ITP36 Overview

Deployment Location: 8/29/2009, 06:00 UTC at 79° 12.7'N, 125° 42.4'E

Last Location: 10/13/2009, 17:02 UTC at 82° 9.3' N, 118° 4.9' E

Duration: 61 days

Distance Traveled: 860 km

Number of profiles: 122 in 44 days

Other instruments: none

ITP 36 was deployed in open water in the Transpolar Drift in collaboration with the Nansen and Amundsen Basins Observational System (NABOS) project from *I/B Kapitan Dranitsyn*. The ITP operated on a typical sampling schedule of 2 one-way profiles between 7 and 760 m depth each day. Less than 2 months after deployment, the system completely ceased transmitting, but the surface package with upper 5 m potted tether section was discovered on the north shore of Iceland by the Icelandic Coast Guard in February 2012 and subsequently returned to Woods Hole.

ITP36 Deployment Operations

The first of 2 ITPs deployed on the 2009 NABOS cruise in the Eurasian Arctic was ITP 36. Due to the dramatic decrease of ice concentration and thickness, especially since 2007, the surface packages of the 2009 ITP builds were redesigned to be conical with a wide squat tube enclosing the electronics on top in order to foster the vertical displacement of the buoy during ridging events, and hopefully prolong the lifetime of the systems. It was anticipated that it would be difficult to find substantial icefloes to deploy the ITPs in the NABOS region, consequently, the WHOI deployment team was prepared for over-the-side installations in open water, and ITP 36 was the first to be deployed in this manner.

Ice coverage was 6 to 7 tenths at the deployment location on the morning of the deployment. Since the operation was performed over-the-side of the ship, a considerable amount of time was saved on reconnaissance, survey icefloes, and transporting gear off of the ship, so that the entire anchor first deployment took only 90 minutes from start to finish. Once released, the buoy with suspended mooring system drifted into the nearby marginal ice with a relatively shallow freeboard above the ice (which would be increased on future builds by reducing the density of the foam).

ITP36 Data Processing

The 122 profiles that were obtained by ITP36 were processed according to the procedures described in the ITP Updated Data Processing Procedures. The processing parameters for this

ITP are shown in the figures to the right. Thermohaline staircases were generally present, enabling CTD lag corrections. However, many of the steps were less sharp than those observed for other ITPs. The processing software tended to favor unusually large lag corrections that tried to sharpen the steps, but frequently introduced "overshoots" with vertical instabilities. Returning to more standard lag settings removed many of the instabilities.

As usual, some conductivity (salinity) data were affected by biofouling or similar glitches. However, after removing the standard spikes and contaminations, the remaining record included an unusual number of poor profiles. The largest offenders were edited out completely. In addition, a fair number of profiles appeared reasonable in a gross sense but showed increased noise and small instabilities including in the deepest "quiet" portion. The glitches were too numerous to be cleaned up by individual editing. Curiously, they frequently responded only little to lag changes, including drastic ones. In response, profiles 31 to 63 were marked as "questionable" (qflag = 1). The conductivity adjustment ("rat") did not include unusually large spikes (i.e, massive short-term contaminations), but showed several smaller step-like changes. These frequently coincided with increased noise.

ITP36 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.

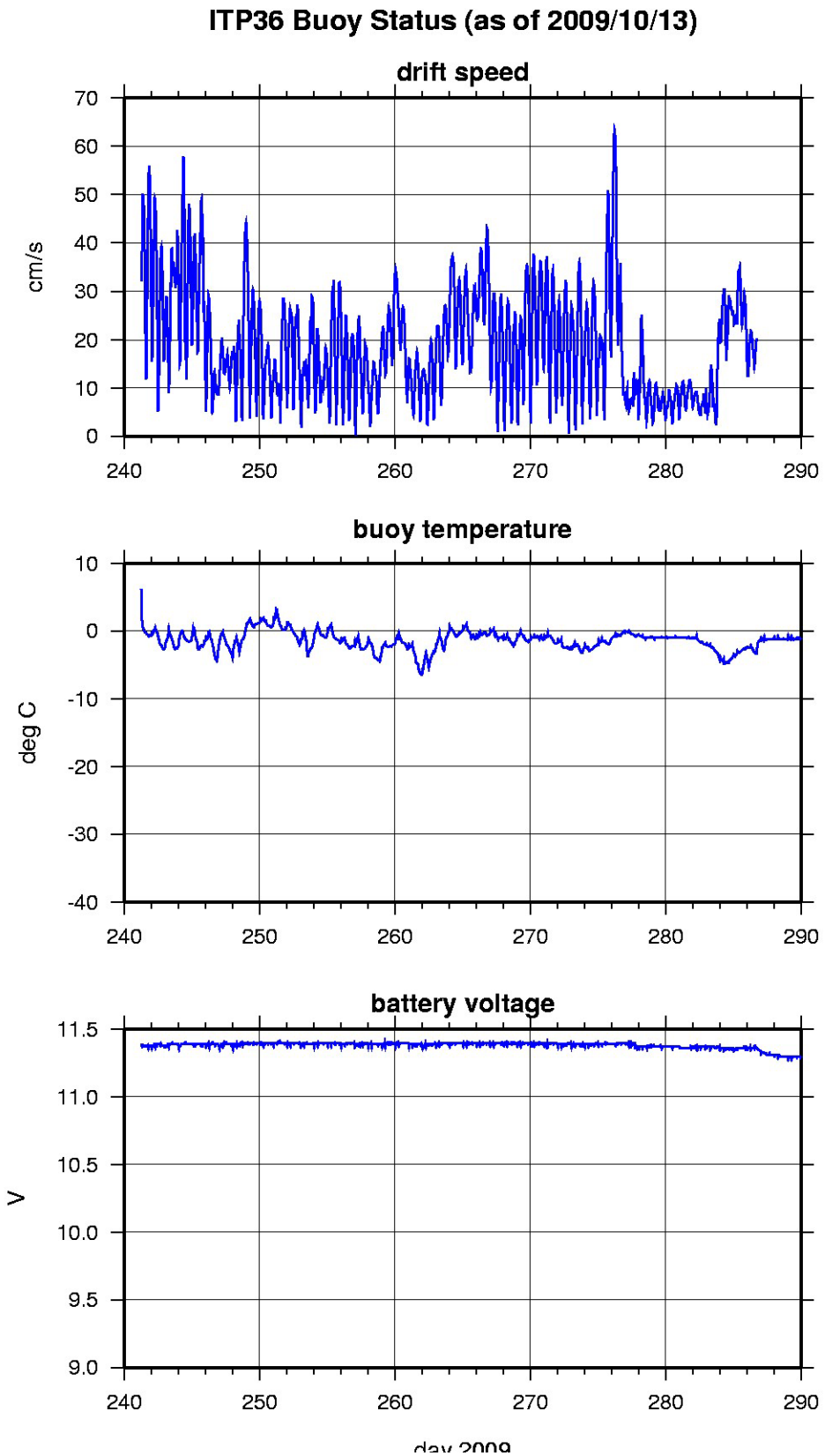
After deployment, the buoy drifted east, then north in the Eastern Eurasian Basin, subject to significant oscillations in drift speed at diurnal or inertial frequencies. Everything was performing well, until 44 days later (October 12, 2009) when the last transmissions of profile 90 data were received from the Iridium transmitter. In February 2012, the surface package and top tether portion were discovered washed ashore in Iceland. While the surface package electronics chamber had been compromised by seawater, information was still able to be obtained from the flash card, so that another 32 profiles (until October 29, 2009) were retrieved, but only one more day of GPS locations (other status information continued to be collected until May 8, 2010). Consequently, it appears that the buoy was encased in a ridge beginning on October 12, 2009 (no Iridium), pushed below the sea ice the following day (no GPS), the tether torn 16 days after that (no profiles), and the surface package flooded 6 months later. It is unknown when the package arrived in Iceland.

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

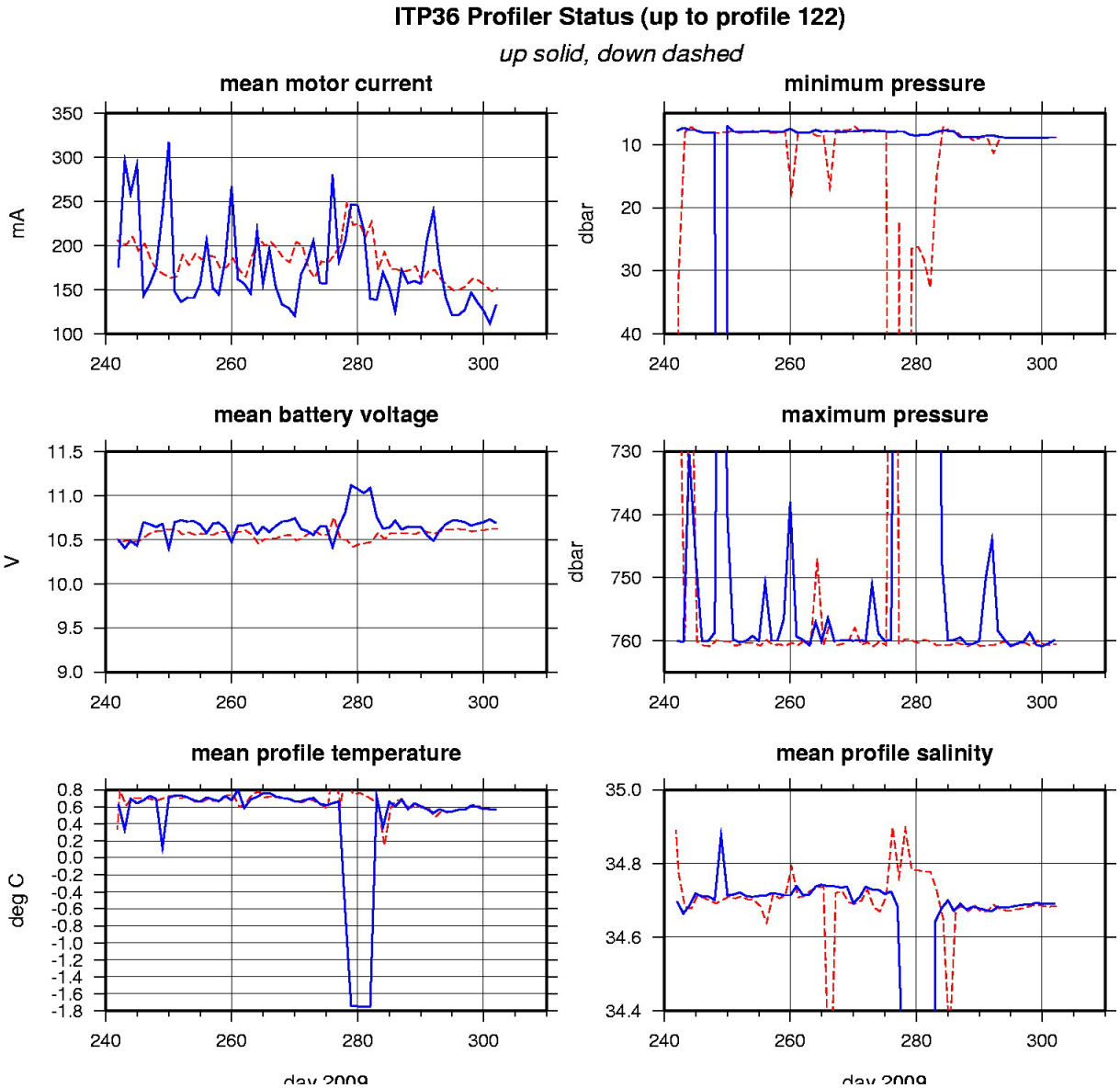
Level II hourly buoy location data in ASCII format: itp36rawlocs.dat

Level III 1-Hz processed profile data in MATLAB format: itp36cormat.tar.Z or itp36cormat.zip

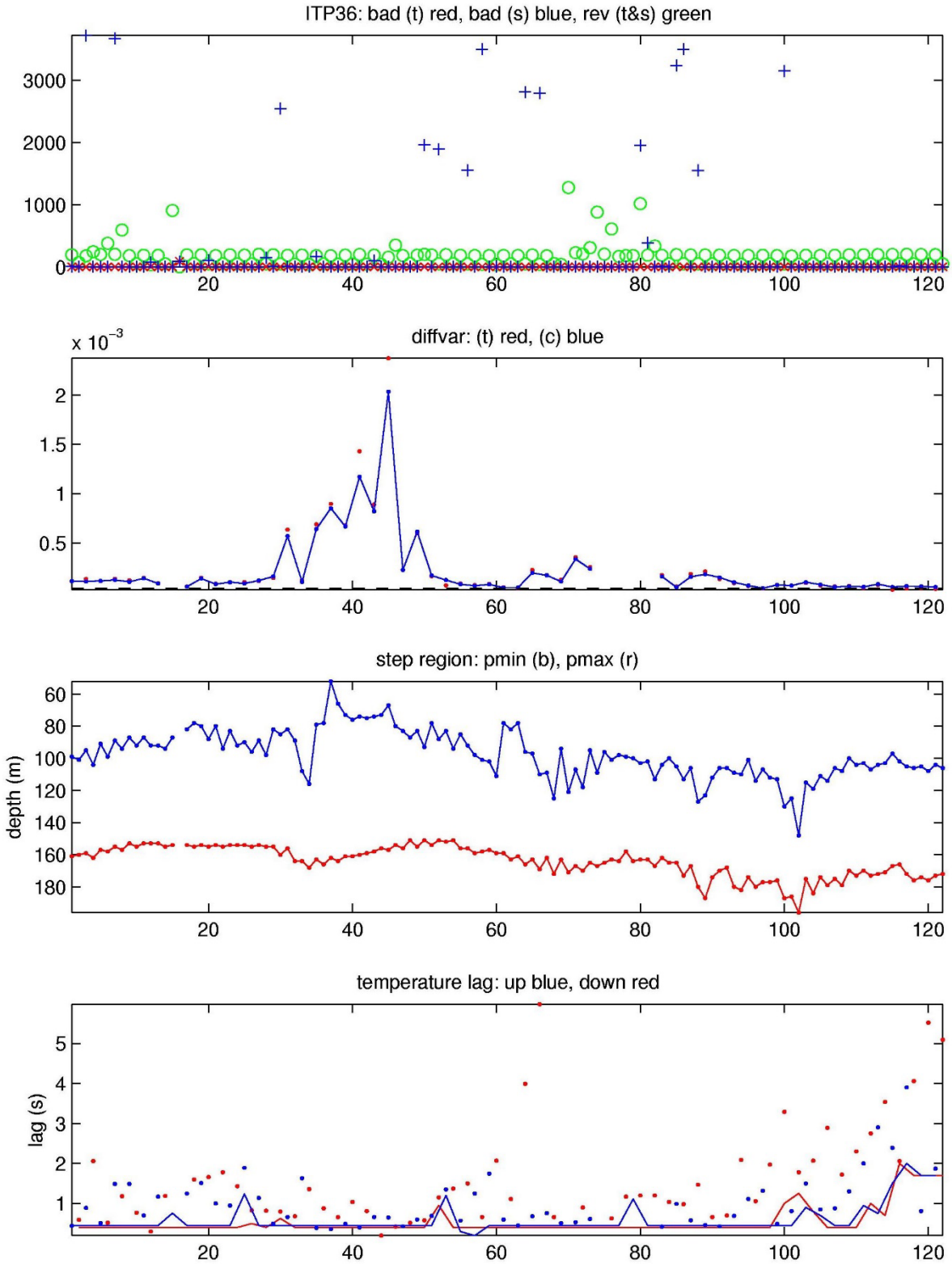
Level III 1-db bin-averaged processed profile data in MATLAB format: itp36final.mat
Level III 1-db bin-averaged processed profile data in ASCII
format: itp36final.tar.Z or itp36final.zip



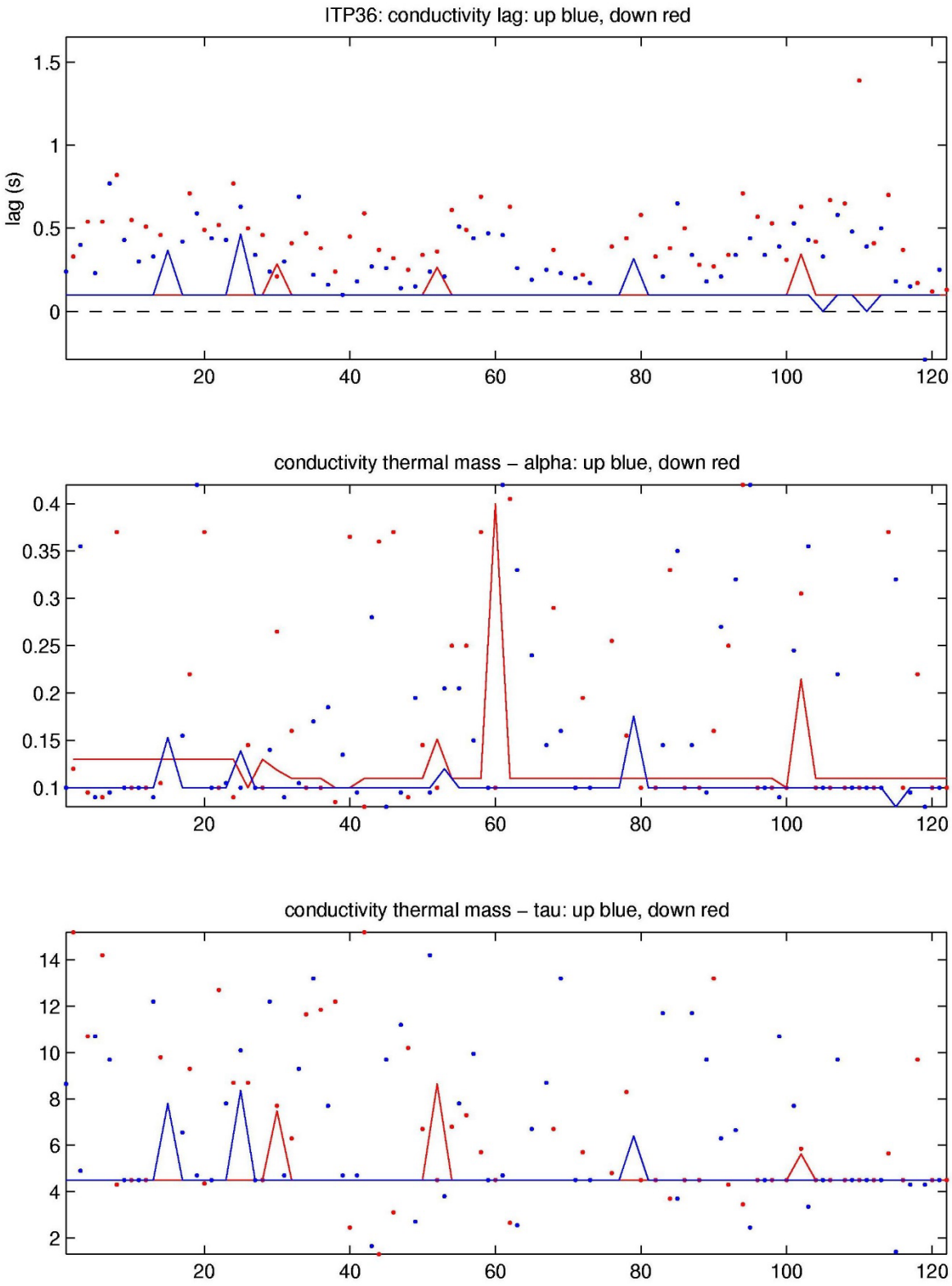
ITP Surface Buoy Status.



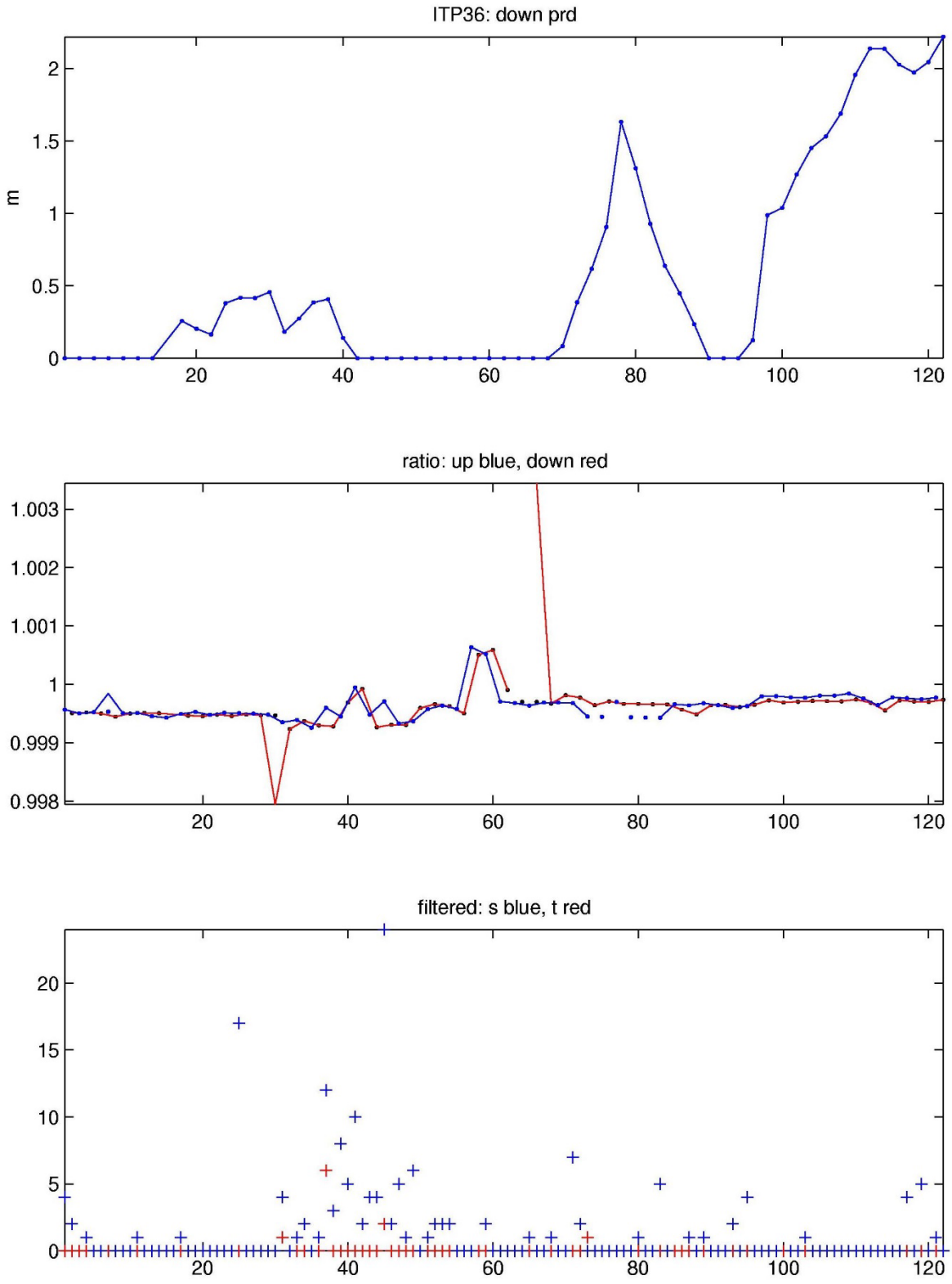
ITP profiler engineering data.



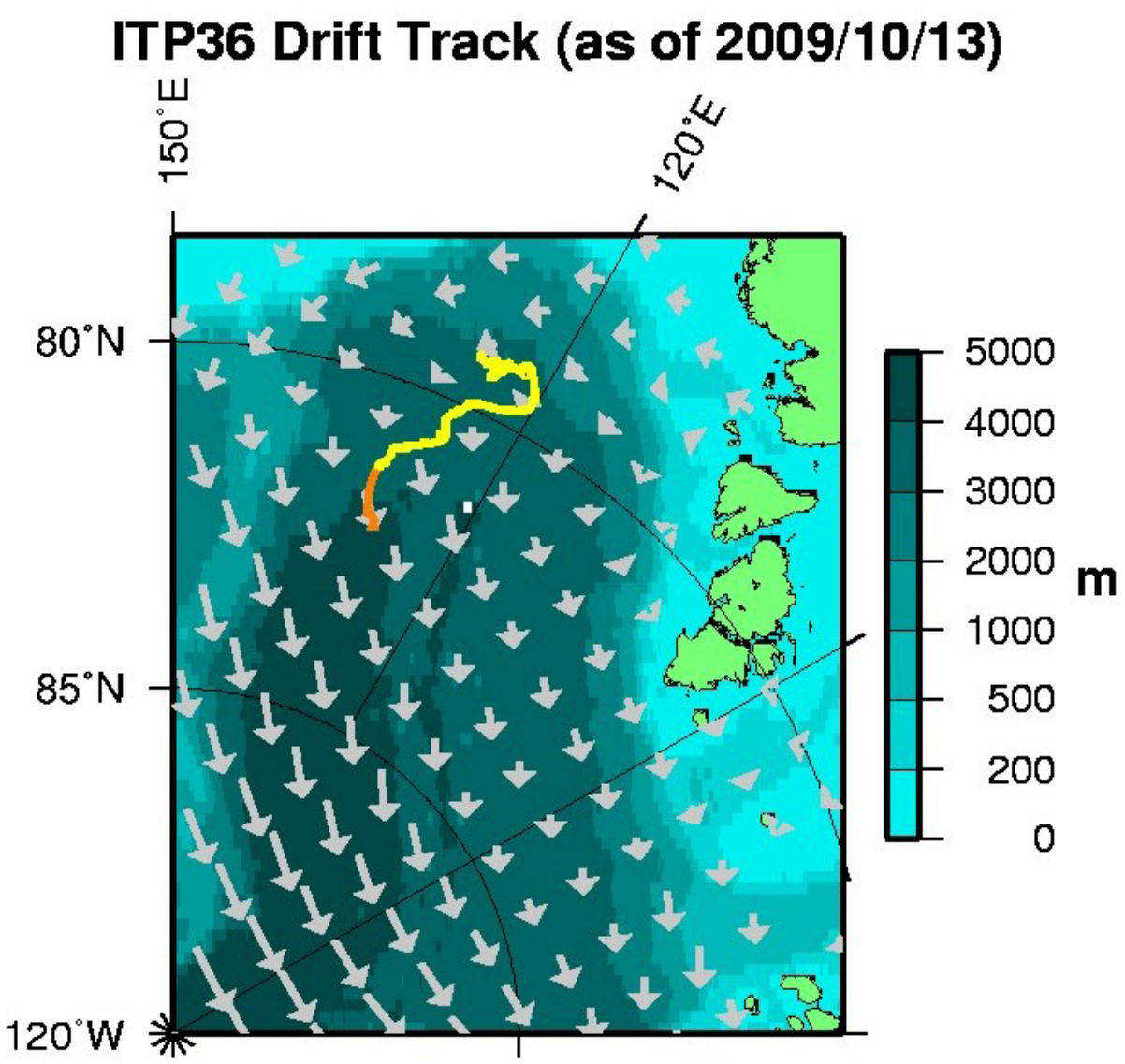
Top: number of bad points removed, Middle: variance of verticle difference of temperature and salinity in step region for up-going profiles, Bottom: temperature lag.



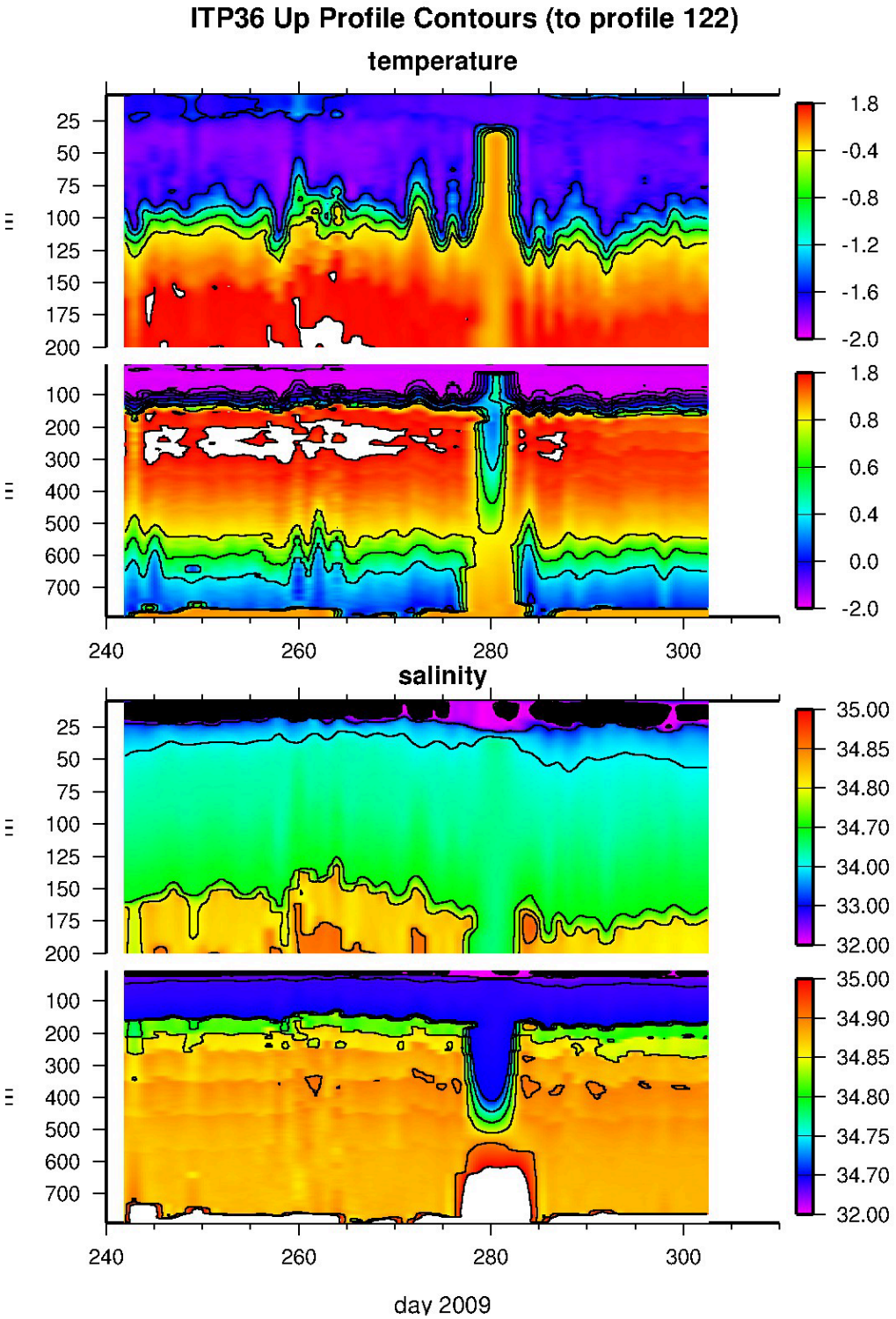
Top: conductivity lag, Middle: conductivity thermal mass amplitude correction, Bottom: conductivity thermal mass lag correction.



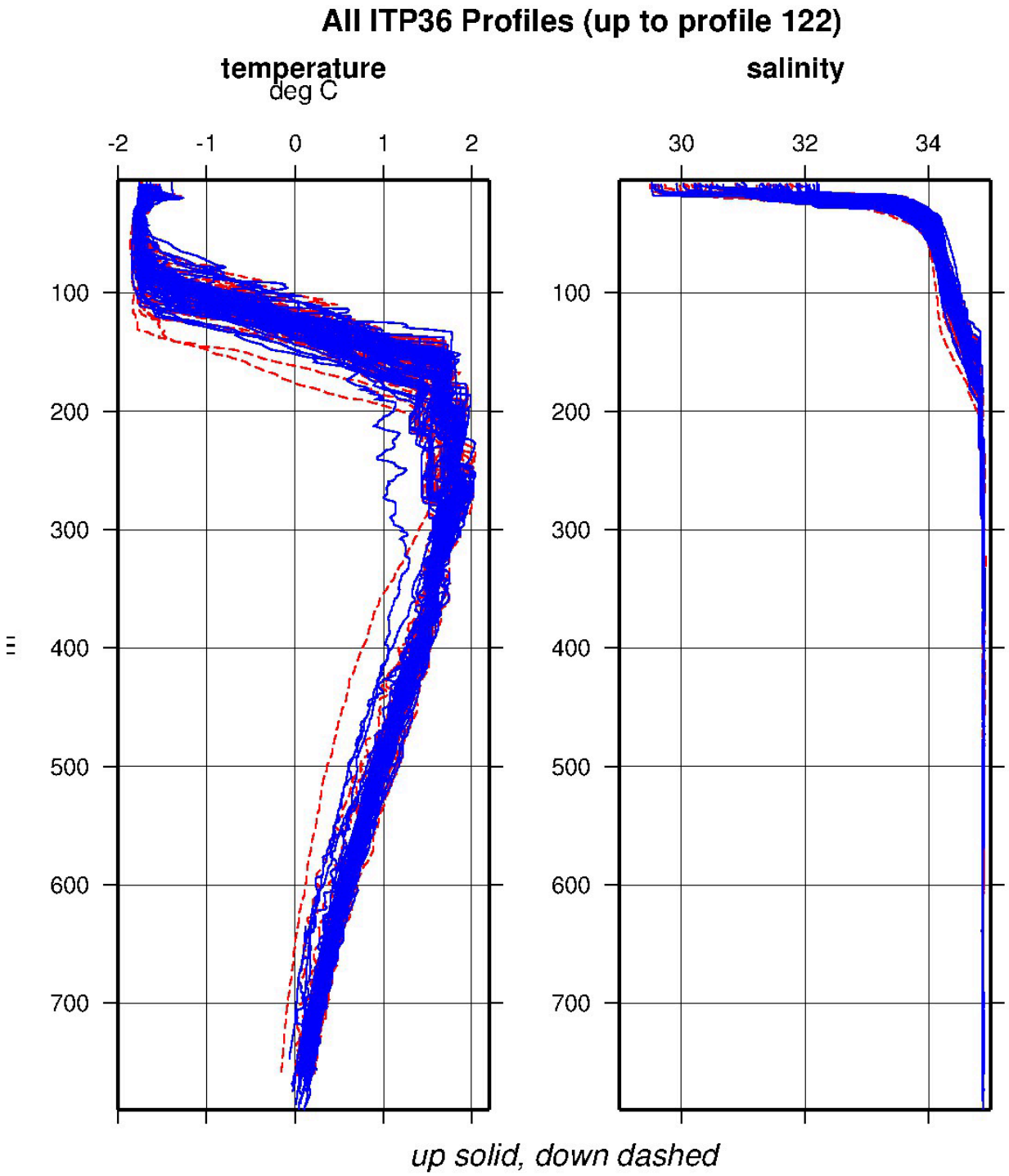
Top: down pressure deviation correction, Middle: salinity ratio adjustment, Bottom: Number of filtered spikes.



Plot of buoy locations.



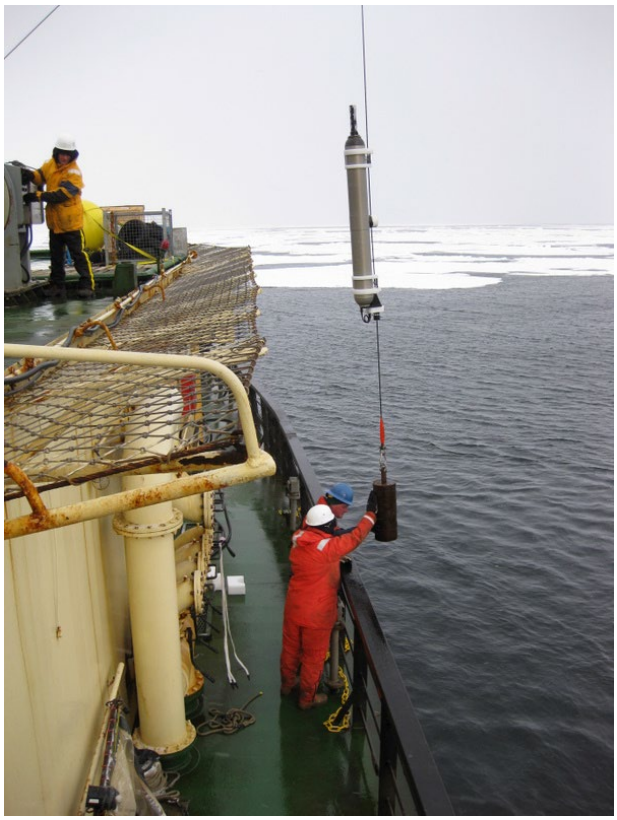
ITP36 temperature and salinity contours.



Composite plot of ITP temperature and salinity contours.

The first ITP to ever be deployed in open water, ITP 36 is surrounded by ice floes in the marginal ice zone over the Arctic Basin north of the Laptev Sea soon after being released from the ship. (Jeff Pietro)

Two and one half years after deployment, ITP 36 surface package and partial tether was found washed up on the northern shore of Iceland. Additional data was eventually retrieved from the flash card memory of the surface controller. (Marvin Ingolfsson)



The deployment begins by lowering the profiler and anchor over-the side. (Jeff Pietro)

The completely assembled system is suspended from the ship’s crane.

The first ITP deployed in open water sits about 25 cm above the waterline with the 790 m profiler mooring suspended below. (Jeff Pietro)