

## ITP49 Overview

**Deployment Location:** 9/11/2011, 17:00 UTC at 84° 22.0'N, 139° 52.6'E

**Last Location:** 12/22/2013, 23:00 UTC at 66° 26.4' N, 22° 18.8' W

**Duration:** 833 days

**Distance Traveled:** 7904 km

**Number of profiles:** 61 in 31 days

**Other instruments:** none

ITP 49 was deployed on a 2 m thick ice floe in the Transpolar Drift during the ARK-XXVI/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.

## ITP49 Deployment Operations

ITP 49 was the third ITP deployed from the *Polarstern* during the ARK-XXVI/3 expedition. Poor weather prevented the use of the helicopter, so the instrument and equipment were craned over the side, and the gangplank was lowered so that the deployment team could deploy the buoy away from the ship on a 2 m thick ice floe that was slightly bumpy, with melt ponds and a ridge nearby. More than 3.5 m thick ice was only about 20 m away from the ITP site. The wind (chill) was quite strong during parts of the deployment. All inductive modem tests (near beginning of deployment and at the end) were successful. No photos were obtained during the operation.

## ITP49 Data Processing

The 62 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.

After collecting two good profiles, CTD data quality dropped starting with profile 3. In addition to profile segments of poor conductivity typically related to cell contamination, conductivity also developed a varying, sometimes large number of very large short-term spikes. The latter was more likely related to instrument problems rather than contaminations. The instrument seemed to recover by profile 20 or so, yielding better salinity estimates for the remainder of the short record.

Oxygen was noisy for the first two profiles but seemed to follow the general profile shape seen in earlier ITP DO profiles collected in this area (e.g., ITP 57 profiles 300 to 350). However, the

oxygen calibration factor changed from typical values near unity to a factor around 2.7, and the profile shape changed significantly as well. Starting with profile 3, oxygen data were deleted. Following more deliberations, profiles 1 and 2 were eventually removed as well because of noise.

The temperature record included two very unusual profiles (19 and 20) for which deep values were 0.5 to 1 degree colder compared to profiles before and after. Since, however, the pattern was repeated over two profiles, and since shallow values matched earlier and later profiles, the data were not edited out. Since this pushed temperature outside the mapped fields typically used at this depth, the conductivity calibration for these two profiles was estimated from earlier/later profiles. This seemed reasonable as the conductivity calibration time series did not change much in time here.

Thermohaline staircases were available to generate initial estimates for CTD lag corrections. They were adjusted manually to reduce profile noise. The conductivity calibration adjustments (variable "rat") were somewhat variable for the early noisy profiles, but still relatively flat and near unity.

## ITP49 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.

During the profiler's short life, the buoy drifted with the Transpolar Drift over the Lomonosov Ridge towards the North Pole for one month before communications with the underwater ceased for no apparent reason. The surface package continued to transmit status and GPS locations for just over another 800 days as it travelled eastward along 85°N, then crossed back over the Lomonosov Ridge and passed through Fram Strait with the East Greenland Current. The last location has the surface package near shore off northern Iceland.

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

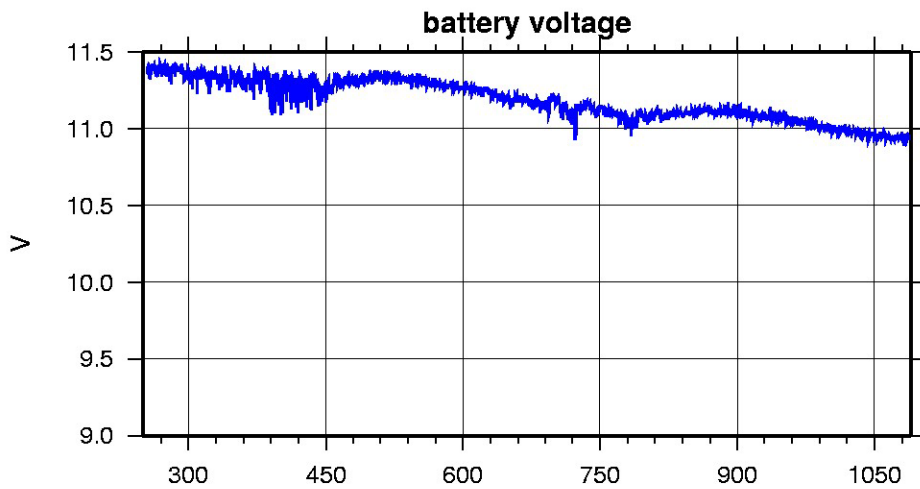
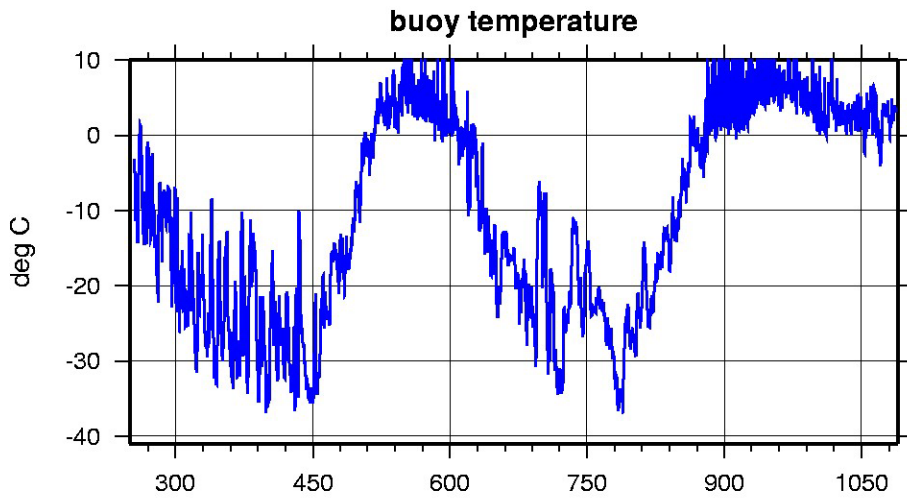
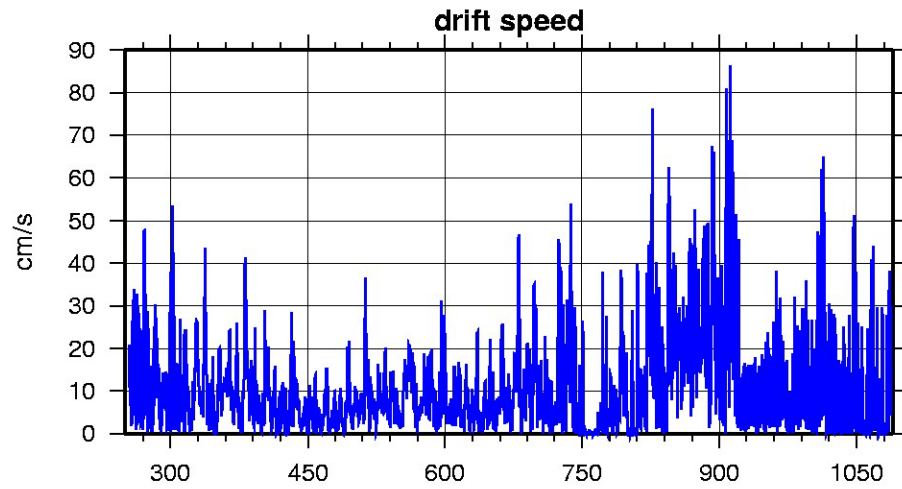
Level II hourly buoy location data in ASCII format: itp49rawlocs.dat

Level III 1-Hz processed profile data in MATLAB format: itp49cormat.tar.Z or itp49cormat.zip

Level III 1-db bin-averaged processed profile data in MATLAB format: itp49final.mat

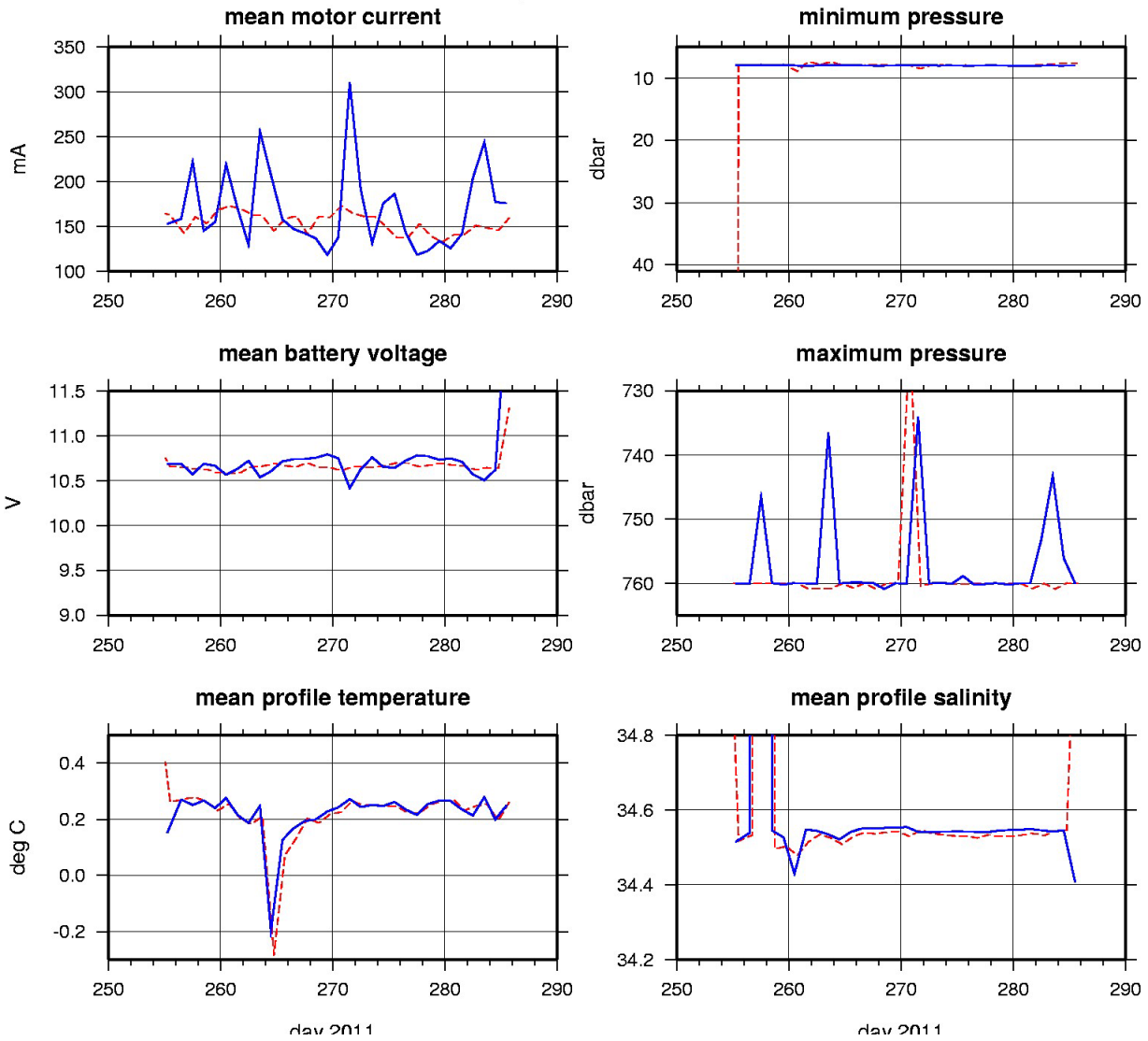
Level III 1-db bin-averaged processed profile data in ASCII format: itp49final.tar.Z or itp49final.zip

# ITP49 Buoy Status (as of 2013/12/22)

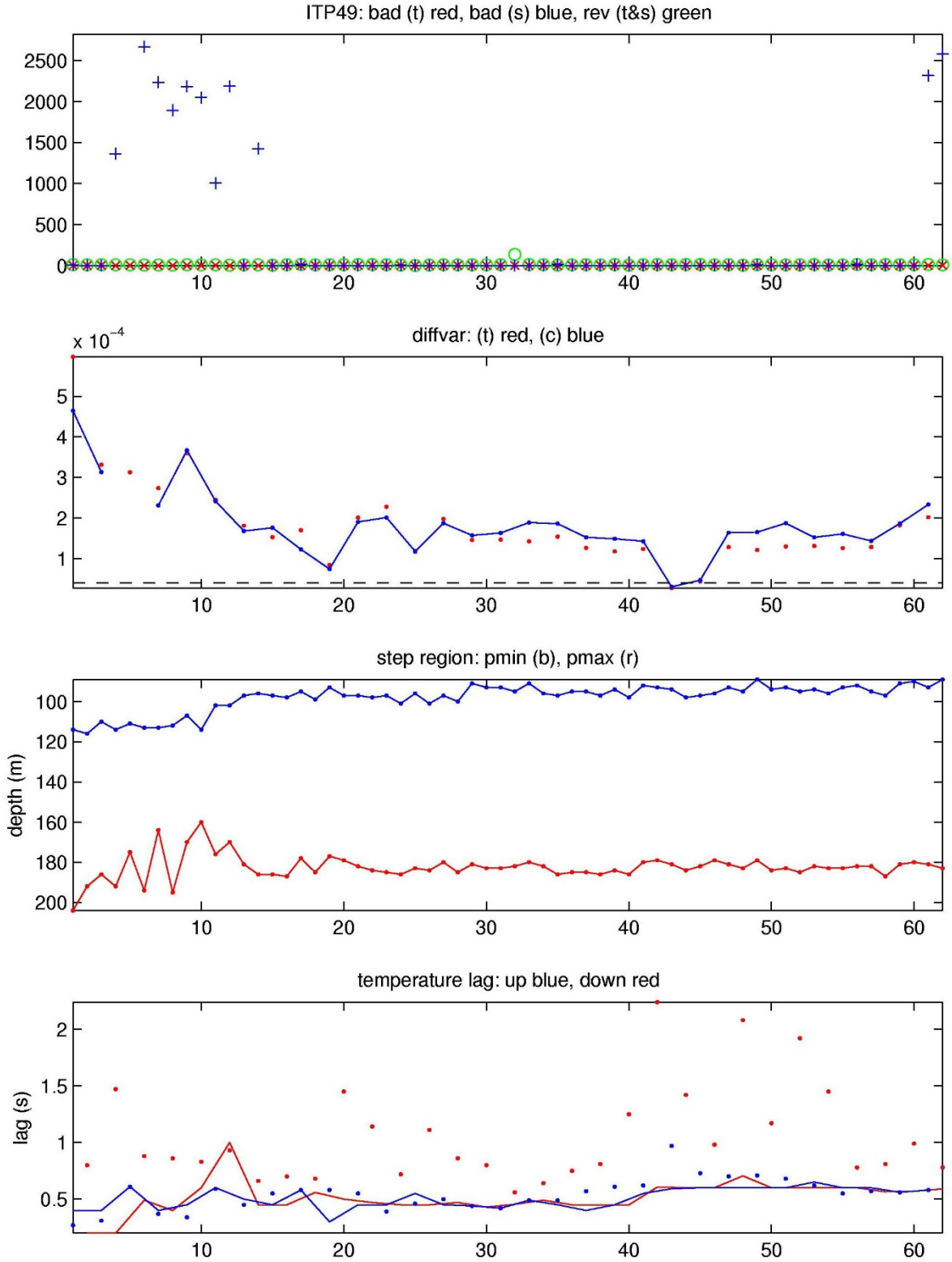


### ITP49 Profiler Status (up to profile 62)

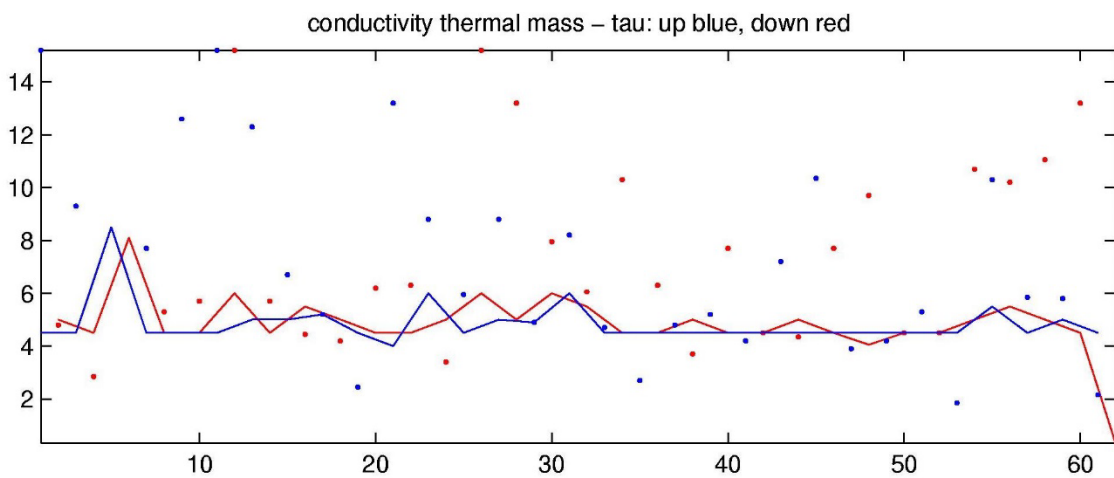
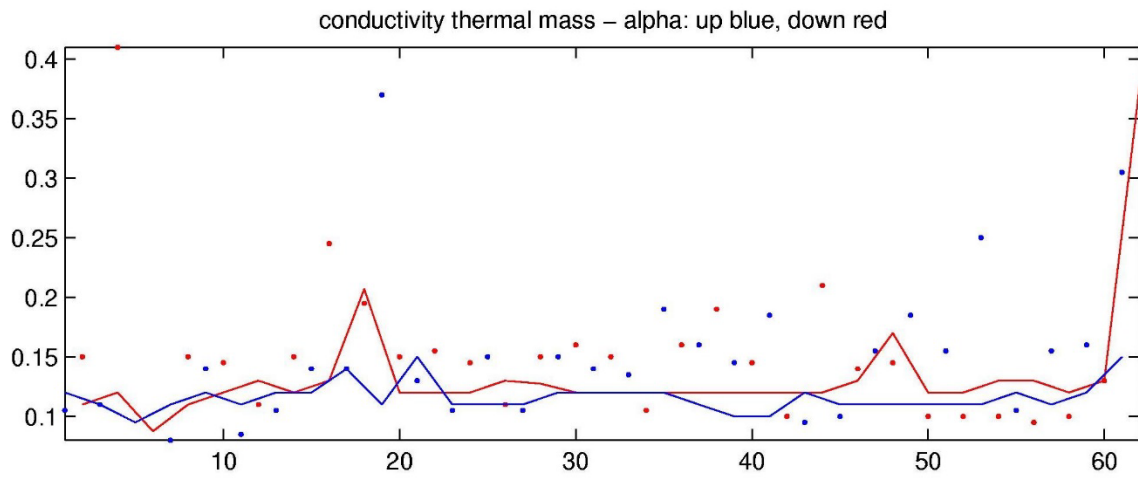
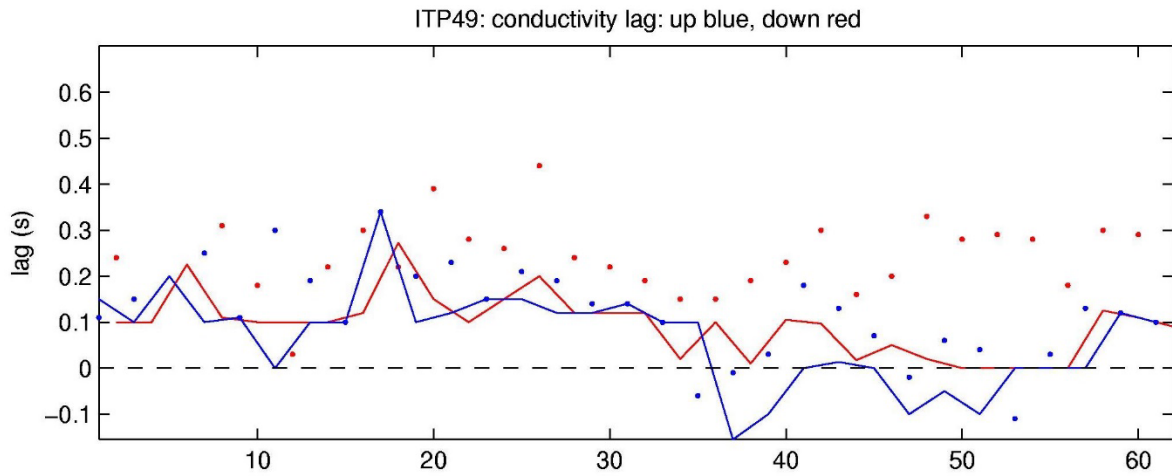
*up solid, down dashed*



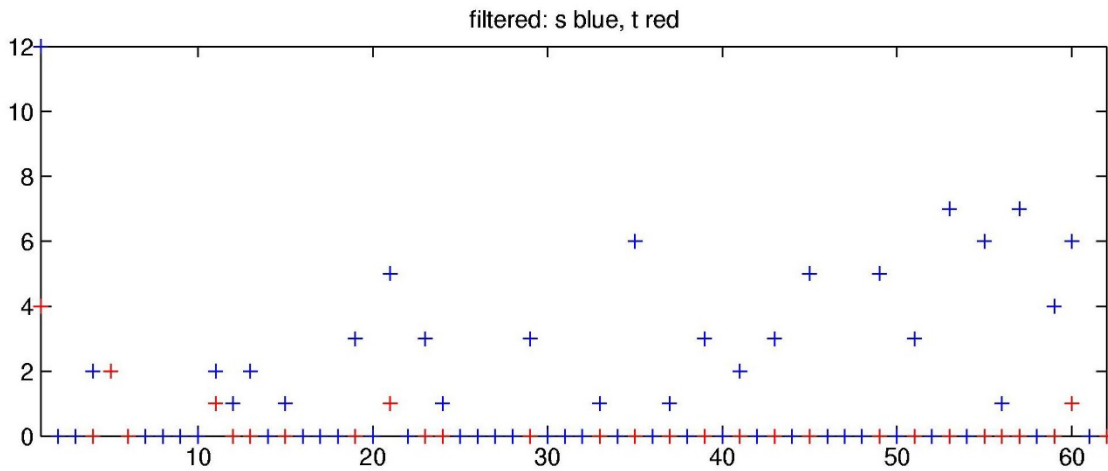
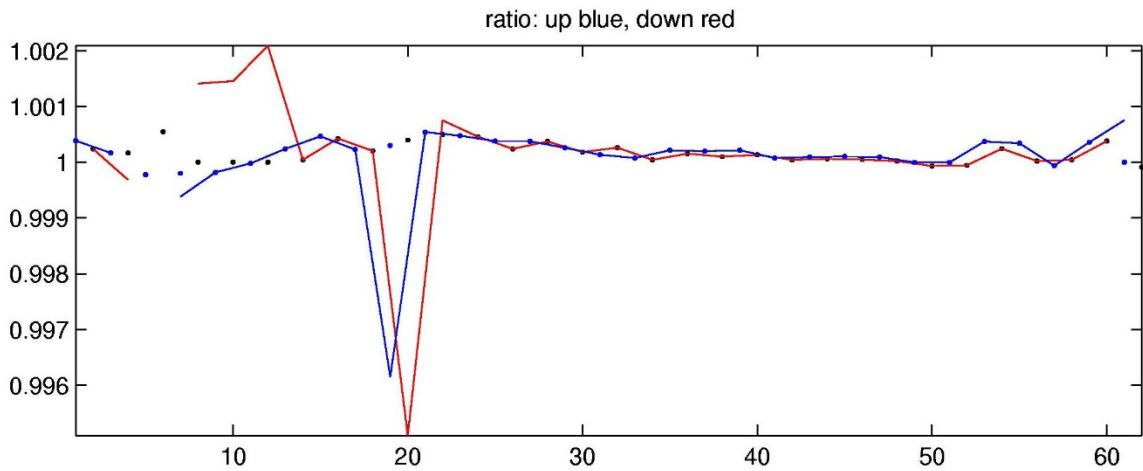
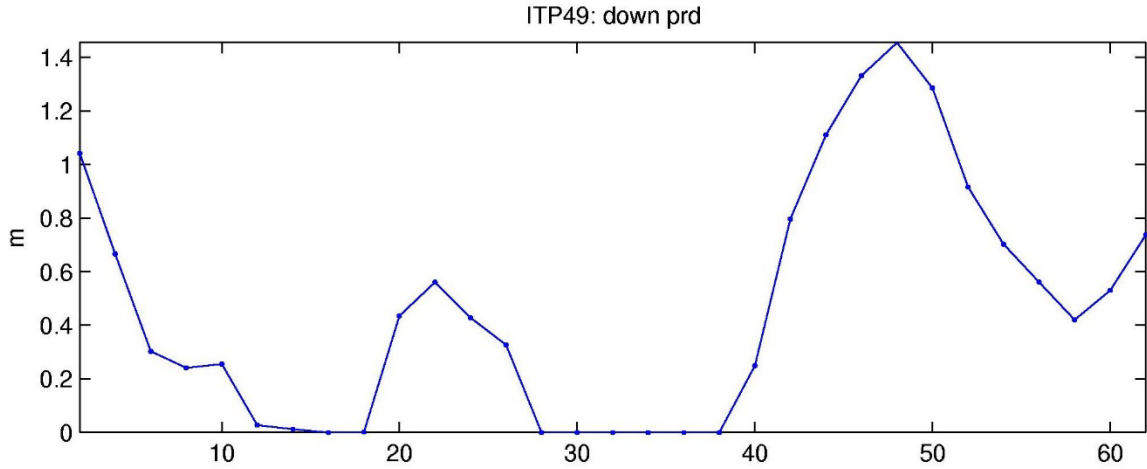
ITP profiler engineering data.



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.

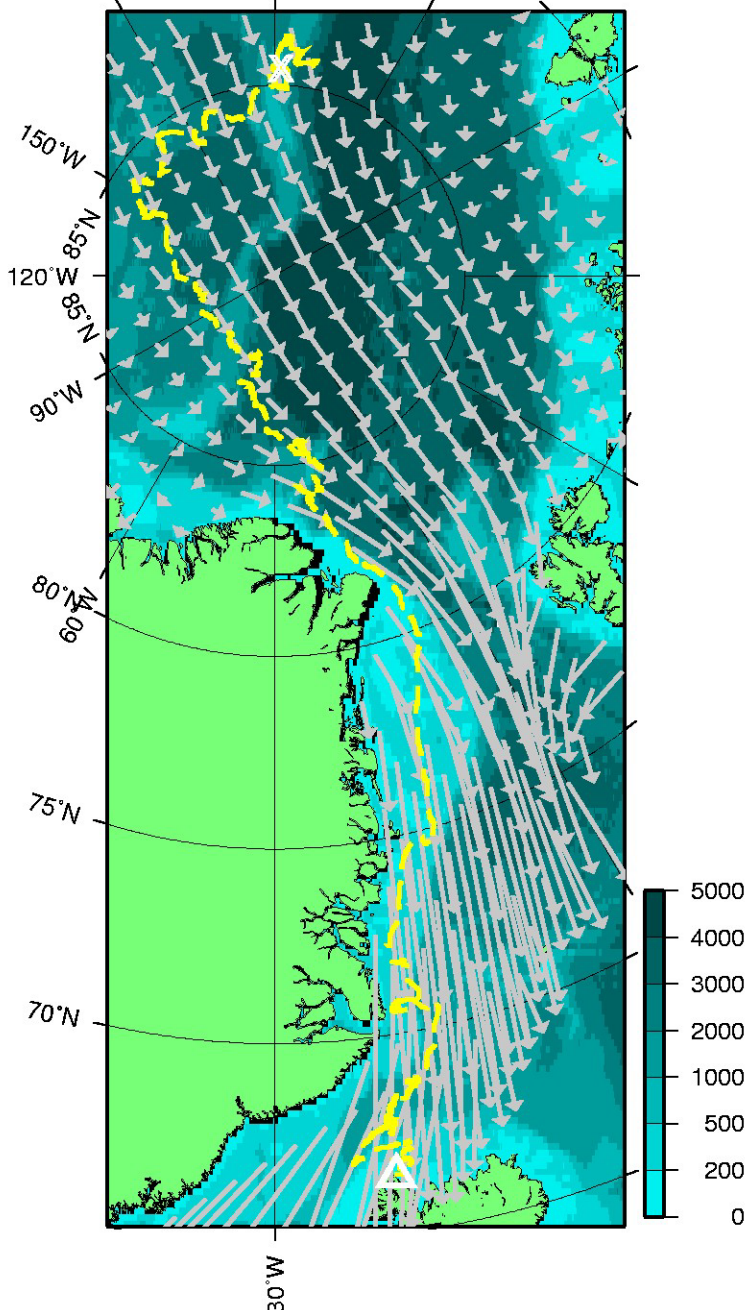


Top: conductivity lag, Middle: conductivity thermal mass amplitude correction, Bottom: conductivity thermal mass lag correction.



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

**ITP49 Drift Track (as of 2013/12/22)**



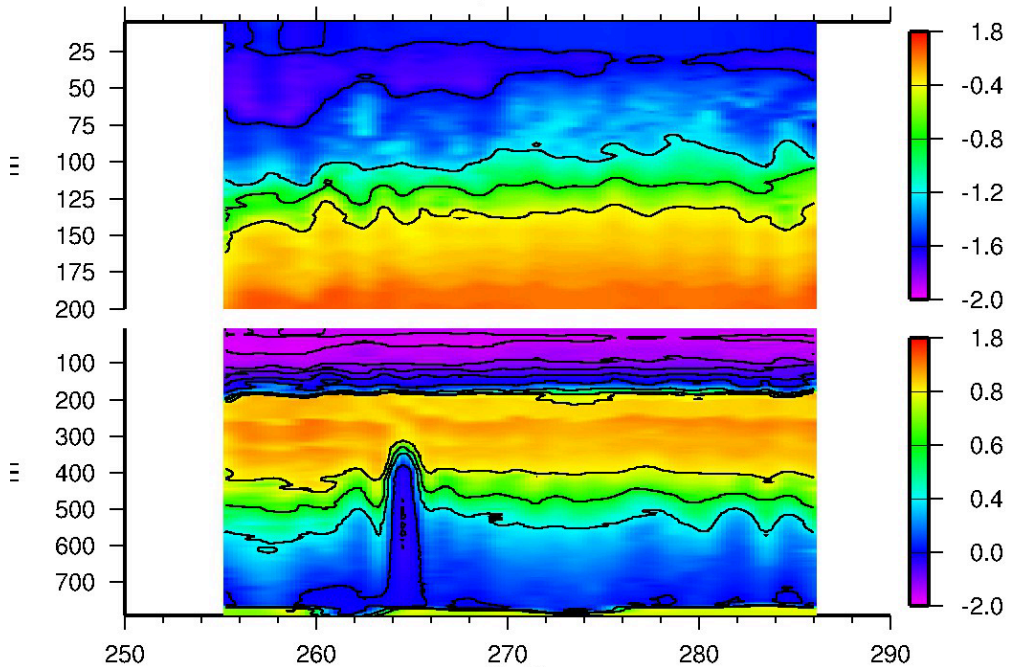
**ITP drift (yellow line), last profile (x), last location (triangle), and annual ice drift from IABP (grey vectors) on IBCAO bathymetry (shading).**

Plot of buoy locations.

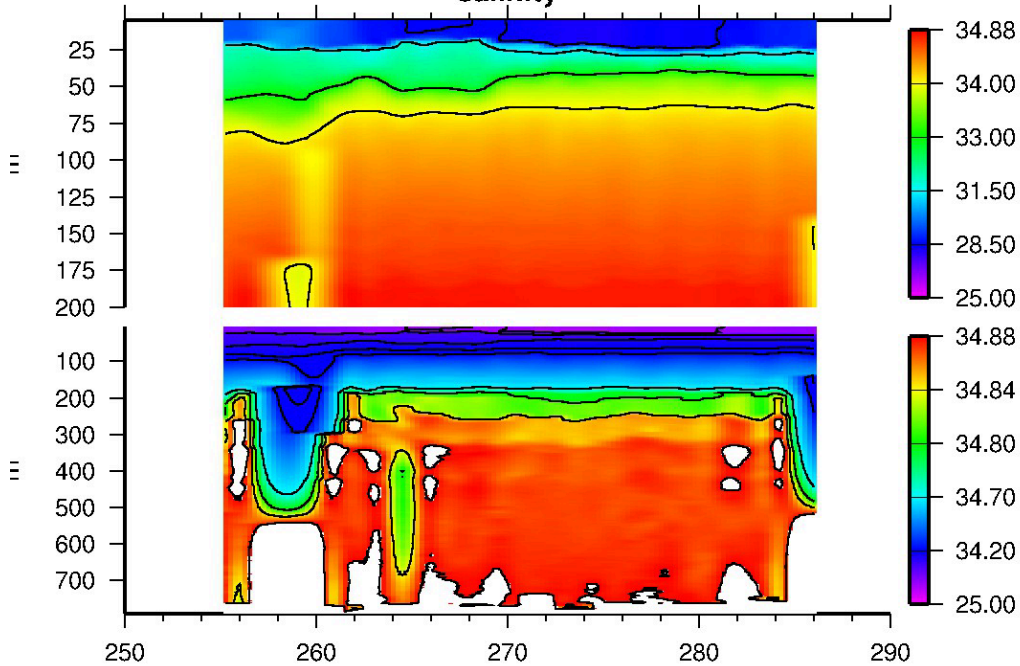


### ITP49 Up Profile Contours (to profile 62)

temperature



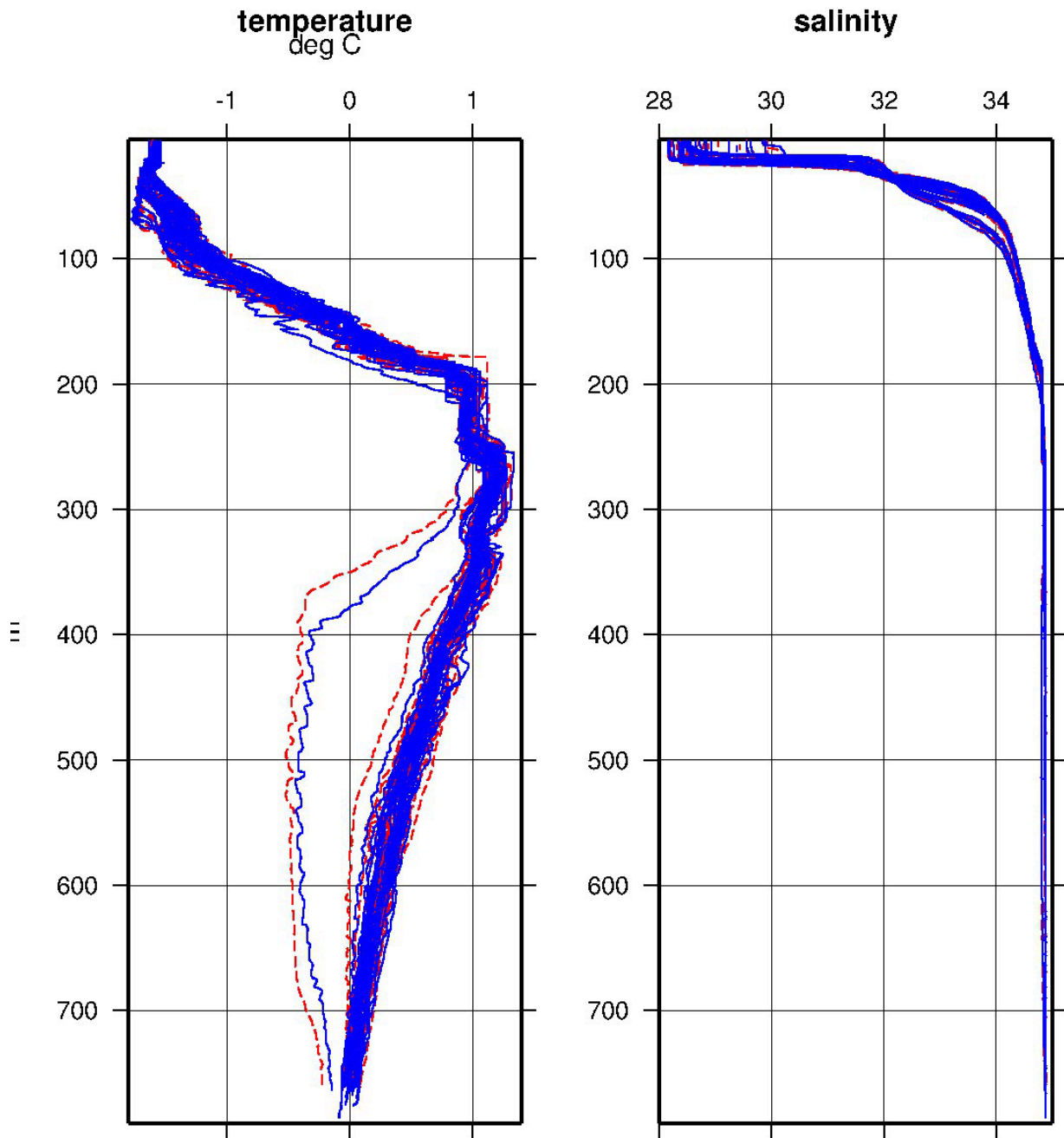
salinity



day 2011

ITP49 temperature and salinity contours.

### All ITP49 Profiles (up to profile 62)



*up solid, down dashed*

Composite plot of ITP temperature and salinity contours.



Surface package of ITP 49 shortly after the deployment during the 2011 TransArc expedition on the Polarstern. (Ben Rabe)