

ITP 58 Overview

Deployment Location: 8/21/2012, 12:00 UTC at 82° 54.9' N, 109° 49.7' E

Last Location: 6/19/2015, 23:00 UTC at 60° 33.5' N, 39° 37.11' W

Duration: 1032 days

Distance Traveled: 12,676 km

Number of profiles: 950 in 475 days

Other instruments: IMB 2012-J

ITP58 was deployed on a 3 m thick icefloe in the Transpolar Drift during the ARK-XXVII/3 cruise (TransArc) on the *R/V Polarstern* as a contribution to the Hybrid Arctic/Antarctic Float Observation System (HAFOS). The ITP included a dissolved oxygen sensor and operated on a standard sampling schedule of 2 one-way profiles between 7 and 760 m depth each day.

ITP 58 Deployment Operations

ITP 58 was the first of 3 ITPs that were successfully deployed from the *R/V Polarstern* during the 2012 TransArc cruise. The day was foggy and the floe was generally thin, but the ice thickness in the corner where the ITP was deployed exceeded 3 m. In general, the icefloe was characterized by many melt ponds, and with several wide and narrow cracks. Ridges were located on one side of the floe near the ITP.

ITP58 Data Processing

The 950 profiles that were transmitted from the ITP 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.

Large series of fouled salinity profiles were removed between profiles 51-63, 89-148, and 890-904. Dissolved oxygen profiles between 49-440 were all removed due to presumed fouling, as the sensor recovered afterwards. Thermohaline staircases were not well defined, so that initial estimates for CTD lag corrections were poorly determined. These initial values were manually modified to reduce density spikes and inversions presumably related to reduced flow through the sensors. Thermal lag estimates were relatively large and variable, particularly after profile 400. On the other hand, the conductivity lag and thermal mass estimates were large and variable during the first 400 profiles but stabilized at more typical values for later profiles. Dissolved oxygen ratio adjustments were also somewhat variable throughout. The potential conductivity adjustment increased nearly 20% after profile 882, all salinities and dissolved oxygen are questionable after profile 899, and all data from profiles after 928 were removed.

ITP58 Data Description

The ITP profiler was configured to operate on 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.

For the first 7 months after deployment in August 2012, the buoy drifted predominantly north toward the Lomonosov Ridge, then east and south across the Eurasian Basins. Late in November 2013, the anchor at the bottom of the tether dragged over the Yermak Plateau northwest of Spitsbergen and all subsequent profile data were fouled and unusable. On December 9, 2013 (over 15 months after deployment) the profiler ceased communicating with the surface package presumably due to separation of the tether as a result of the anchor dragging on the shallow bathymetry. The surface package continued to broadcast locations for another 18 months as it drifted through Fram Strait and with the East Greenland current through the Denmark Strait. The last location transmitted from ITP58 in June 2015 was east of the southern tip of Greenland.

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

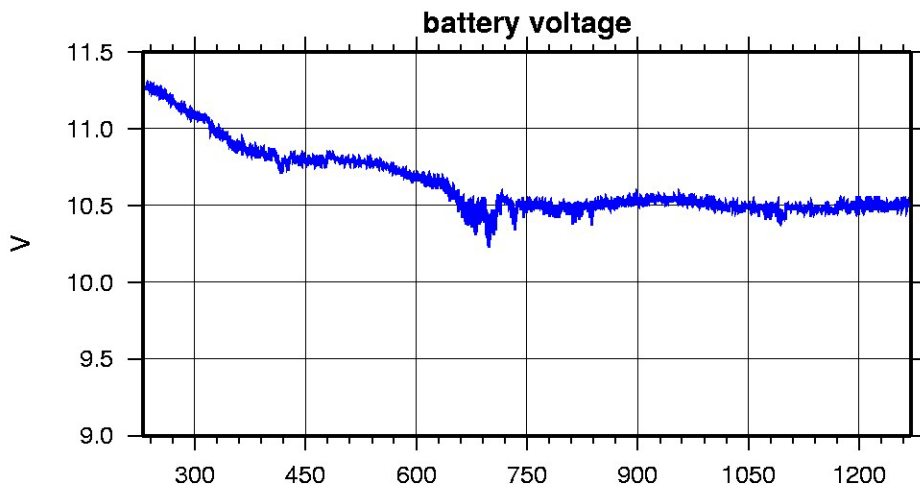
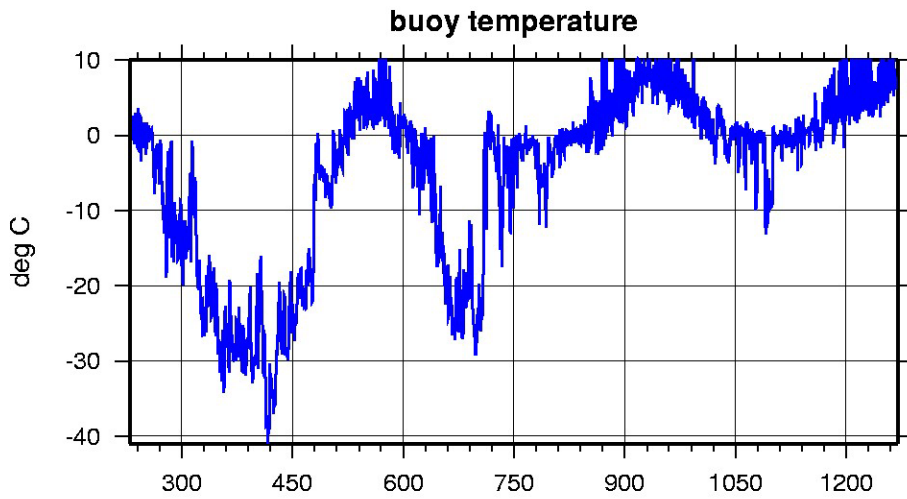
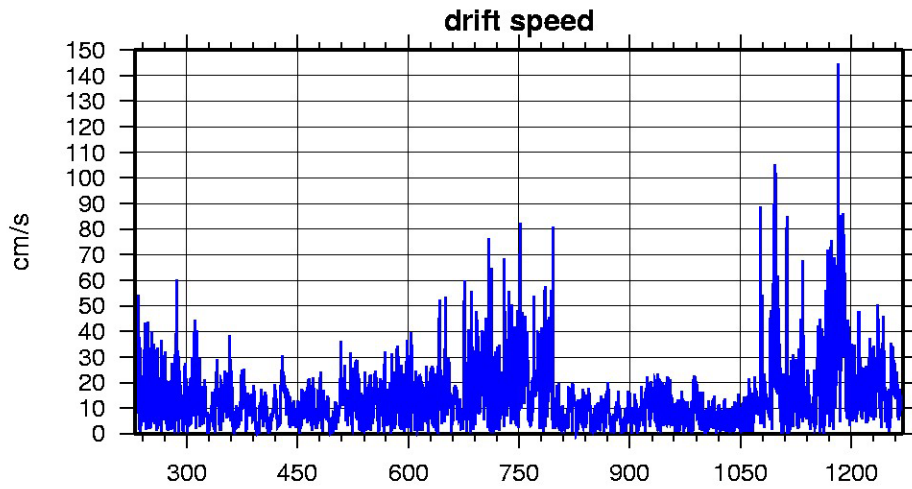
Level II hourly buoy location data in ASCII format: `itp58rawlocs.dat`

Level III 1-Hz processed profile data in MATLAB format: `itp58cormat.tar.Z` or `itp58cormat.zip`

Level III 1-db bin-averaged processed profile data in MATLAB format: `itp58final.mat`

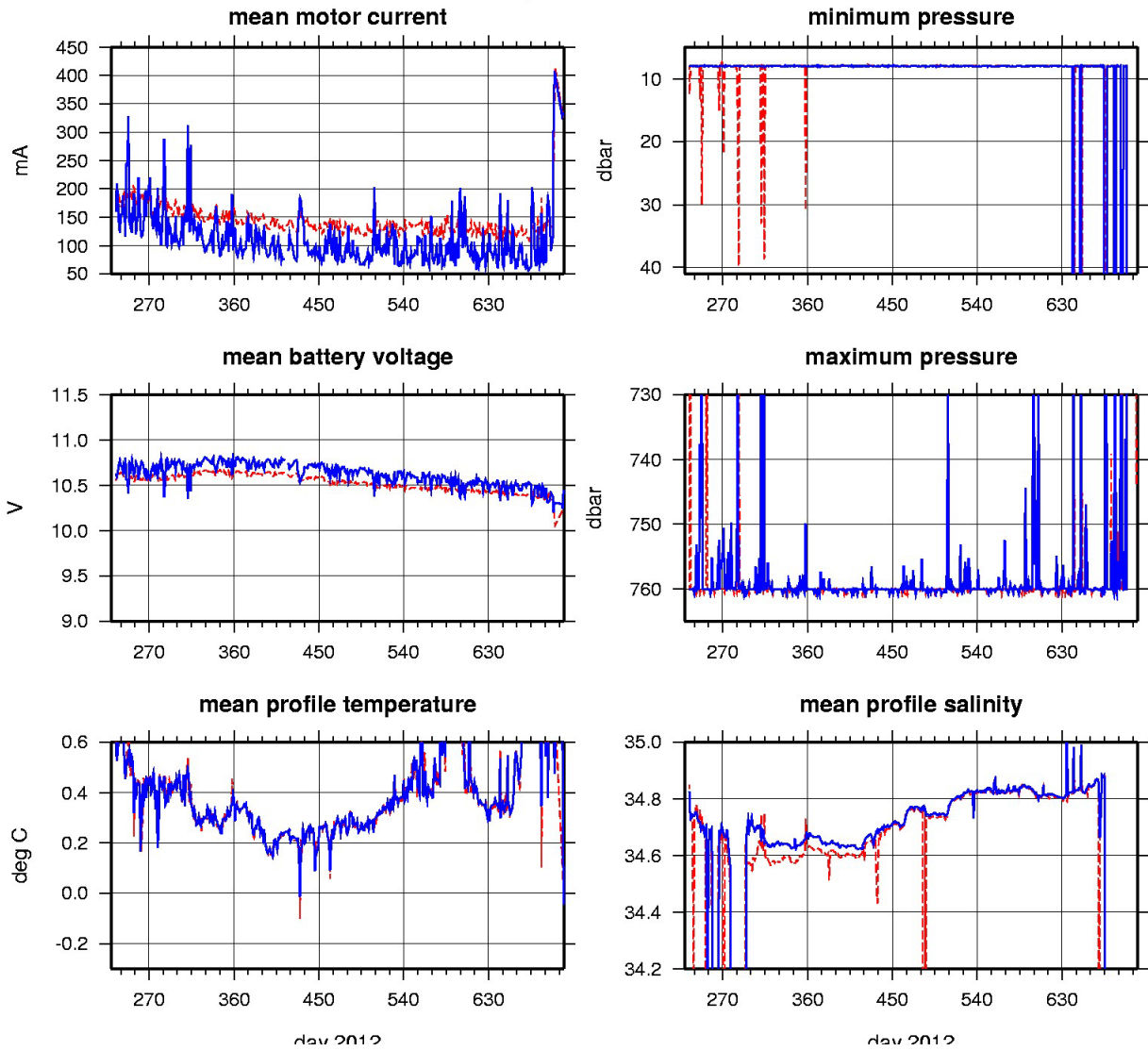
Level III 1-db bin-averaged processed profile data in ASCII format: `itp58final.tar.Z` or `itp58final.zip`

ITP58 Buoy Status (as of 2015/06/19)

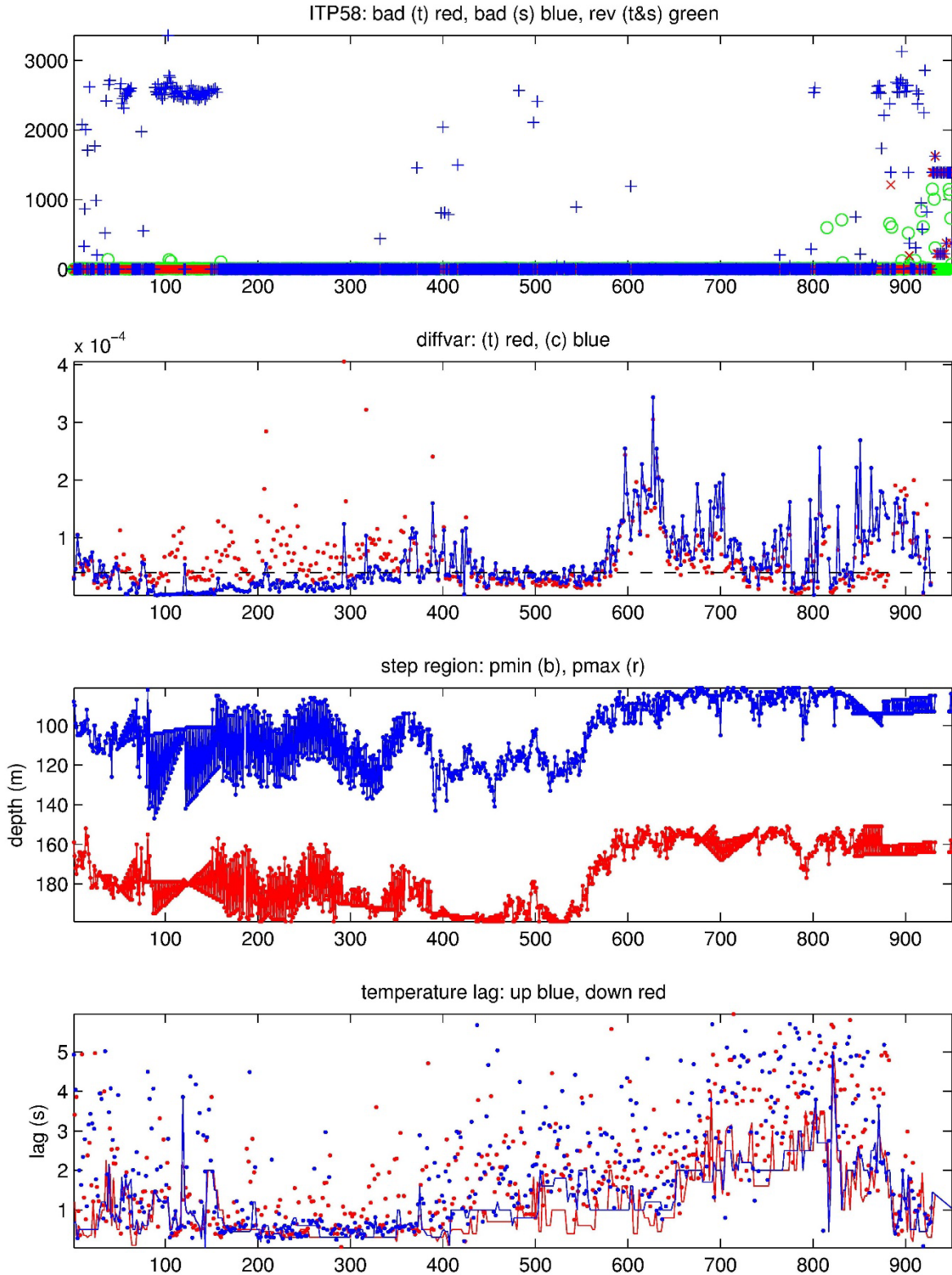


ITP58 Profiler Status (up to profile 950)

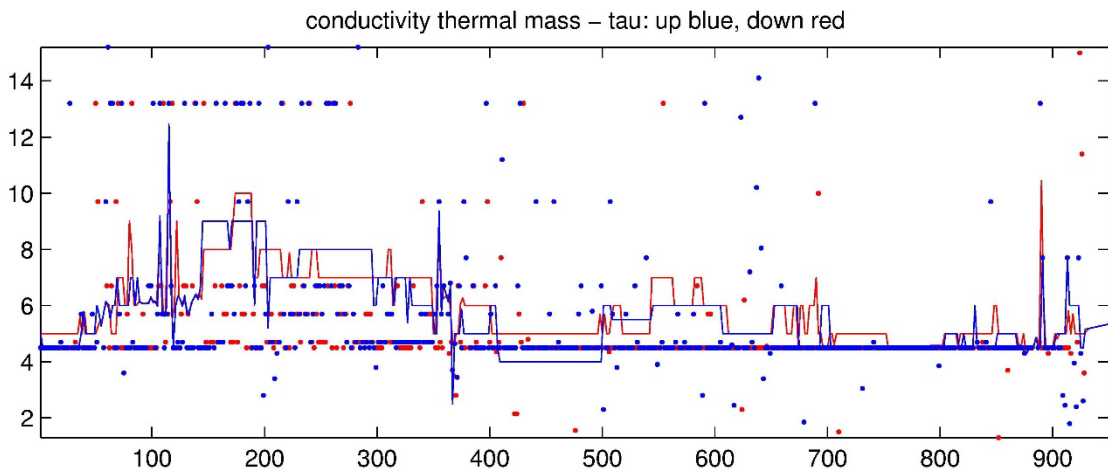
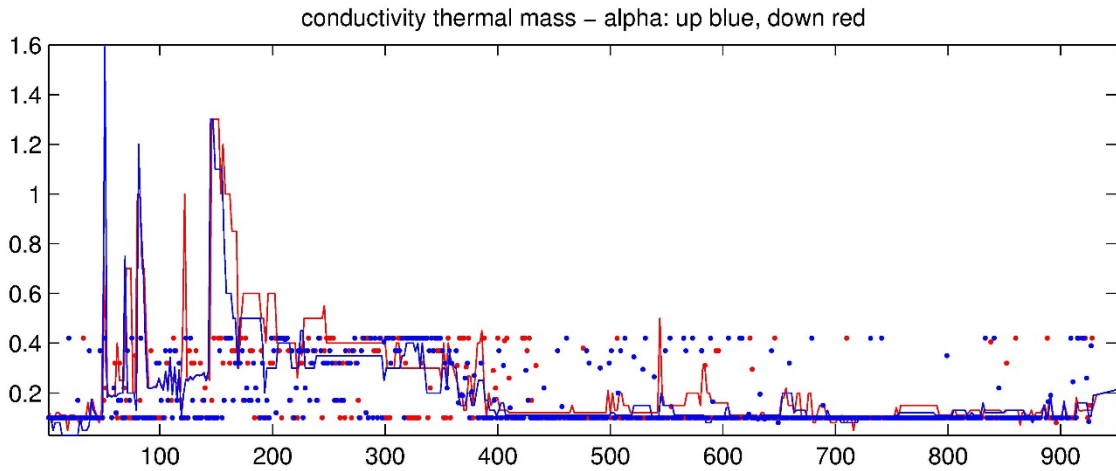
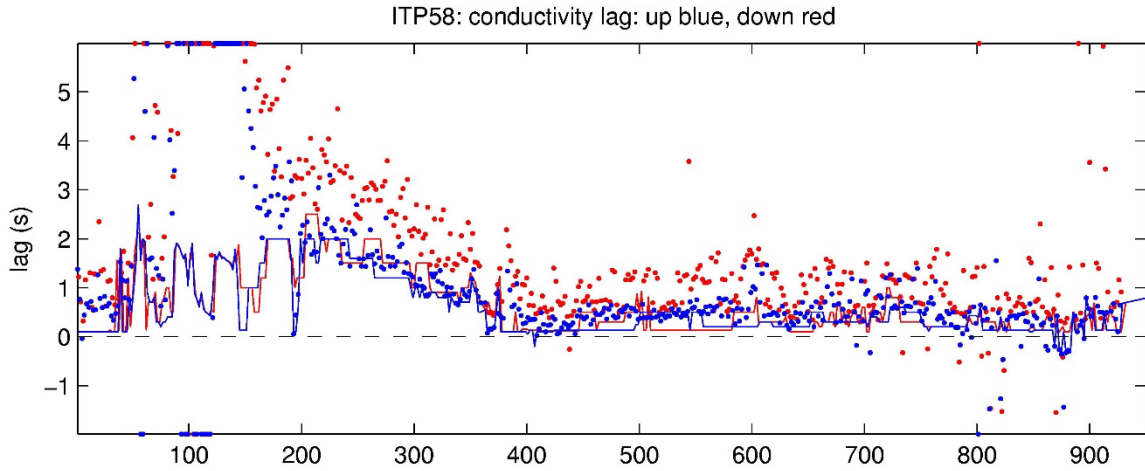
up solid, down dashed



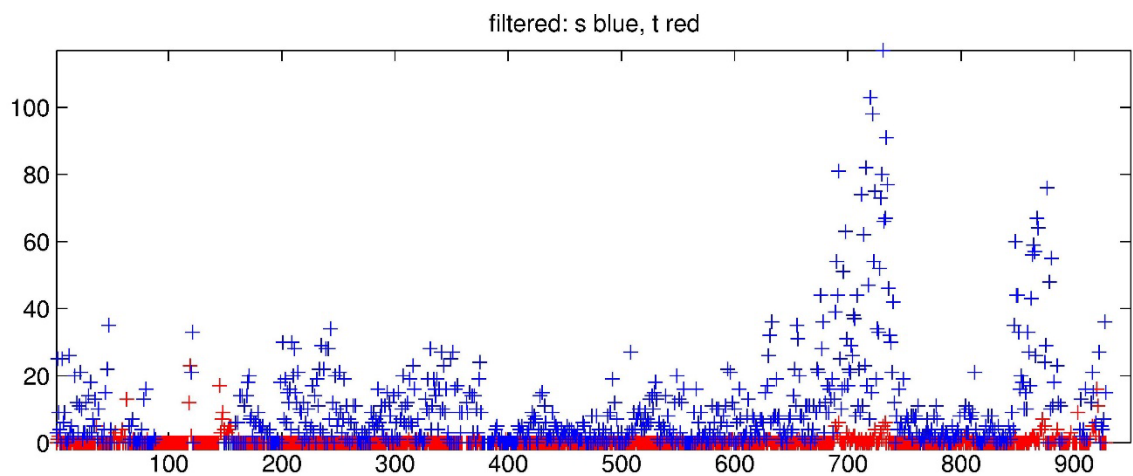
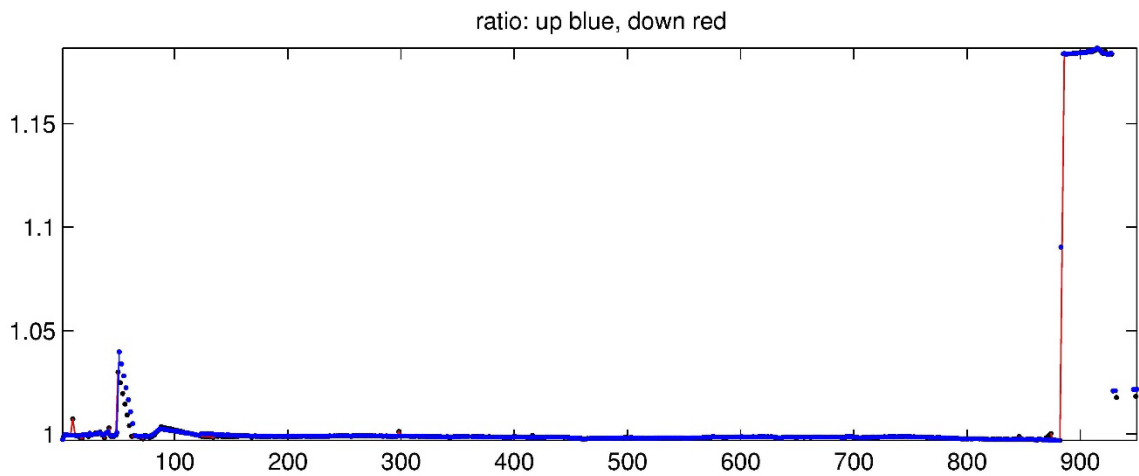
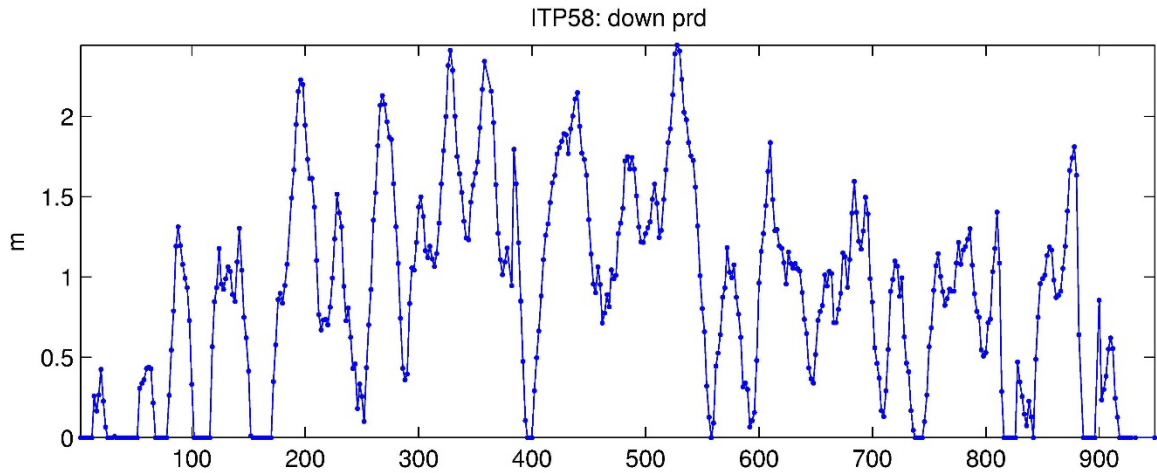
ITP profiler engineering data.



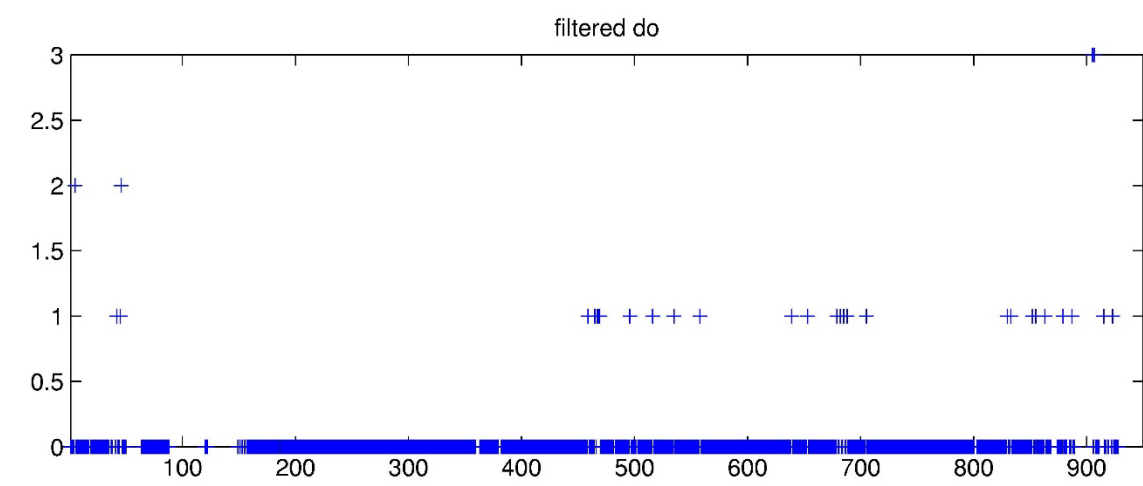
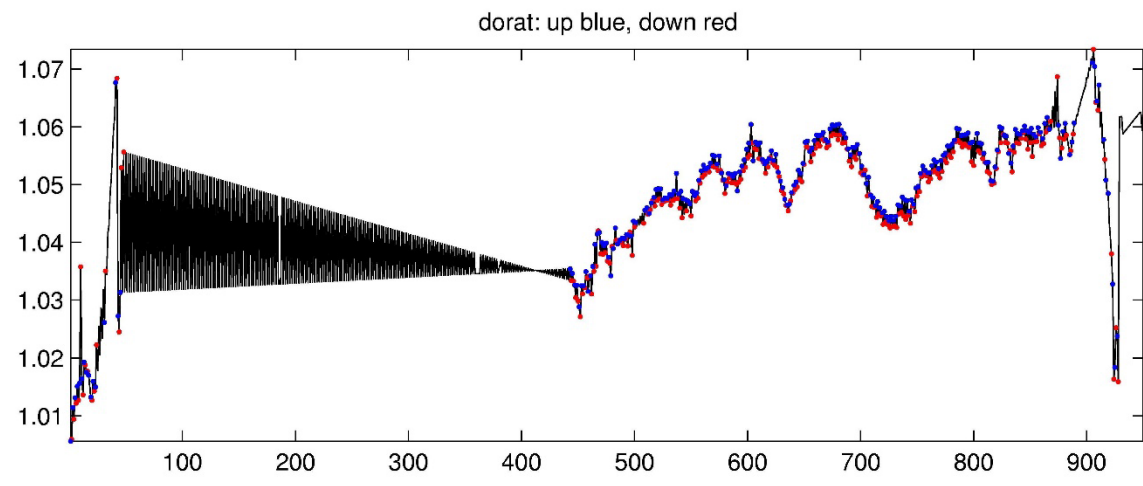
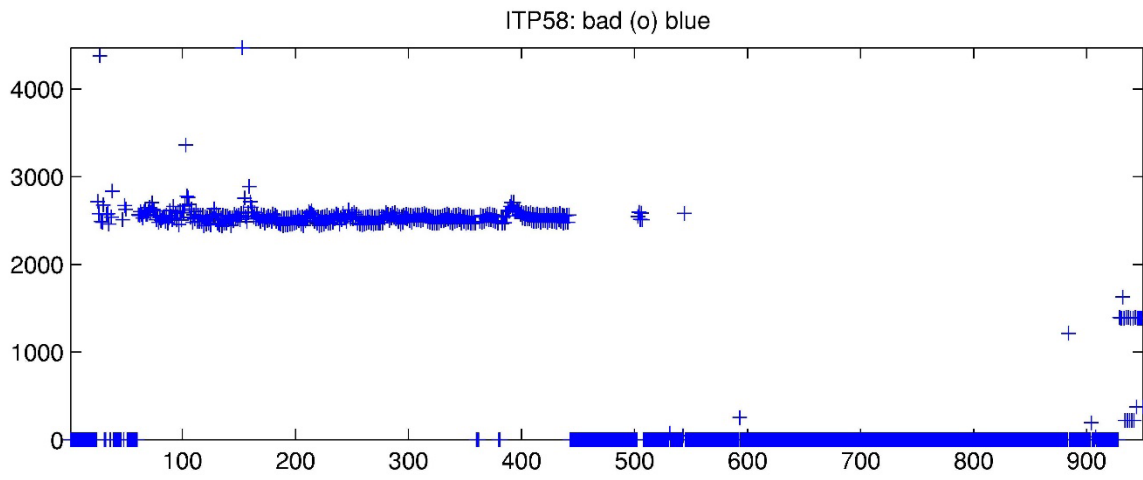
Top: number of bad points removed, Middle: variance of verticle difference of temperature and salinity in step region for up-going profiles, Bottom: temperature lag.



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

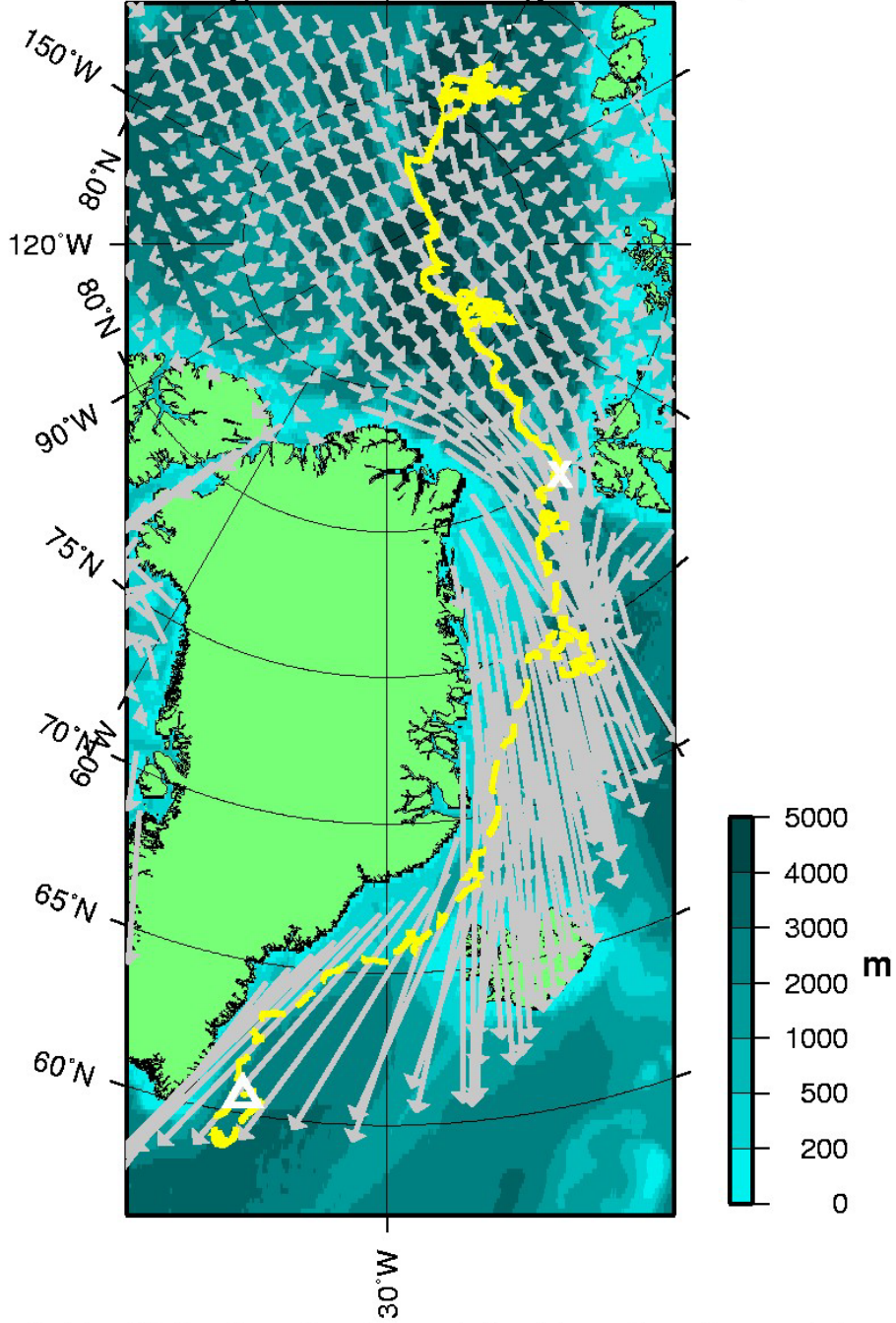


Top: down pressure deviation correction, Middle: salinity ratio adjustment, Bottom: number of filtered spikes.



Top: number of bad dissolved oxygen points removed, Middle: dissolved oxygen ratio adjustment, Bottom: number of filtered spikes.

ITP58 Drift Track (as of 2015/06/19)

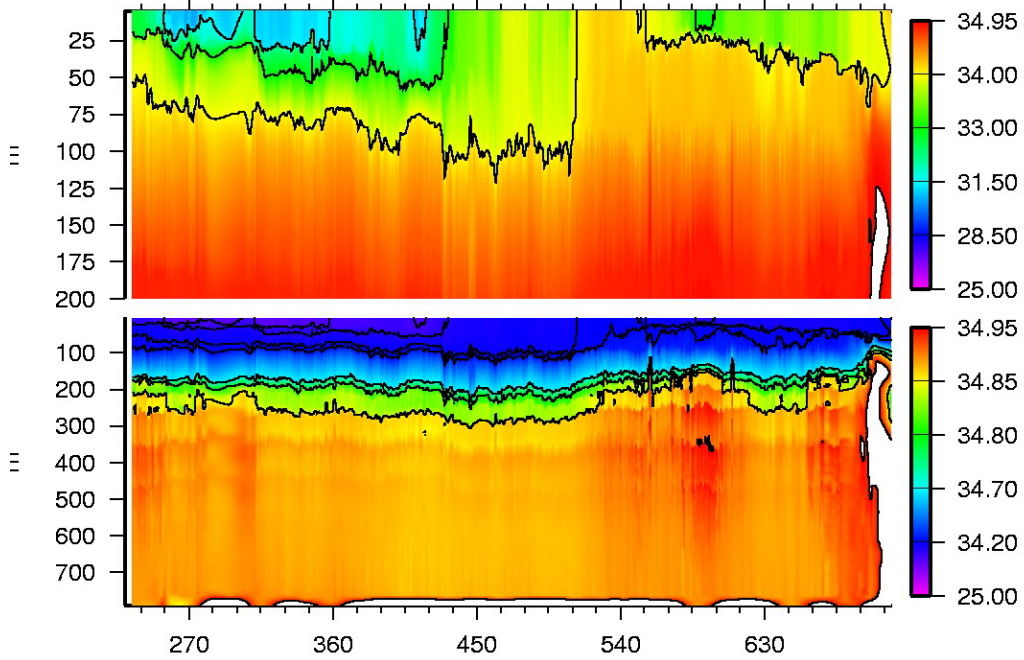
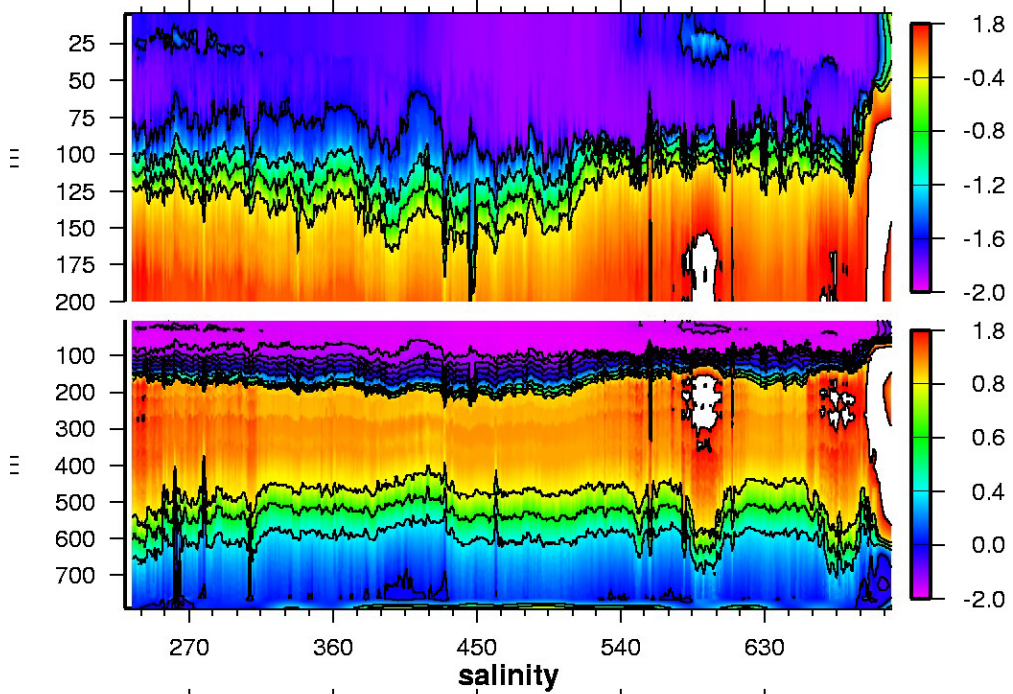


**ITP drift (yellow line) and latest location (triangle),
and annual ice drift from IABP (grey vectors) on
IBCAO bathymetry (shading).**

Plot of buoy locations.

ITP58 Up Profile Contours (to profile 950)

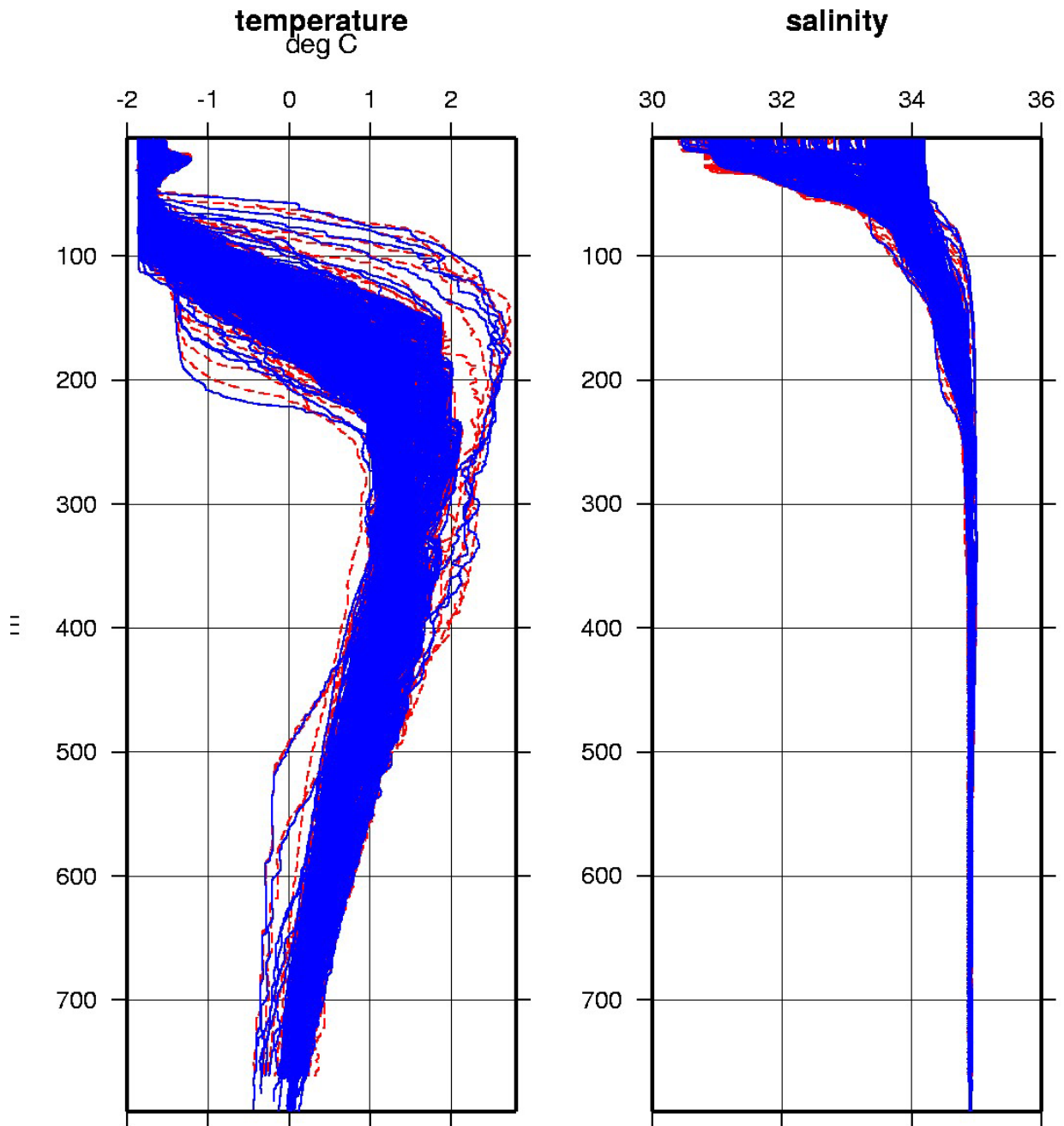
temperature



day 2012

ITP58 temperature and salinity contours.

All ITP58 Profiles (up to profile 950)

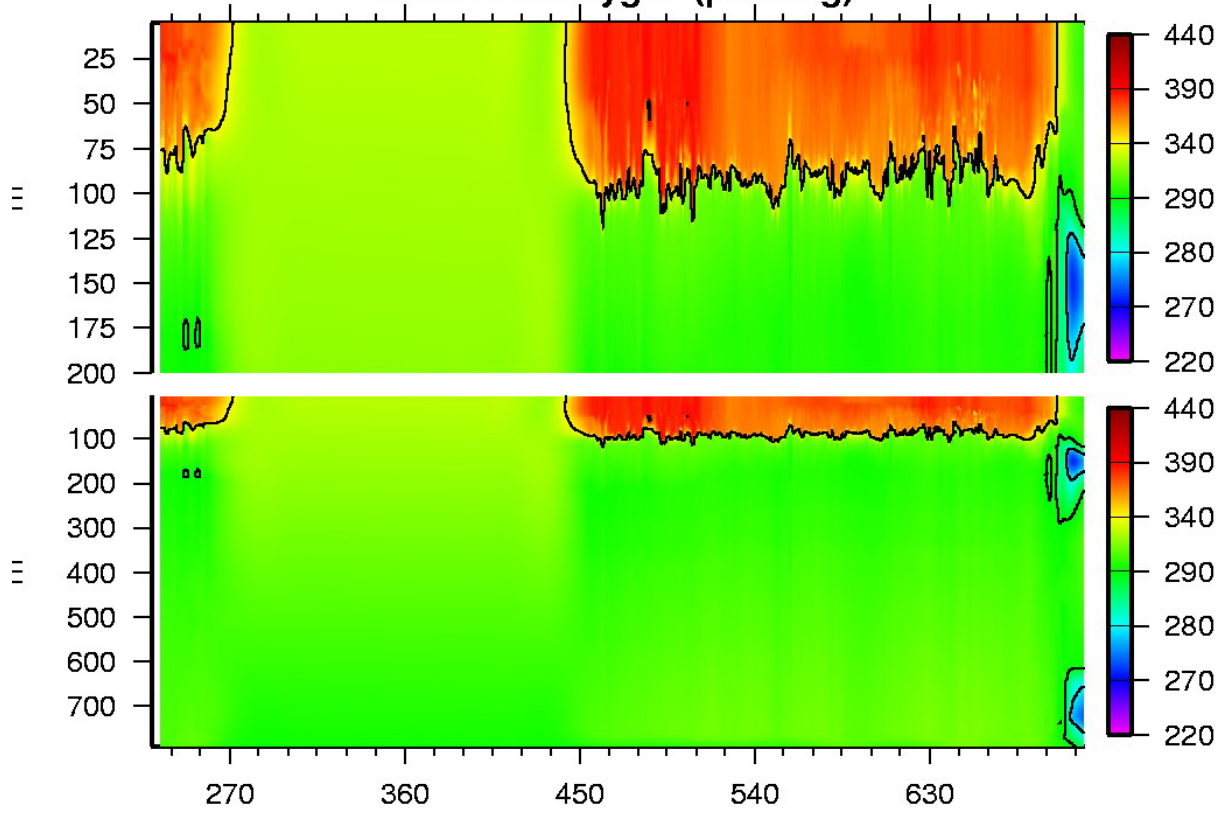


up solid, down dashed

Composite plot of ITP temperature and salinity profiles.

ITP58 Up Profile Contours (to profile 949)

dissolved oxygen ($\mu\text{mol/kg}$)

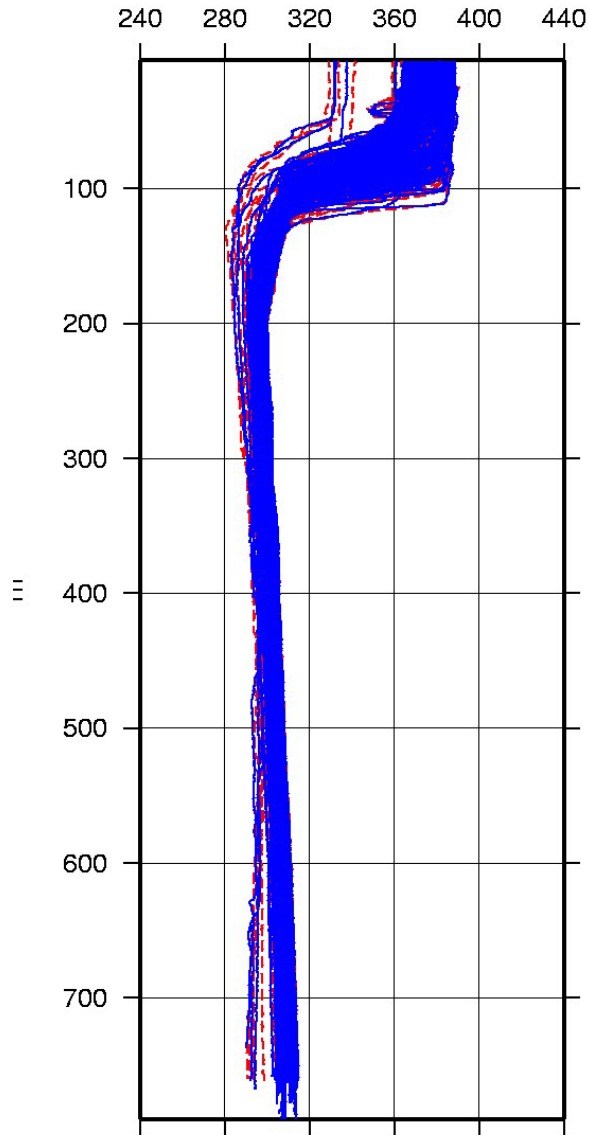


day 2012

ITP58 dissolved oxygen contours.

All ITP58 Profiles (up to profile 949)

dissolved oxygen
 $\mu\text{mol/kg}$



up solid, down dashed

Composite plot of ITP dissolved oxygen profiles.



ITP58 pictured the day after deployment from the R/V Polarstern prior to departure from the site.
(Ben Rabe)



The ITP deployment apparatus was lowered onto the ice using the ship's crane and hauled to deployment site using sleds. (Raquel Somavilla)