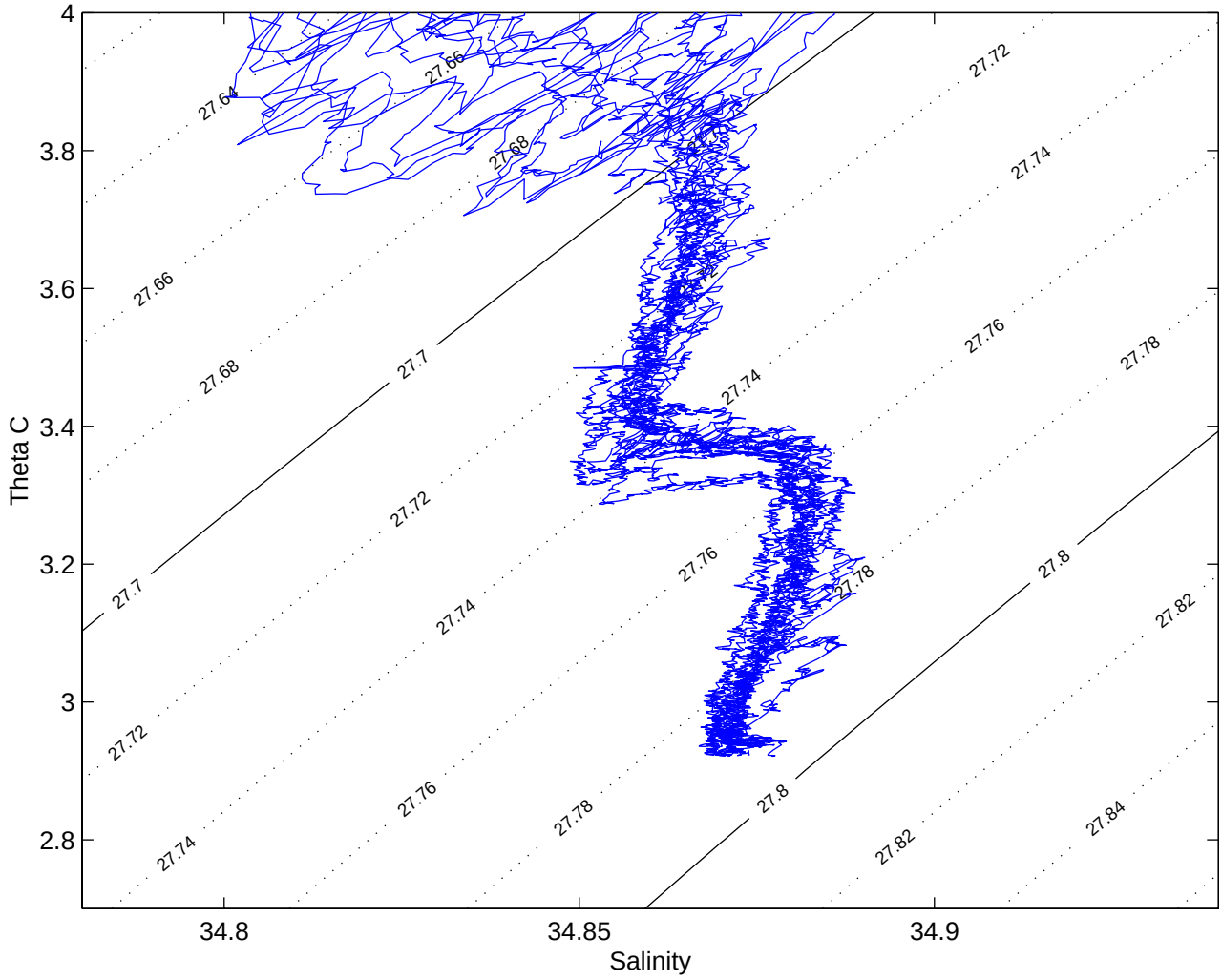

Figure 2: Time series of T−S from the offshore moored profiler (see Figure 1).