

## ITP26 Overview

**Deployment Location:** 9/11/2008, 01:00 UTC at 80° 6.1'N, 141° 18.4'E

**Last Location:** 10/5/2010, 23:00 UTC at 74°11.3' N, 17° 18.2' W

**Duration:** 755 days

**Distance Traveled:** 5823 km

**Number of profiles:** 364 in 181 days

**Other instruments:** none

ITP 26 was deployed on a 2.2 m thick ice floe in the Transpolar Drift from the Russian Research Vessel *Federov*. The ITP operated on a typical sampling schedule of 2 one-way profiles between 7 and 760 m depth each day.

## ITP26 Deployment Operations

ITP 26 was the final ITP deployment on the *Federov* 2008 expedition. Because the proposed deployment site was away from the location of the ship and its intended cruise track, all of the ITP deployment gear was loaded into the helicopter with the intent of conducting a survey and the deployment on the same trip (unlike the previous 3 deployments on the cruise). The helicopter pilots and ice surveying team were anxious and excited to find a suitable flow for our operations, but also concerned because they would need to land and shut down the helicopter while the ITP deployment team worked, and Russian scientists performed ice measurements in strategic locations to determine the ice flow's overall dimensions and characteristics.

Because of the ice conditions in the area, a >2-meter thick floe with a slight hummock was selected. The helicopter landed, shut down and after approximately 2.5 hours the deployment and inductive modem test were completed -- slightly faster than previous days, due to the help from the pilots who were eager to lend a hand and learn what the operation was about. Once completed, it was refreshing to be able to load the helicopter and leave the deployment site immediately to return to the ship, rather than wait for transportation as before.

## ITP26 Data Processing

The 364 profiles telemetered by ITP 26 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. Buoy drift speeds were almost always less than 30 cm/s, and the profiler covered the full extent of every profile.

The CTD data required some editing for biofouling or similar glitches. In most cases these were short conductivity spikes, although for some profiles significant portions of the conductivity

record were eliminated; 13 profiles were deleted completely. Following these edits, ITP26 had a 95% good data return.

Thermohaline staircases were present for most of the time series, enabling CTD lag corrections. The lags were in the typical range found for previous systems. During manual editing, about 60 profiles had temperature lags and/or thermal lags modified. The TS staircases for this record typically consisted of very short steps above 200 dbar followed by longer steps below. It seems that the shortest steps may have generated lag values that then overcorrected the longer ones.

The conductivity adjustment ("calibration") was mostly constant and close to unity. However, three portions of the record stuck out with larger adjustments. The first instance (near profile 168) was based on apparently contaminated profiles that were mostly deleted, and the calibration "outlier" disappeared. The second instance (near profile 202) appeared real: while some of the nearby profiles had been edited for conductivity contamination, remaining "clean" profiles showed consistency at depth after applying the correction. The third instance (near profile 325) was unusual in that the calibration adjustment, while "correcting" (bringing in line) the deep portions of the profiles, it caused unrealistic changes to the shallow portions (< 300 dbar). Further, the structure of the affected profiles at depth was different from their neighbors. It was decided that the deep feature could be real and should not be "corrected away". The initial peak of the conductivity adjustment was therefore removed.

## ITP 26 Data Description

### *Data Description*

ITP 26 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.

Between its deployment in September 2008 and February 26, 2009, the ITP transmitted 338 profiles (in 168 days) while drifting in the central Arctic Basin before transmissions from the surface unit ceased. Over 17 months (530 days) later, the surface package resurfaced some 700 km south in the East Greenland current in August 2010 and resumed sending its stored queue of status and profile data. Another 26 profiles (up to March 10, 2009) were recovered with GPS locations until the profiler stopped communicating with the surface unit and the location fixes could no longer be obtained. At that same time, the temperature of the surface package suddenly increased from -30° C to slightly more than 0° C in less than a day and remained largely constant at that temperature until it reappeared again. The evidence suggests that the package was likely caught in a ridging event when it ceased transmissions in February, and subsequently pushed below the ice in March when the underwater unit ceased communicating (perhaps the cable was severed at this time).

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

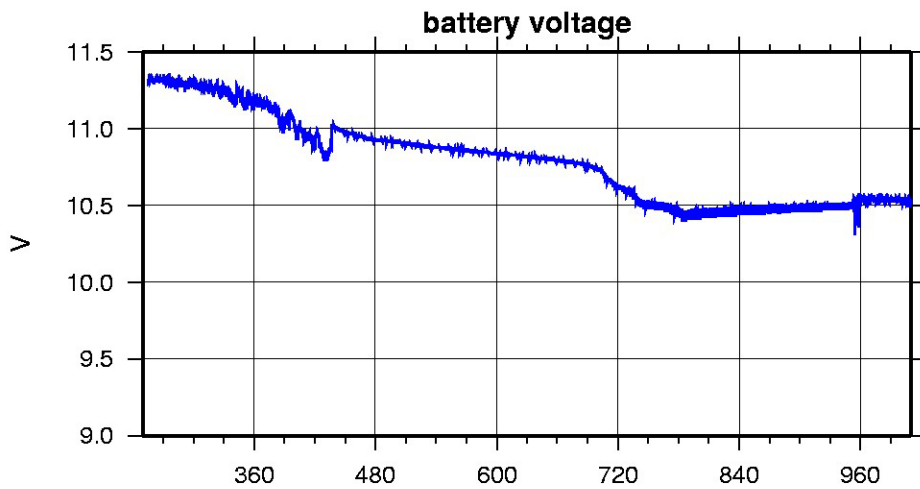
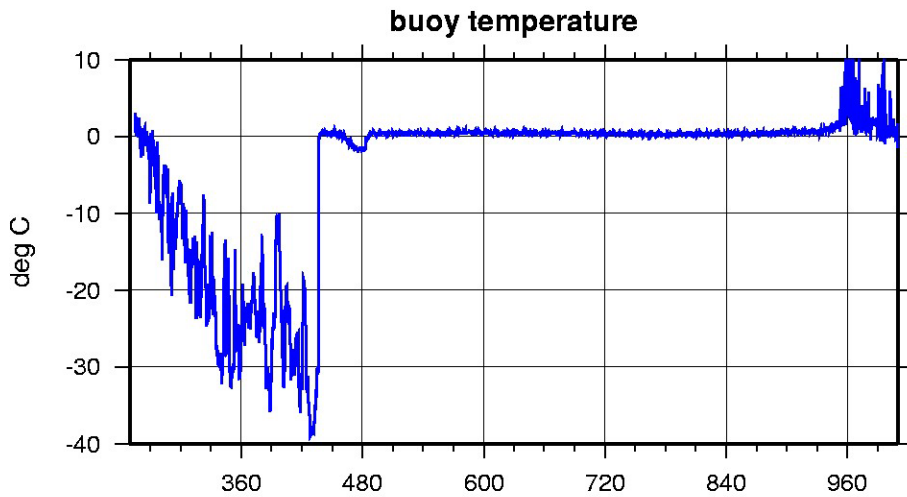
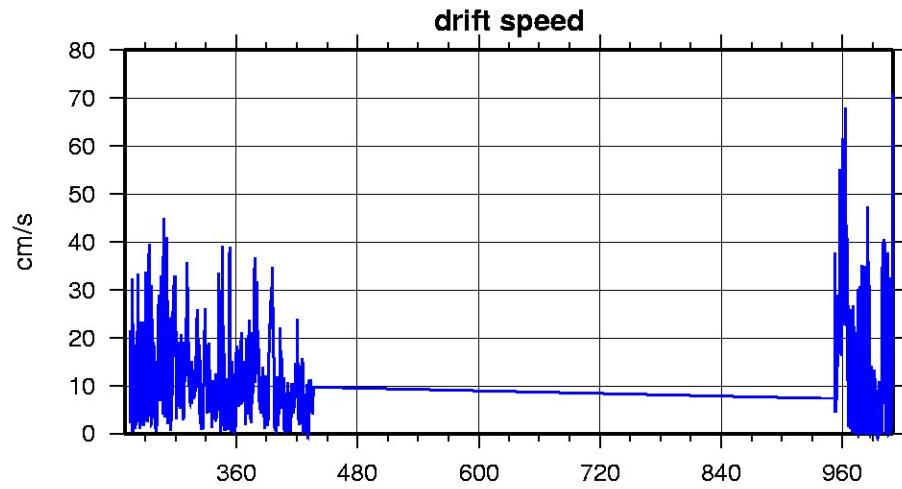
Level II hourly buoy location data in ASCII format: itp26rawlocs.dat

Level III 1-Hz processed profile data in MATLAB format: itp26cormat.tar.Z or itp26cormat.zip

Level III 1-db bin-averaged processed profile data in MATLAB format: itp26final.mat

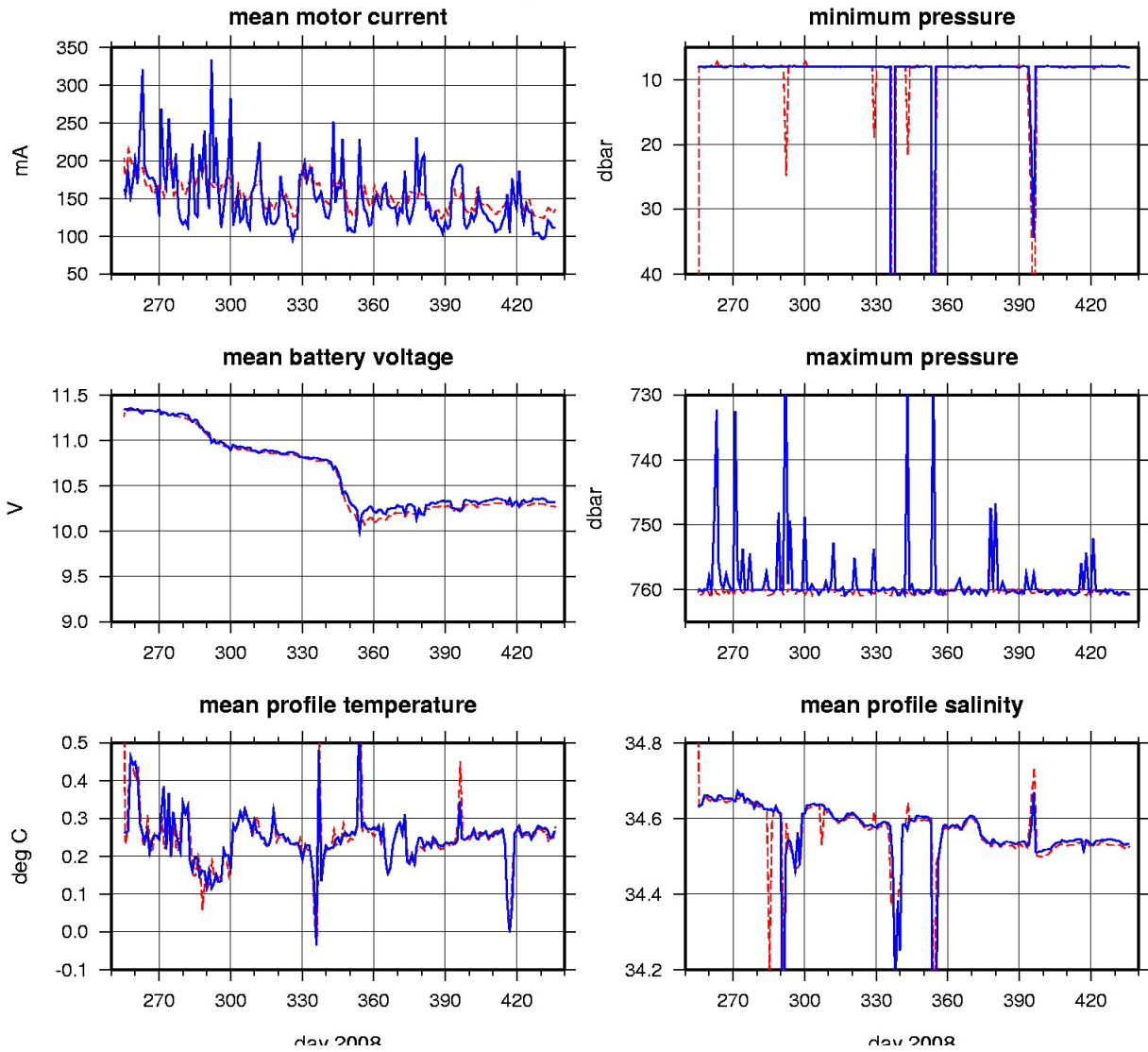
Level III 1-db bin-averaged processed profile data in ASCII format: itp26final.tar.Z  
or itp26final.zip

# ITP26 Buoy Status (as of 2010/10/05)

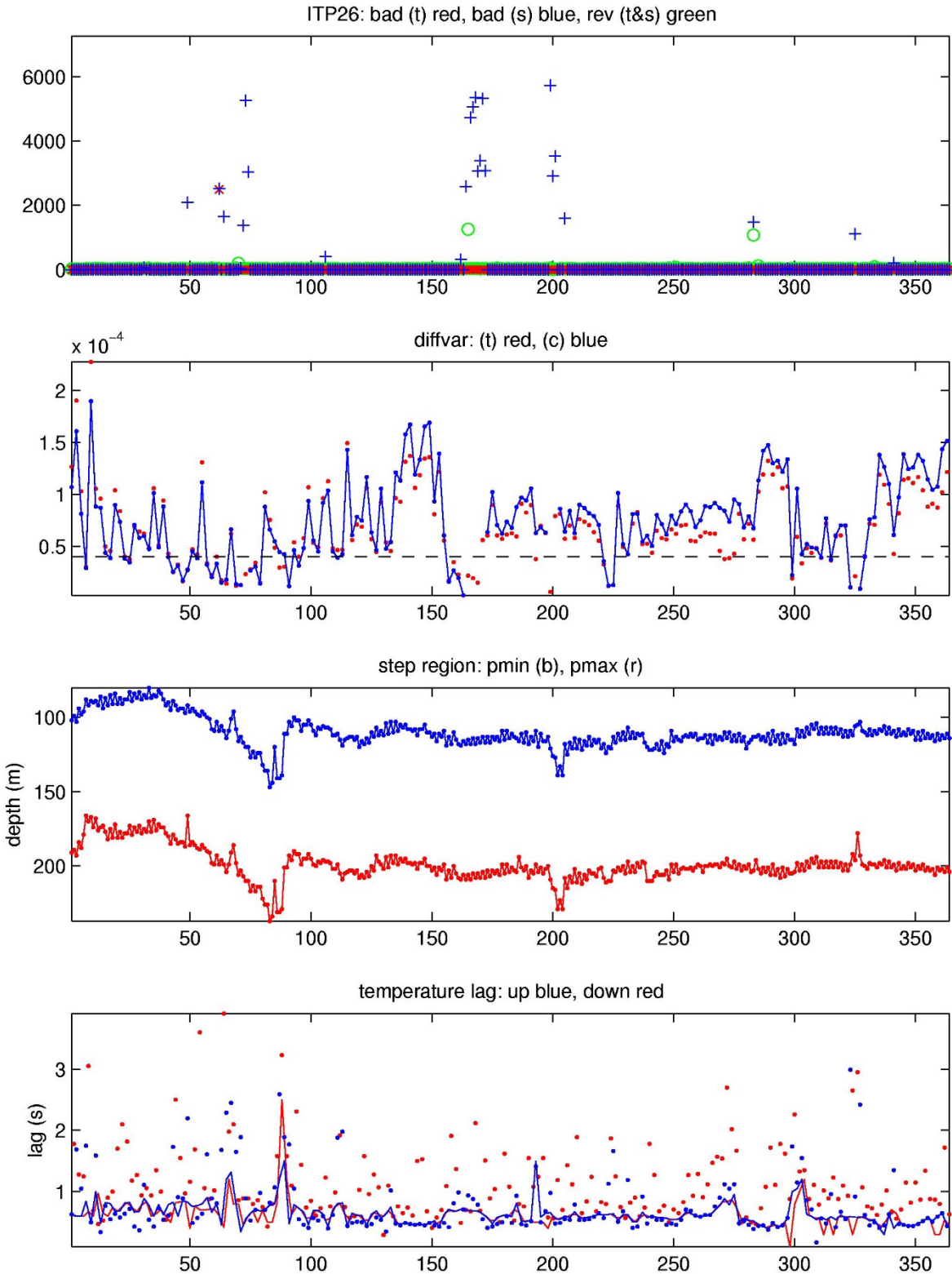


### ITP26 Profiler Status (up to profile 364)

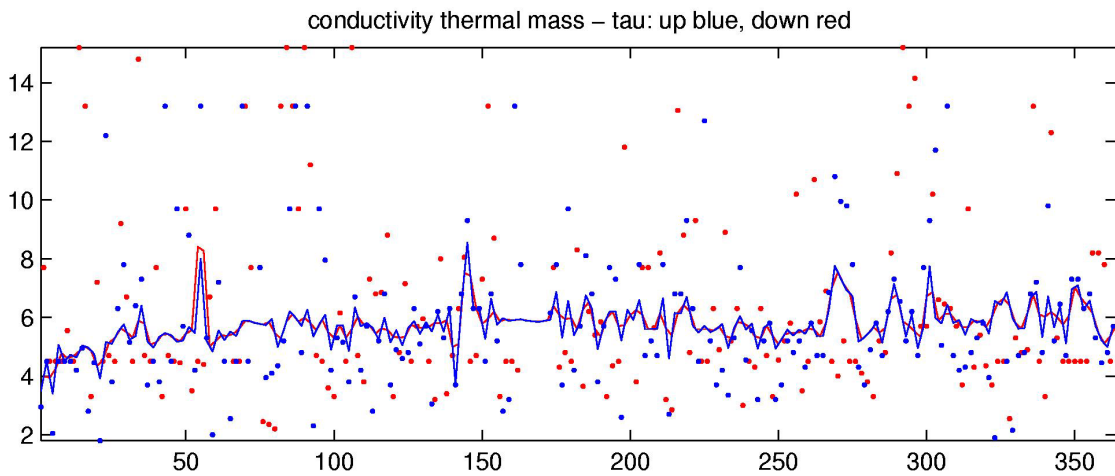
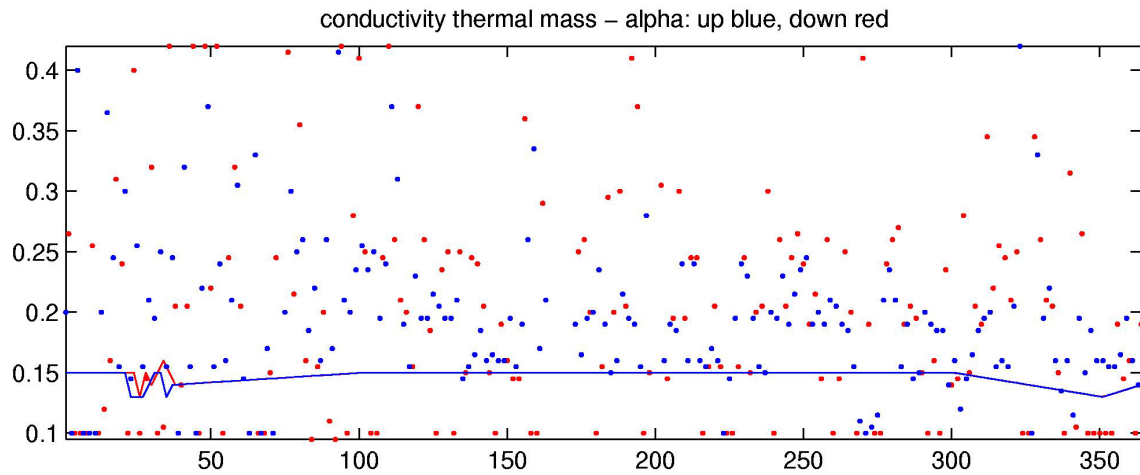
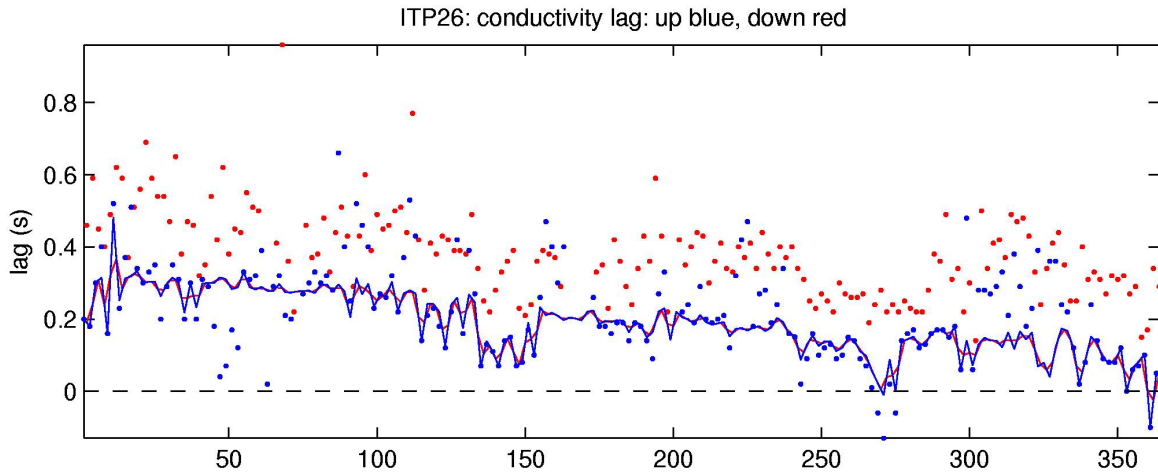
*up solid, down dashed*



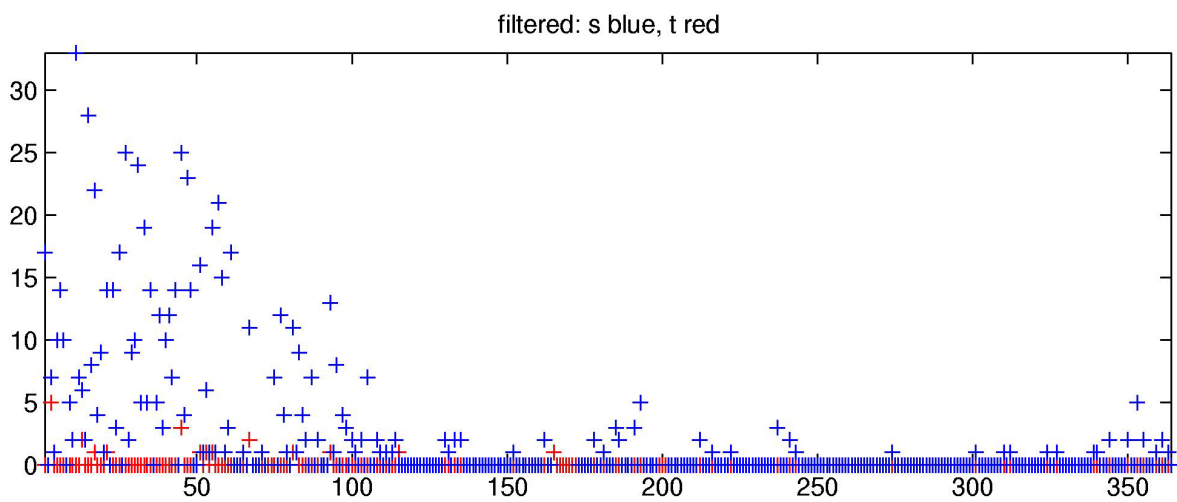
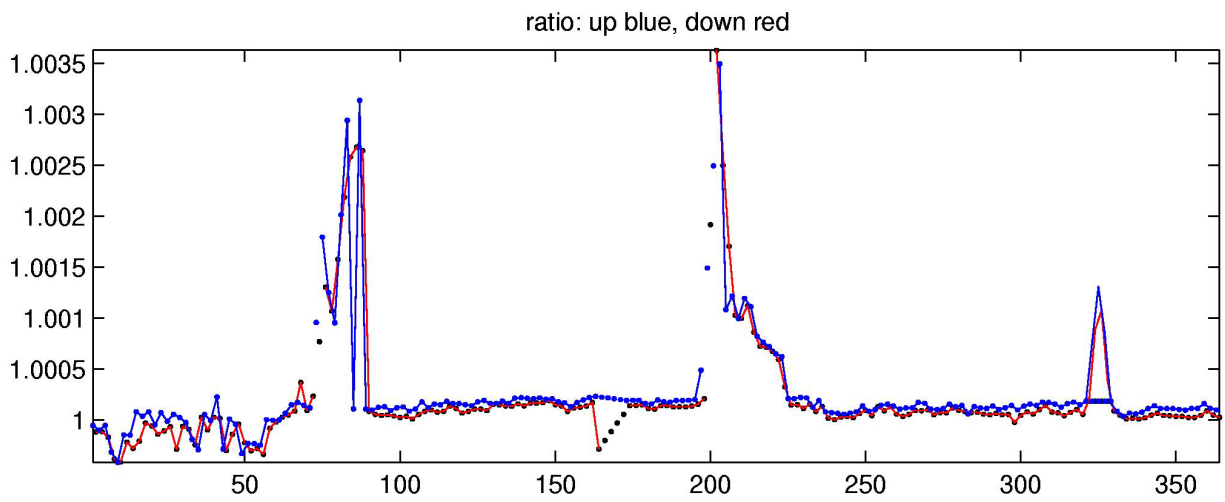
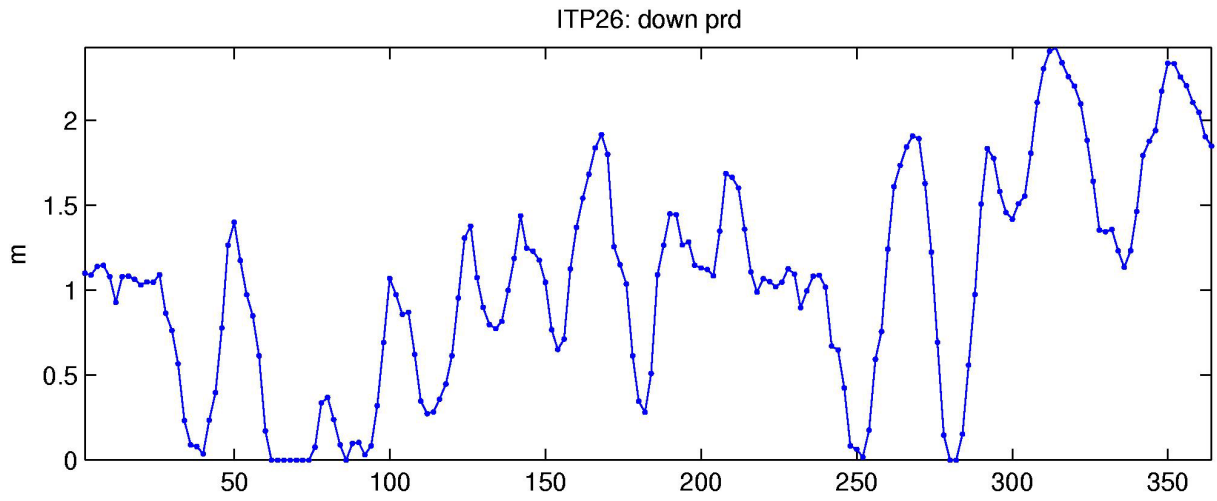
ITP profiler engineering data.



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.



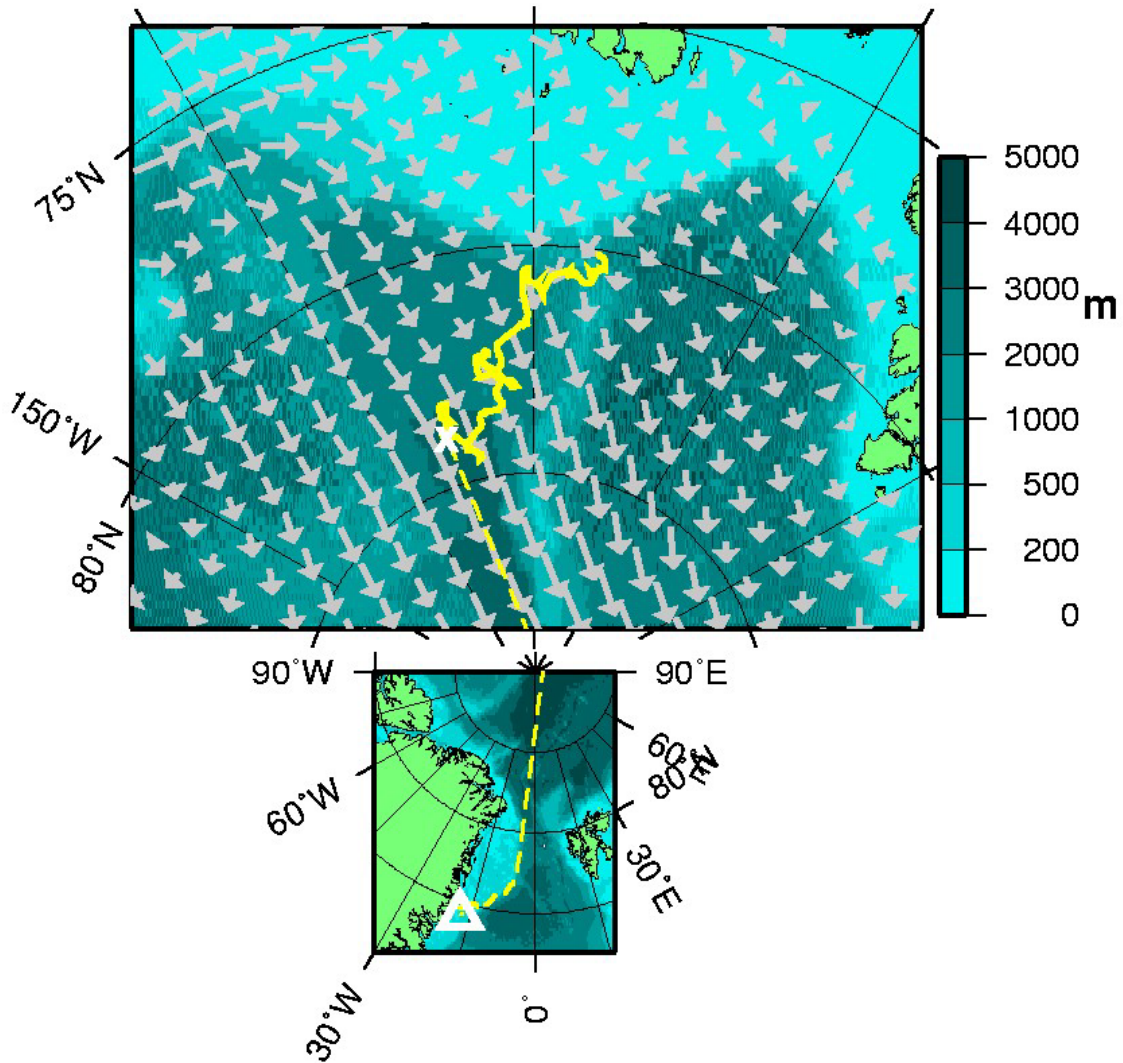
Top: conductivity lag, Middle: conductivity thermal mass amplitude correction, Bottom: conductivity thermal mass lag correction.



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



## ITP26 Drift Track (as of 2010/10/05)

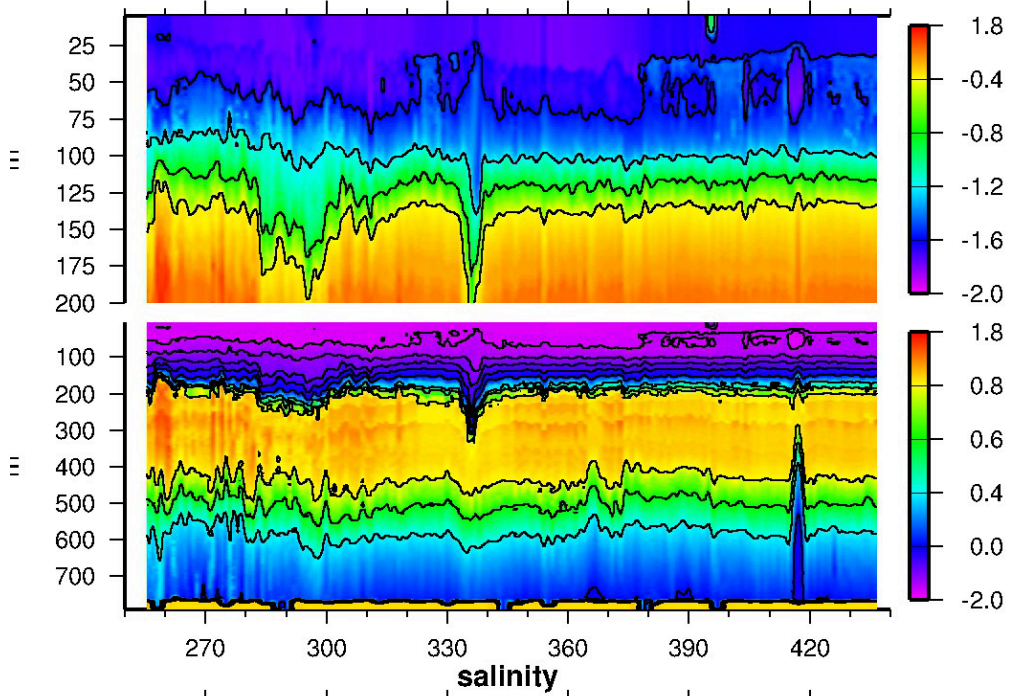


**ITP drift (yellow line), last profile (cross), and last location (triangle), BGOS moorings (circles) and annual ice drift from IABP (grey vectors) on IBCAO bathymetry (shading).**

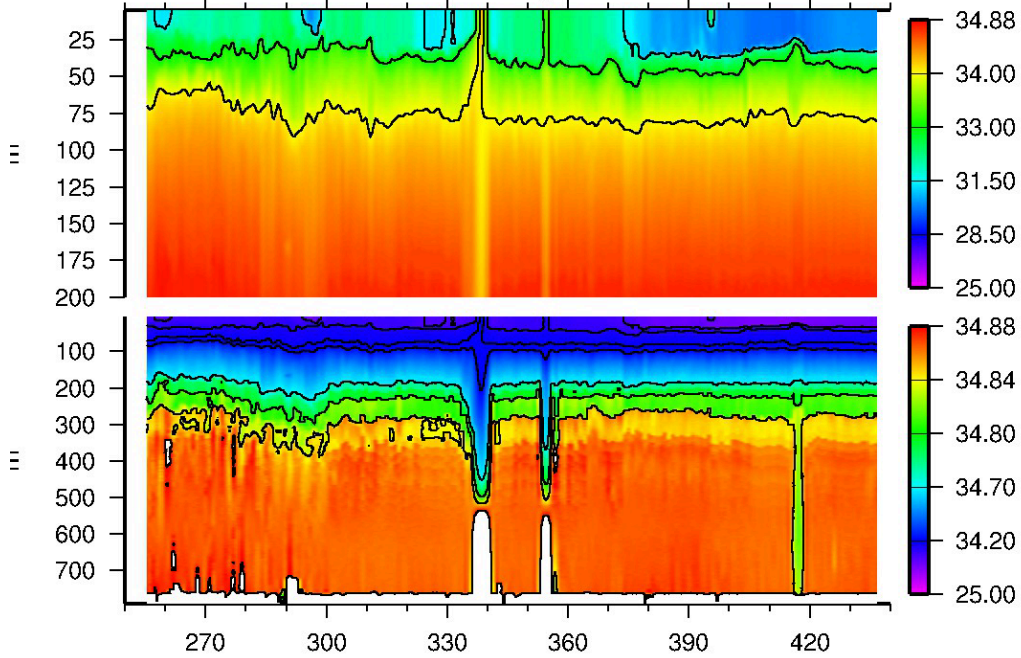
Plot of buoy locations.

### ITP26 Up Profile Contours (to profile 364)

temperature



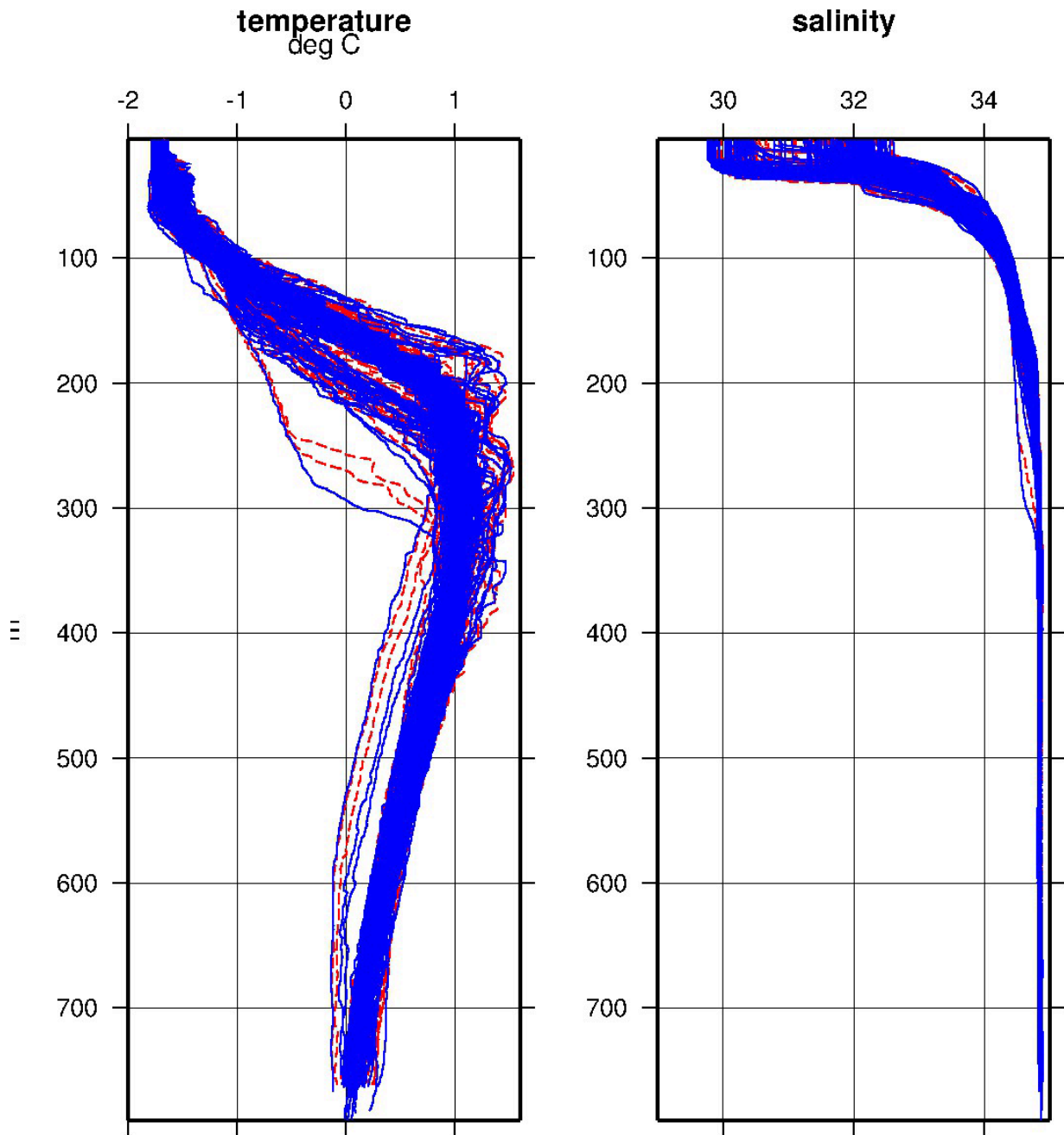
salinity



day 2008

ITP25 temperature and salinity contours.

### All ITP26 Profiles (up to profile 364)



*up solid, down dashed*

Composite plot of ITP temperature and salinity contours.



A Russian scientist stretches to auger a survey hole in the ice floe while the Sergey Unovidov assist Newhall and Pietro with assembling the ITP deployment apparatus.



Once the tripod and other deployment apparatus were assembled, the ITP wire with 250 lb anchor were deployed through the 11" augered hole in the ice. It took approximately 30-35 minutes for the 790 m of wire to be deployed. (Photo by Sergey Unovidov)



Immediately upon installation of ITP 26 (with conical supplemental flotation) the system's ability to transfer data from the underwater profile to surface package is tested. Kris Newhall performs the inductive modem test while Jeff Pietro begins disassembling the deployment apparatus. (Photo by Sergey Unovidov)