

ITP 61 Overview

Deployment Location: 4/10/2013, 21:00 UTC at 89° 2.0'N, 179° 36.6'W

Last Location: 8/2/2016, 12:00 UTC at 58° 43.14' N, 38° 24.38' W

Duration: 1210 days

Distance Traveled: 17,921 km

Number of profiles: 911 in 228 days

Other instruments: IMB 2013-B, AOFB 28, PAWS

ITP61 was deployed on a 1.9 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 28), an US Army Cold Regions Research and Engineering Laboratory (CRREL) Seasonal Ice Mass Balance Buoy (IMB 2013-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.

ITP61 Deployment Operations

Due to the ice conditions, the annual Russian ice camp Barneo was situated near the 180th meridian approximately 55 km from the North Pole in April 2013. The weather was dominated by high pressure which meant clear skies, cold air temperatures (-28 °C) and light winds which were good for flight operations. In collaboration with the NPEO an Ice Based Observatory (IBO) consisting of ITP 61, an AOFB, a seasonal IMB, and PAWS were to be deployed further upstream of the ice camp using the MI-8 helicopter as in some previous years.

After breakfast on the morning of April 10, all of the buoys and deployment apparatus were loaded on to the MI-8 helicopter along with the 6-member deployment team. After flying south generally along 180° for 1.5 hours, the helicopter selected a deployment site on a 2 m thick ice floe approximately 125 km from Barneo. Due to the extreme cold temperatures, a portable tent was quickly set up on the ice to provide a warm shelter for electronics and essential deployment gear.

The deployment team split into 2 groups so that the AOFB and IMB could be deployed simultaneously, and the ITP and PAWS also deployed simultaneously afterwards. Despite the cold, the deployments proceeded as expected, and the AOFB and IMB were deployed within 2 hours after arrival, followed by a short personnel warming break. Then the ITP and PAWS were deployed over the next several hours, and the deployment apparatus reloaded onto the MI-8. The entire operation took only 5 hours from the time the helicopter landed on the floe until it took off again and arrived back at Barneo only a little over an hour later.

ITP61 Data Processing

The 911 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. Buoy drift speeds were predominantly less than 30 cm/s while traversing the Arctic Basin, so the profiler covered the full extent of 95% of the profiles that it performed.

Some thermohaline staircases were present early during the time series (up to about profile 200), enabling CTD lag correction estimates. During this period, lags were in typical ranges which were carried through the rest of the time series. Fouling was minimal, so that the profile-to-profile potential conductivity corrections varied only modestly.

ITP61 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 with the Transpolar Drift over the Lomonsov Ridge for the first 50 days, then proceeded southward between 10°W and 5°E meridians carried by the East Greenland Current through the Fram Strait. On November 22, 2013 the mooring dragged on the shelf and the profiler ceased profiling. Two days later communications with the underwater unit ended, likely due to parting of the tether. The surface package continued to transmit location for another 2.5 years, drifting through the Denmark Strait and meandering cyclonically southwest off of the southeast coast of Greenland until its last broadcasts in August 2016.

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

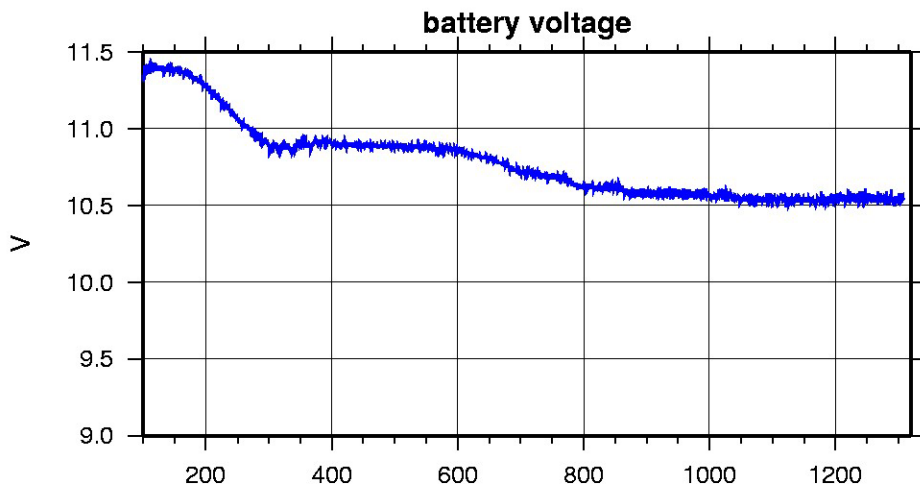
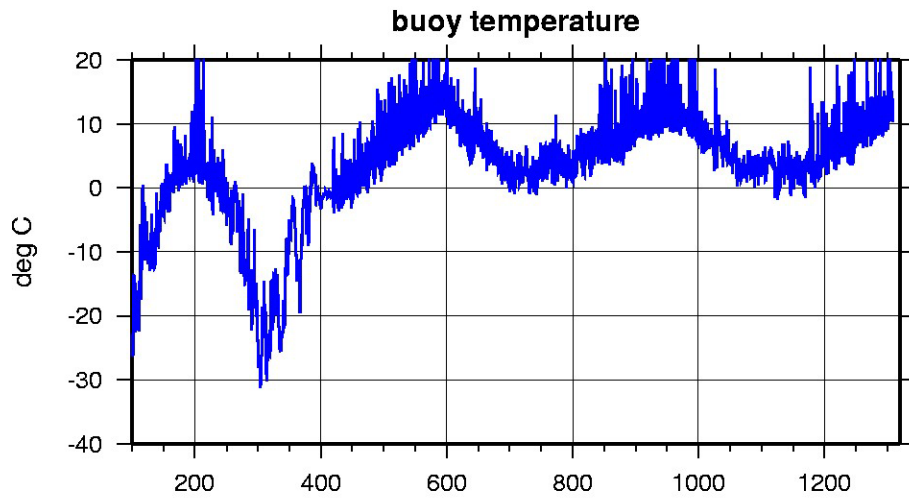
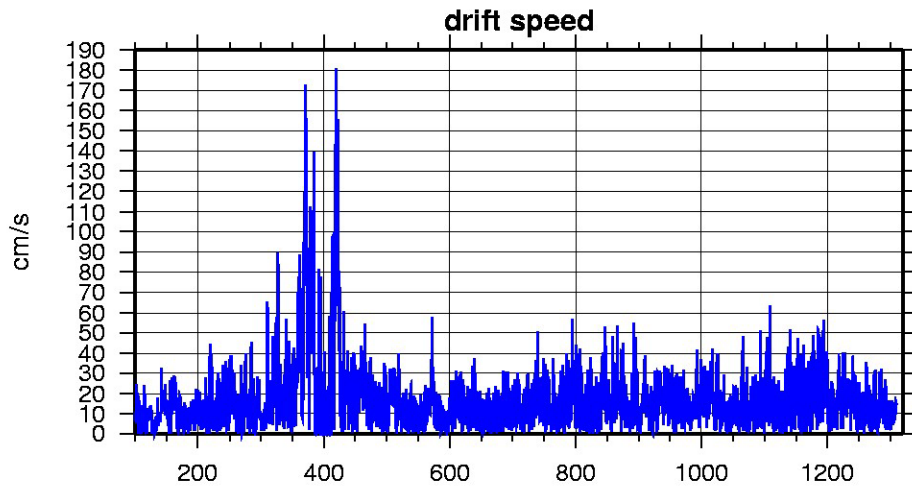
Level II hourly buoy location data in ASCII format: `itp61rawlocs.dat`

Level III 1-Hz processed profile data in MATLAB format: `itp61cormat.tar.Z` or `itp61cormat.zip`

Level III 1-db bin-averaged processed profile data in MATLAB format: `itp61final.mat`

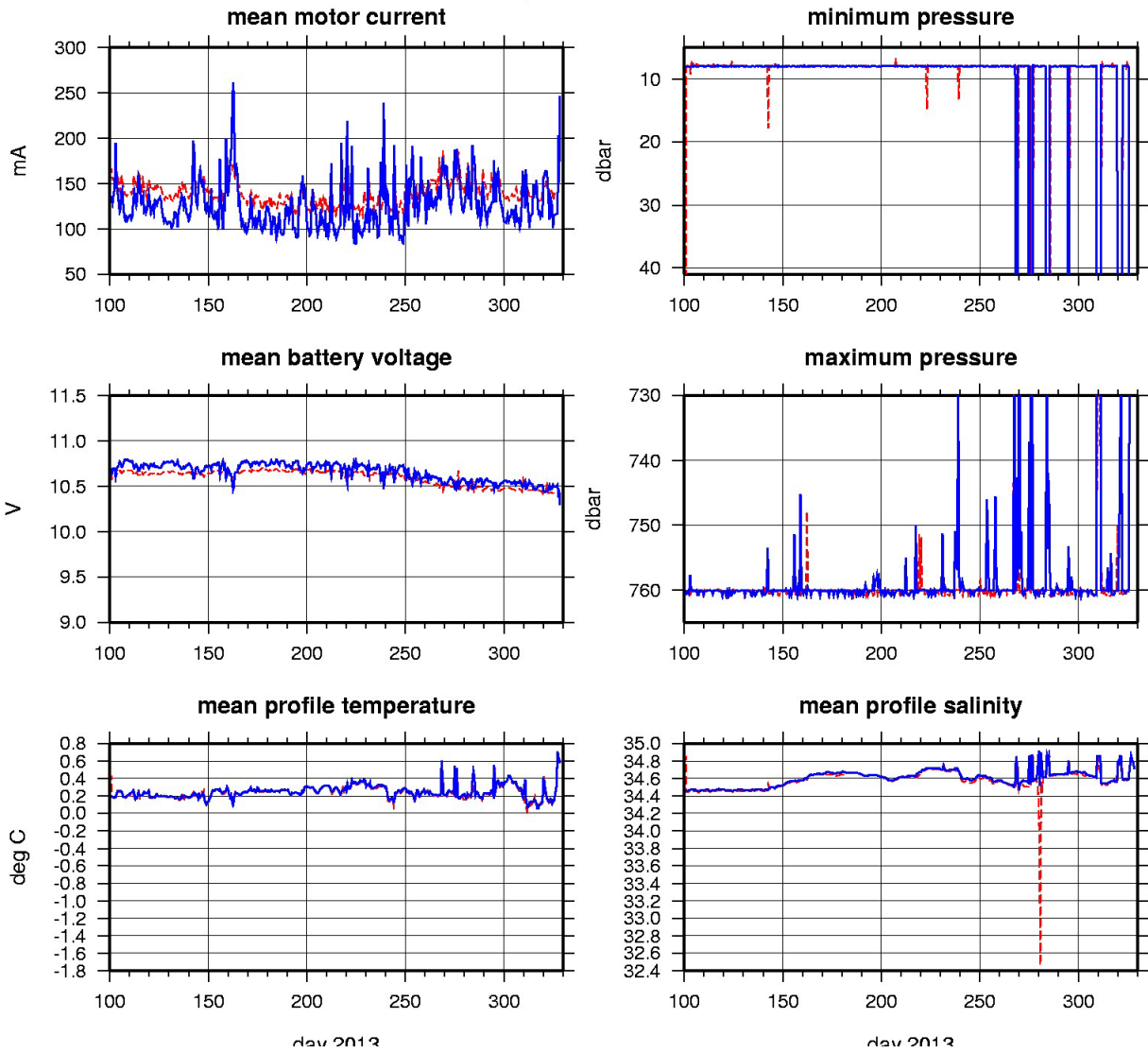
Level III 1-db bin-averaged processed profile data in ASCII format: `itp61final.tar.Z` or `itp61final.zip`

ITP61 Buoy Status (as of 2016/08/02)

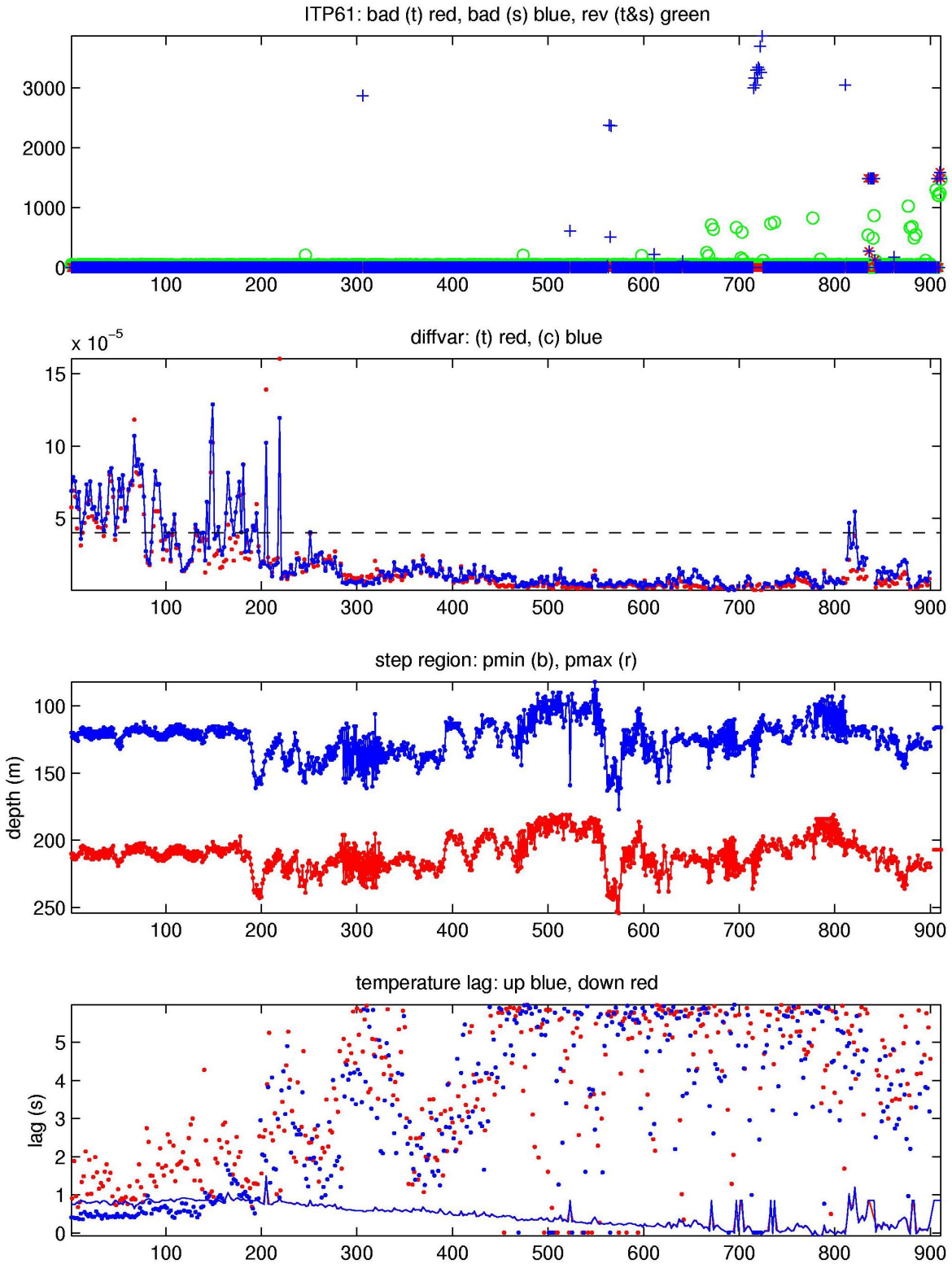


ITP61 Profiler Status (up to profile 911)

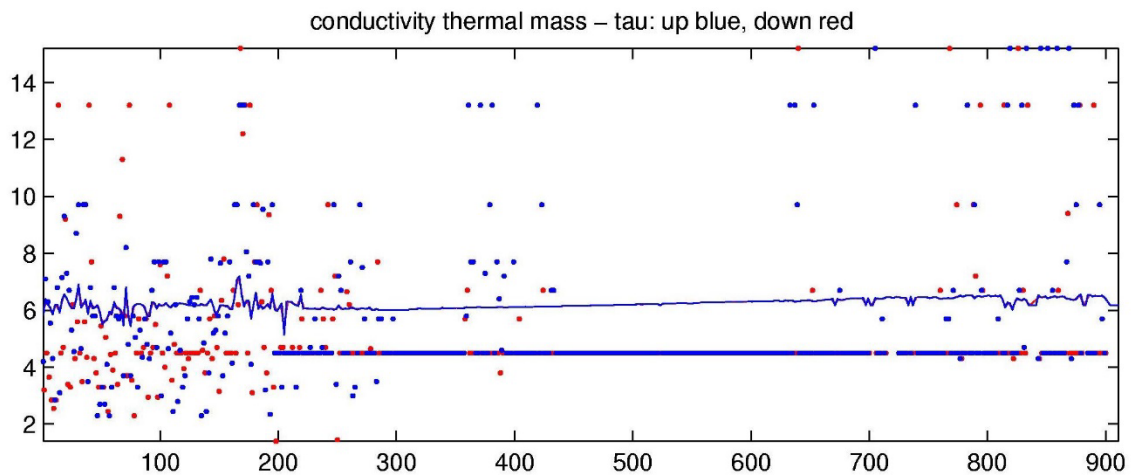
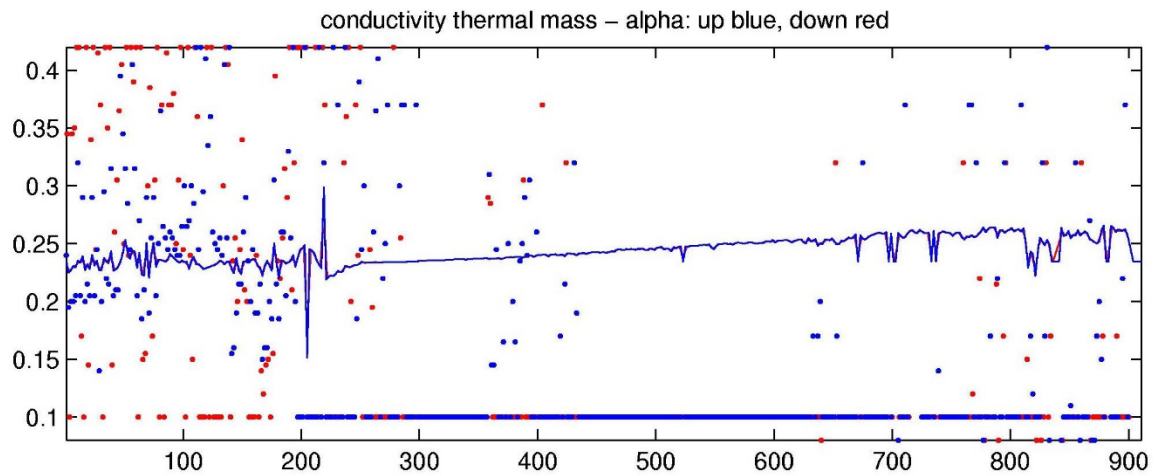
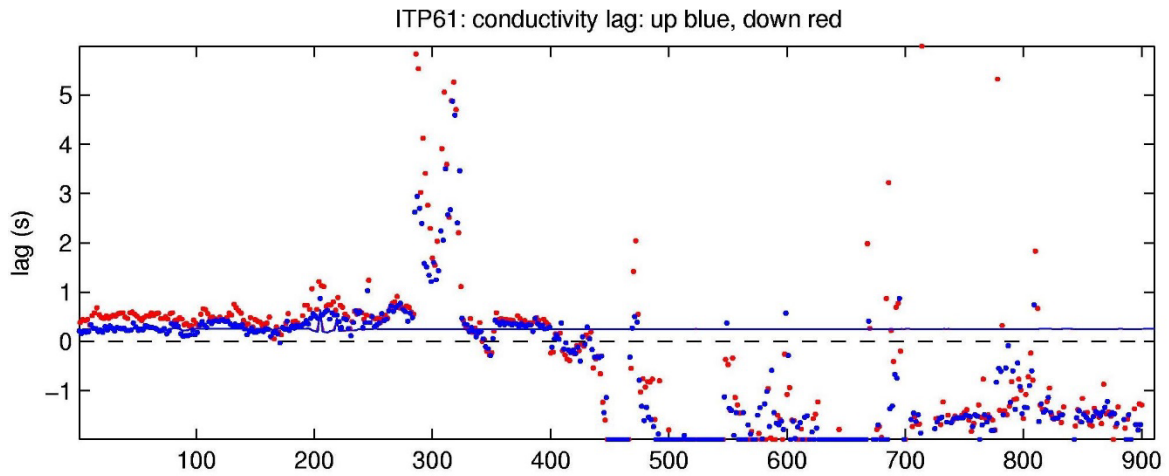
up solid, down dashed



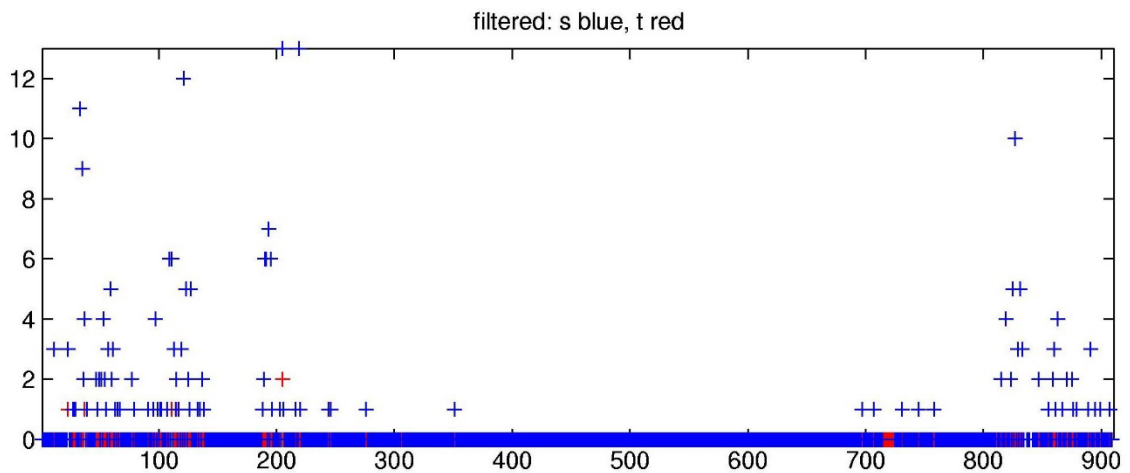
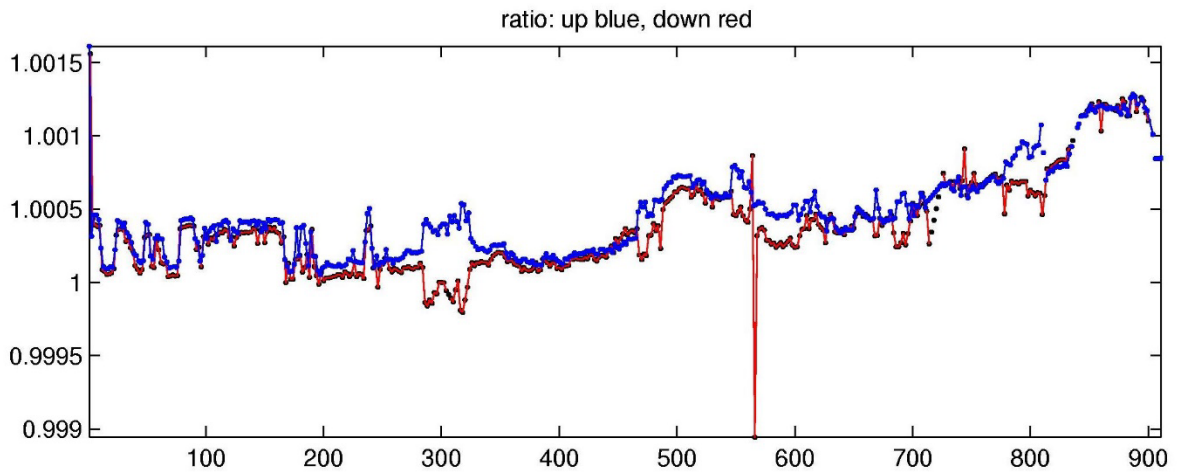
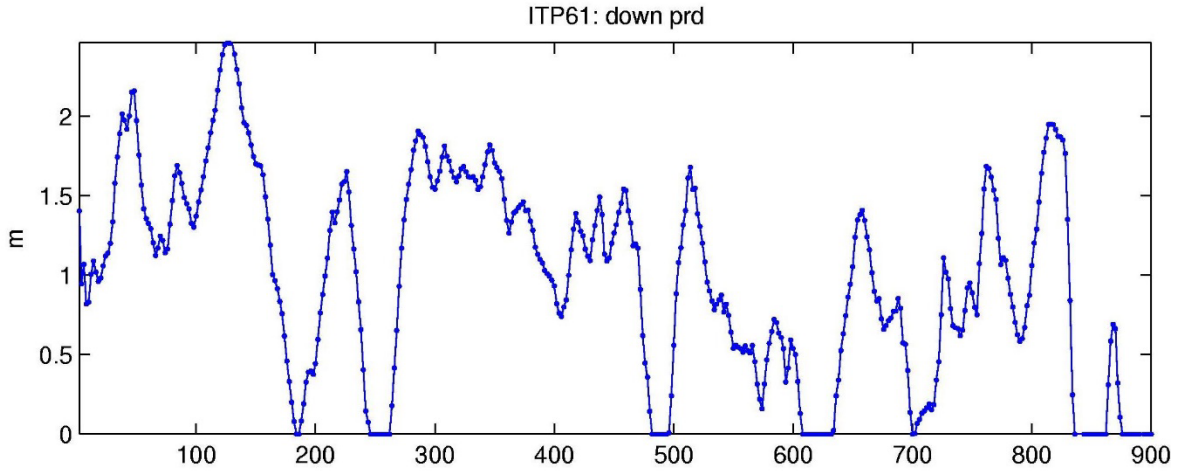
ITP profiler engineering data.



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.

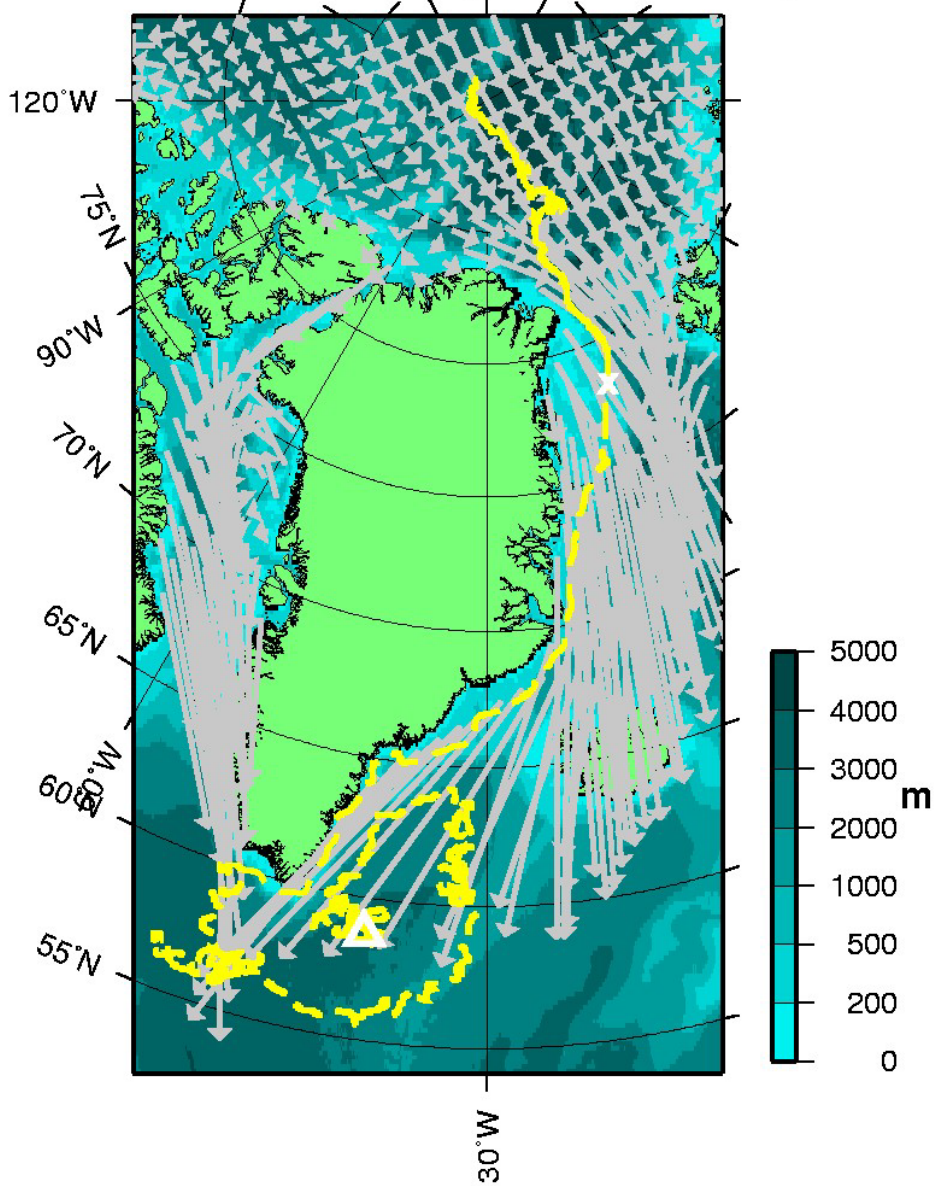


Top: conductivity lag, Middle: conductivity thermal mass amplitude correction, Bottom: conductivity thermal mass lag correction



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

ITP61 Drift Track (as of 2016/08/02)

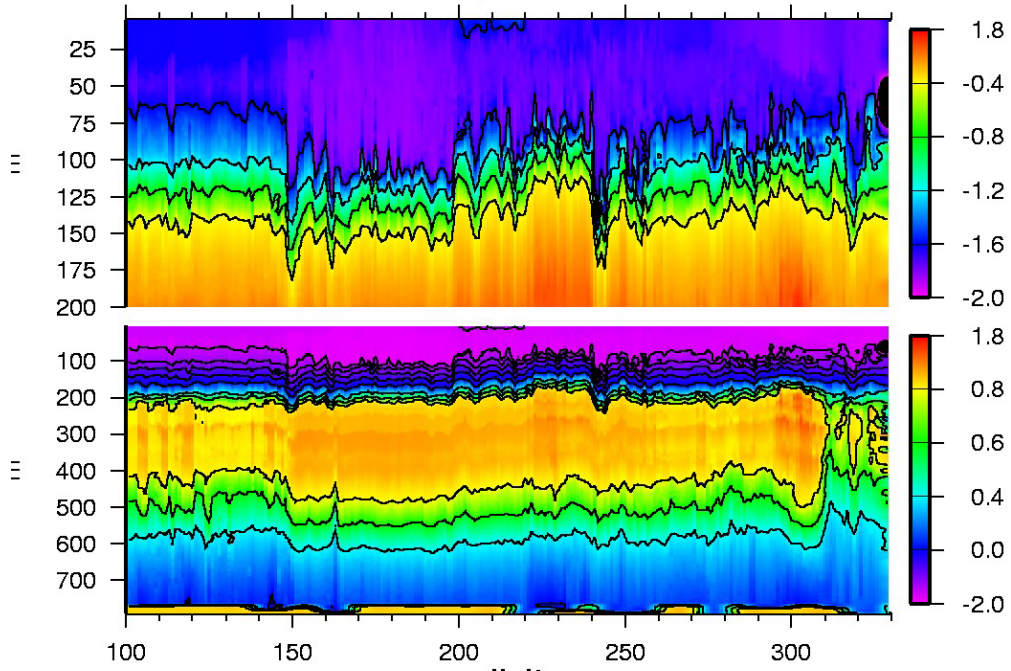


ITP drift (yellow line), last profile (x), last location (triangle), and annual ice drift from IABP (grey vectors) on IBCAO bathymetry (shading).

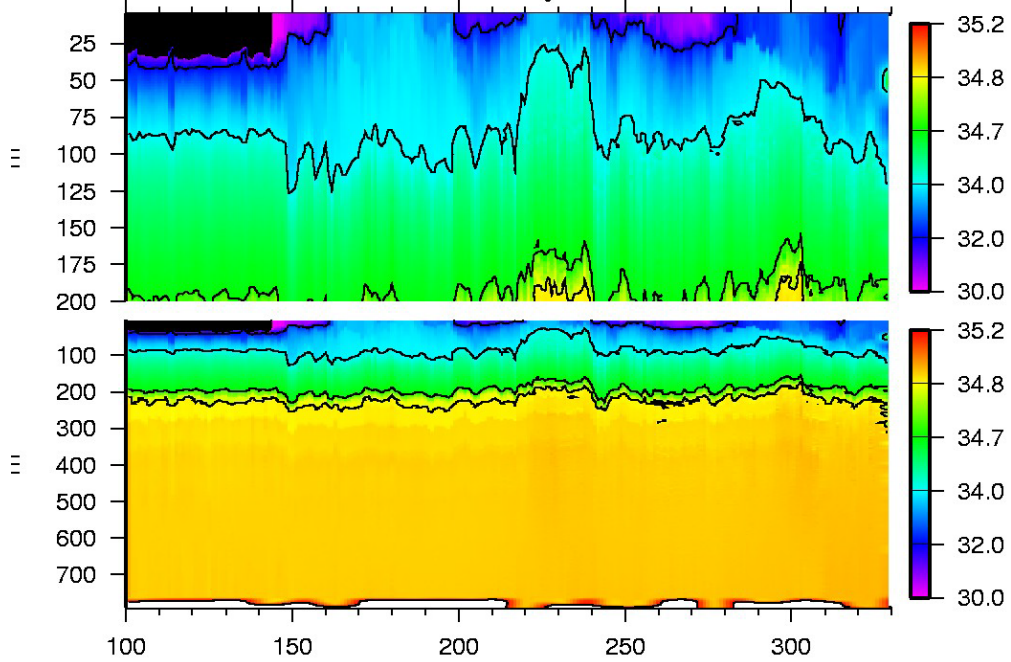
Plot of buoy locations.

ITP61 Up Profile Contours (to profile 911)

temperature



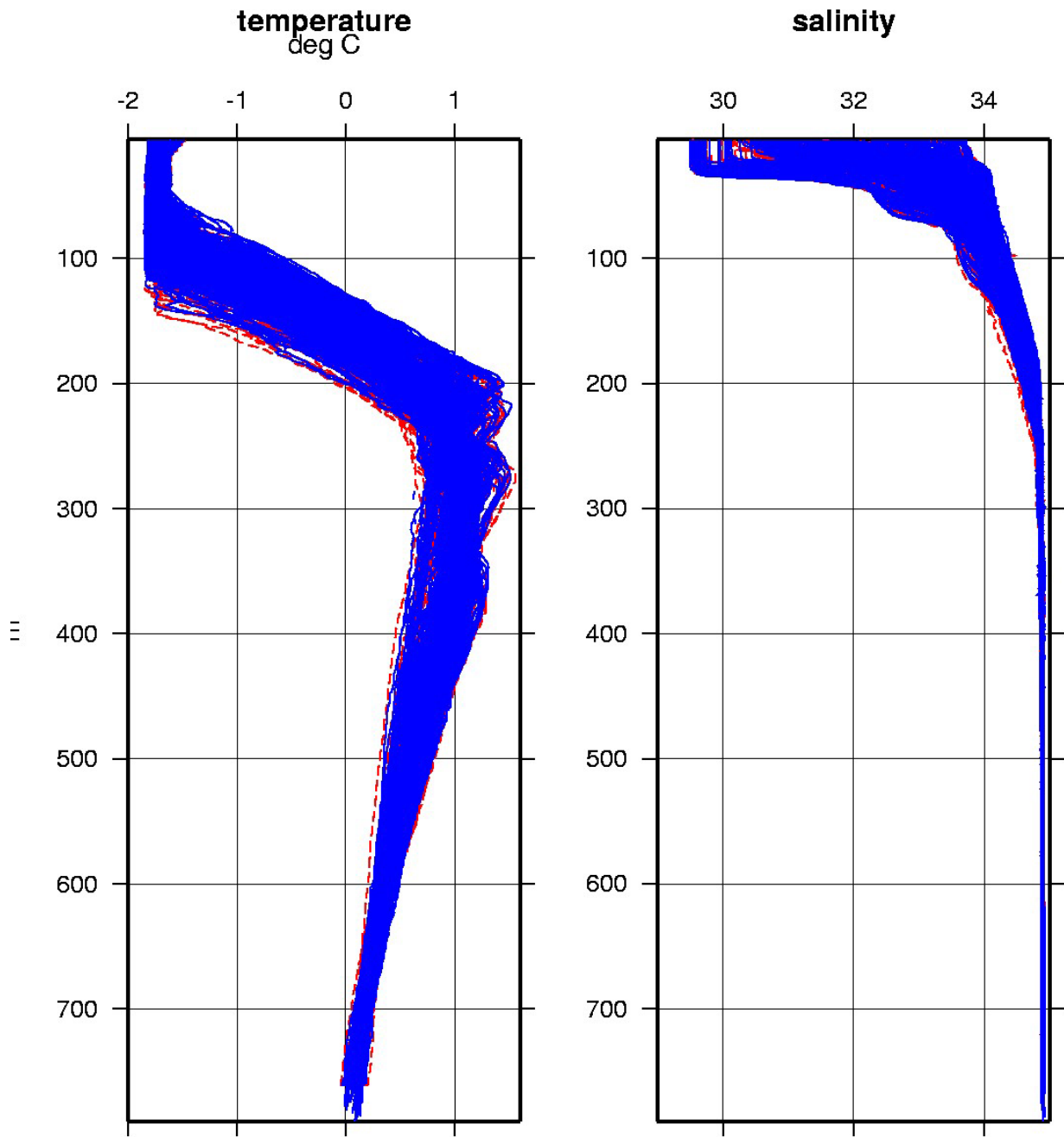
salinity



day 2013

ITP61 temperature and salinity contours.

All ITP61 Profiles (up to profile 911)



up solid, down dashed

Composite plot of ITP temperature and salinity contours.



ITP 61 as deployed in April 2013 approximately 110 km upstream in the Transpolar Drift from the North Pole. (Rick Krishfield)



Reloading the MI-8 helicopter after the operations are completed. (Rick Krishfield)



The installed IBO consisting of (from left to right): PAWS, seasonal IMB, AOFB, and ITP 61.
(Rick Krishfield)