

## ITP 57 Overview

**Deployment Location:** 9/5/2012, 23:00 UTC at 81° 52.9' N, 130° 52.2' E

**Last Location:** 12/21/2013, 23:00 UTC at 87° 29.2' N, 20° 41.3' E

**Duration:** 472 days

**Distance Traveled:** 5593 km

**Number of profiles:** 946 in 473 days

**Other instruments:** none

ITP57 was deployed on a 2-2.5 m thick icefloe in the Transpolar Drift during the ARK-XXVII/3 cruise (TransArc) on the *R/V Polarstern* as a contribution to the 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.

## ITP57 Deployment Operations

The second ITP deployed during the 2012 TransArc cruise on the *R/V Polarstern* was ITP 57. The selected site was in a well consolidated part of a several km wide consolidated icefloe about 2-2.5 mm thick, mostly surrounded by ridges. An hour later, the ice hole had been augered, and the profiler deployed through the hole. Inductive modem communications tests were successfully conducted when the instrument was first lowered into the ocean, after about 200 m wire had been paid out, and after the system was fully deployed another hour later. After the group photo, the deployment equipment was slung back to the ship by helicopter.

## ITP57 Data Processing

The 946 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. Thermohaline staircases were not well defined, especially over the early part of the record, so that initial estimates for CTD lag corrections could not be determined from sharp interfaces. Instead, constant values based on standard values were mostly used and modified slightly where needed to address occasional density spikes and inversions presumably related to reduced flow through the sensors.

Over 96% of the profiles spanned more than 700 m of the vertical range and nearly 90% contained both good temperature and conductivity data. A few small periods of contaminated conductivity profiles were removed (the largest contiguous series consisted of 6 profiles, with a total of 20 for the whole record). Some small amount of up/down hysteresis remains for a few short periods (e.g., profiles 730 to 740 and 840 to 870).

## ITP57 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.

After deployment, the buoy drifted north with the Transpolar Driftstream current predominantly between the 130 and 140 °E meridians, parallel to and several times crossing the Lomonsov Ridge. The system came as close as 210 km to the North Pole, before continuing towards Fram Strait. However, ITP 57 never completed the transect across the Eurasian Basin. After operating consistently for 472 days, and with substantial power still remaining in the surface package and profiler battery packs, the surface unit abruptly ceased communicating via Iridium in late December 2013.

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

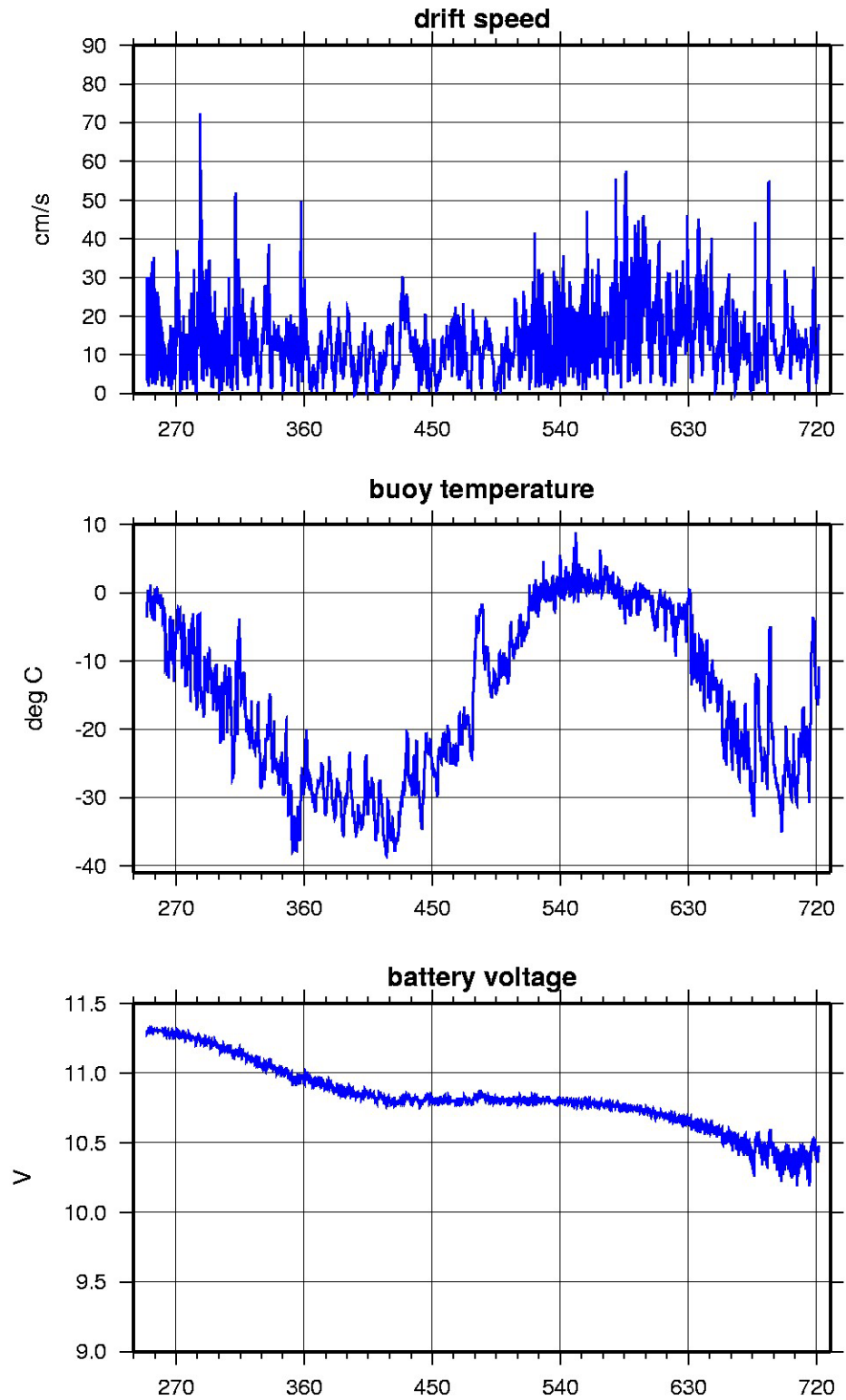
Level II hourly buoy location data in ASCII format: `itp57rawlocs.dat`

Level III 1-Hz processed profile data in MATLAB format: `itp57cormat.tar.Z` or `itp57cormat.zip`

Level III 1-db bin-averaged processed profile data in MATLAB format: `itp57final.mat`

Level III 1-db bin-averaged processed profile data in ASCII format: `itp57final.tar.Z` or `itp57final.zip`

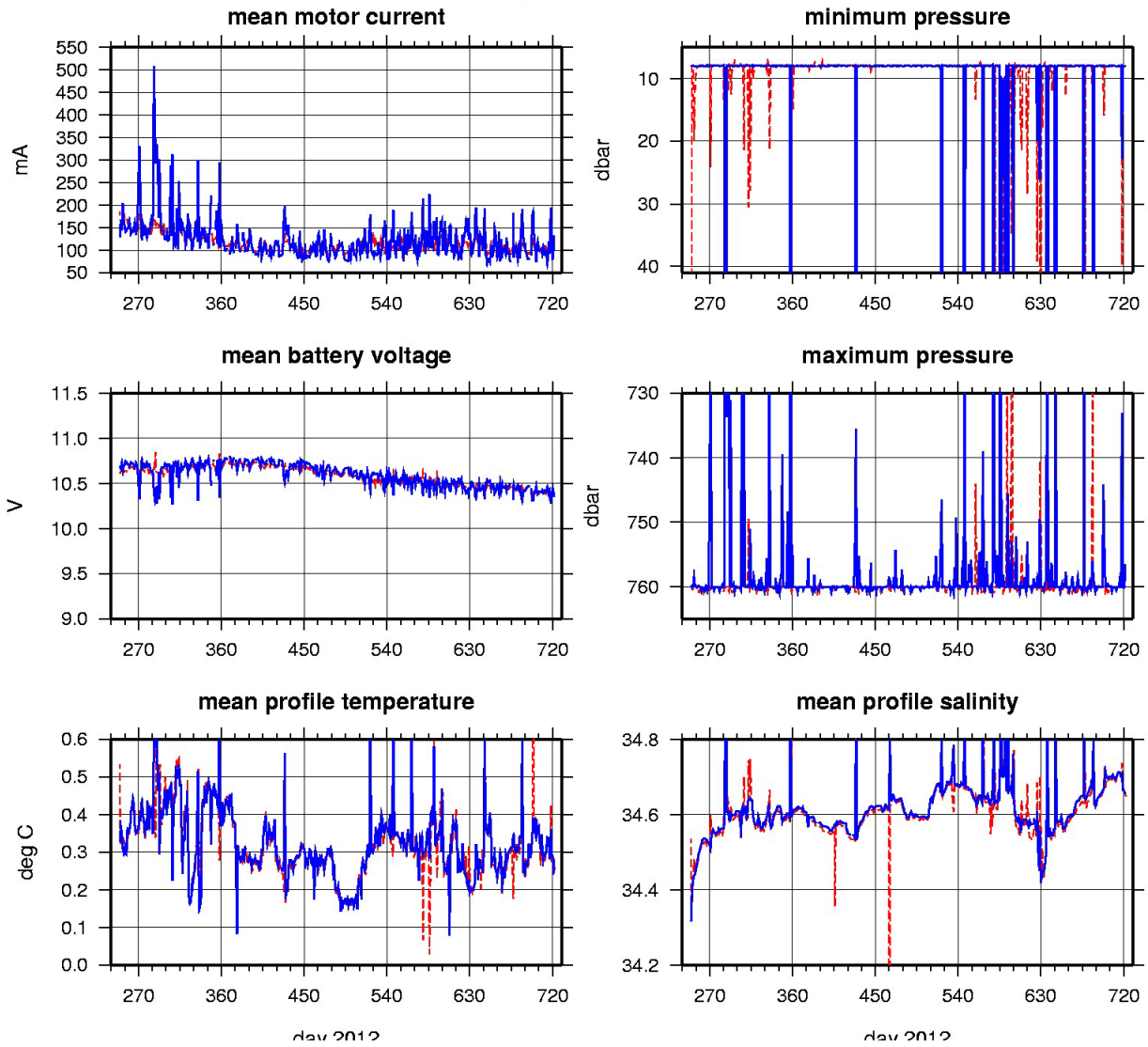
# ITP57 Buoy Status (as of 2013/12/21)



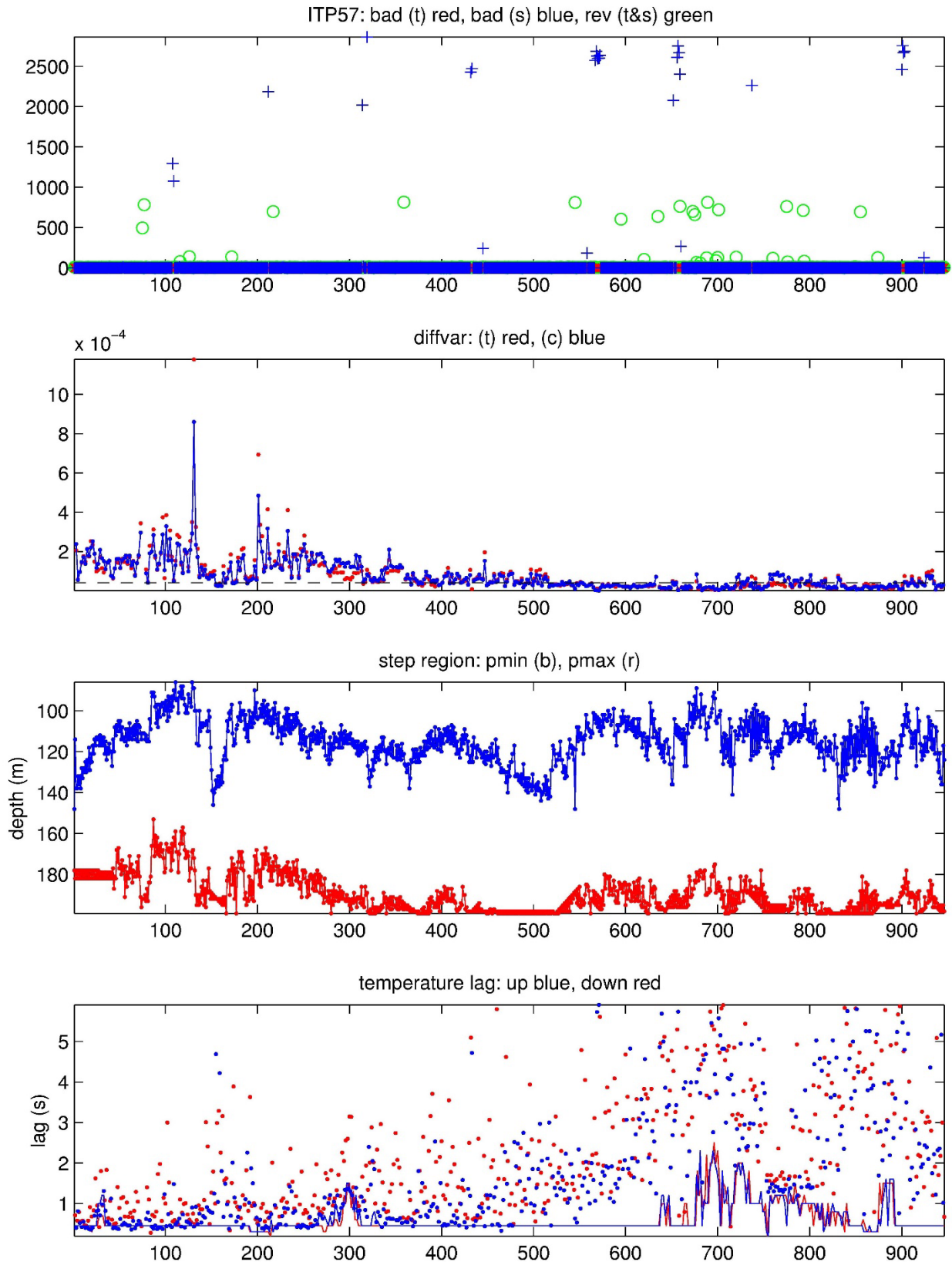
Nov 2012  
ITP Surface Buoy Status.

### ITP57 Profiler Status (up to profile 946)

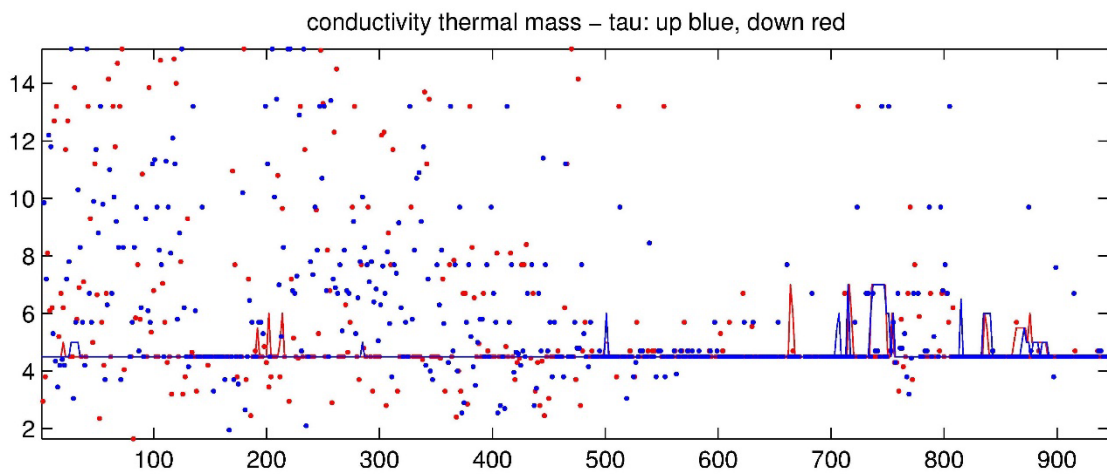
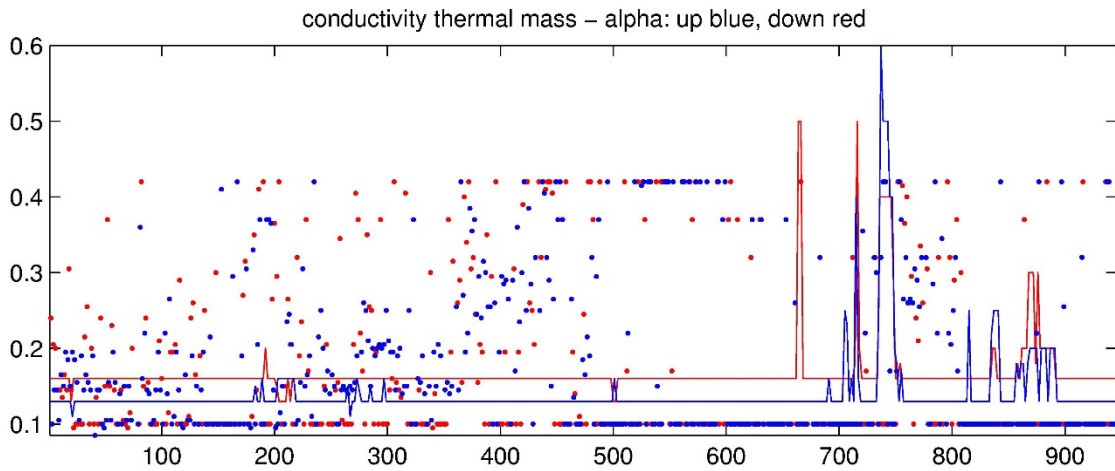
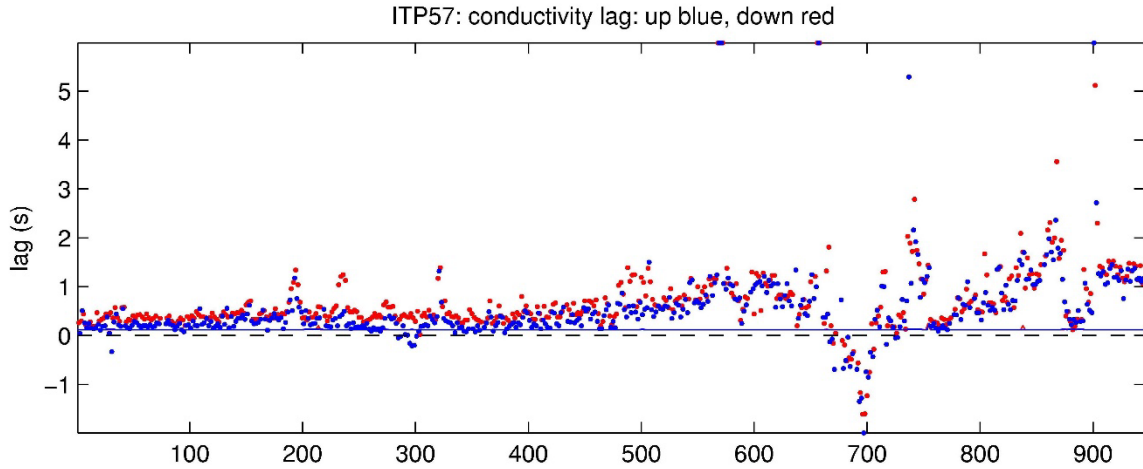
*up solid, down dashed*



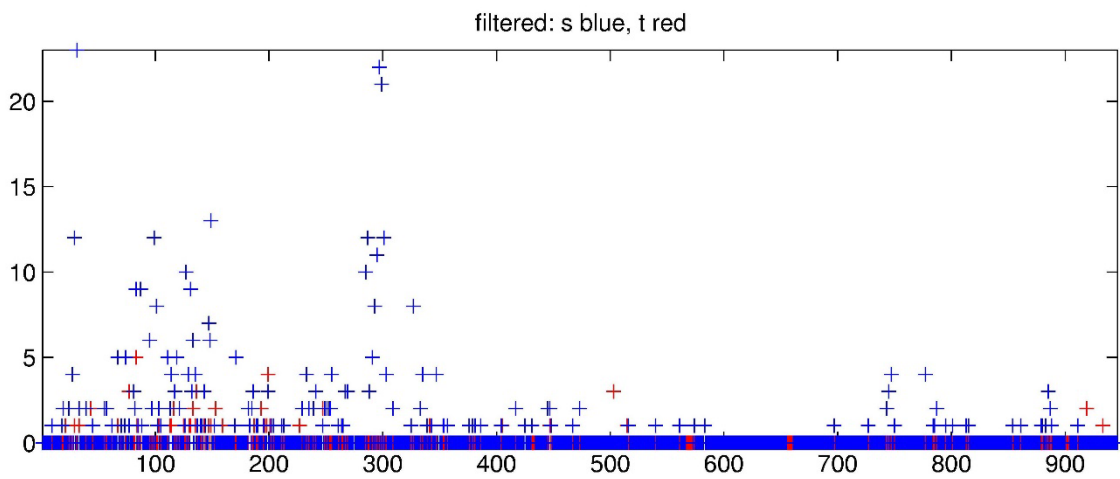
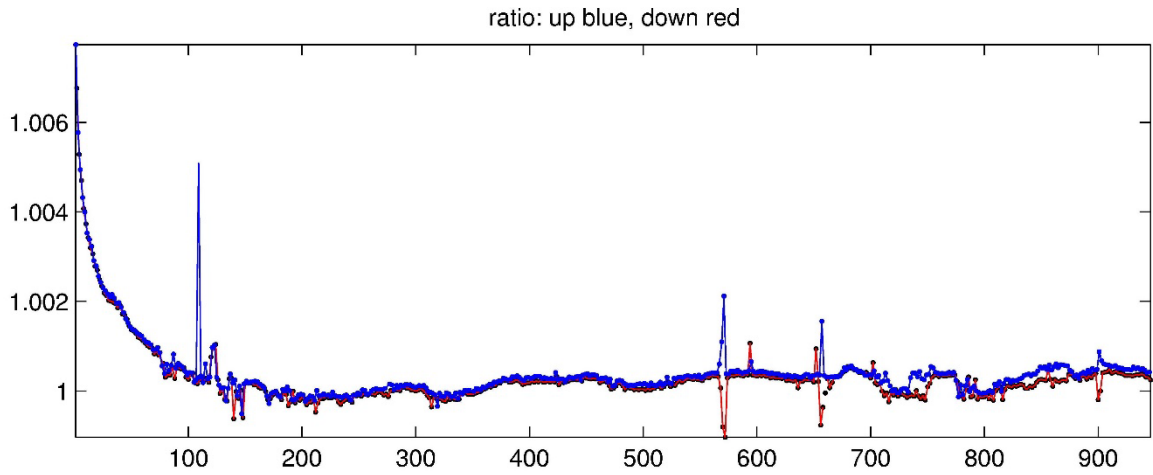
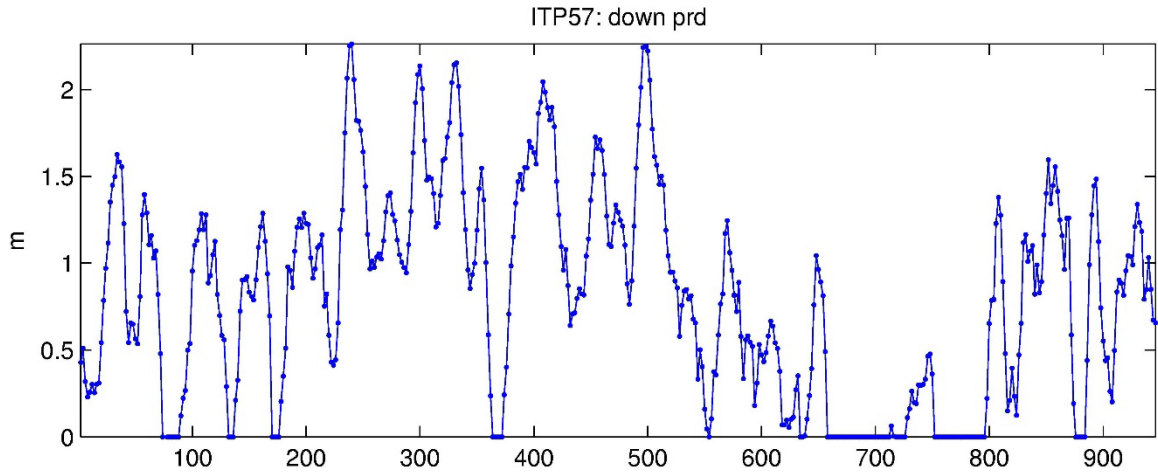
ITP profiler engineering data.



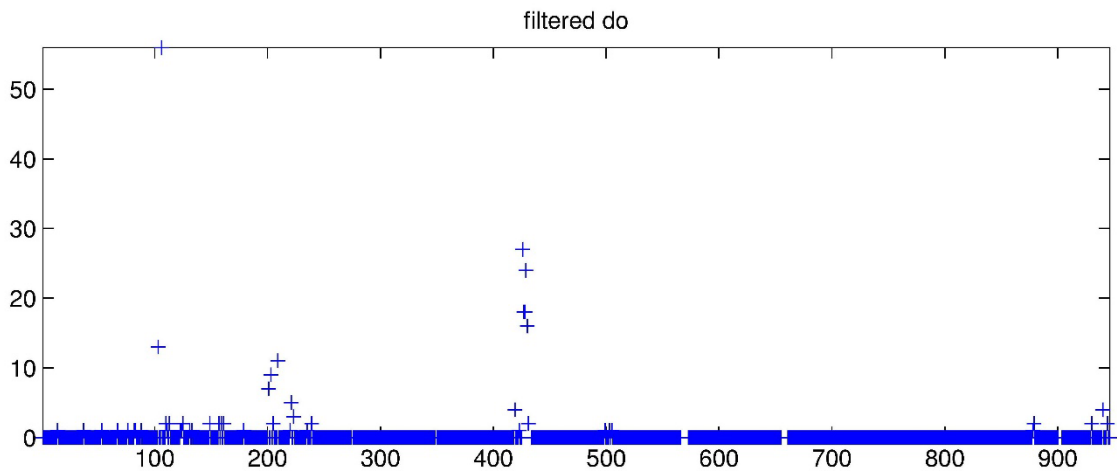
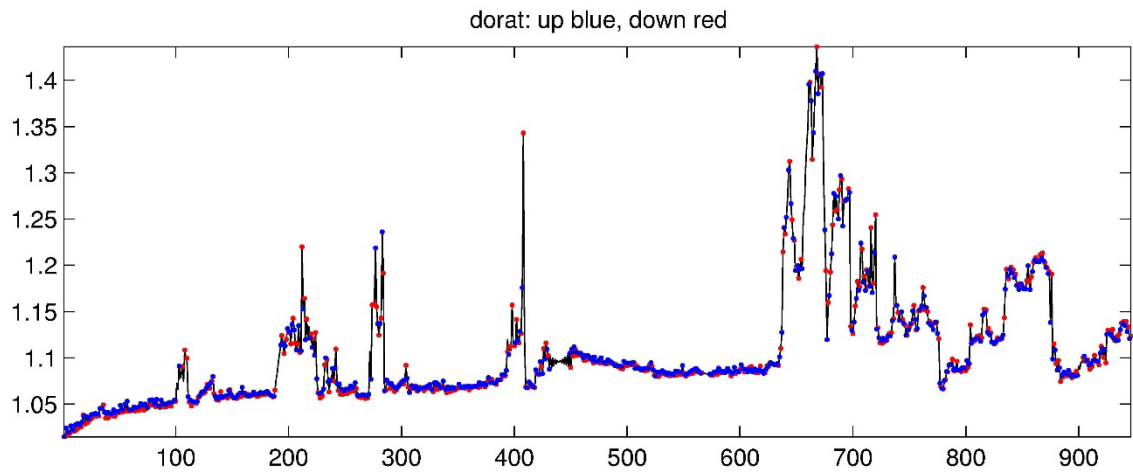
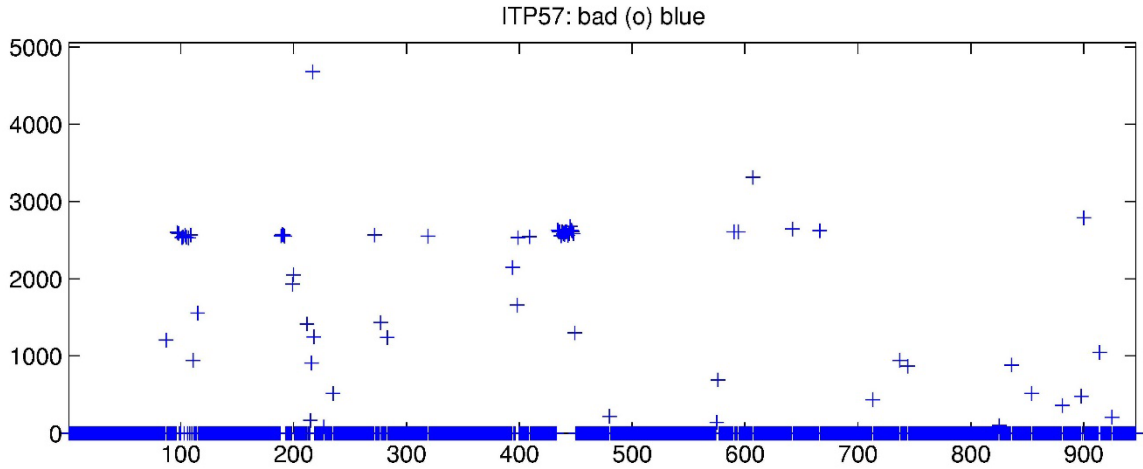
Top: number of bad points removed, Middle: variance of verticle difference of temperature and salinity in step region for up-going profiles, Bottom: temperature lag.



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

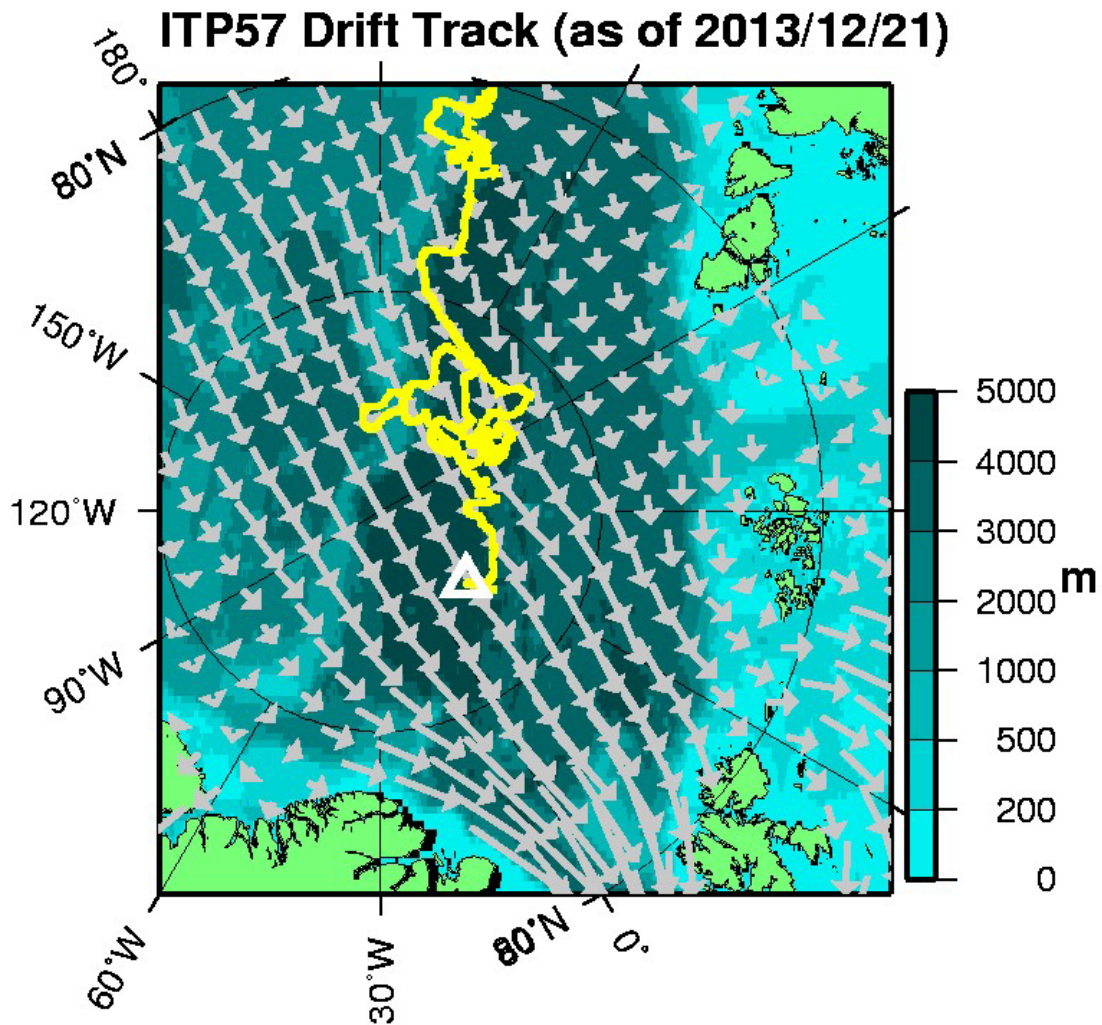


Top: down pressure deviation correction, Middle: salinity ratio adjustment, Bottom: number of filtered spikes.



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



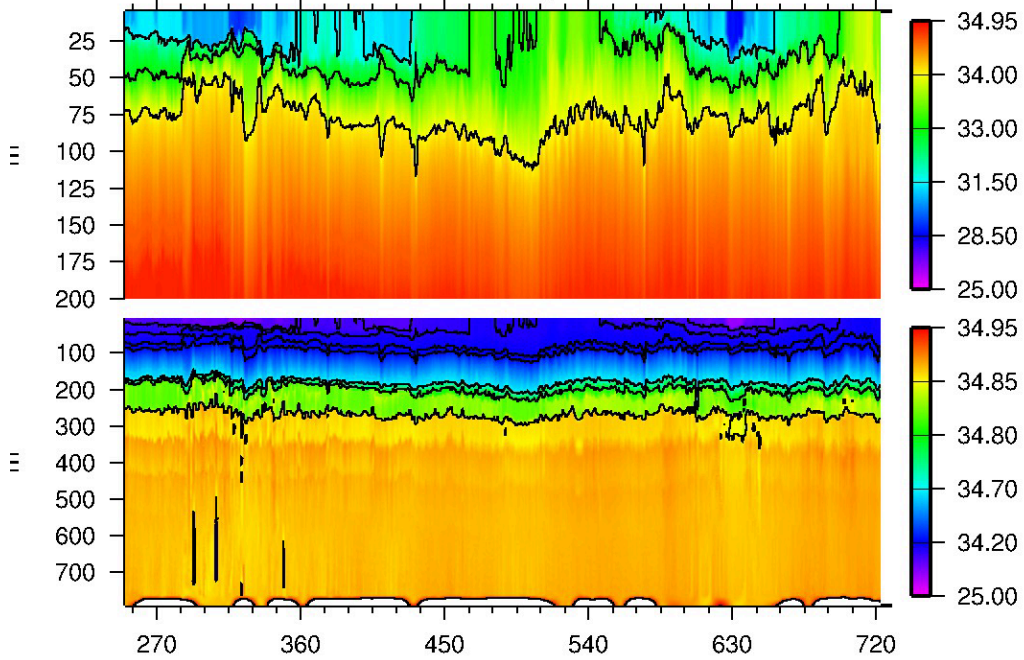
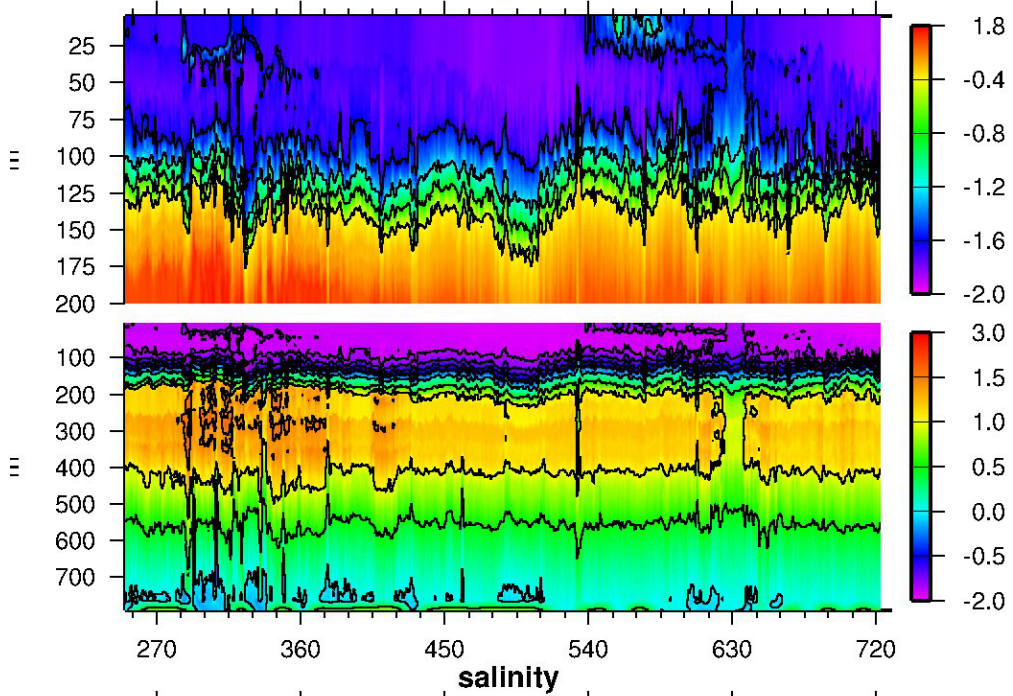


**ITP drift (yellow line) and latest location (triangle),  
and annual ice drift from IABP (grey vectors) on  
IBCAO bathymetry (shading).**

Plot of buoy locations.

### ITP57 Up Profile Contours (to profile 946)

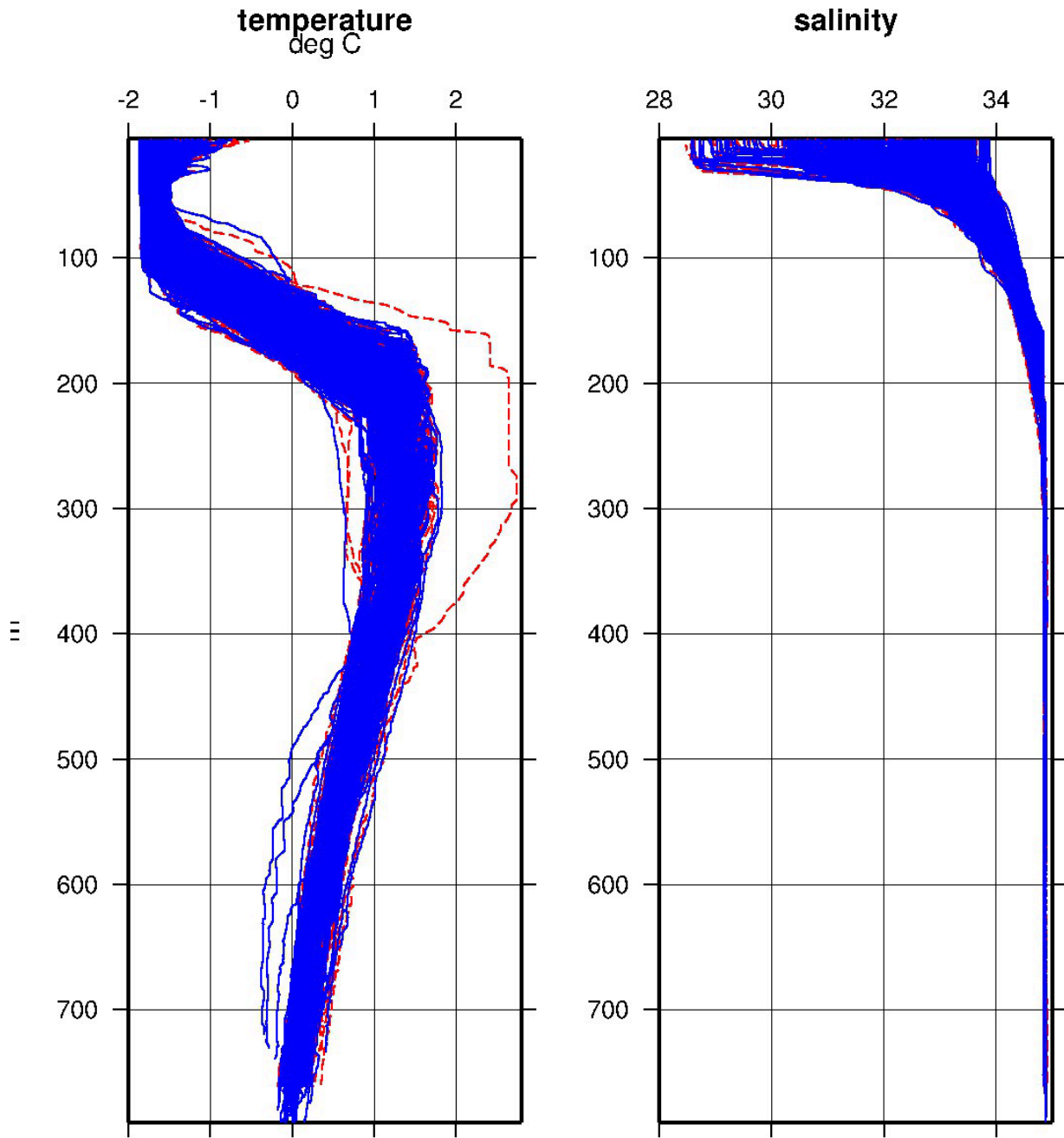
temperature



day 2012

ITP57 temperature and salinity contours.

### All ITP57 Profiles (up to profile 946)

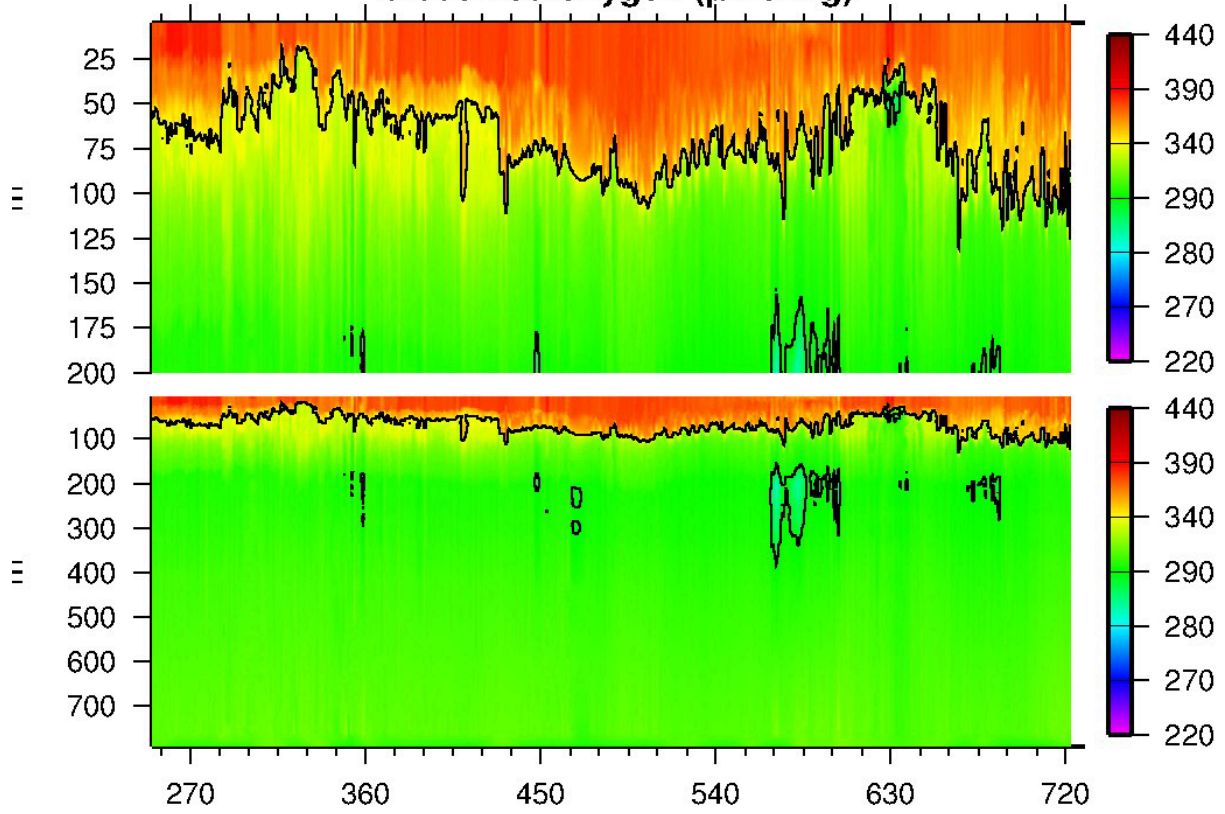


*up solid, down dashed*

Composite plot of ITP temperature and salinity profiles.

# ITP57 Up Profile Contours (to profile 945)

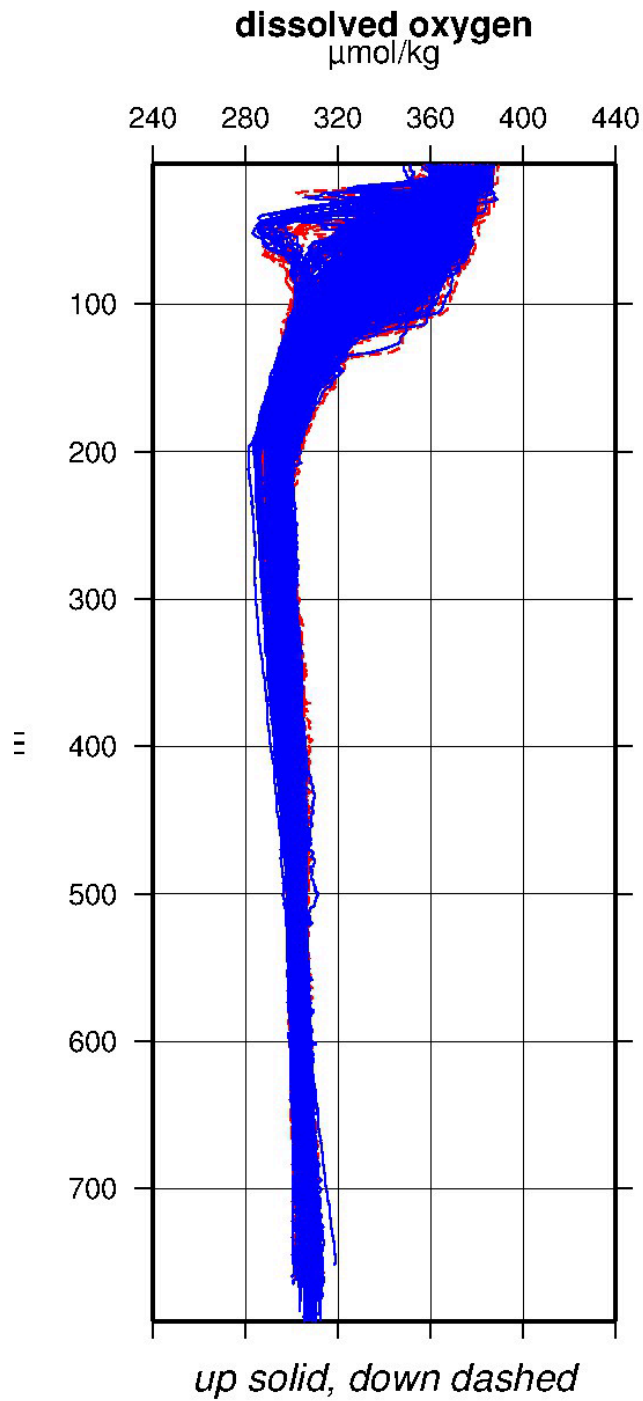
dissolved oxygen ( $\mu\text{mol/kg}$ )



day 2012

ITP57 dissolved oxygen contours.

# All ITP57 Profiles (up to profile 945)



Composite plot of ITP dissolved oxygen profiles.



The deployment apparatus and ITP instrumentation were delivered to the ice floe using the ship's helicopter. (Kare Bakker)



The surface package installed in the flotation just prior to deployment. (Ben Rabe)