

ITP34 Overview

Deployment Location: 10/10/2009, 21:00 UTC at 74° 35.0'N, 134° 45.5'W

Last Location: 8/7/2012, 21:02 UTC at 84° 56.8' N, 66° 19.7' W

Duration: 1032 days

Distance Traveled: 8064 km

Number of profiles: 824 in 411 days

Other instruments: none

ITP 34 was deployed on a 2.8 m thick ice floe in the Beaufort Sea as part of the Beaufort Gyre Observing System (BGOS) during the JOIS 2009 cruise on the *CCGS Louis S. St. Laurent*. The ITP operated on a standard sampling schedule of 2 one-way profiles between 7 and 760 m depth each day.

ITP34 Deployment Operations

It was the second week of October, the daylight hours were decreasing, and while the air temperature was only about -5°C, the wind chill was much less during the deployment of ITP 34, the last of the JOIS 2009 cruise. The morning reconnaissance by helicopter revealed that the ice conditions in the area appeared to largely consist of a rubble field, obscured by a light coating of wind-blown snow, hampering floe selection. However, a relatively small level floe of 2.8 m thickness was identified on the second landing and selected for the buoy site.

Back on the ship, the instruments and deployment apparatus were staged, and the operations began in the afternoon. After three flights of passengers and a slingload of gear, augering of the icefloe immediately began, while another group of scientists surveyed the icefloe. As there was no shelter from the frigid wind, no time was wasted completing the operations. Within an hour, the profiler was lowered into the water, 40 minutes later the buoy was installed, and everyone was safely back onboard the warm ship another 40 minutes after that.

ITP34 Data Processing

Following its deployment in October 10 2009, ITP34 transmitted 342 nearly flawless journeys up and down the wire until March 30, 2010. At that time, the profiler stopped crawling and continued to provide "point measurements" from single depths for another 482 profiles until the end of November 2010. Only the profiling portion of the record is included in the level 3 data set.

The data 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. Buoy drift speeds stayed mostly between 10 and 20 cm/s, with a few isolated spikes exceeding 40 cm/s. As usual, some conductivity (salinity) data were affected by biofouling or similar glitches. However, they were relatively few here, most were short or even single bins, and none lasted over several profiles.

Well defined thermohaline staircases were present over the first half of the time series, enabling CTD lag corrections. The lags were in the typical range found for previous systems. During manual editing, thermal lag corrections were dialed back somewhat to remove overcompensation. The combination of $\text{Alpha} = 0.11$ and $\text{Tao} = 4.5$ worked well in most cases. For the remainder of the record, staircases became very small (in vertical extent) and frequently were absent. Previous settings were maintained here, though these profiles displayed less change when modifying alpha and tao. A few instances of the thermistor lag corrections ("tlag" in the code) were modified to better adjust sharp spikes at the top/bottom of stair cases. The conductivity - temperature time offsets ("cshift") were not modified from those calculated by the processing code.

The conductivity adjustment ("rat") remained fairly flat and close to unity for nearly the whole deployment, interrupted only by two short periods of larger adjustments for a small set of profiles ("rat spikes"). Presumably these adjustments were triggered by conductivity cell contaminations. Here, the spike extended over just one (profile 81) or two (profiles 159, 160) profiles. After inspecting both cases repeatedly, it was decided to wipe the complete profiles since the conductivity calibration appeared to change over the course of the profile, i.e., adjusting to deep TS left shallower portions as outliers.

ITP34 Data Description

The ITP profiler was configured to operate with 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.

The buoy drifted westward in the Canada Basin for the first 5 months, then climbed the slope in the Chukchi Sea and was dragged along the shelf for another 3 months, before returning to deep water over the Chukchi Plain. Once the mooring climbed the slope, the mooring presumably dragged in the shallow water and the profiler ceased climbing, but apparently was dragged near or along the bottom while continuing to send data from only single or a few meter vertical extents varying in time. Even after returning to the deeper water in June 2010, the profiler was unable to climb and continued to send limited vertical extent data until November 26, 2010, when the profiler ceased communicating with the surface package. The surface package continued drifting across the Arctic Ocean until it ceased transmitting on August 7, 2012 north of Greenland.

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

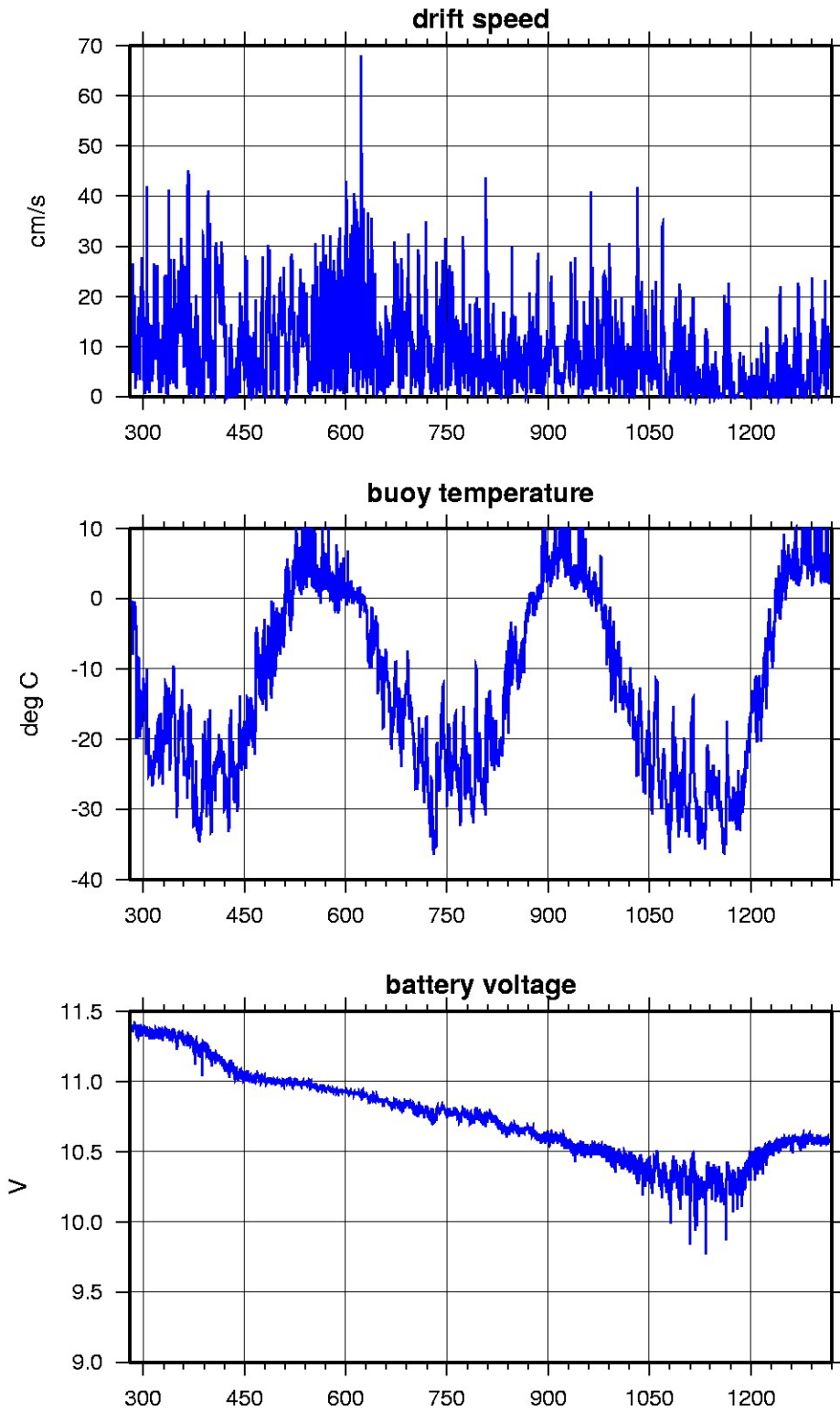
Level II hourly buoy location data in ASCII format: itp34rawlocs.dat

Level III 1-Hz processed profile data in MATLAB format: itp34cormat.tar.Z or itp34cormat.zip

Level III 1-db bin-averaged processed profile data in MATLAB format: itp34final.mat

Level III 1-db bin-averaged processed profile data in ASCII
format: itp34final.tar.Z or itp34final.zip

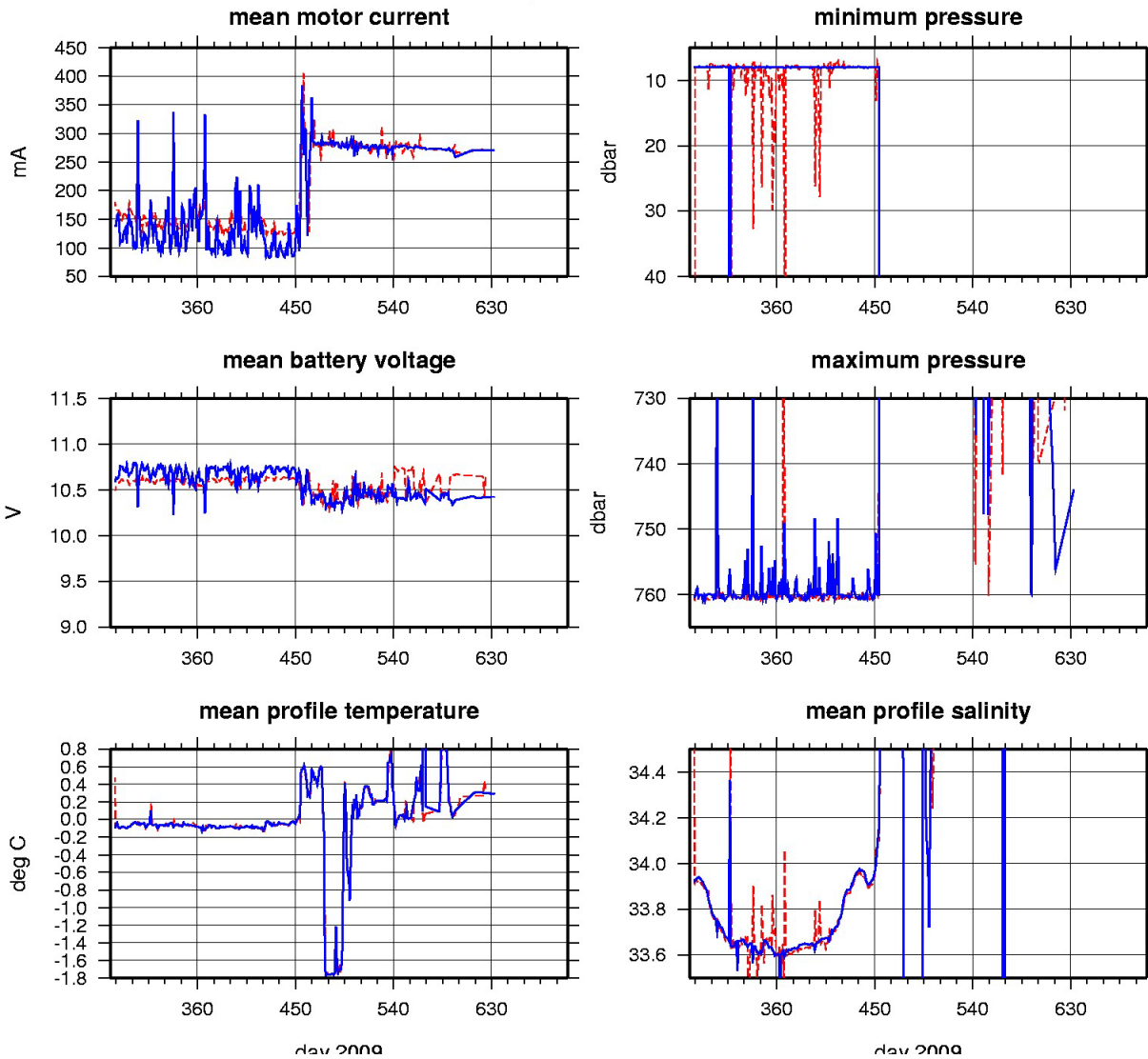
ITP34 Buoy Status (as of 2012/08/07)



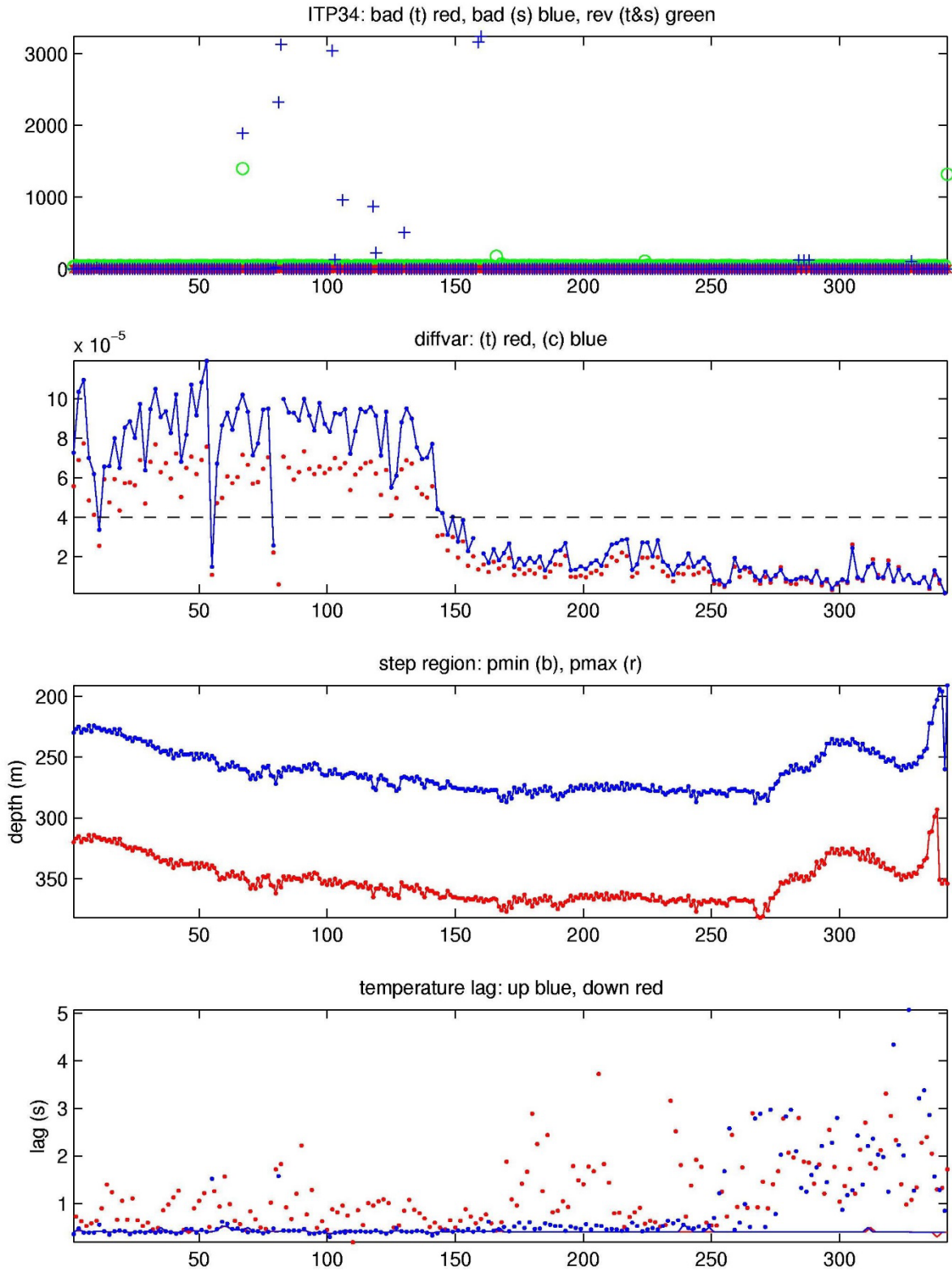
ITP Surface Buoy Status.

ITP34 Profiler Status (up to profile 824)

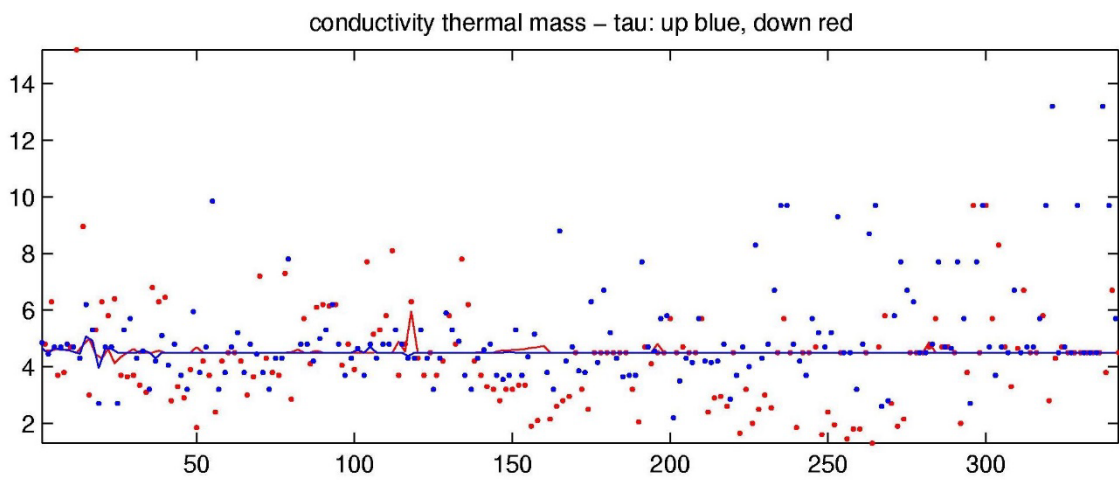
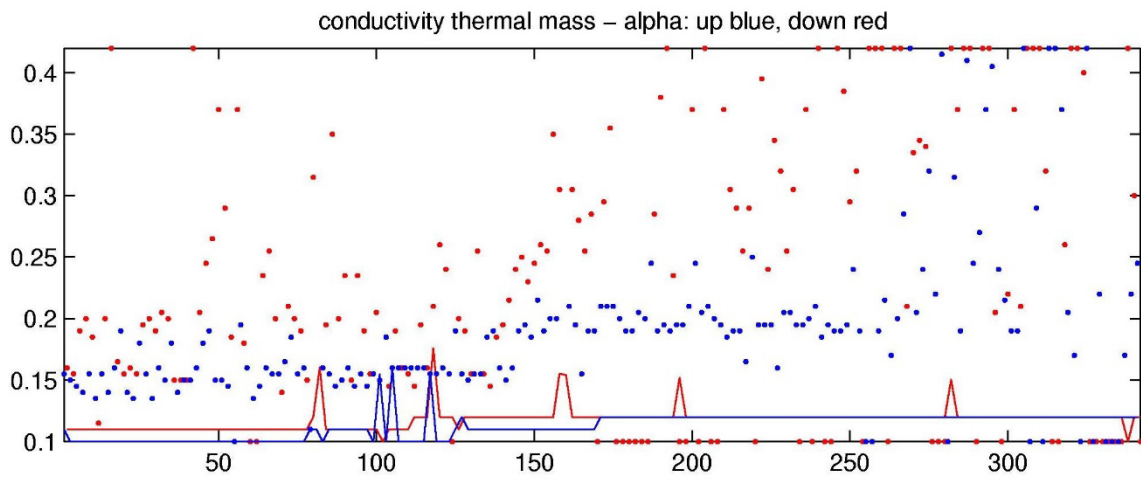
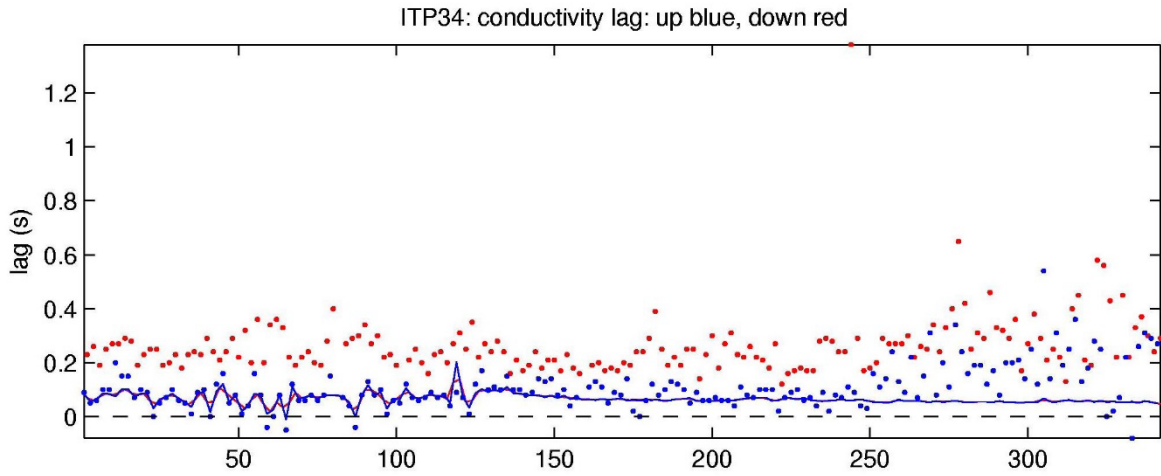
up solid, down dashed



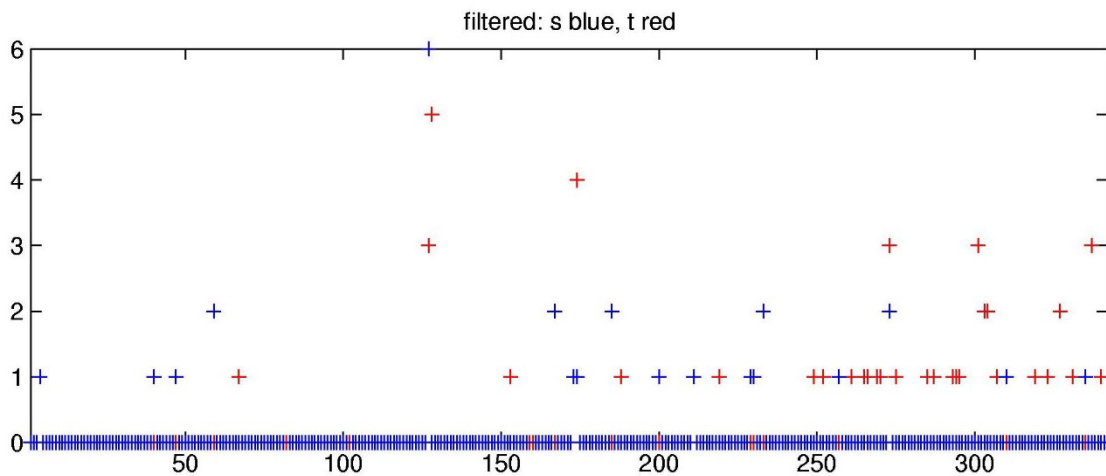
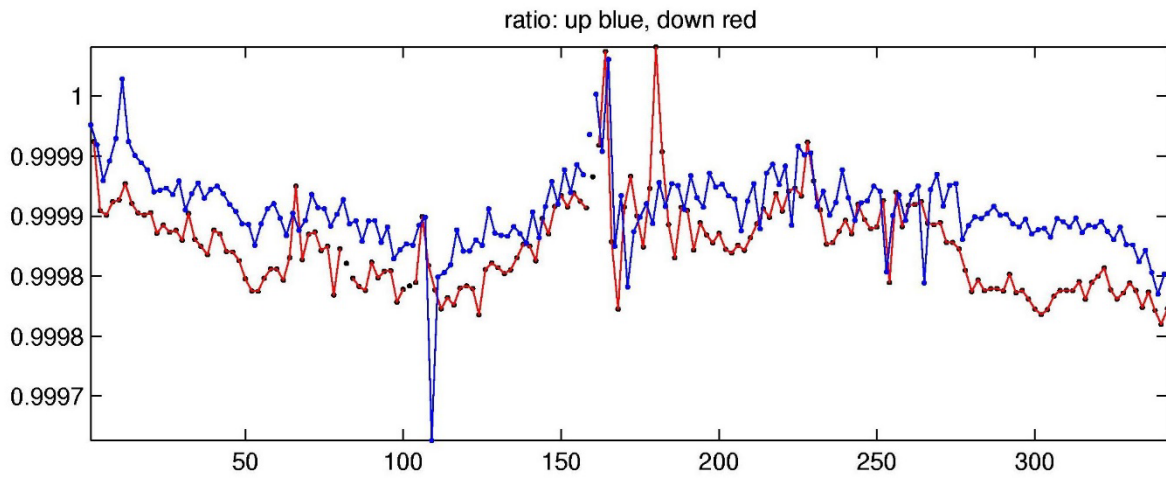
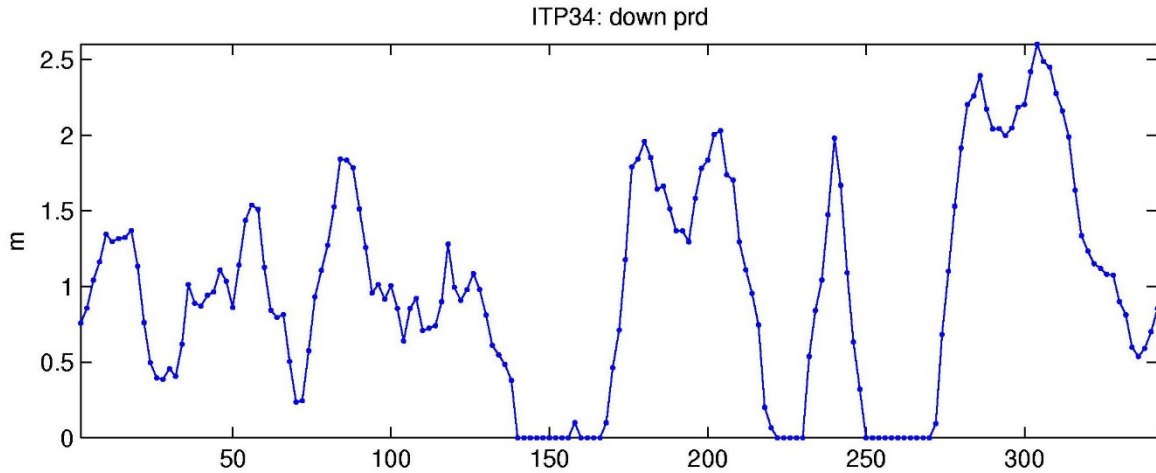
ITP profiler engineering data



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.

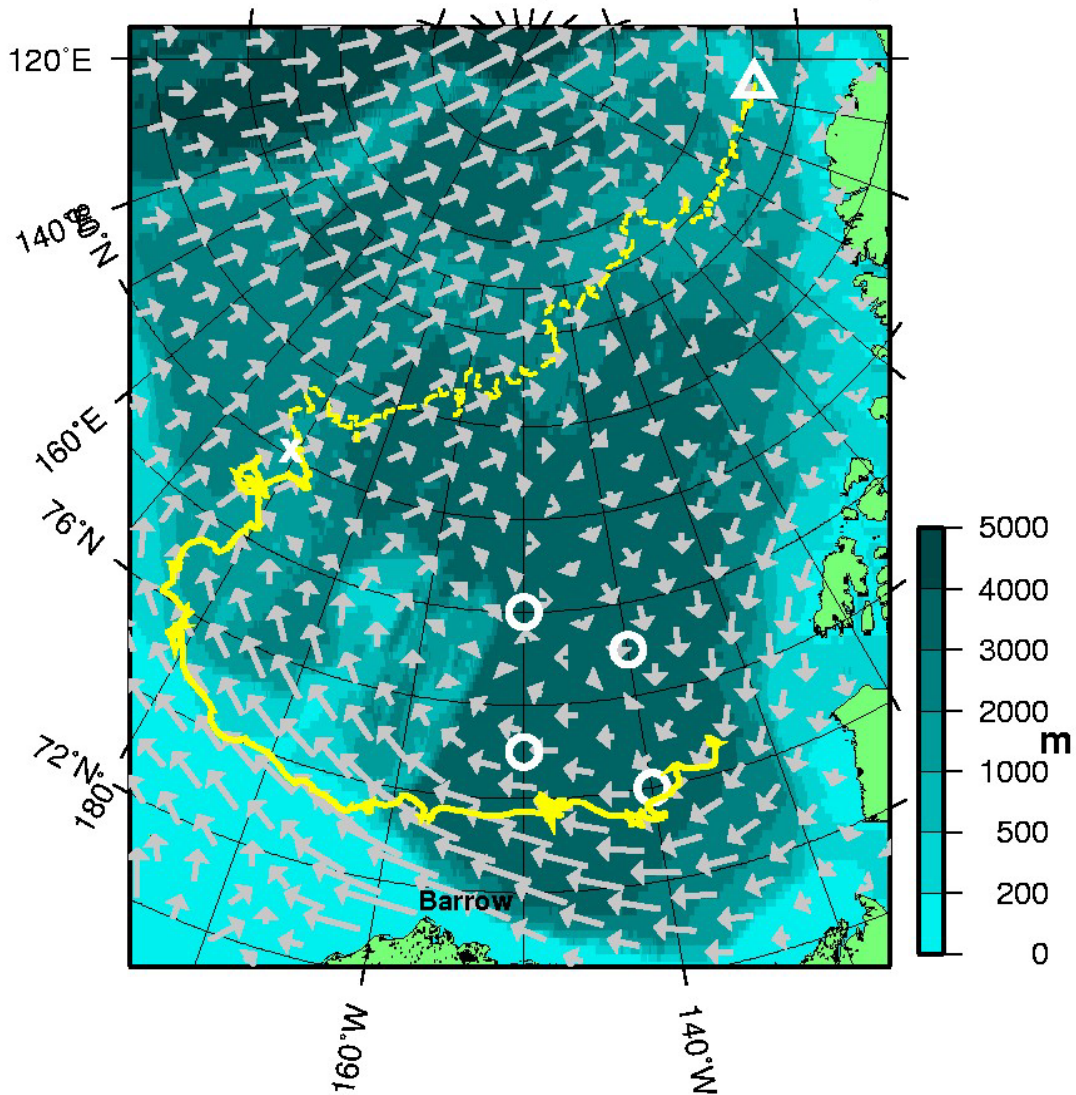


Top: conductivity lag, Middle: conductivity thermal mass amplitude correction, Bottom: conductivity thermal mass lag correction.



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

ITP34 Drift Track (as of 2012/08/07)

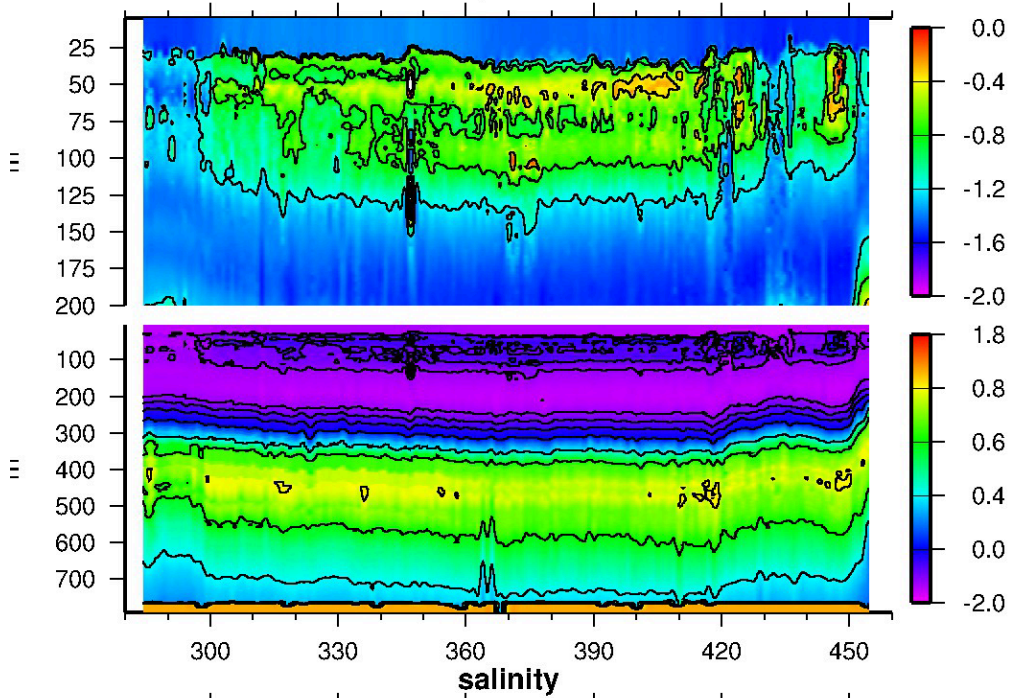


ITP drift (yellow line), last profile (cross), and last location (triangle), BGOS moorings (circles) and annual ice drift from IABP (grey vectors) on IBCAO bathymetry (shading).

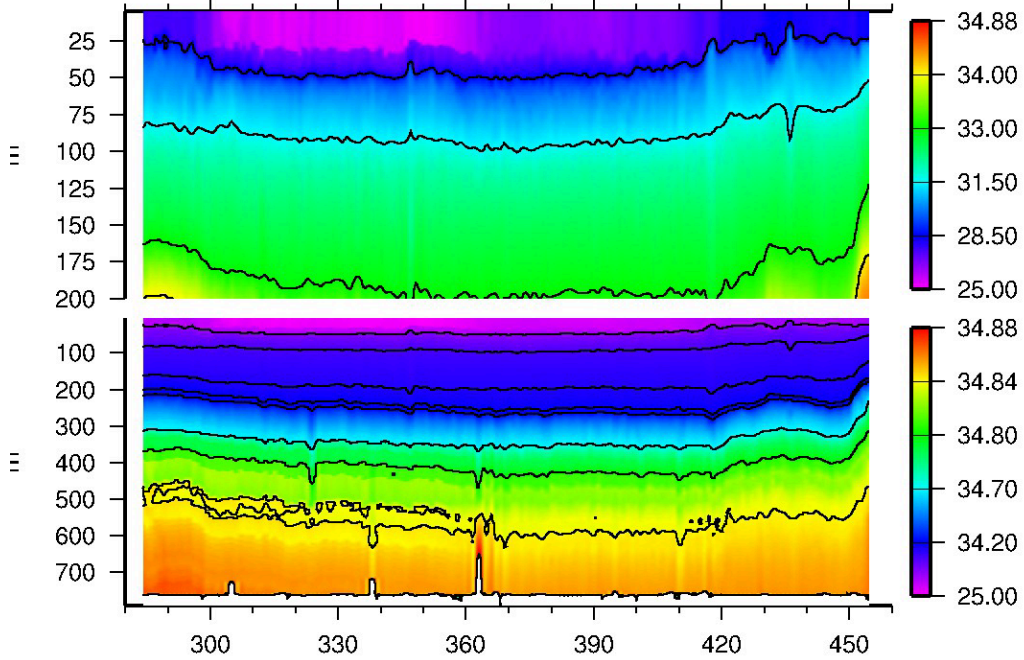
Plot of buoy locations.

ITP34 Up Profile Contours (to profile 342)

temperature



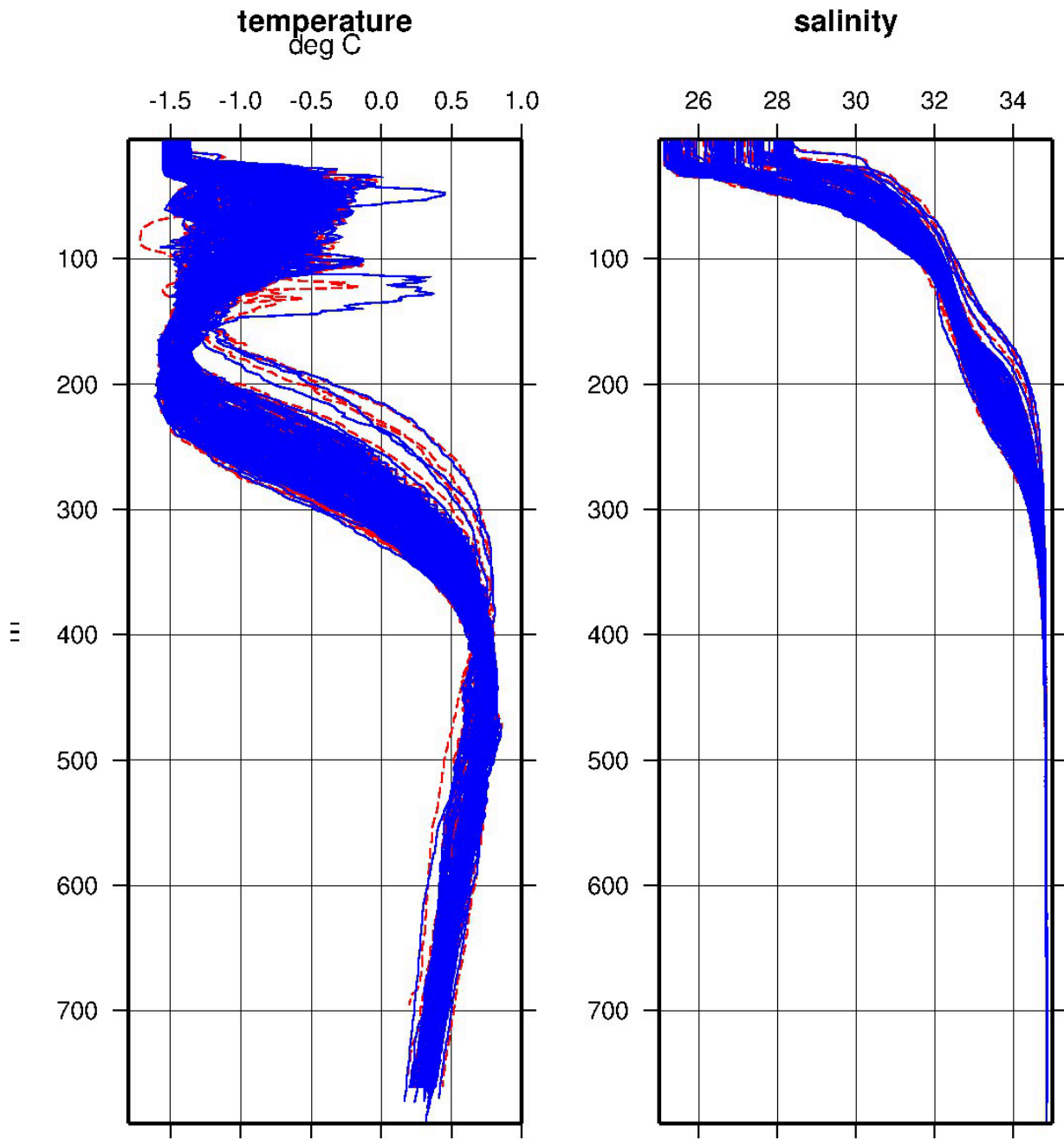
salinity



day 2009

ITP34 temperature and salinity contours.

All ITP34 Profiles (up to profile 342)



up solid, down dashed

Composite plot of ITP temperature and salinity contours.



ITP 34 alone on the floe shortly after deployment as viewed from the helicopter returning to the ship with the last passengers. (Rick Krishfield)