ITP28 Overview

Deployment Location: 9/1/2008, 02:00 UTC at 81° 36.9'N, 179° 43.2'W

Last Location: 12/15/2010, 13:01 UTC at 74° 37.9' N, 18° 46.2' W

Duration: 836 days

Distance Traveled: 5810 km

Number of profiles: 217 in 108 days

Other instruments: none

ITP 28 was deployed on a 1.6 m thick ice floe in the Transpolar Drift from the Russian Research Vessel *Federov*. The ITP is operated on a typical sampling schedule of 2 one-way profiles between 7 and 760 m depth each day.

ITP 28 Deployment Operations

Less than a day after the first ITP deployment from the *Federov* in 2008, the next ITP (number 28) deployment began. The ice in the area was mostly first year and required an extensive helicopter survey in order to find a multi-year flow suitable for the deployment. As a result, the chosen floe was miles away from the pre-selected ITP deployment location and the ship.

When a potential floe was chosen by Anatoli the ice observer, and experienced helicopter pilots, the door of the helicopter was abruptly opened and the ice observer assisted the pilots to a safe and secure landing on the chosen flow using a wireless communications system. Once on the ice, the floe was drilled and found to be over 1.5 m so acceptable for the deployment. Operations took longer than expected because of the extremely cold temperatures coupled with a 25 knot wind, causing the wind chill factor to be less than -20°C. A modified sled hut was assembled and used as a snack hut to provide a small amount of shelter from the wind, and stocked with tea/coffee, cheese and crackers, and Russian chocolates to provide energy for the deployment team.

Once the deployment was complete and clean-up was underway, the ship was called using an Iridium telephone to recover the science team. During the several hour deployment operations the ice drifted significantly, so that updated GPS coordinates needed to be passed to the pilots in order to relocate the deployment team.

ITP28 Data Processing

The 215 profiles that were obtained from the ITP were processed according to the procedures described in the ITP Updated Data Processing Procedures. The processing parameters for ITP 28 are shown in the figures to the right.

As usual, some conductivity (salinity) data were affected by biofouling or similar glitches. However, they were relatively few here, and none lasting over several profiles (though, of course, with 215 profiles this record was also relatively short). Thermohaline staircases were present for a large portion of the time series, enabling CTD lag corrections. The lags were in the typical range found for previous systems. During manual editing, thermal lag corrections were dialed back somewhat to remove overcompensation. Other parameters such as the thermistor lag corrections ("tlag" in the code) and the conductivity- temperature time offsets ("cshift") were not modified from those calculated by the processing code.

The conductivity adjustment ("rat") showed a somewhat unusual pattern for this ITP: while typicall around 1 (no adjustment) with occasional outliers related to minor conductivity contaminations, it showed a gradual decline from 1.0026 to 1.0017over the course of the CTD record. One short outlier region reached over 1.0036 (profiles 85:89). There were no other obvious deviations or glitches noted for these profiles, and after making the adjustment they followed nearby profiles very closely in TS and density. As a check, applying the adjustment of 1.002 found just outside of the "rat" spike produced clear outliers.

The plots below are of the final, calibrated, edited data (as opposed to the raw data presented on the active instrument pages).

ITP28 Data Description

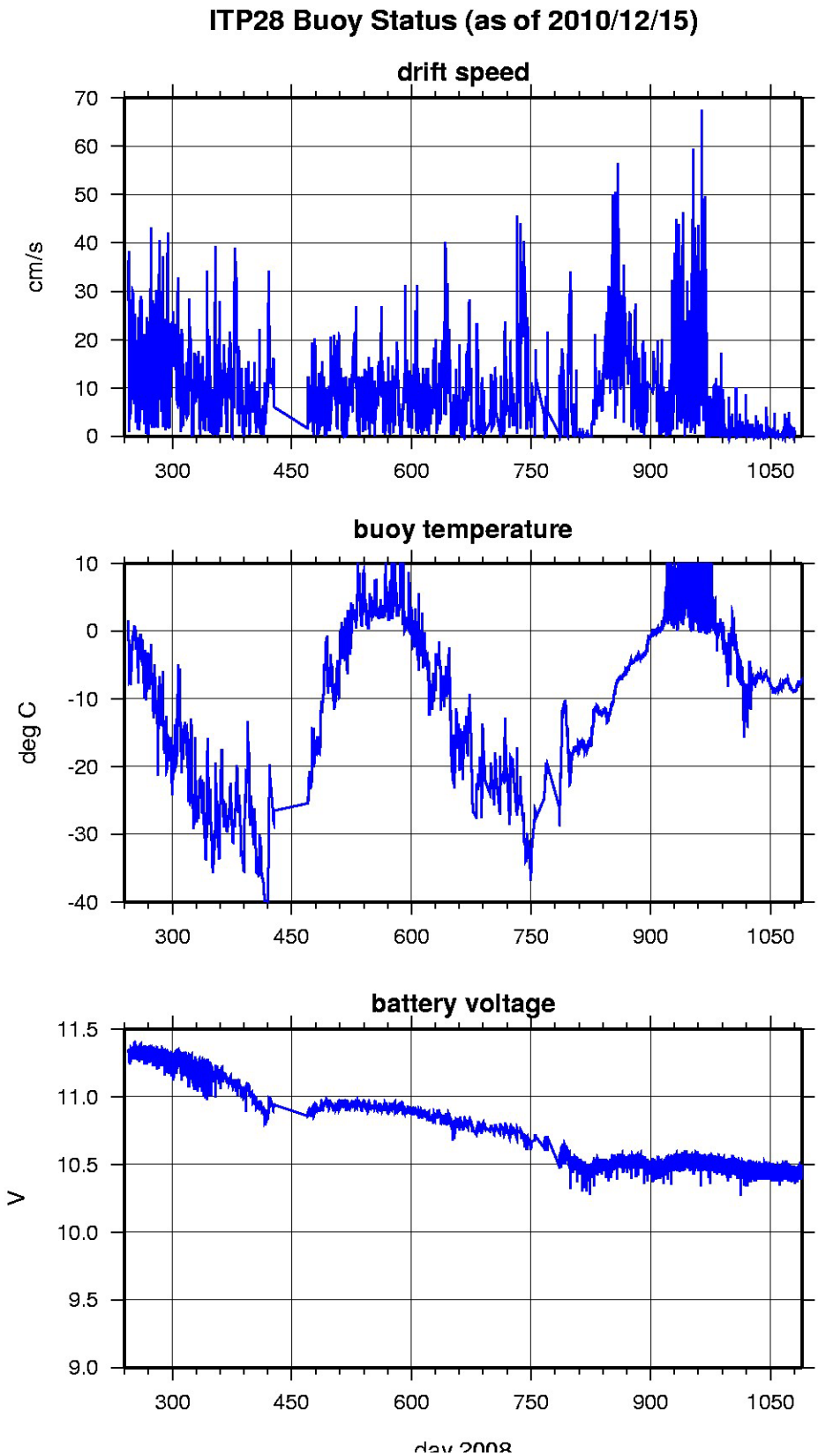
The ITP profiler was configured to operate with a standard sampling schedule of 2 one-way profiles between 7 and 750 m depth each day. In the surface package, the GPS receiver was powered hourly to obtain locations, and buoy temperature and battery voltage status were recorded. Buoy drift speeds stayed mostly between 10 and 30 cm/s, with a few spikes exceeding 40 cm/s.

After 108 days of normal operation, the profiler began having difficulty transferring files to the surface unit on December 18, 2008. The profiler continued to ring the surface unit on the inductive modem circuit for three more days, but was not able to successfully continue file transfers. On this day, the surface unit began intermittently restarting itself indicating a potential hardware problem, and no more rings were heard from the underwater package. However, status information, including GPS locations, continued to be obtained and telemetered for 2 more years as the system drifted out of the Makarov basin, and continued along the northeast coast of Greenland and through Fram Strait.

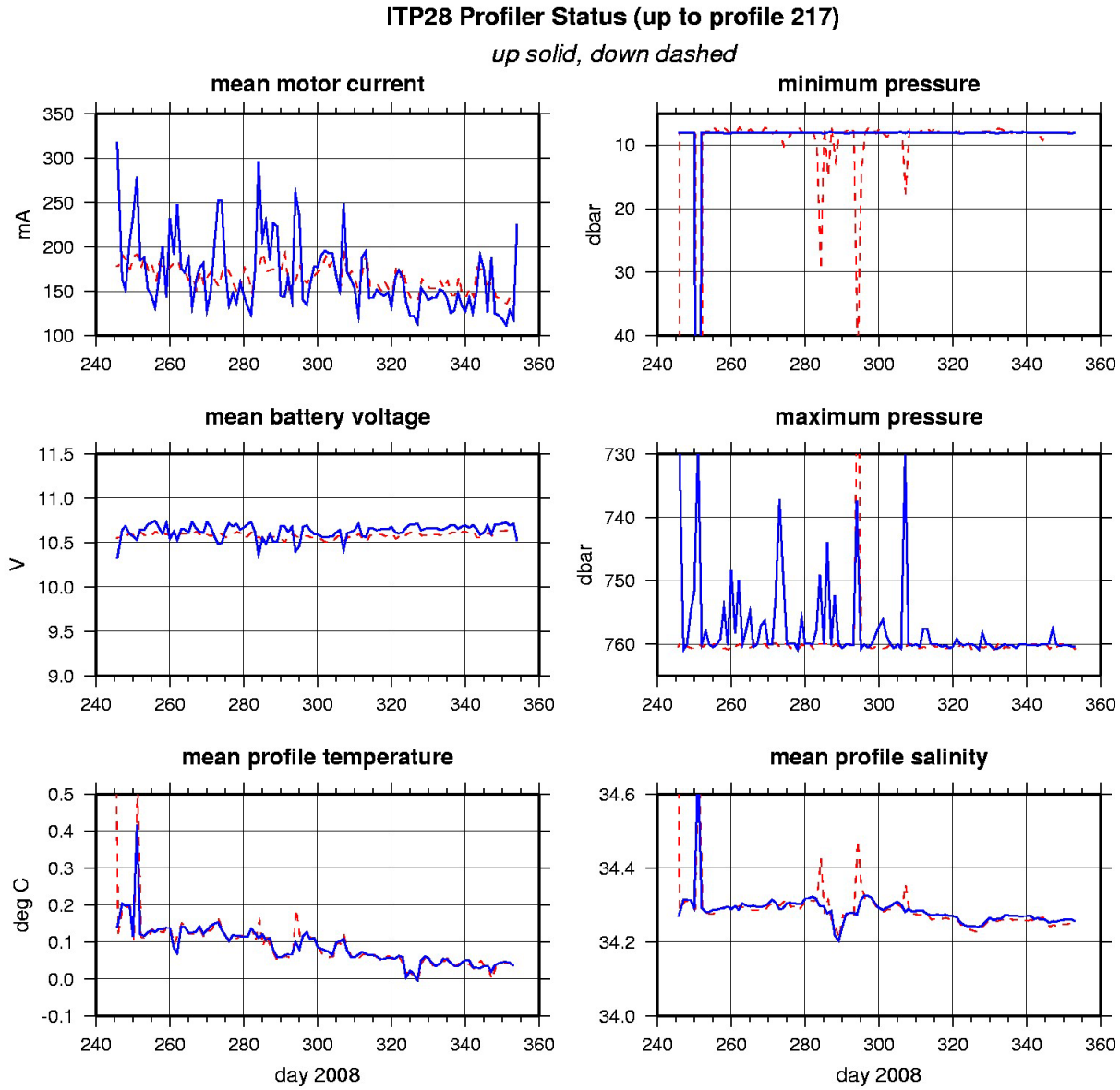
Level II hourly buoy location data in ASCII format: itp28rawlocs.dat

Level III 1-Hz processed profile data in MATLAB format: itp28cormat.tar.Z or itp28cormat.zip

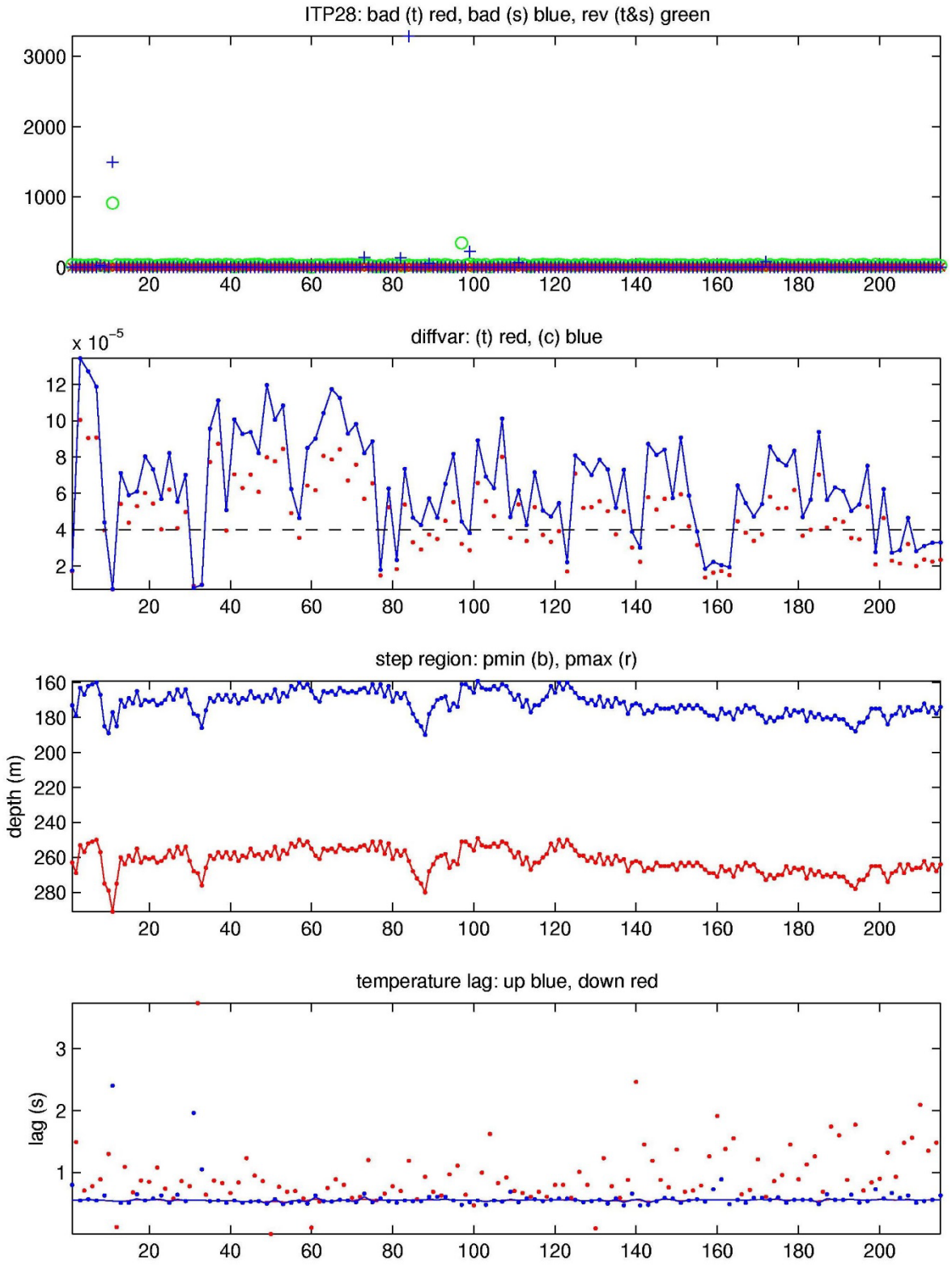
Level III 1-db bin-averaged processed profile data in MATLAB format: itp28final.mat
Level III 1-db bin-averaged processed profile data in ASCII format: itp28final.tar.Z
or itp28final.zip



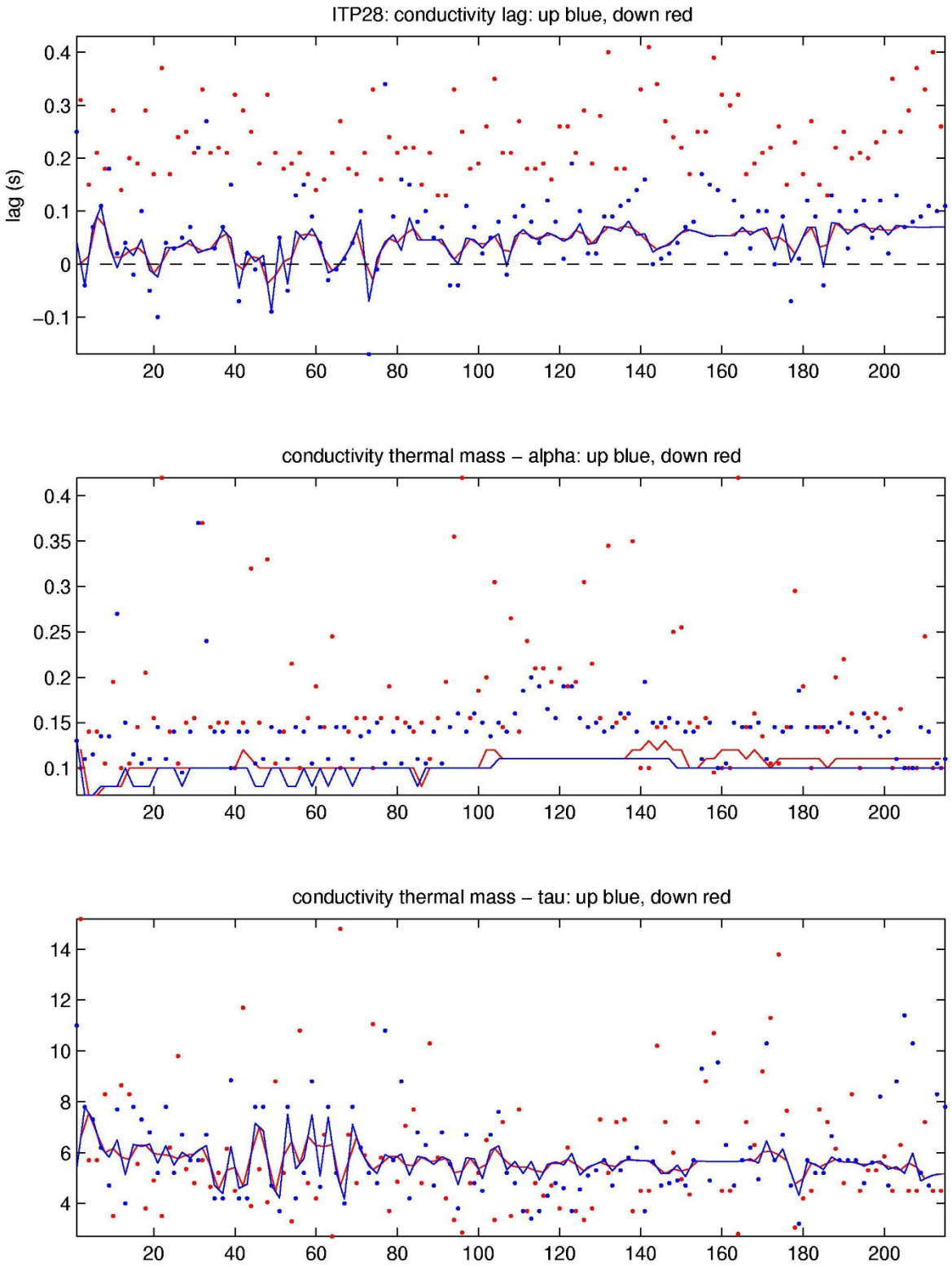
ITP Surface Buoy Status



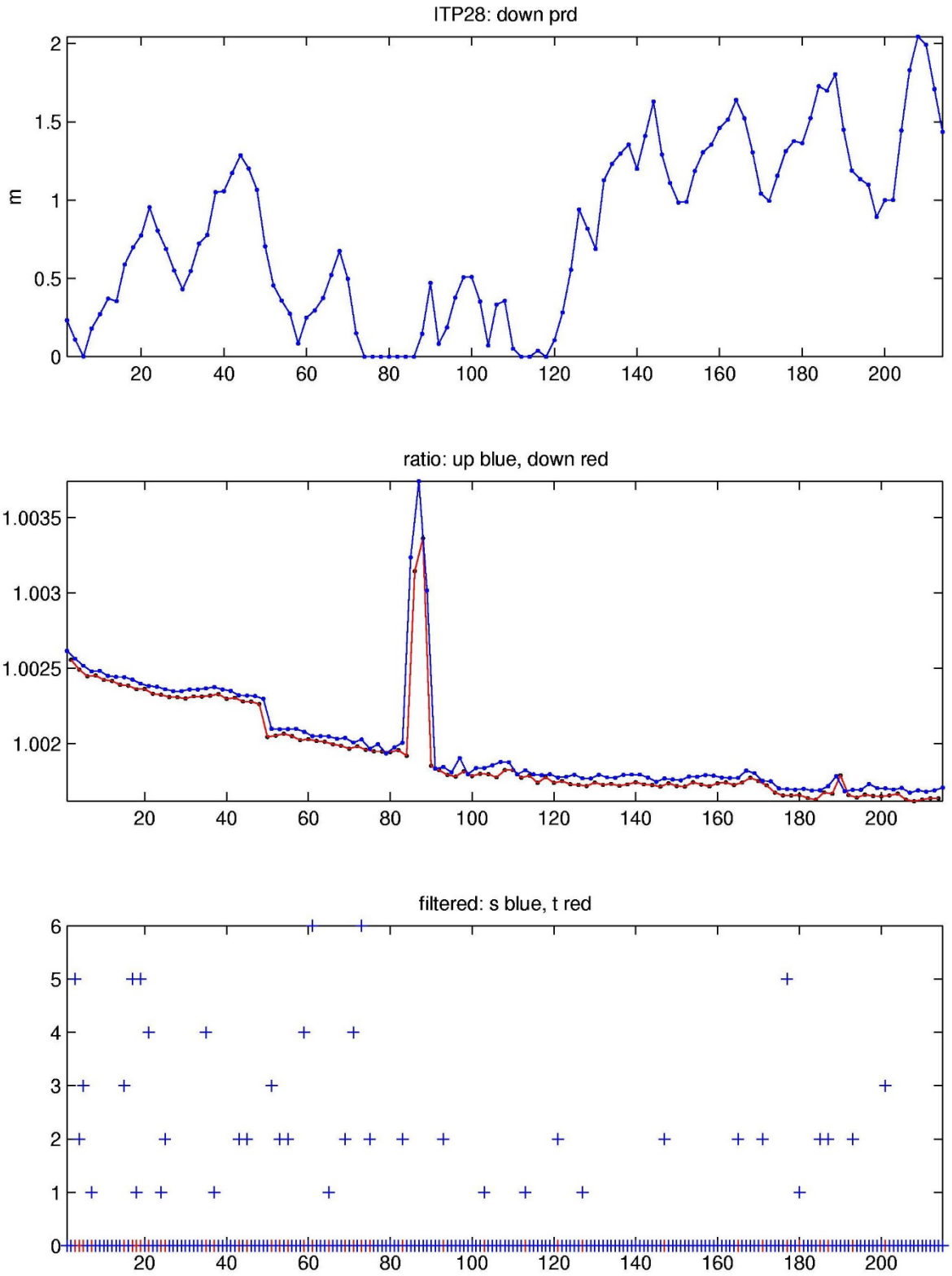
ITP profiler engineering data.



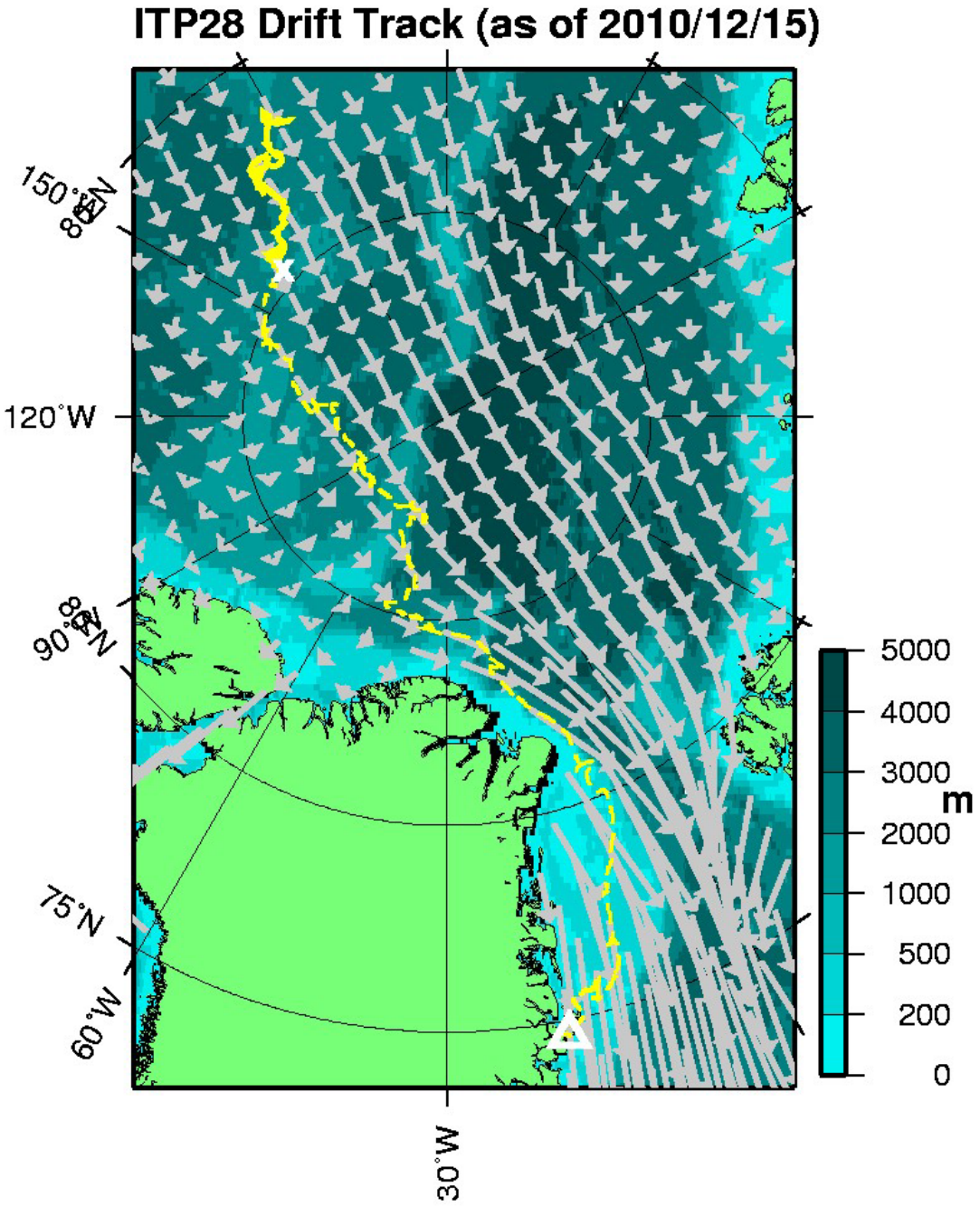
Top: number of bad points removed, Middle: variance of verticle difference of temperature and salinity in step region for up-going profiles, Bottom: temperature lag.



Top: conductivity lag, Middle: conductivity thermal mass amplitude correction, Bottom: conductivity thermal mass lag correction.

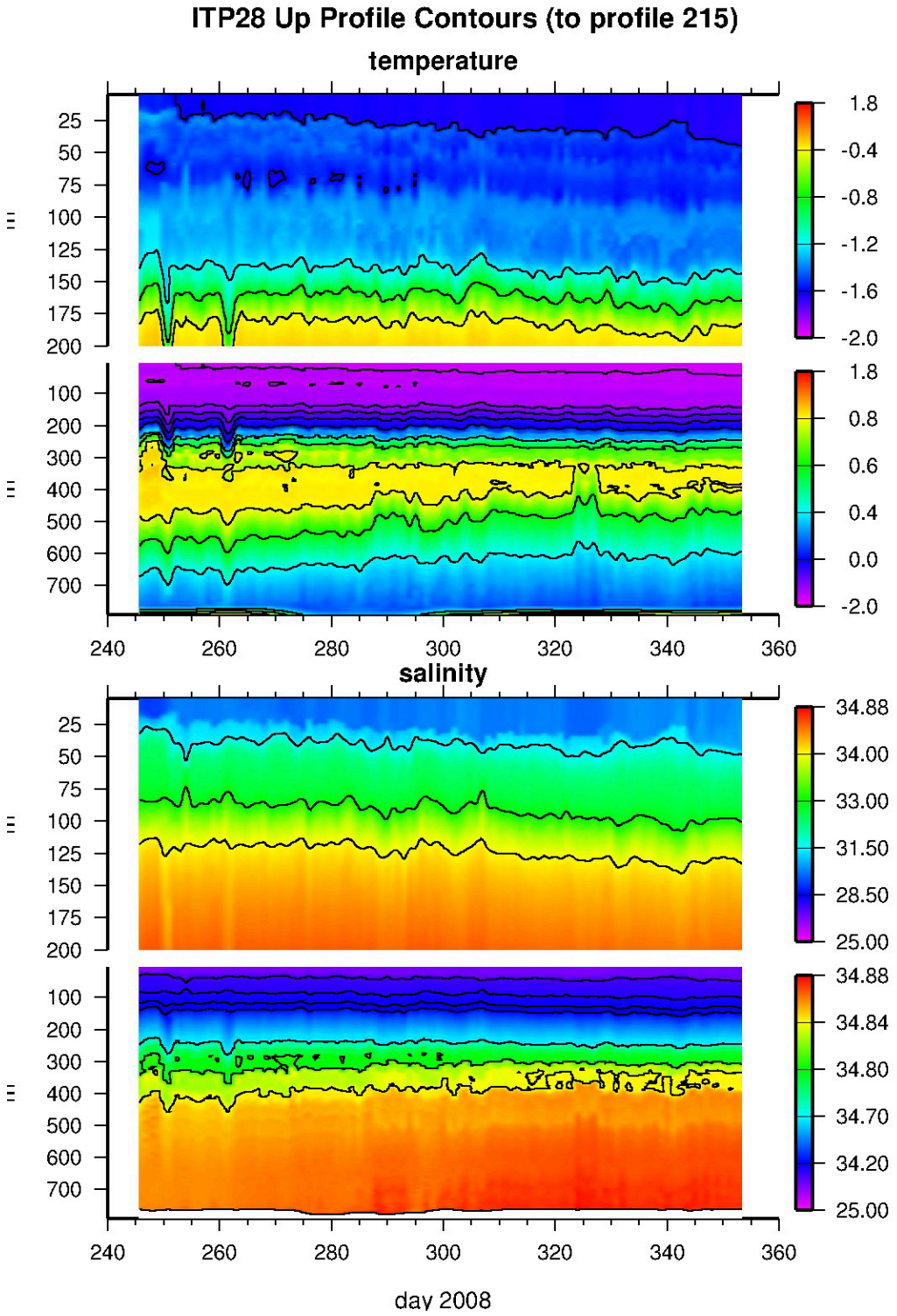


Top: down pressure deviation correction, Middle: salinity ratio adjustment, Bottom: Number of filtered spikes.

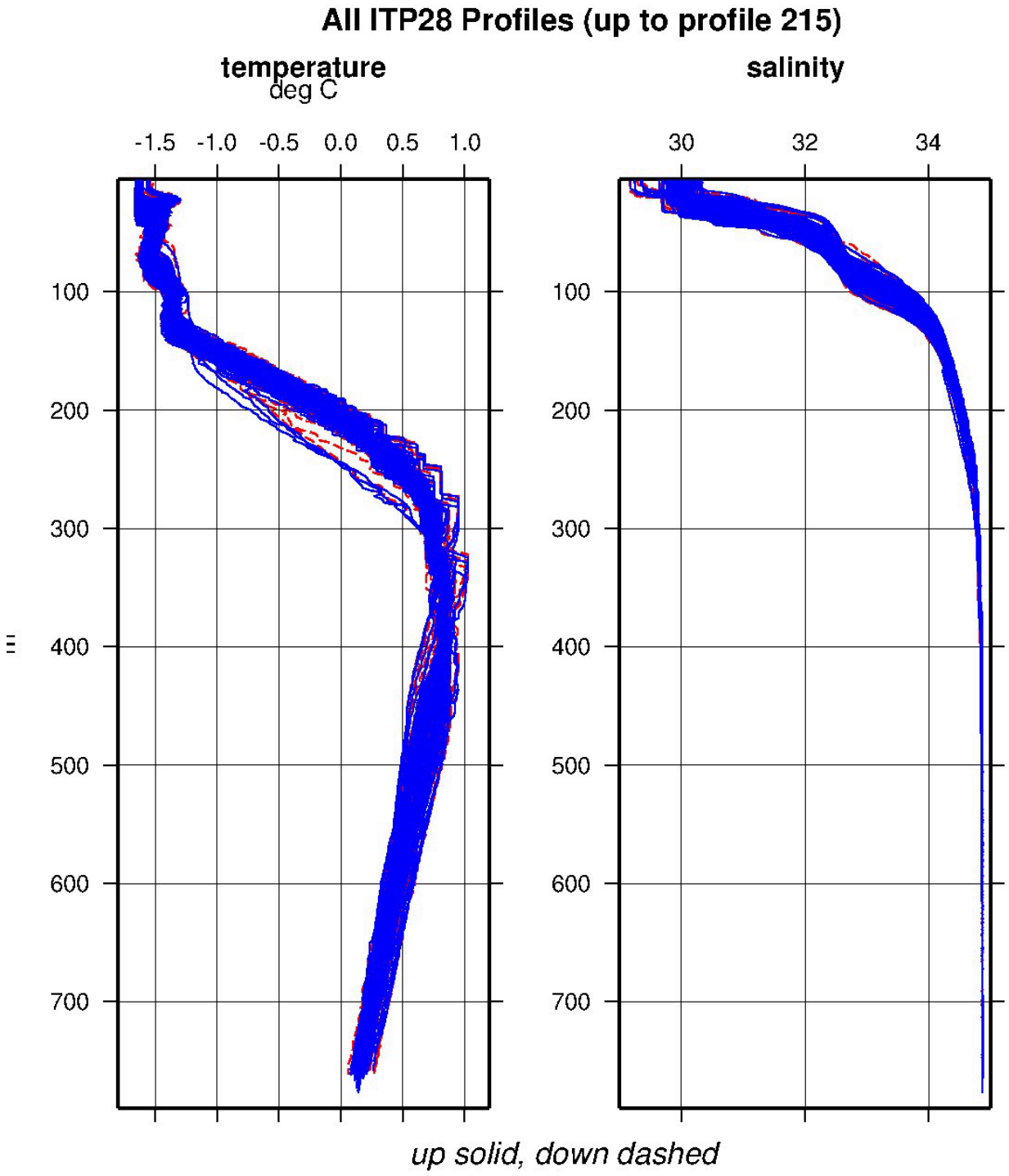


ITP drift (yellow line), last profile (cross), and last location (triangle), BGOS moorings (circles) and annual ice drift from IABP (grey vectors) on IBCAO bathymetry (shading).

Plot of buoy locations.



ITP28 temperature and salinity contours.



Composite plot of ITP temperature and salinity contours.

ITP 28 surface package after deployment in the Markarov Basin from the R/V Academik Federov. (Photo by Sergey Unovidov)

Newhall and Pietro stand next to the deployed ITP system while the other deployment team members warm inside the modified sled snack hut. Depending on other helicopter operations, it could take as long as 4-6 hours before the deployment team would be retrieved after the deployment. (Photo by Sergey Unovidov)