ITP 10 Overview

Deployment Location: 9/10/2007, 9:00 UTC at 84° 59.6'N, 132° 14.6'W

Last Location: 5/24/2008, 23:00 UTC at 83° 33.6' N, 110° 46.6' W

Duration: 258 days

Distance Travelled: 814 km

Number of profiles: 537 in 258 days

Other instruments: IMB 2007-H

ITP10 was deployed on a 2.9 m thick icefloe from the Russian icebreaker *Akademik Federov* as part of the European Union DAMOCLES Program in 2007. On the same icefloe, a US Army Cold Regions Research and Engineering Laboratory (CRREL) Ice Mass Balance Buoy (IMB 2007-H) was also installed. The ITP operated on a typical sampling schedule of 2 one-way profiles between 7 and 760 m depth each day.

ITP 10 Deployment Operations

The operation to deploy ITP 10 (and companion IMB) was conducted using the Federov MI-8 helicopter, starting with a reconnaissance that began after midnight. The ITP, IMB, and deployment team of scientists from Arctic and Antarctic Research Institute (AARI) in Russia, Université Pierre et Marie Curie (UPMC) in France, and WHOI were all loaded onto a single MI-8 and transported to the selected icefloe. Once the ice party and gear were unloaded, the helicopter departed to continue to search for suitable sites for the installation of North Pole 35 ice camp. In the colorful twilight which characterizes the darkest time of the night at this latitude and season, both the ITP and IMB were efficiently deployed in several hours. In fact, the operations were performed so rapidly that the ice party had to wait for several hours in light snowfall for the MI-8 to return and transport them back to the ship.

ITP 10 Data Processing

The 537 profiles that were recovered from the ITP were processed according to the procedures described in the ITP Updated Data Processing Procedures. The processing parameters for ITP 10 are shown in the figures to the right. Thermohaline staircases are found in some profiles but not prevalent throughout the time series. However, the sensor lags determined from the staircase profiles are consistent. Few instances of biofouling were detected, and only one bad salinity profile was eliminated. Drift speeds never exceeded 30 cm/s so that the profiler was not hindered from completing full vertical profiles due to hydrodynamic drag. However, the version of the operating software in the 2007 profilers contained an overflow bug which caused instrument resets at random times. ITP 10 experienced 23 resets with complete loss of data for these profiles, and typically incomplete vertical coverage for the next subsequent profiles.

ITP 10 Data Description

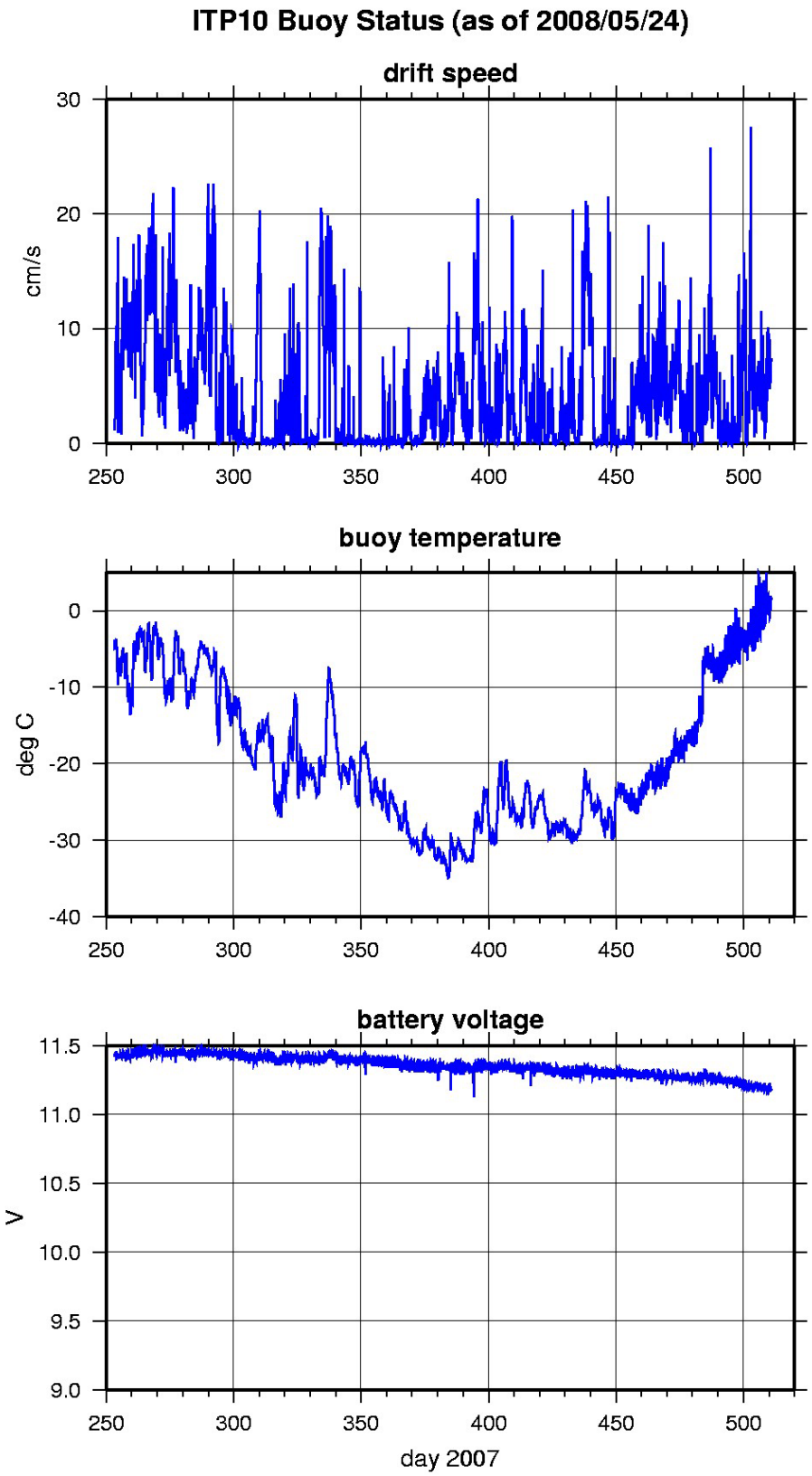
The ITP profiler was configured to operate with a standard sampling schedule of 2 one-way profiles between 7 and 760 m depth each day, and the GPS receiver was powered every hour to obtain locations, and buoy temperature and battery voltage status were recorded. After 258 days of reliable operation and data telemetry, the instrument stopped phoning in – presumably crushed in the ice pack.

The plots below are of the final, calibrated, edited data.

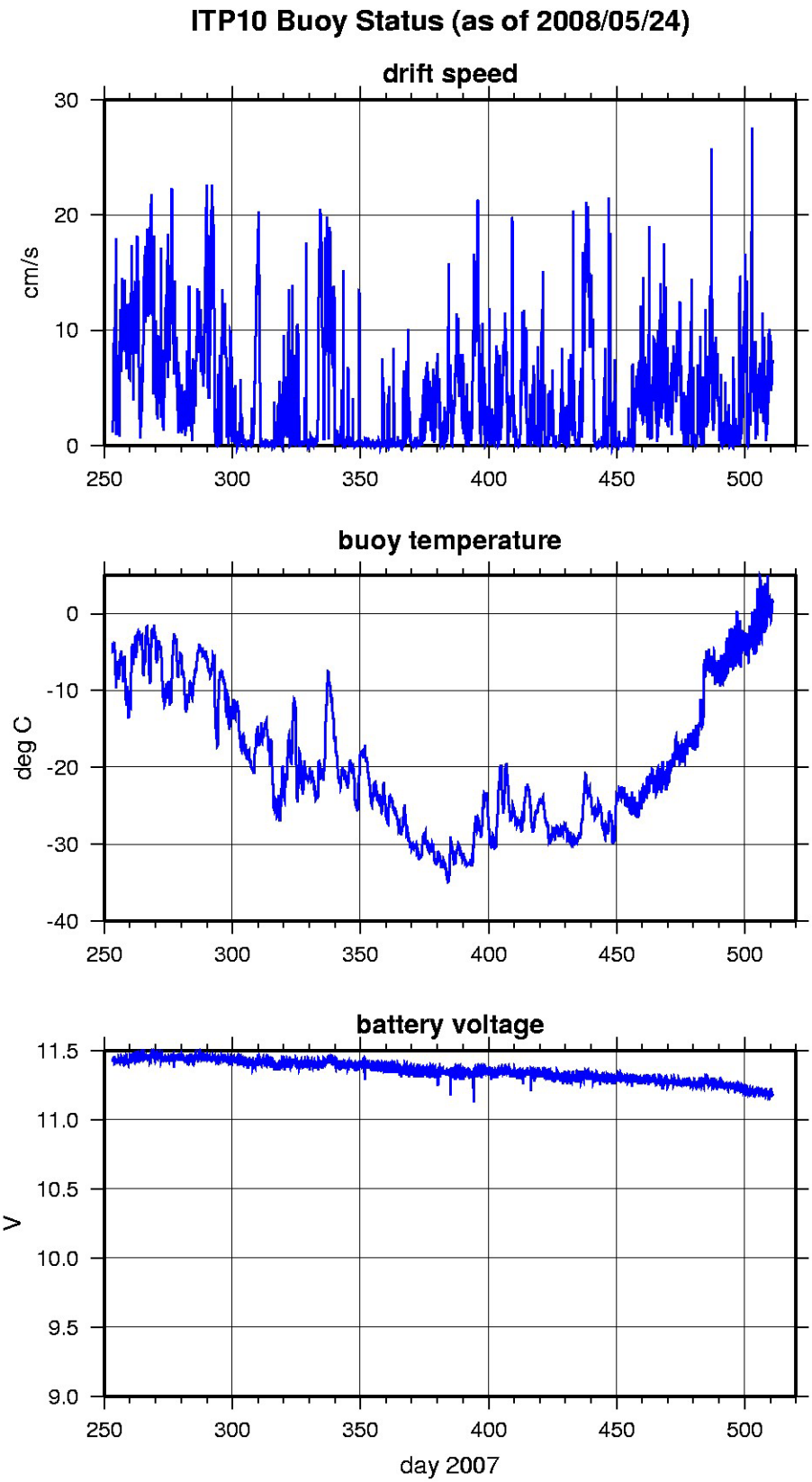
Level II hourly buoy location data in ASCII format: itp10rawlocs.dat

Level III 1-Hz processed profile data in MATLAB format: itp10cormat.tar.Z or itp10cormat.zip

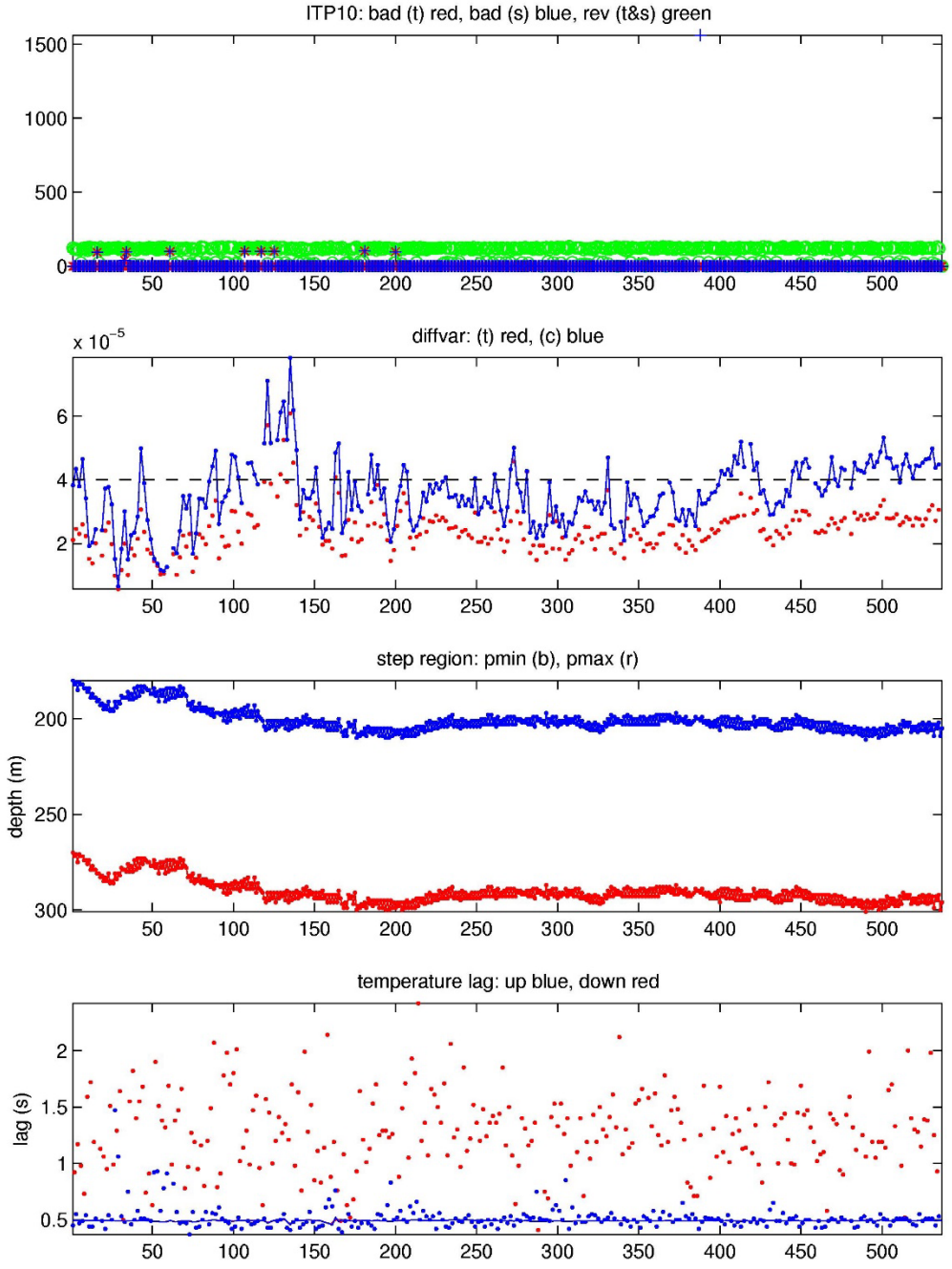
Level III 1-db bin-averaged processed profile data in MATLAB format: itp10final.mat
Level III 1-db bin-averaged processed profile data in ASCII
format: itp10final.tar.Z or itp10final.zip



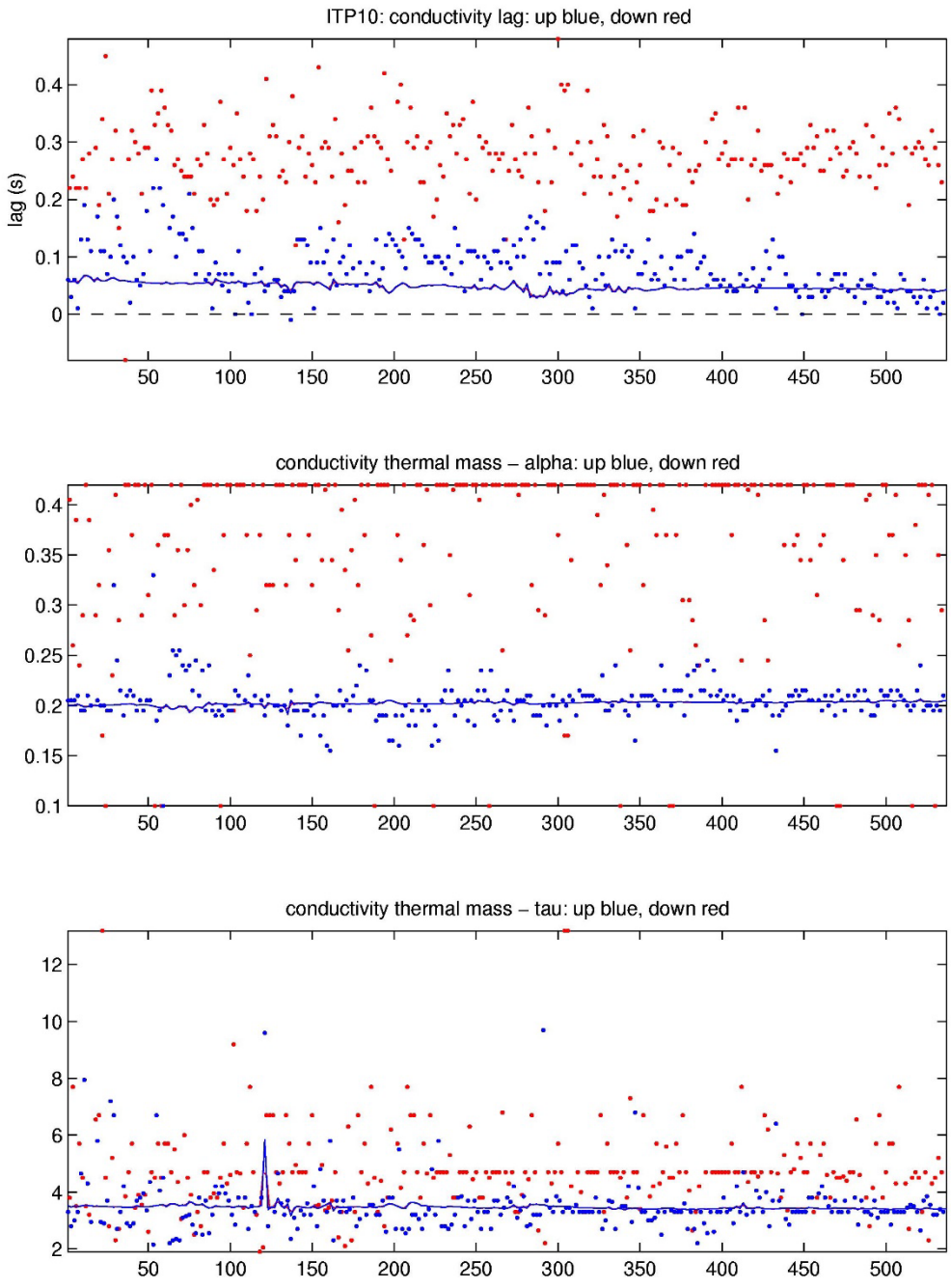
ITP surface buoy status



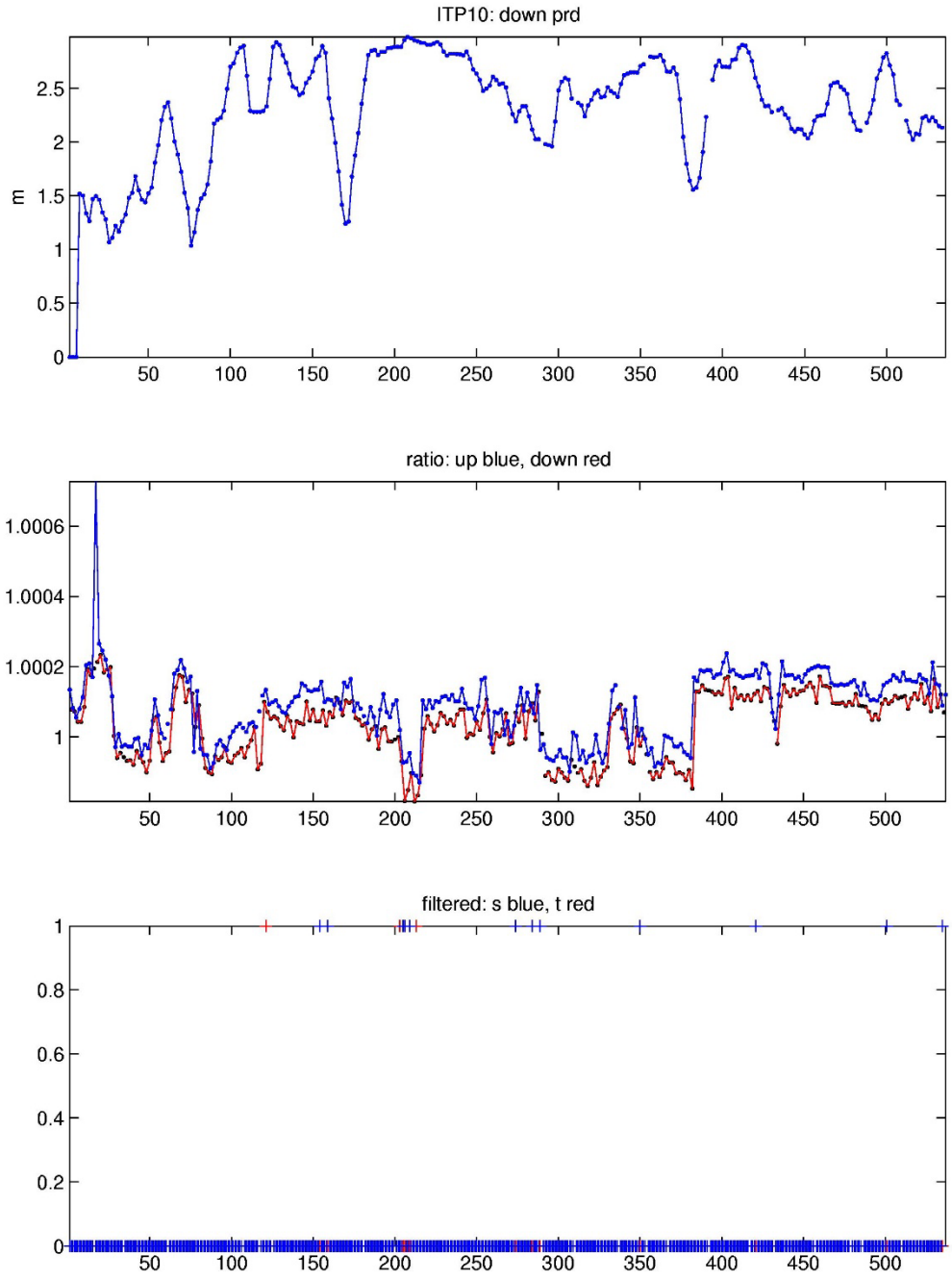
ITP profiler engineering data



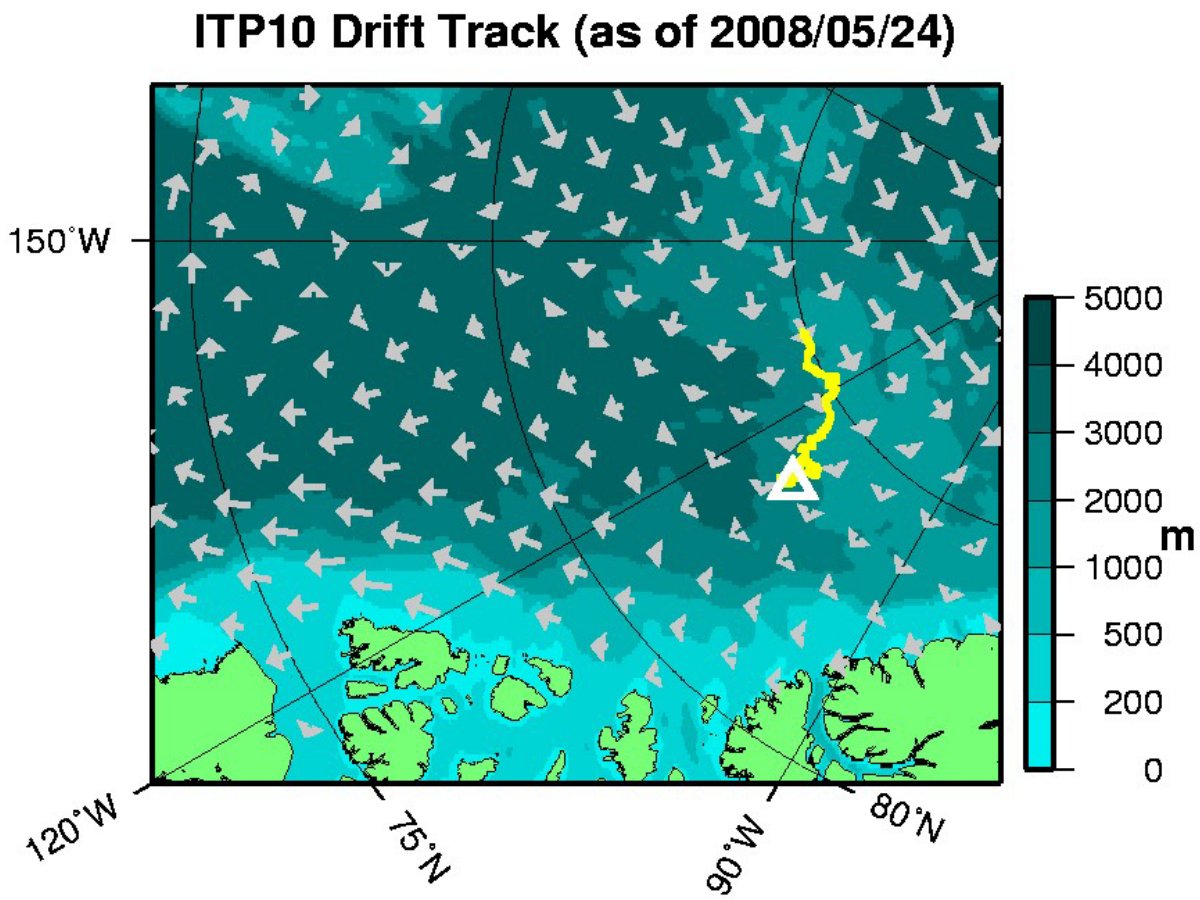
Number of bad points removed (top); variance of vertical difference of temperature and salinity in step region for up-going profiles; depth of staircase layer; temperature lag (bottom).



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

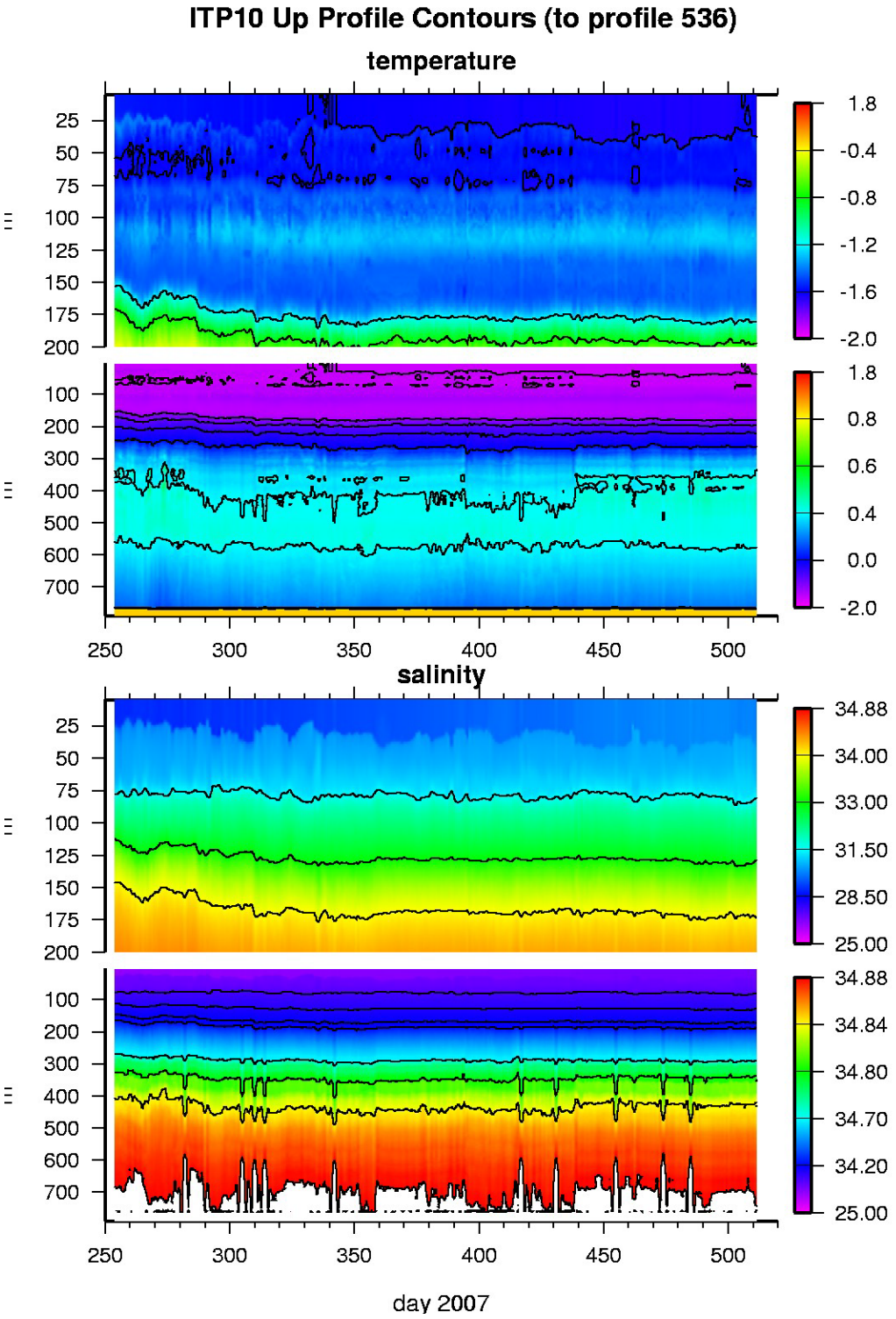


Top: down pressure deviation correction, Middle: salinity ratio adjustment, Bottom: Number of filtered spikes.

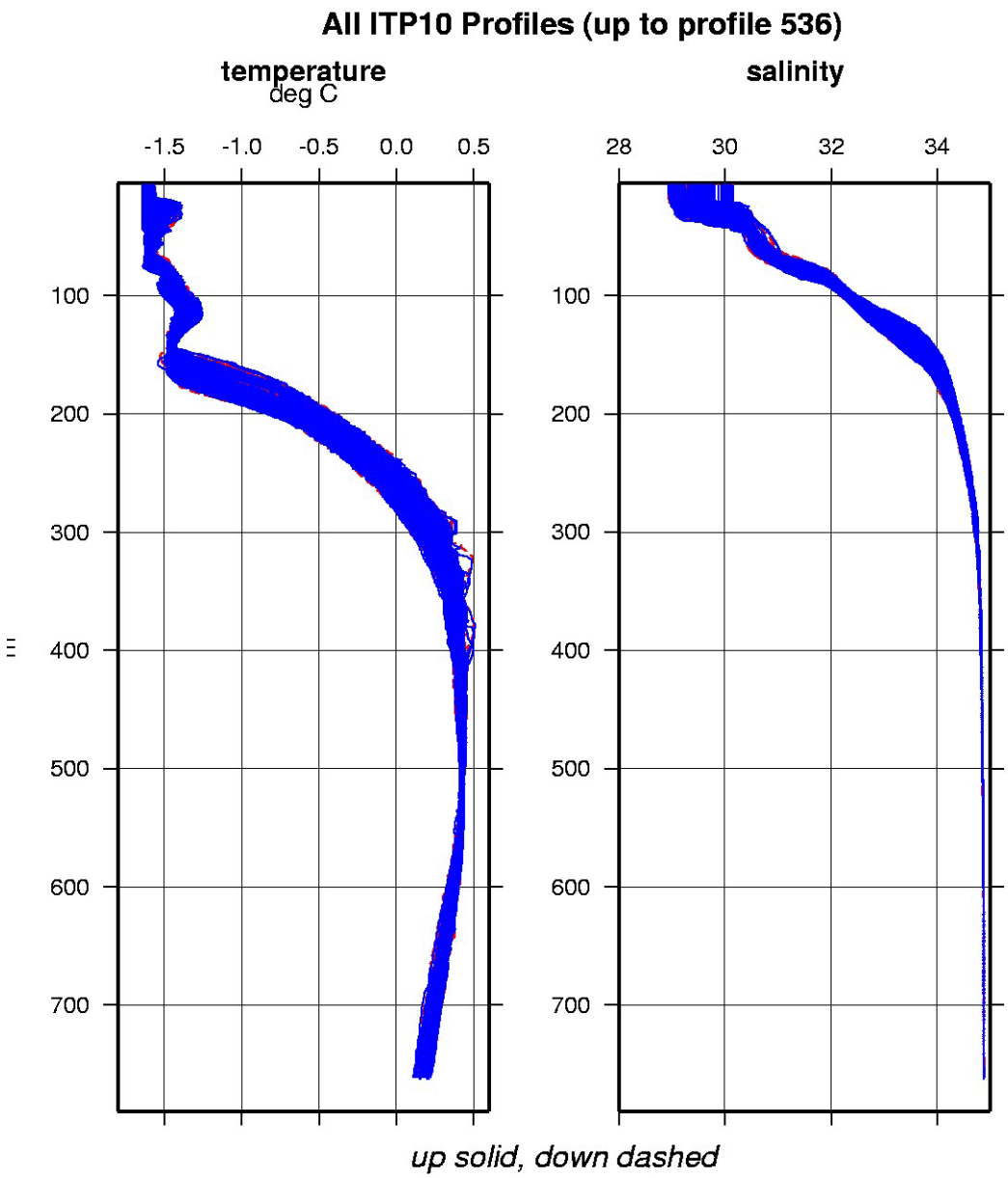


ITP drift (yellow line) and latest location (triangle), and annual ice drift from IABP (grey vectors) on IBCAO bathymetry (shading).

Plot of buoy locations.

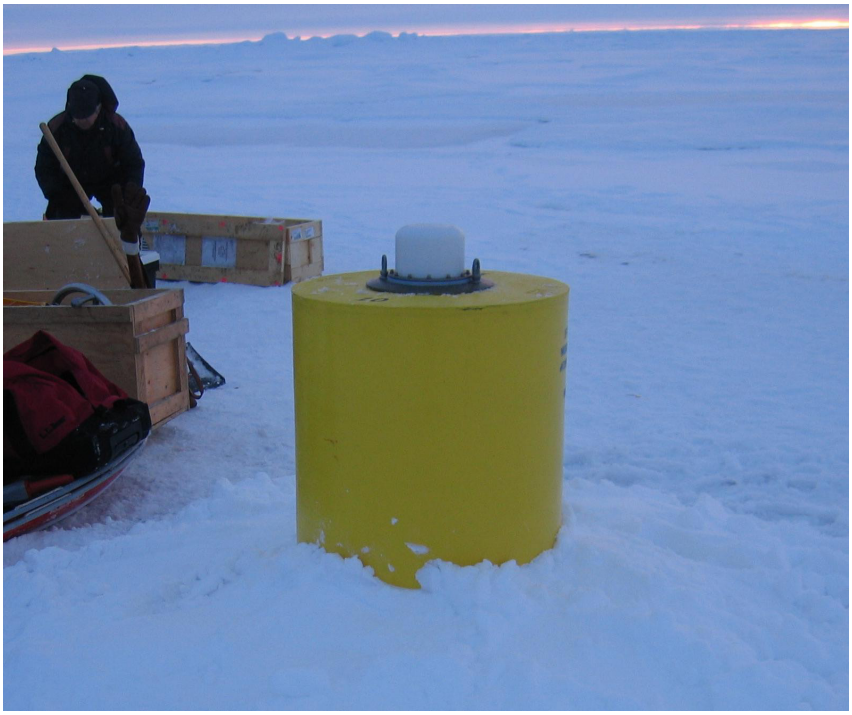


ITP 10 temperature and salinity contours.



Composite plot of ITP temperature and salinity profiles.

After landing on the selected deployment icefloe, the cargo bay doors of the Russian MI-8 helicopter are opened to unload the ITP instrument and deployment apparatus (and IMB). Photo by John Kemp.



ITP 10 in the morning twilight shortly after deployment in September 2007. Photo by John Kemp.