

ITP 59 Overview

Deployment Location: 9/3/2013, 11:00 UTC at 80° 15.4' N, 155° 53.3' E

Last Location: 12/26/2015, 6:01 UTC at 59° 53.49' N, 43° 29.62' W

Duration: 844 days

Distance Traveled: 8699 km

Number of profiles: 9 in 5 days

Other instruments: IMB 2013-H, O-Buoy 9, Met buoy, Uptempo

ITP59 was deployed on a 1.5 m thick ice floe in the Transpolar Drift in collaboration with the Nansen and Amundsen Basins Observational System (NABOS) project from the Russian Research Vessel *Federov*. On the same icefloe, a US Army Cold Regions Research and Engineering Laboratory (CRREL) Ice Mass Balance Buoy (IMB 2013-H), an autonomous atmospheric chemistry buoy (O-Buoy 9), a meteorological buoy, and Uptempo buoy were also installed. The ITP includes a dissolved oxygen sensor and operated on a standard sampling schedule of 2 one-way profiles between 7 and 760 m depth each day and a fixed SAMI pCO₂ with SBE-37 microcat at 6 m depth.

ITP59 Deployment Operations

ITP 59 was first attempted to be deployed in 2012, but due to a communications problem with the profiler, was immediately recovered and returned to WHOI. The surface unit was found to have a damaged controller board which was replaced and the system retested in the spring of 2013. It became the second ITP system deployed during the 2013 NABOS cruise on the *Federov*.

ITP59 Data Processing

The 9 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.

CTD lag corrections determined from the profile data were somewhat larger than typical, and did not vary too greatly over the short time period. Bad salinity and dissolved oxygen data was removed from the last 3 profiles.

ITP59 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 hourly, and buoy temperature and battery voltage status were recorded.

For unknown reasons, the profiler could not communicate with the surface package only 5 days after deployment. The surface package did not receive any wakeup tones from the profiler between September 8 and November 8 2013, when one more engineering file from the profiler (profile 10) was received indicating that the profiler was still intact at that time. No ring tones from the profiler were received thereafter.

However, the surface package was able to successfully communicate with the SAMI pCO₂ and SBE-37 microcat fixed on the ITP tether at 6 m depth for over 238 days until April 29 2014, when communications between the instruments and their inductive modem ceased. The microcat provided a complete time series of temperature and salinity in the mixed layer every 2 hours during this period, but unfortunately the dissolved oxygen and SAMI pCO₂ sensors did not produce good data.

The Transpolar Drift current took the buoy across the Arctic Ocean generally along the western side of the Lomonosov Ridge, then southward along the north coast and east coasts of Greenland. The last communications from the surface package 844 days after deployment were near Cape Farewell, Greenland.

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

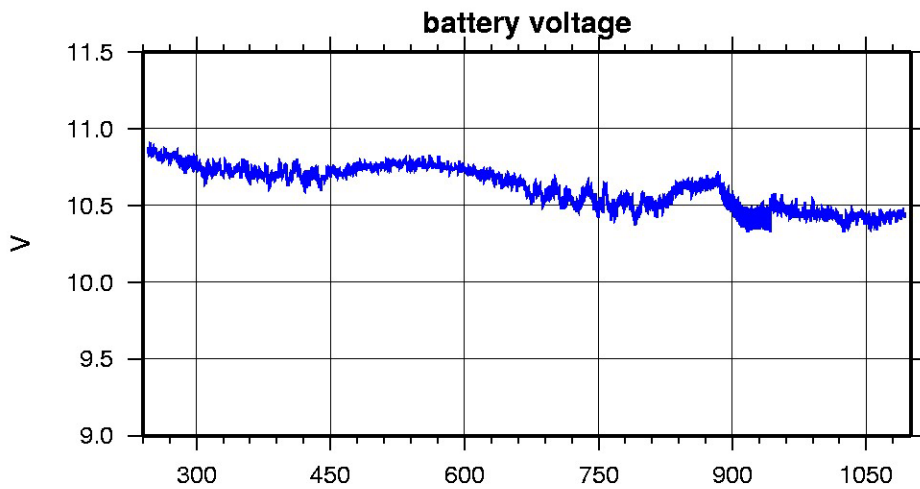
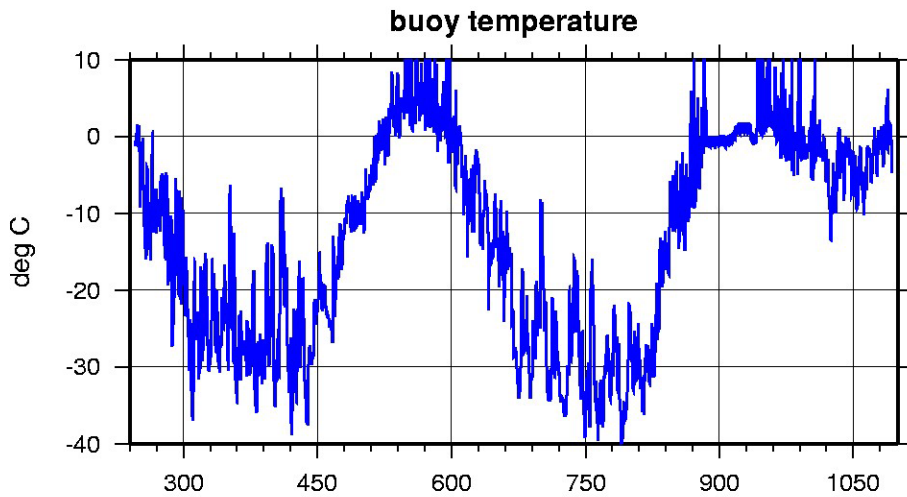
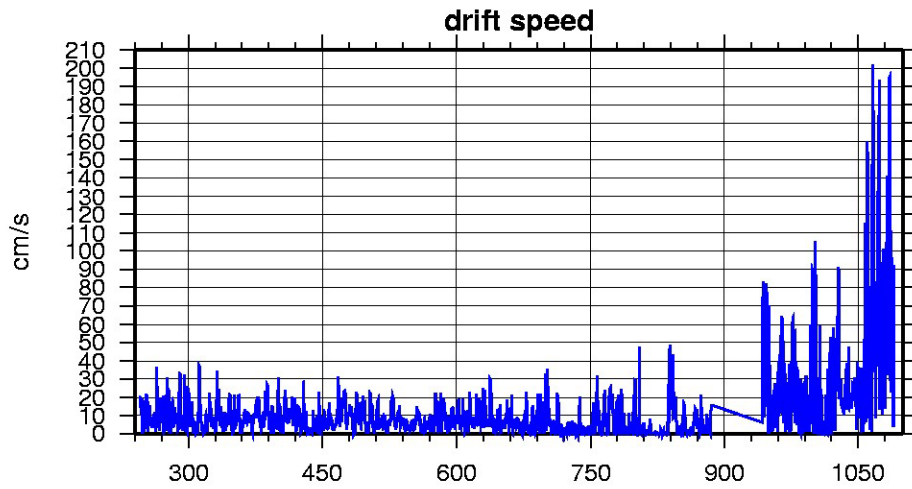
Level II hourly buoy location data in ASCII format: `itp59rawlocs.dat`

Level III 1-Hz processed profile and SAMI microcat data in MATLAB format: `itp59cormat.tar.Z` or `itp59cormat.zip`

Level III 1-db bin-averaged processed profile and SAMI microcat data in MATLAB format: `itp59final.mat`

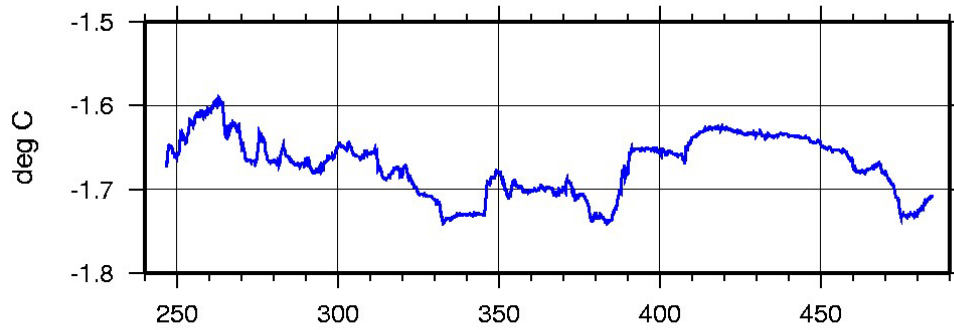
Level III 1-db bin-averaged processed profile and SAMI microcat data in ASCII format: `itp59final.tar.Z` or `itp59final.zip`

ITP59 Buoy Status (as of 2015/12/26)

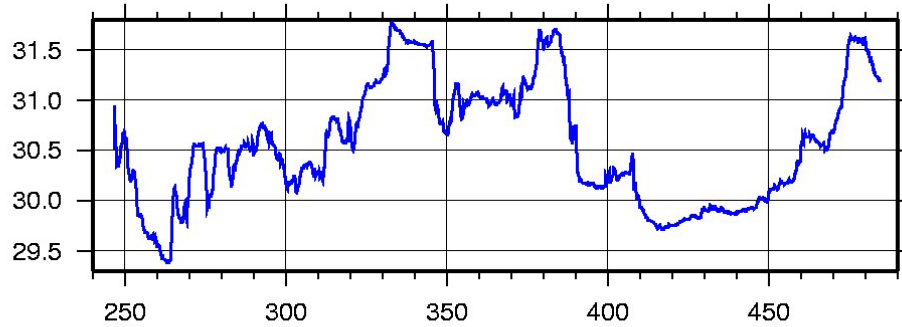


ITP59 SAMI data (as of 2014/4/29)

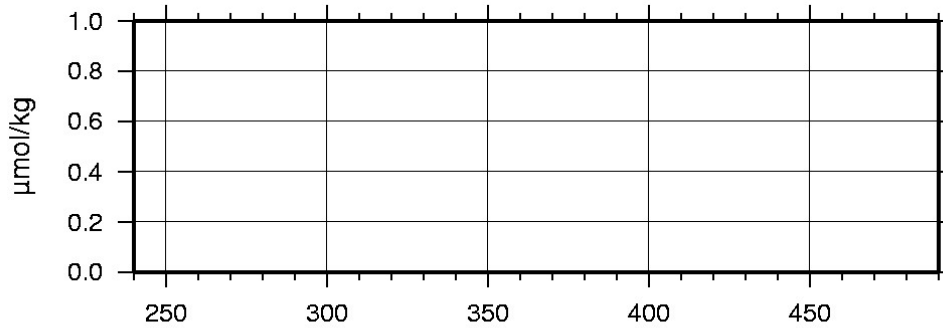
temperature



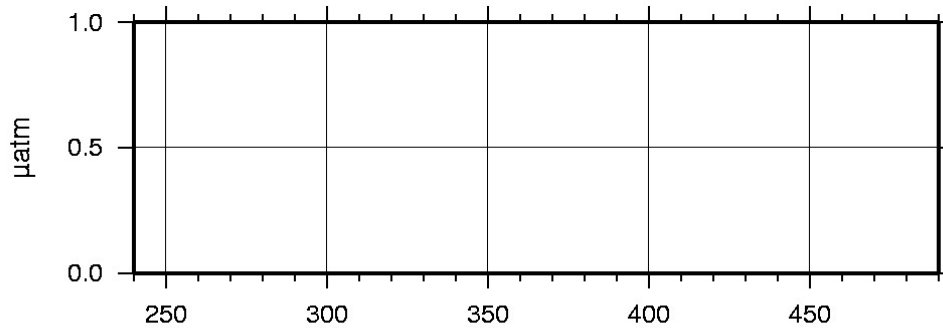
salinity



dissolved oxygen

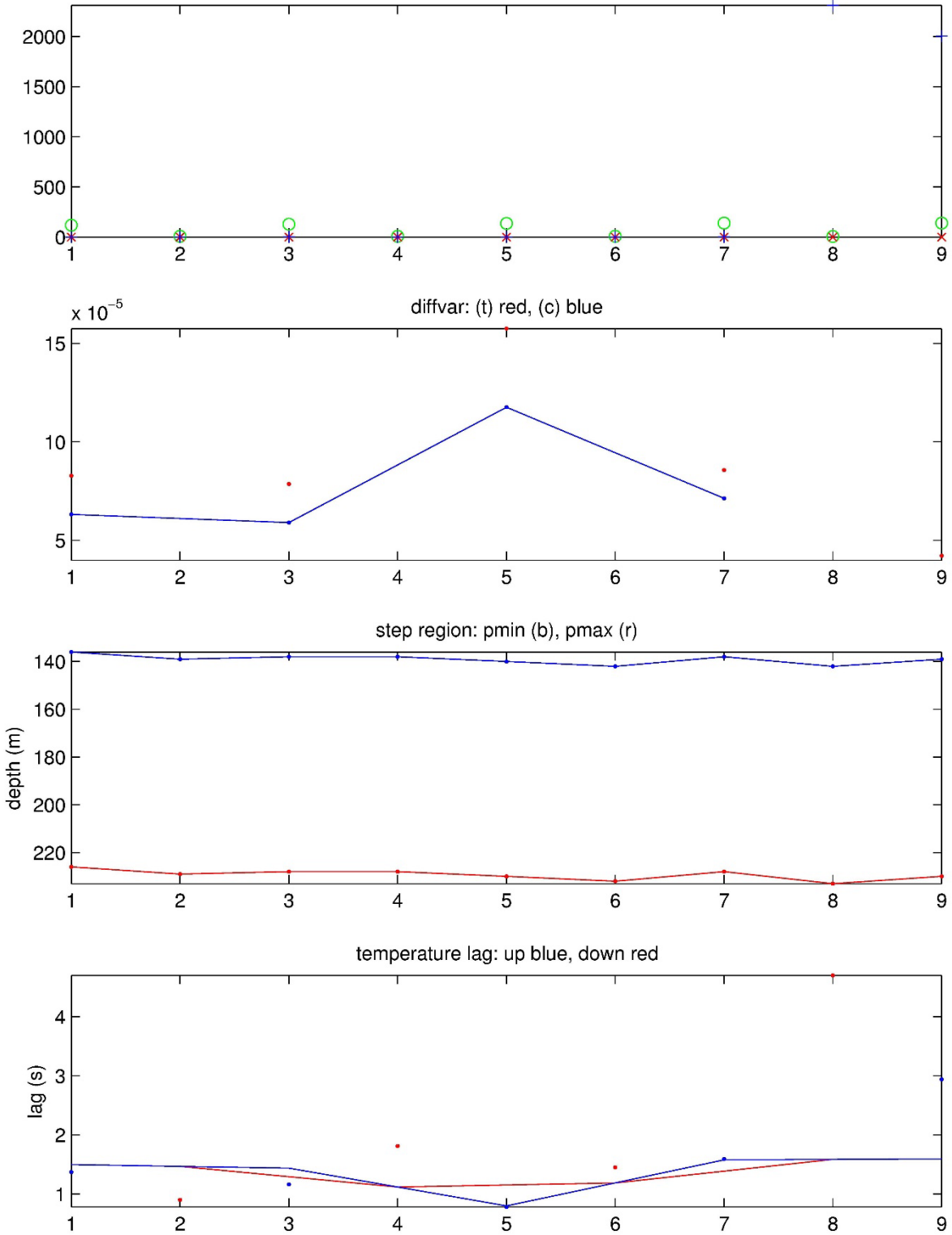


pCO2

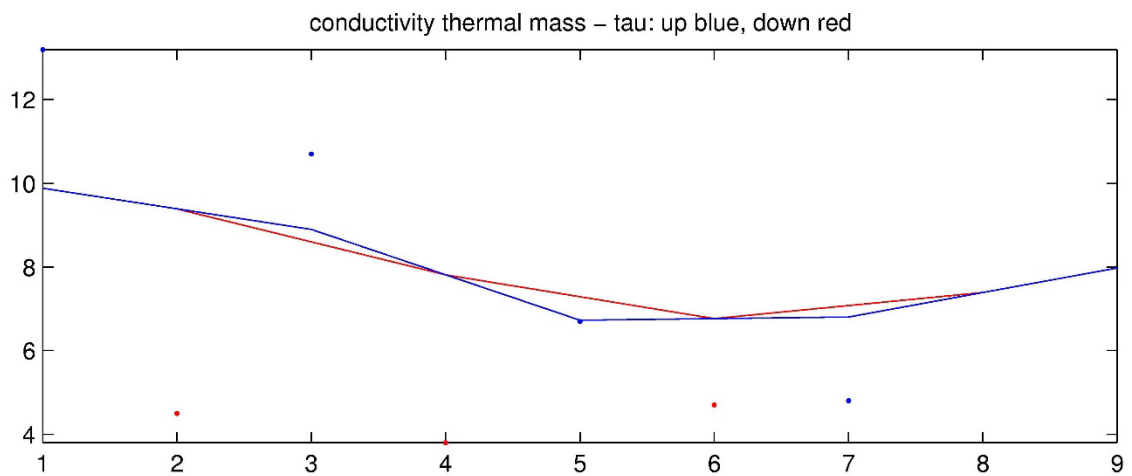
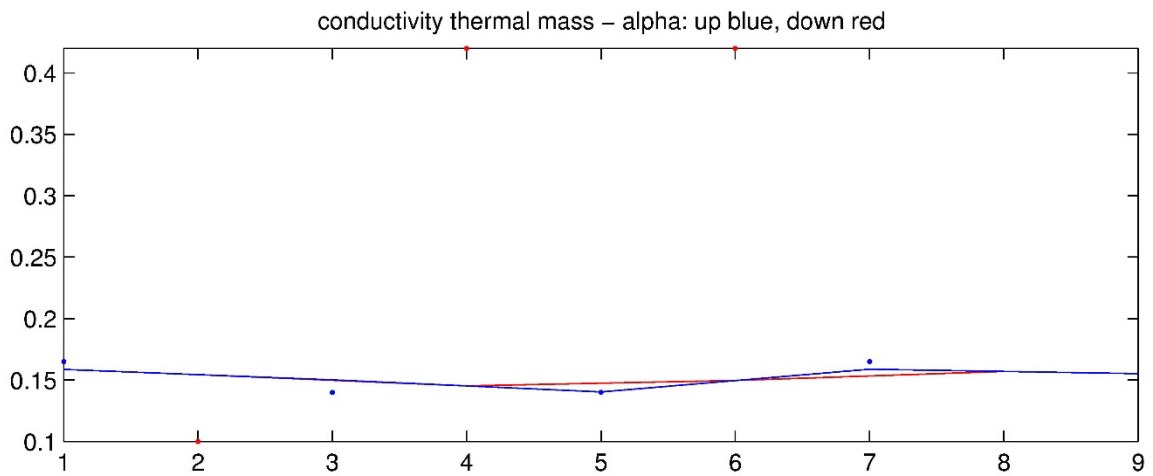
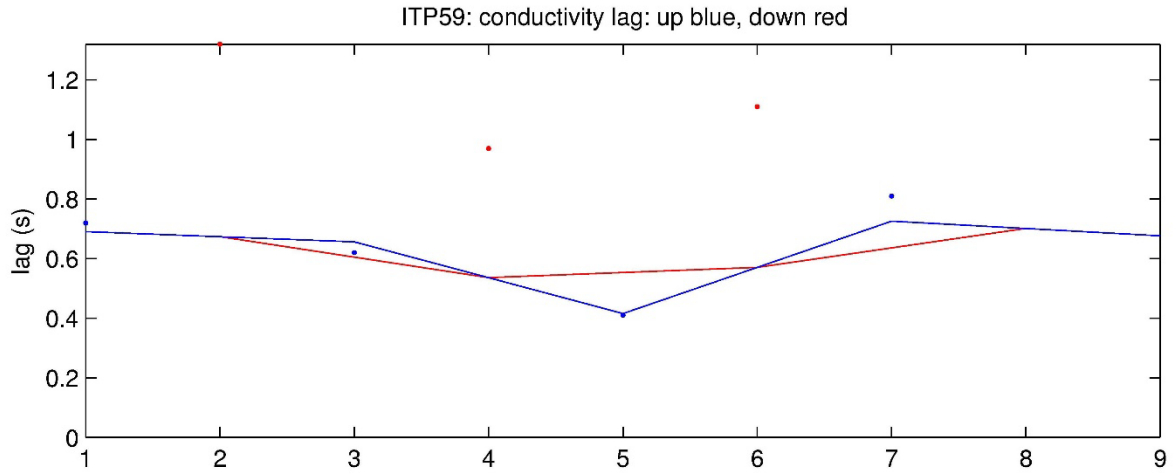


day 2013

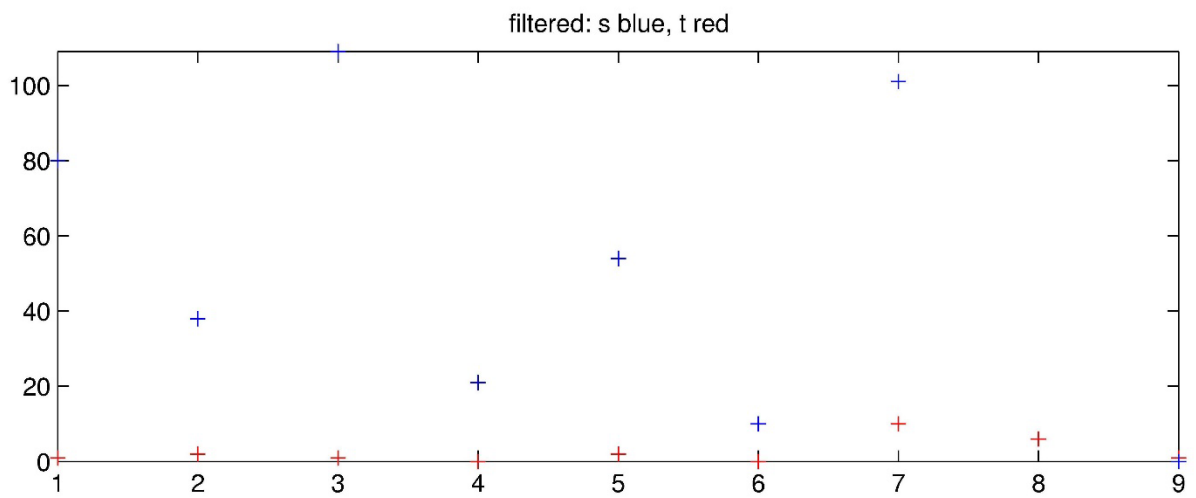
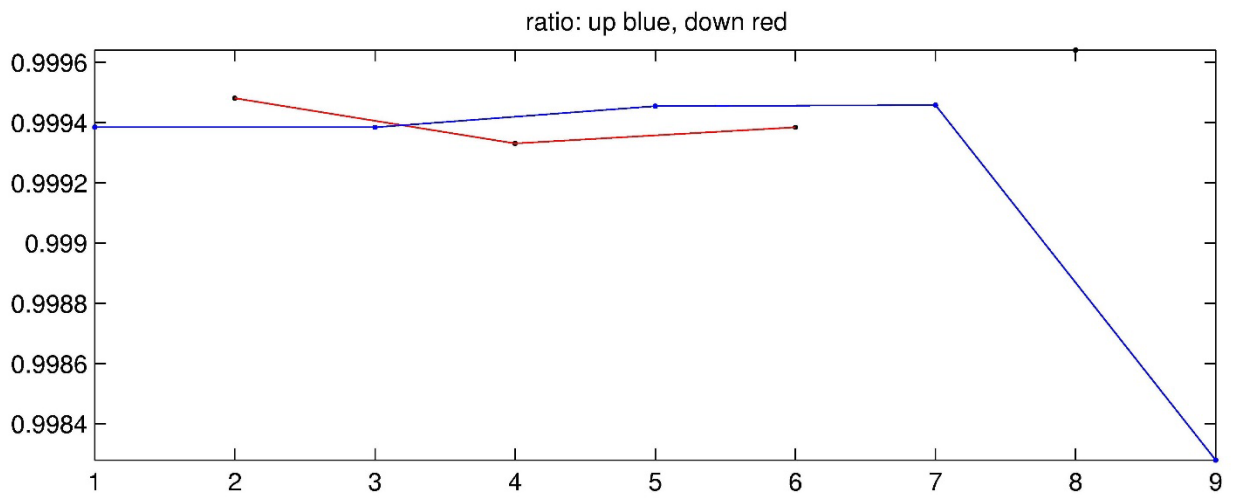
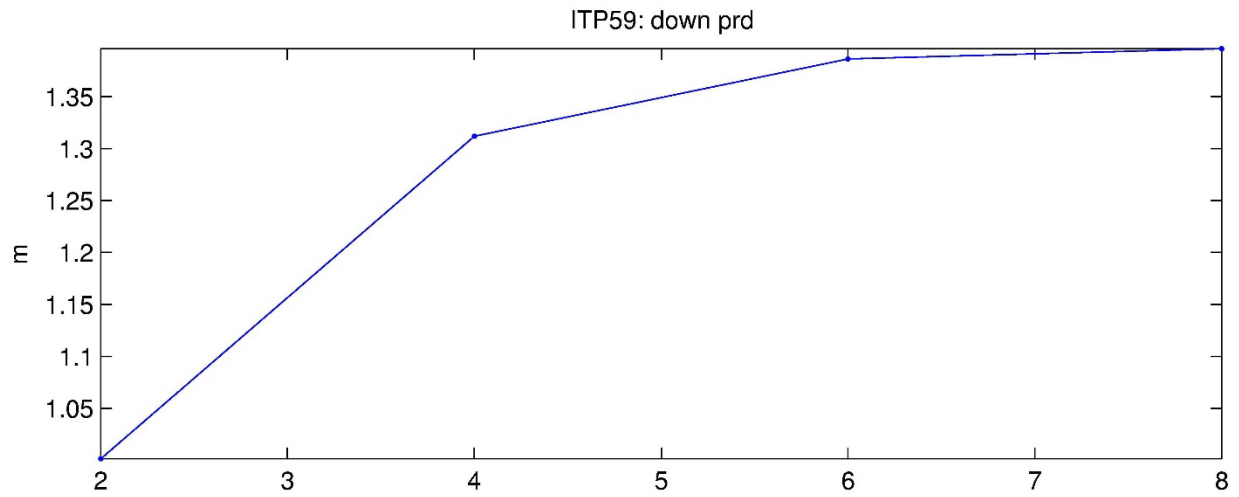
ITP profiler engineering data.
ITP59: bad (t) red, bad (s) blue, rev (t&s) green



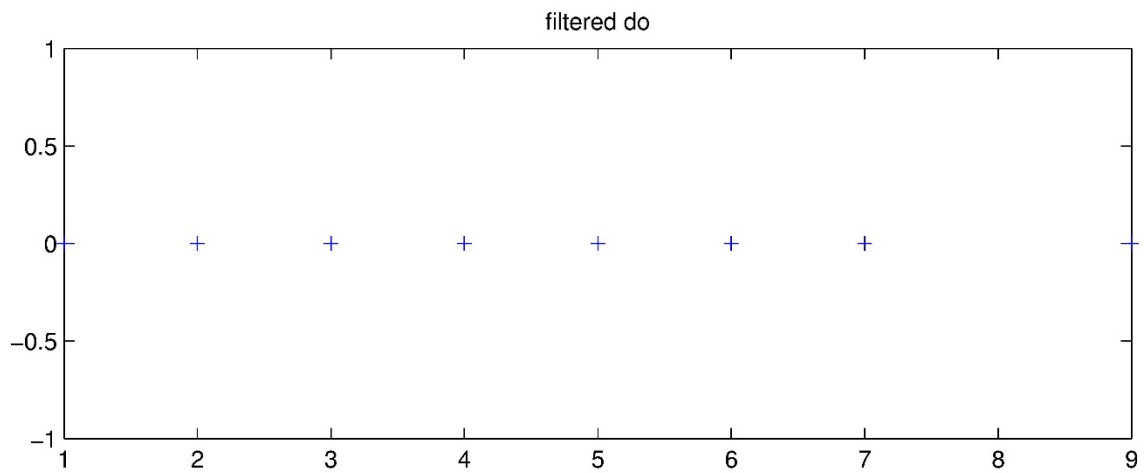
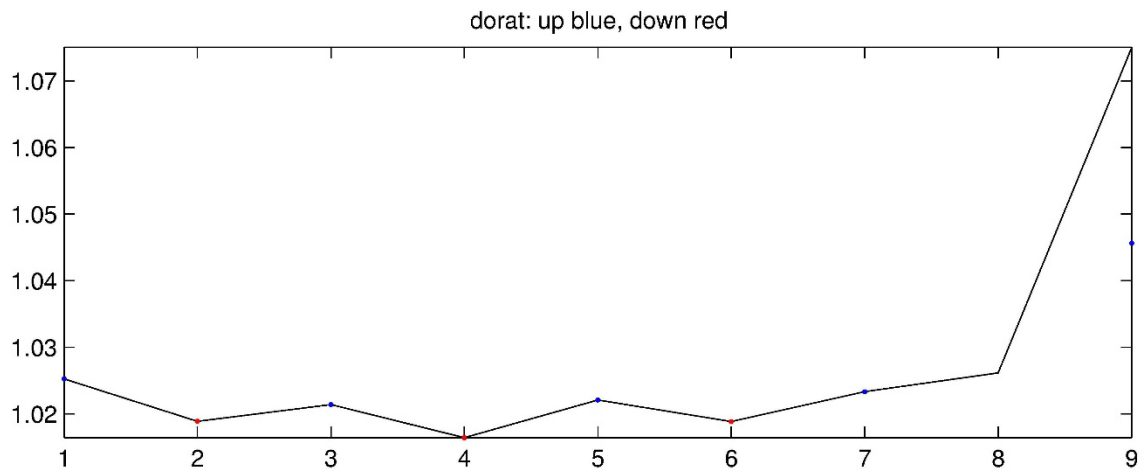
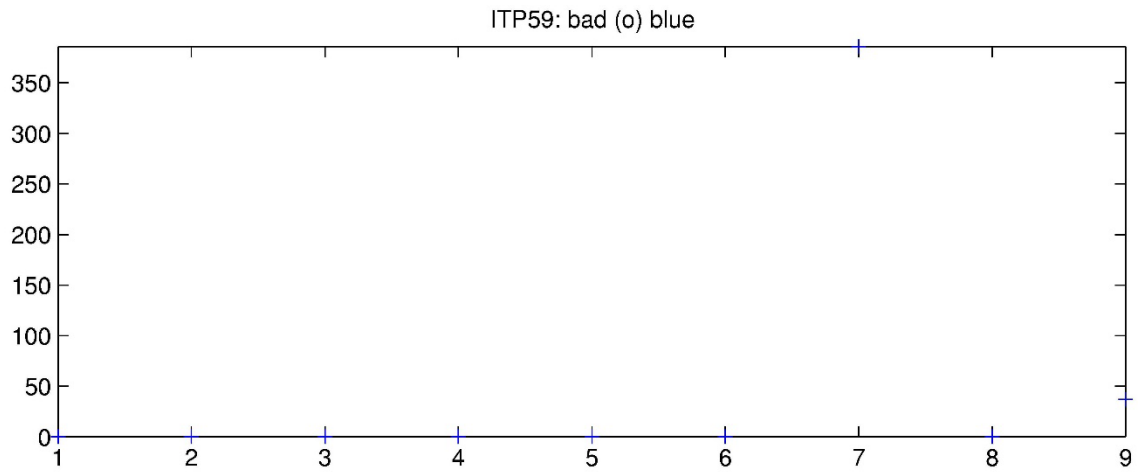
Top: number of bad points removed, Middle: variance of verticle difference of temperature and salinity in step region for up-going profiles, Bottom: temperature lag.



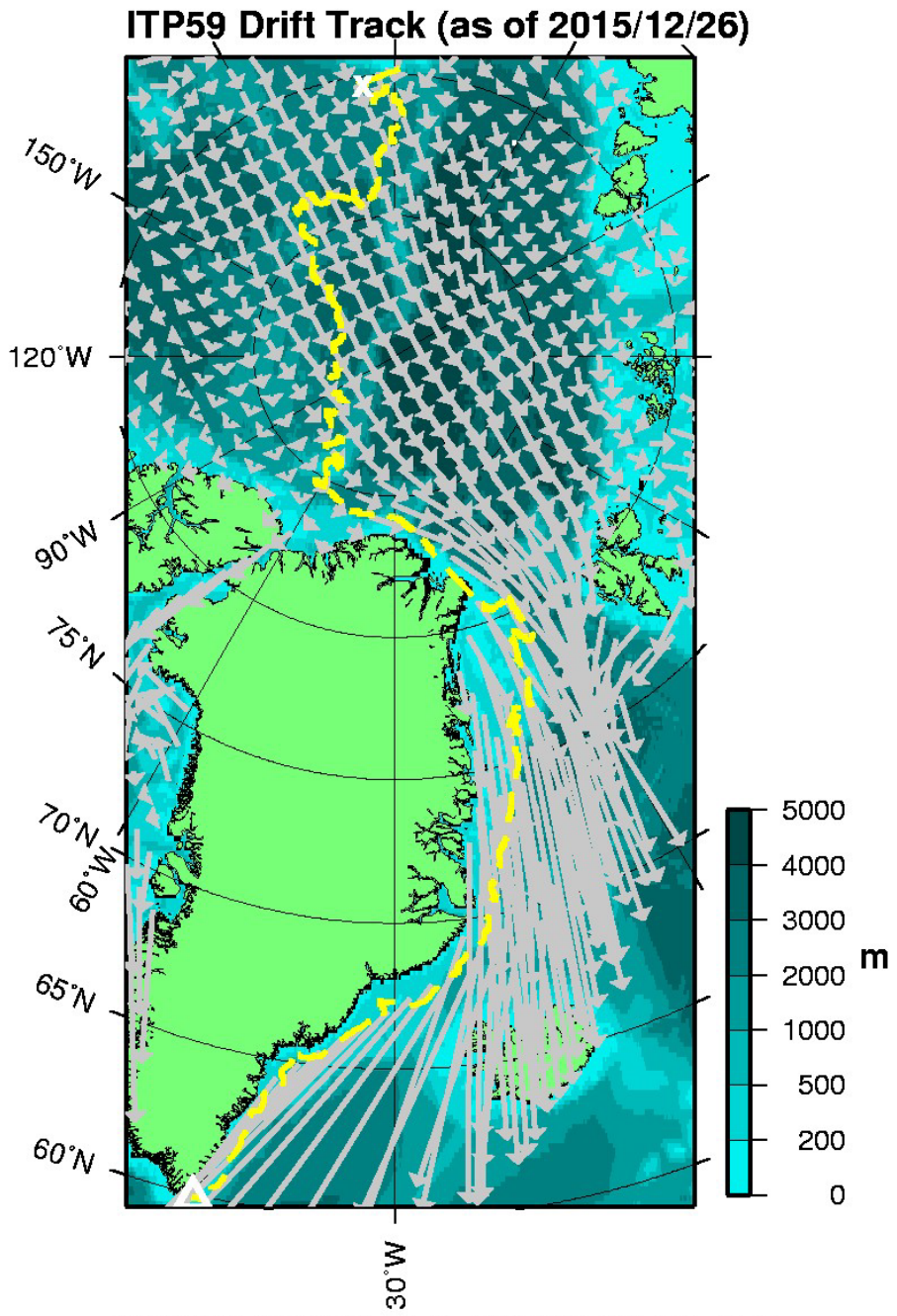
Top: conductivity lag, Middle: conductivity thermal mass amplitude correction, Bottom: conductivity thermal mass lag correction.



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



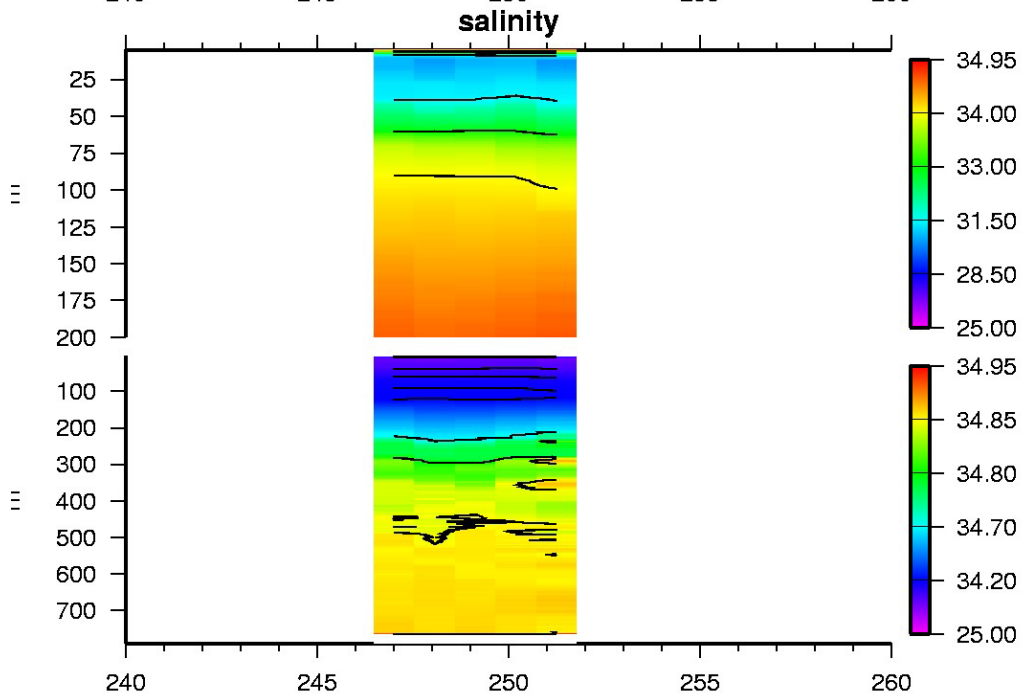
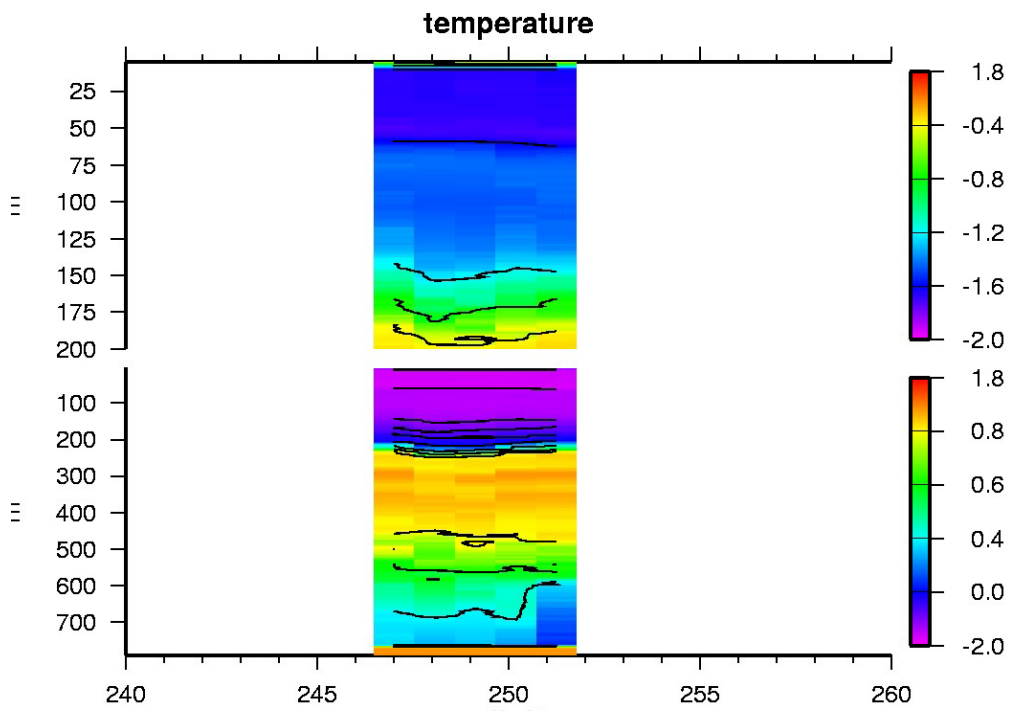
Top: number of bad dissolved oxygen points removed, Middle: dissolved oxygen ratio adjustment, Bottom: number of filtered spikes.



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

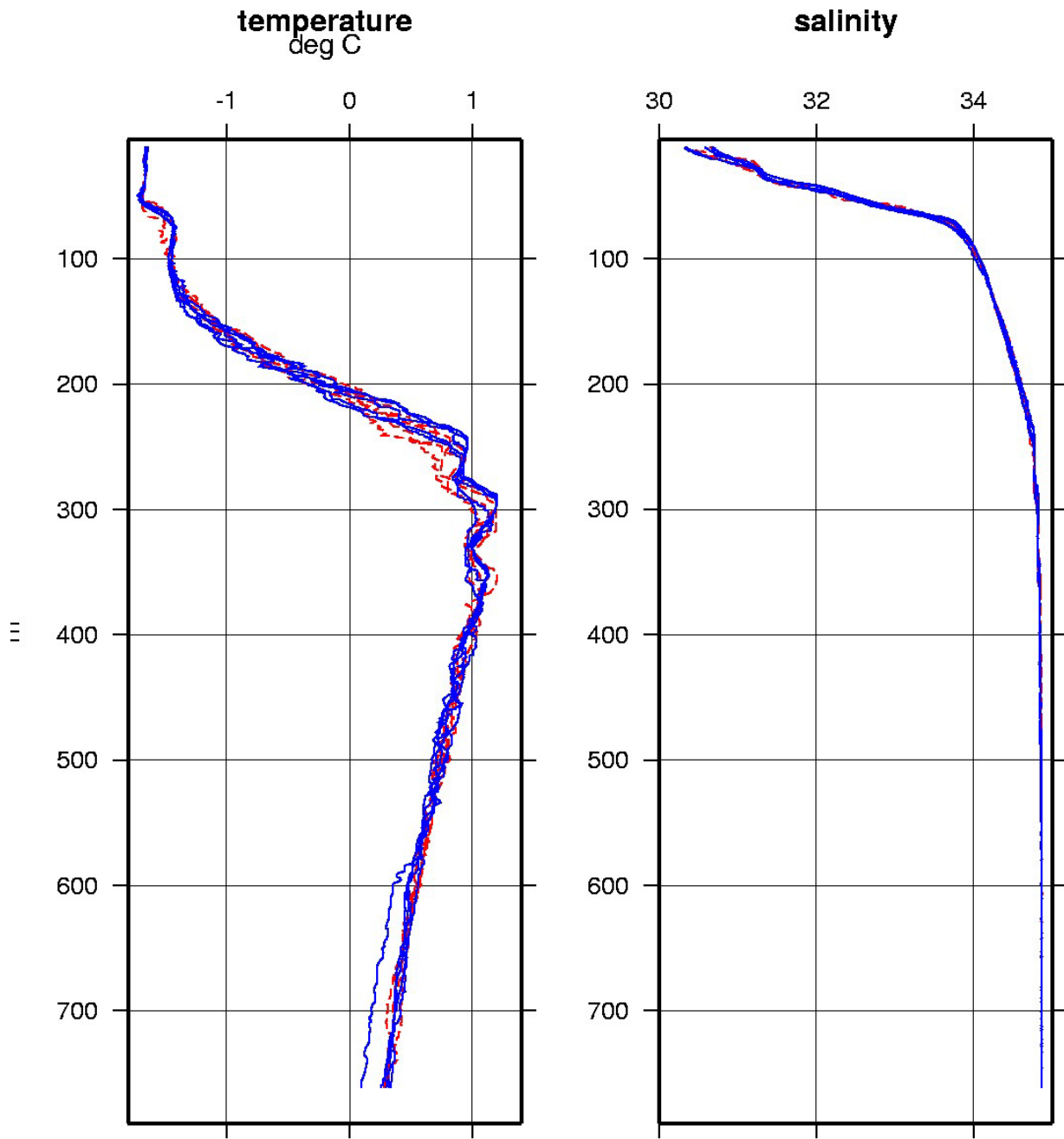
Plot of buoy locations.

ITP59 Up Profile Contours (to profile 9)



day 2013
ITP55 temperature and salinity contours.

All ITP59 Profiles (up to profile 9)

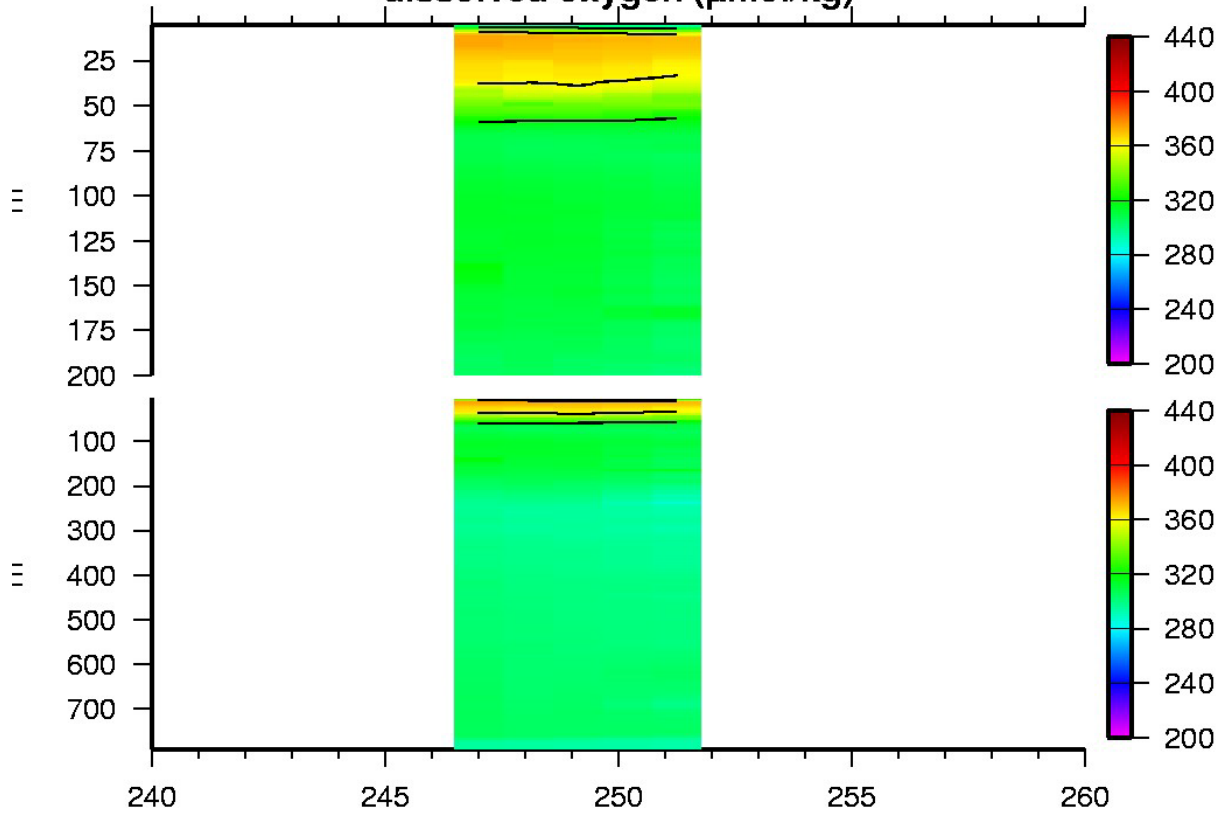


up solid, down dashed

Composite plot of ITP temperature and salinity contours.

ITP59 Up Profile Contours (to profile 8)

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

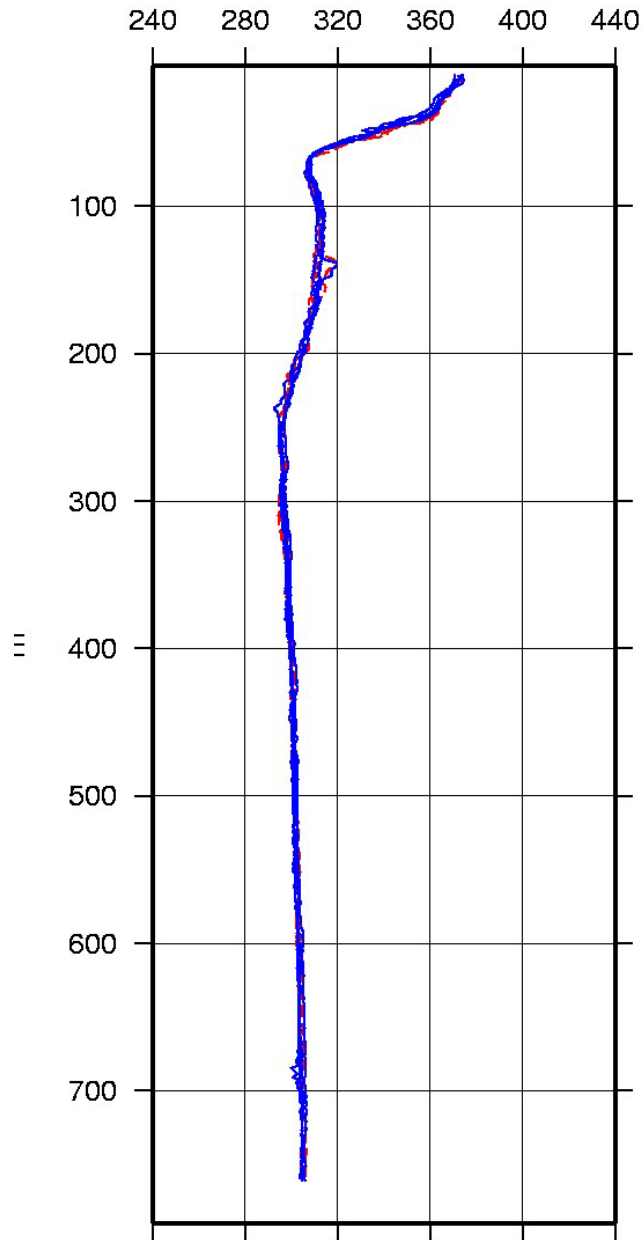


day 2013

ITP59 dissolved oxygen contours.

All ITP59 Profiles (up to profile 8)

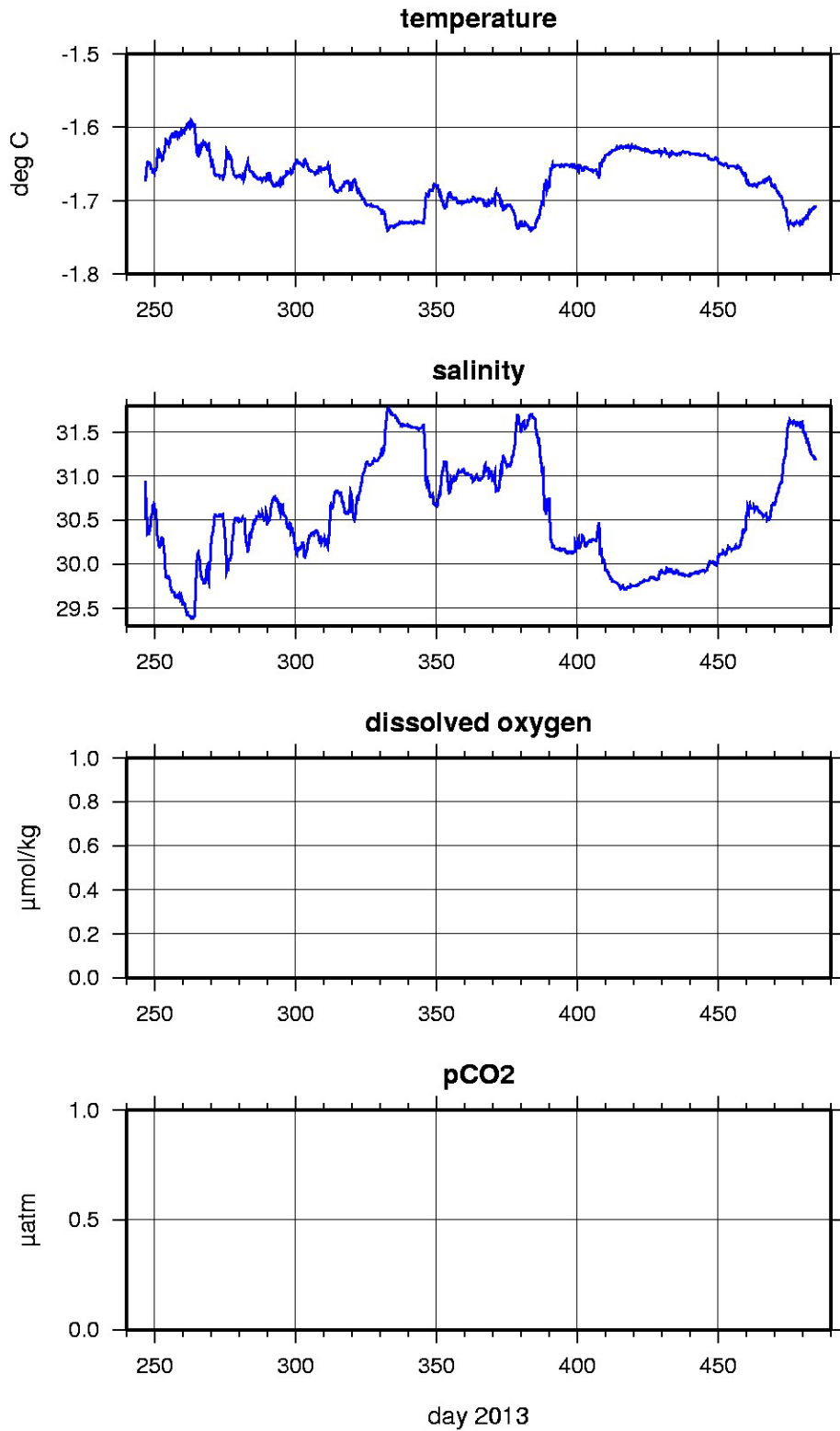
dissolved oxygen
 $\mu\text{mol/kg}$



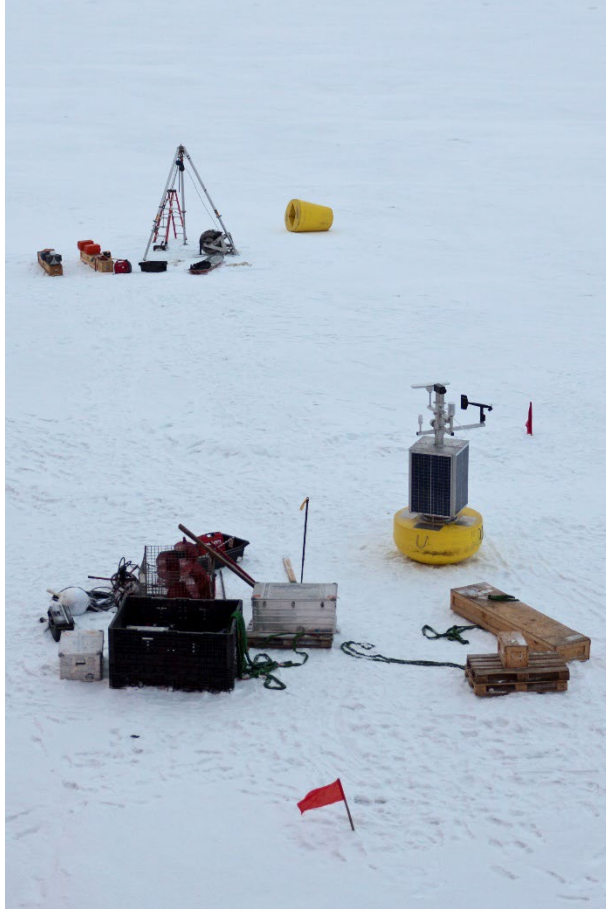
up solid, down dashed

Composite plot of ITP dissolved oxygen profiles.

ITP59 SAMI data (as of 2014/4/29)



Plot of Microcat and SAMI time series.



The deployment team installed the O-Buoy before the ITP. (Ilona Goszczko)