

ITP 56 Overview

Deployment Location: 4/15/2012, 20:00 UTC at 89° 19.5'N, 1° 54.8'E

Last Location: 5/3/2013, 23:00 UTC at 71° 29.5' N, 2° 30.5' W

Duration: 383 days

Distance Traveled: 3293 km

Number of profiles: 1532 in 382 days

Other instruments: IMB 2012-B, AOFB 26, PAWS, webcam

ITP56 was deployed on a 1.5 m thick icefloe in the Transpolar Drift from the Russian ice camp Barneo in collaboration with the North Pole Environmental Observatory (NPEO) . On the same icefloe, a Naval Postgraduate School Arctic Ocean Flux Buoy (AOFB 26), an US Army Cold Regions Research and Engineering Laboratory (CRREL) Ice Mass Balance Buoy (IMB 2012-B), and an US-IABP Polar Area Weather Station (PAWS) were deployed. The ITP operated on a fast-sampling schedule of 4 one-way profiles between 7 and 760 m depth each day.

ITP56 Deployment Operations

On April 14, 2012, our deployment team of 3 personnel, ITP 56, an AOFB, PAWS, and IMBB, plus deployment apparatus arrived at ice camp Barneo in order to deploy an Ice-Based Observatory (IBO). In order to extend the duration of the drift of the IBO before reaching Fram Strait, the plan was to use the Russian MI-8 helicopter to fly ~100 km upstream to deploy the systems while the helicopter waited, as was performed the previous year with ITP 47. On the remainder of this day, the deployment apparatus and instruments were unpacked and organized in preparation for the remote operations which were to be conducted on the following day.

However, the weather deteriorated by the next day (Russian Easter) so that visibility prohibited flying the helicopters. Hoping for a change in conditions, we waited throughout the day for a positive assessment by the pilots, which never occurred. Since we were scheduled to depart the camp the following day, it became necessary to install the IBO a few hundred meters outside of camp. With the help of our Russian scientist colleagues, the deployment operations began just after 5 PM local time (15:00 UTC). Two hours later, the AOFB buoy was deployed on 2 m thick ice, and work began on deploying ITP 56.

Approximately 25 m away the deployment hole for the ITP was augured through the 1.5 m thick icefloe, and preparations were made to lower the ITP profiler into the ocean. However, the profiler had been stored in the camp mess tent to keep it warm, but unfortunately the floor of the tent was still cold enough to cause the instrument to cease functioning when attempting to load the deployment schedule. Therefore, the profiler had to be warmed, opened and repowered, then programmed. Fortunately, it responded, and the ITP was finally deployed and successfully

tested nearly 4 hours after the AOFB had been installed. Subsequently, the PAWS and IMBB were simultaneously deployed nearby by separate teams so that the installation of the IBO was completed just before midnight UTC.

ITP56 Data Processing

The 1532 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 are shown in the figures to the right. Until the buoy reached Fram Strait and broke out of the in early October, there were only a few instances where the drift speed exceeded 30 cm/s which prevented the profiler from obtaining full profiles.

The ITP worked well for the first 200 profiles but was then struck by either massive obstructions and/or pump problems. A significant number of the worst conductivity (salinity) profiles were removed. Performance improved somewhat later in the record so that more profiles were retained, but all salinities were marked as questionable (qflag=1) starting with profile 589. Temperature was considered less affected and was retained throughout.

Passing through Fram Strait, the drift speed approached 1 m/s, and after breaking out of the ice around profile 760, the ITP ceased collecting up profiles. Due to the dense seawater characteristics and roller wear, it is likely that the instrument may have been sliding up the wire towards the top stop after completing the down profile, so that little upward travel distance remained before each up profile.

ITP56 Data Description

The ITP profiler was configured to operate on a fast-sampling schedule of 4 one-way profiles between 7 and 750 m depth each day. In the surface package, the GPS receiver was powered hourly to obtain locations hourly, and buoy temperature and battery voltage status were recorded.

The buoy drifted south with the Transpolar Drift for 6 months towards Fram Strait, passed through the strait and avoided the shallow Greenland continental shelf for another 6 months before transmissions ceased. After accelerating through Fram Strait on the ice, the drift speed rapidly slowed when the buoy was released from the ice floe (as indicated by buoy temperatures). Unfortunately, as explained in the Data Processing section, only down profiles were acquired in the Greenland Sea section, so these data are subject to smearing in the wake of the profiler.

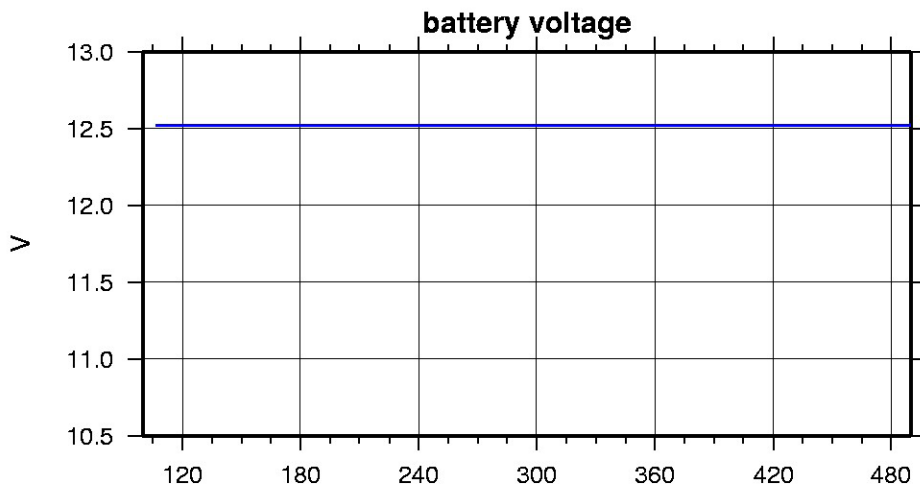
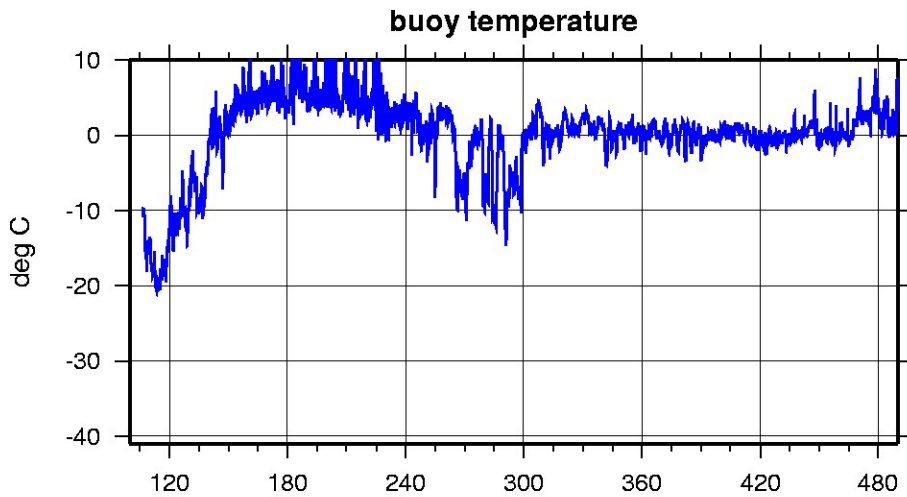
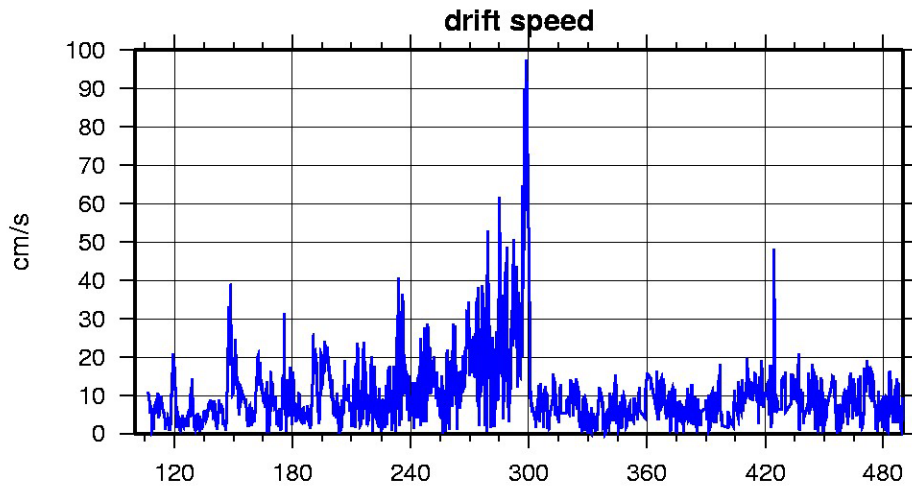
The plots below are of the final, calibrated, edited data (as opposed to the raw data presented on the active instrument pages).

Level II hourly buoy location data in ASCII format: `itp56rawlocs.dat`

Level III 1-Hz processed profile data in MATLAB format: `itp56cormat.tar.Z` or `itp56cormat.zip`

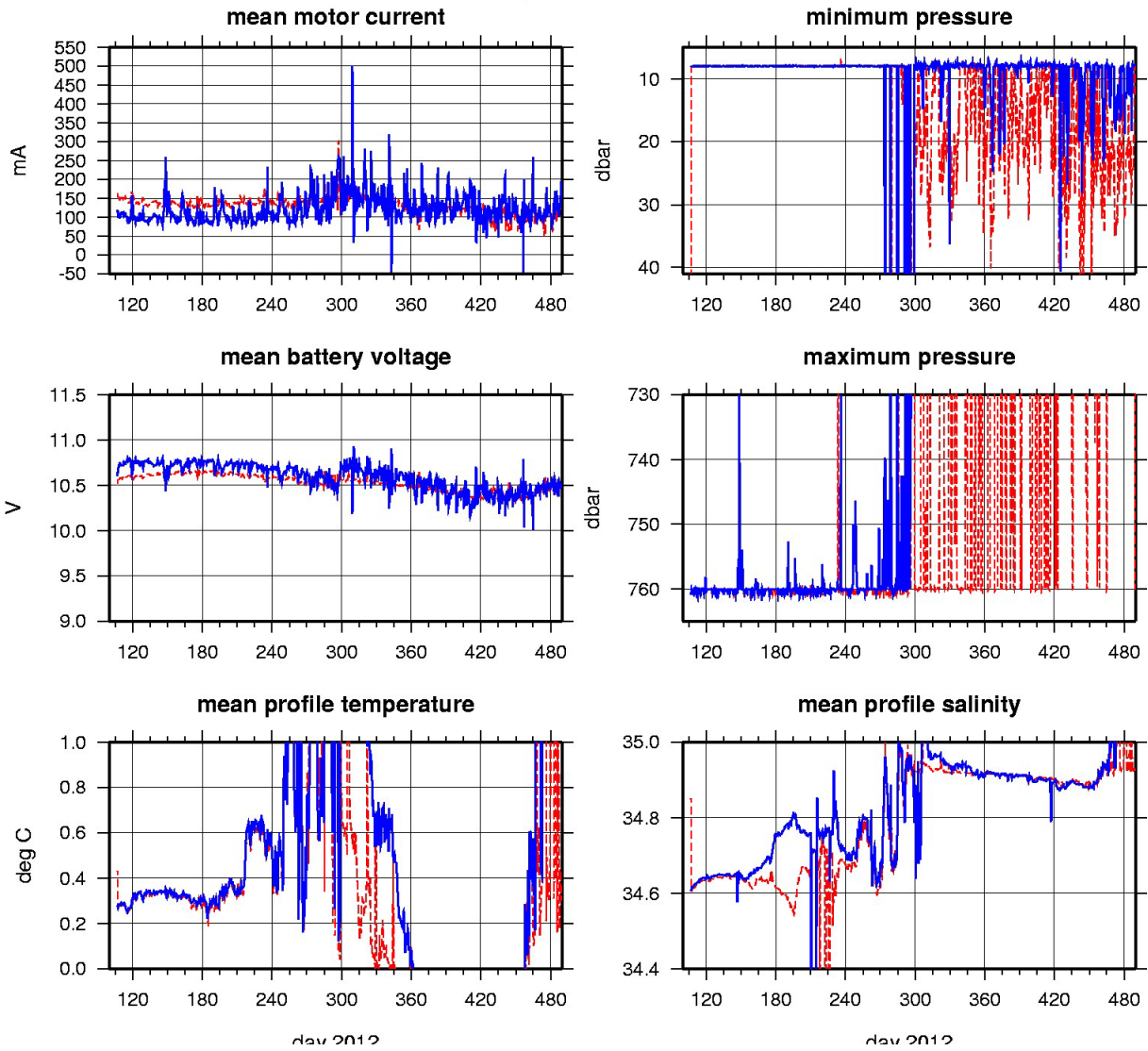
Level III 1-db bin-averaged processed profile data in MATLAB format: itp56final.mat
Level III 1-db bin-averaged processed profile data in ASCII
format: itp56final.tar.Z or itp56final.zip

ITP56 Buoy Status (as of 2013/05/03)

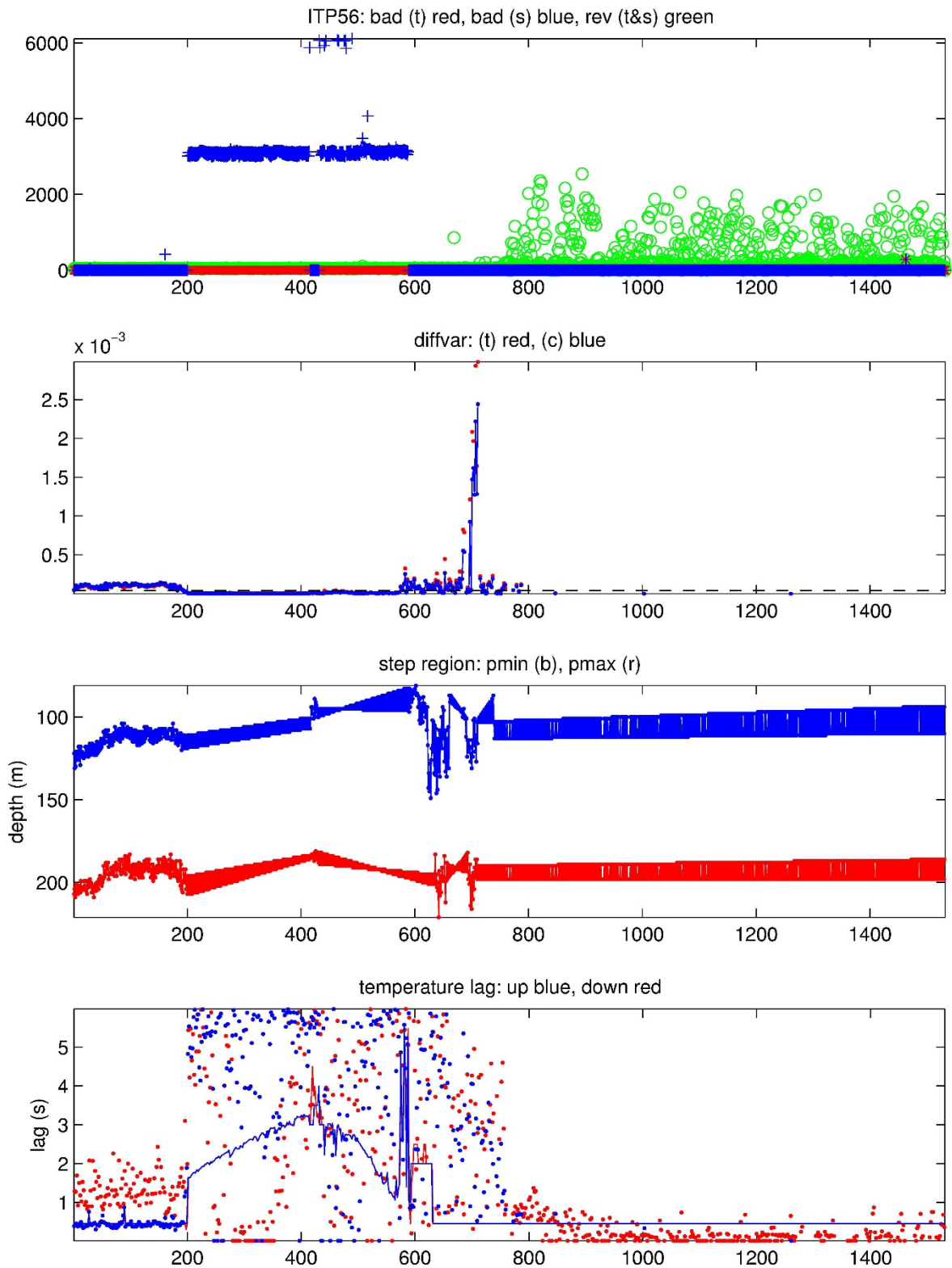


ITP56 Profiler Status (up to profile 1532)

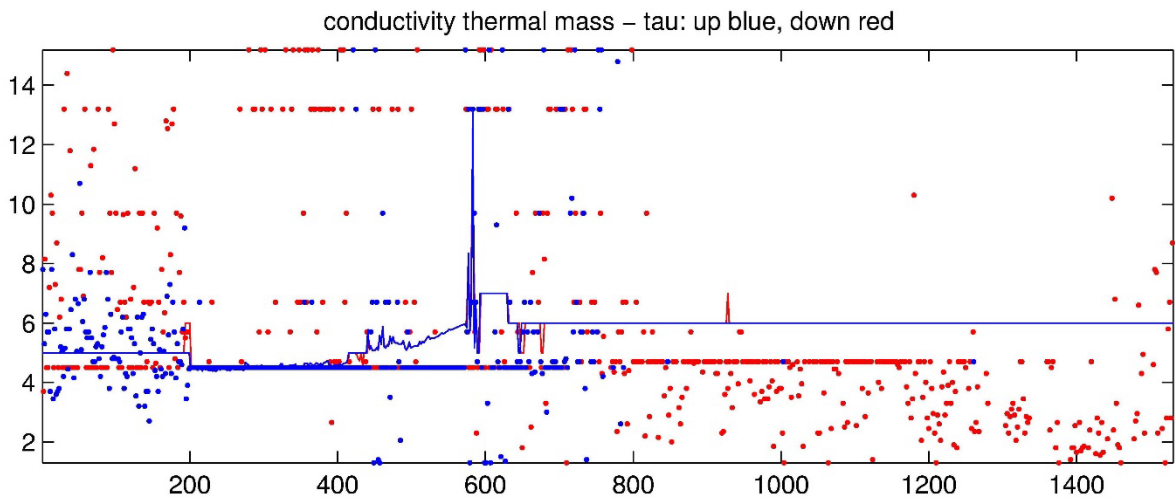
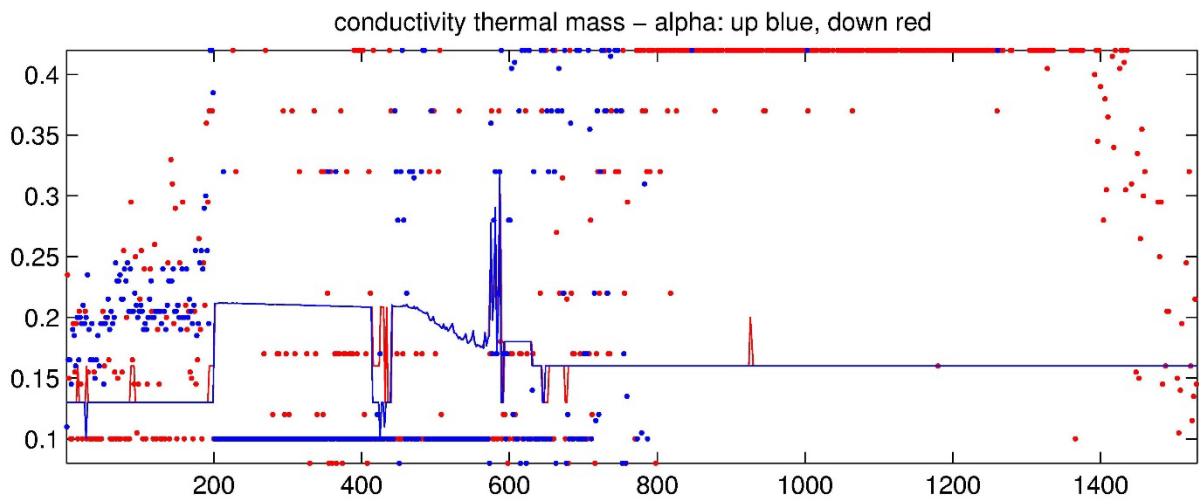
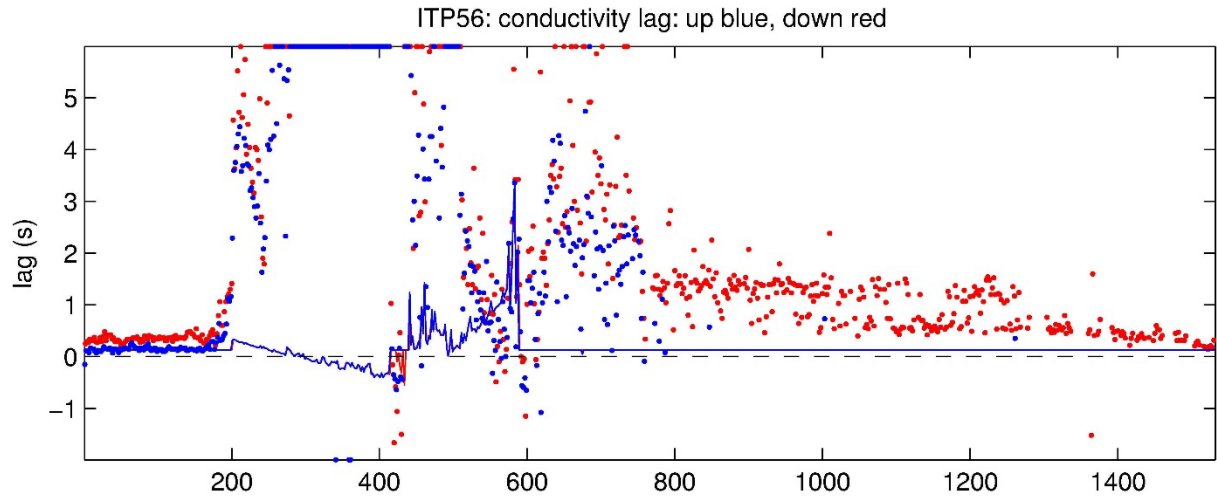
up solid, down dashed



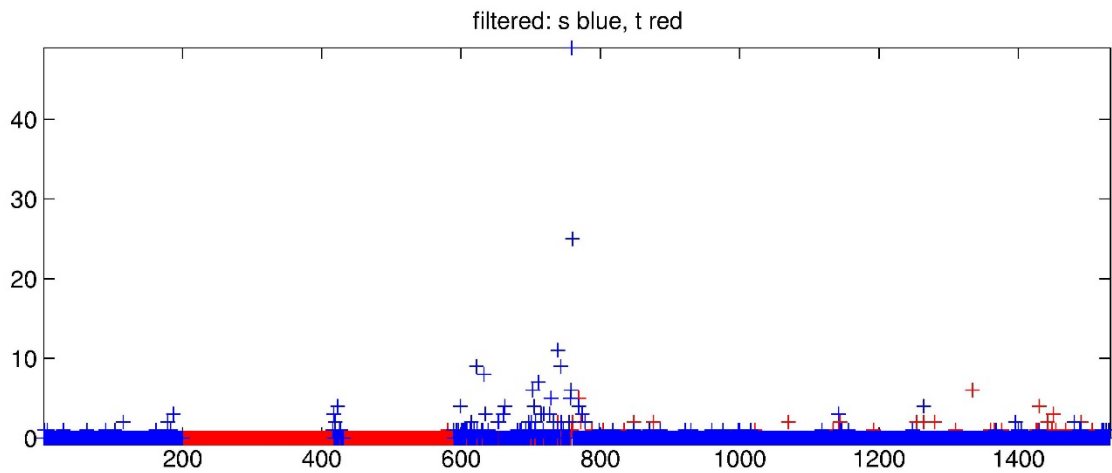
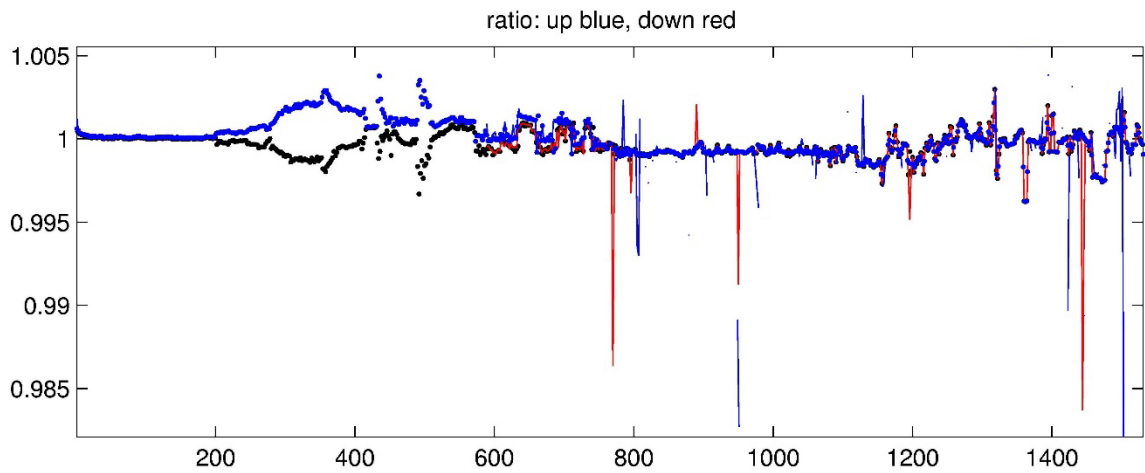
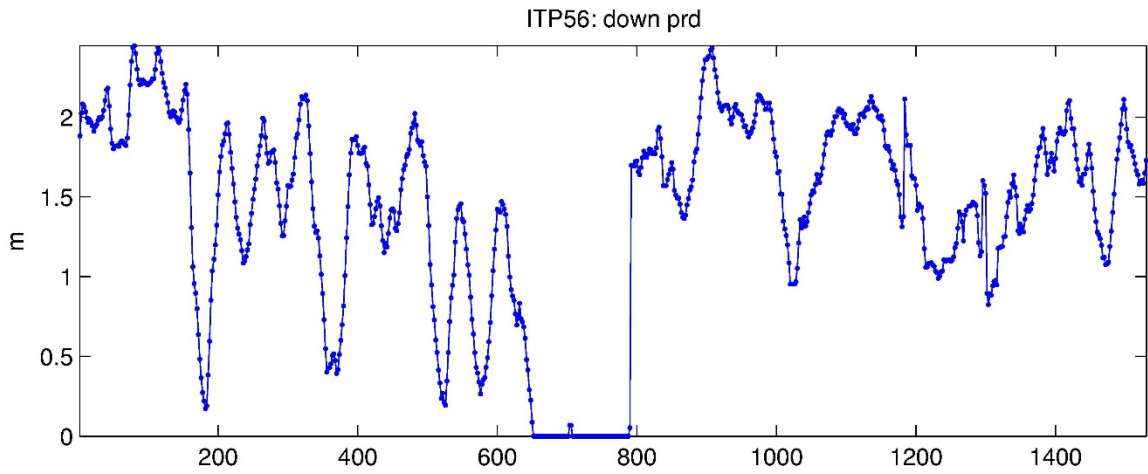
ITP profiler engineering data.



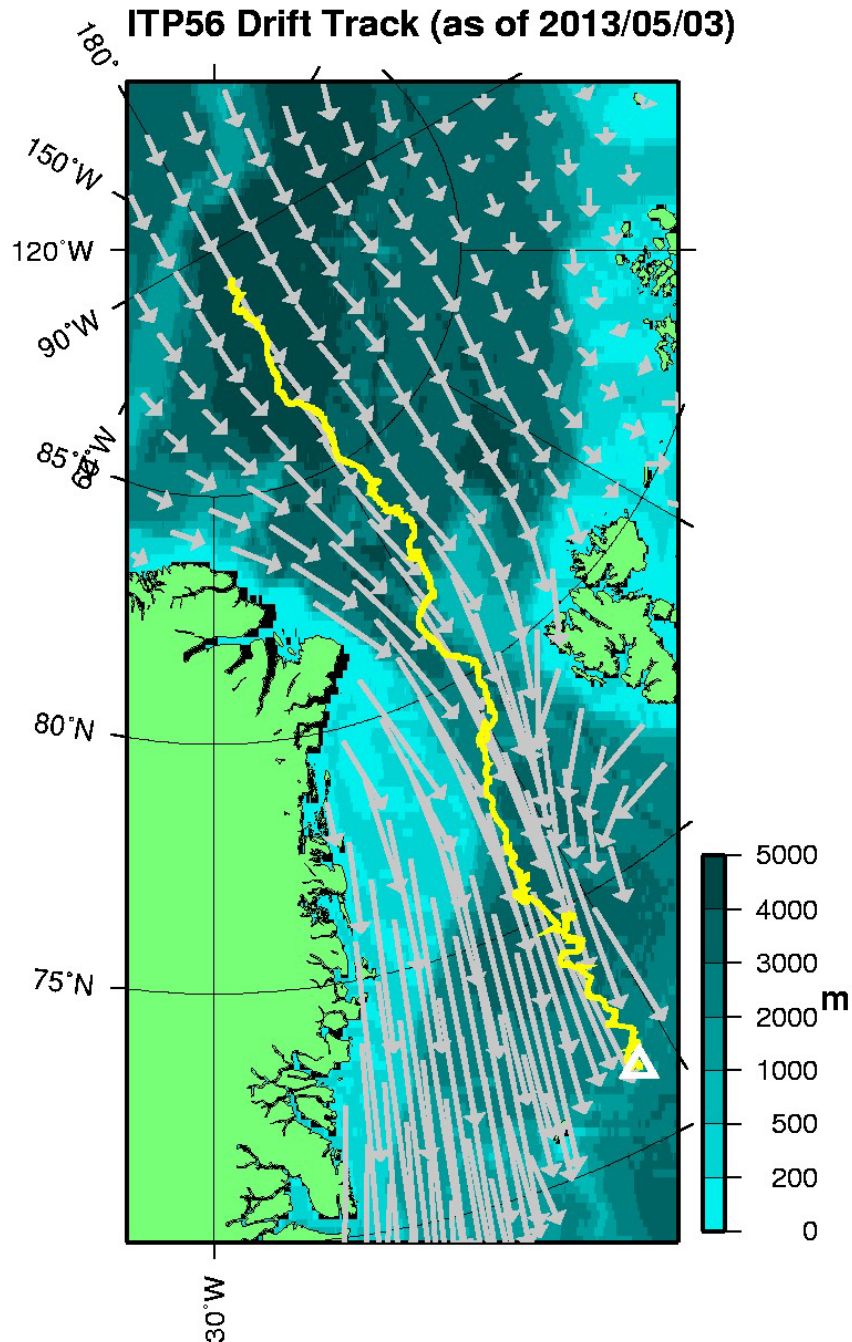
Top: number of bad points removed, Middle: variance of vertical difference of temperature and salinity in step region for up-going profiles, Bottom: temperature lag.



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.

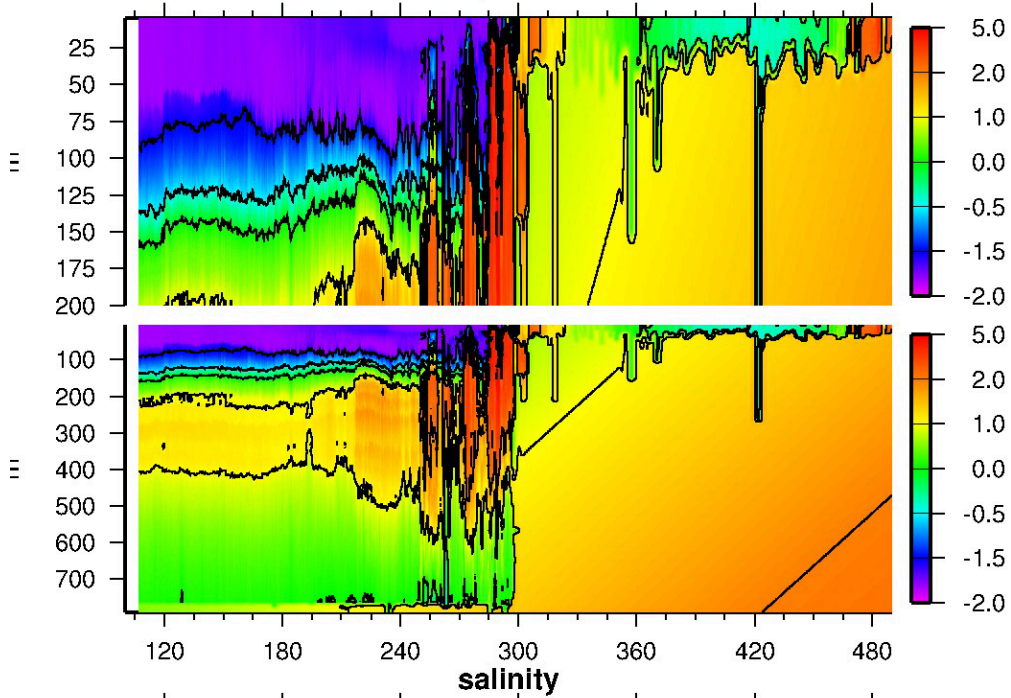


ITP drift (yellow line) and last location (triangle), and annual ice drift from IABP (grey vectors) on IBCAO bathymetry (shading).

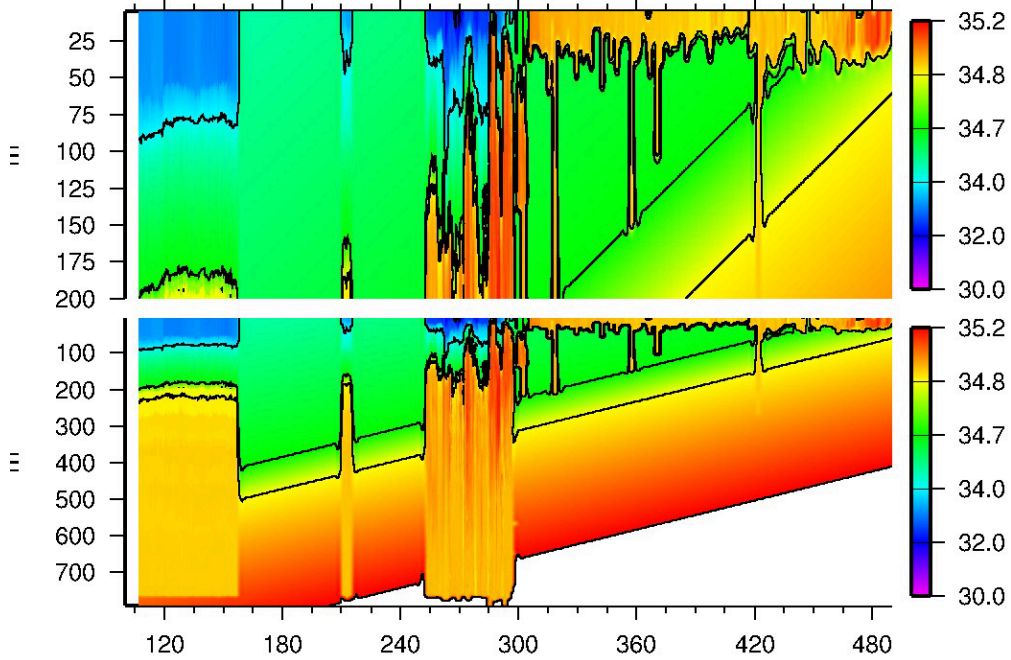
Plot of buoy locations.

ITP56 Up Profile Contours (to profile 1532)

temperature



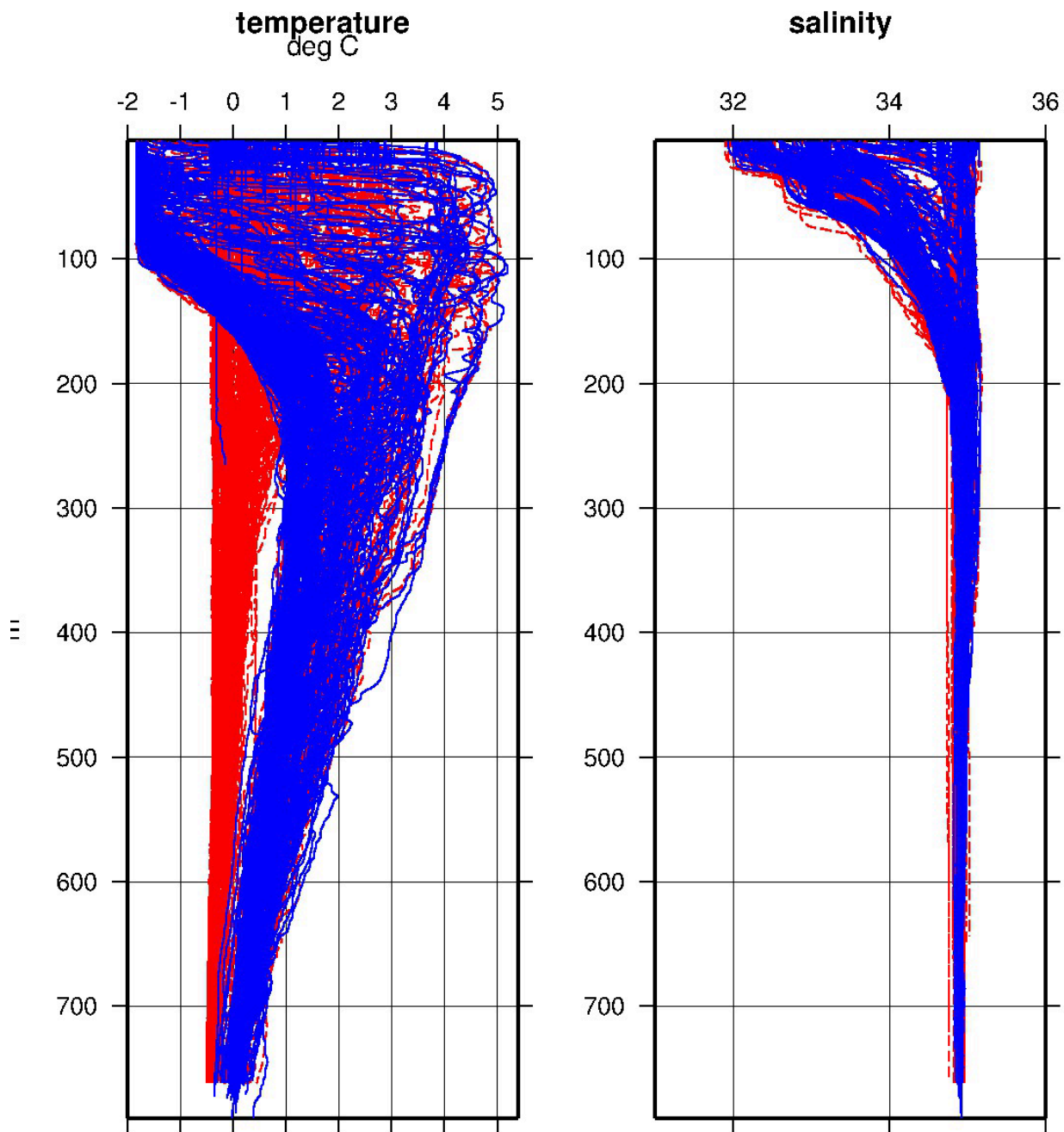
salinity



day 2012

ITP56 temperature and salinity contours.

All ITP56 Profiles (up to profile 1532)



up solid, down dashed

Composite plot of ITP temperature and salinity contours.



ITP 56 and PAWS as deployed from ice camp Barneo in 2012. (Photo by Steve Lambert)



Using the snow machine to haul the ITP foam and wire rope reel to the deployment site. (Rick Krishfield)



Ice Based Observatory shortly after deployment from ice camp Barneo in 2012 consisting of (from left to right) ITP56, PAWS, AOFB26, and IMB 2012-B. (Rick Krishfield)