ITP 14 Overview

Deployment Location: 9/13/2007, 8:00 UTC at *89° 0.9'N, 104° 35.7'E*

Last Location: 11/9/2008, 23:00 UTC at 66° 27.9' N, 22° 52.4' W

Duration: 423 days

Distance Travelled: 4789 km

Number of profiles: 166 in 53 days

Other instruments: none

ITP14 was deployed on a 3.0 m thick icefloe from the Russian icebreaker *Akademik Federov* as part of the European Union DAMOCLES Program. The ITP operated on a rapid sampling schedule of 3 one-way profiles between 7 and 760 m depth each day for nearly two months, when the profiler stopped communicating with the surface package for unknown reason. The surface package continued to transmit locations for another year while it drifted through Fram Strait until it grounded in northwest Iceland.

ITP 14 Deployment Operations

Two days after deployment of the previous system, ITP14 became the fourth ITP deployed from the *Akademik Federov* as part of the DAMOCLES Program. This site did not include an Ice-Mass Balance deployment, but only the ITP. The operation was conducted using a MI-8 helicopter from the ship in the same manner as the previous two systems. The operation departed the ship in gray, overcast conditions in the middle of the Arctic night with the temperature hovering around a relatively warm -2° C. After the personnel and gear were unloaded on the selected ice floe, the helicopter departed to continue to scout for a suitable ice floe for the Russian North Pole ice camp (NP-35). The deployment proceeded smoothly, then the field party were retrieved and transported back to the ship.

ITP 14 Data Processing

The 166 profiles that were recovered from the ITP were processed according to the procedures described in the ITP Data Processing Procedures, and the processing parameters are shown in the figures to the right. Despite the short duration of operation, the profiler experienced 26 software resets (and typically incomplete vertical coverage for the next subsequent profiles) due to the 2007 software bug. This percentage of resets (15%) was superseded by only one other ITP (number 16 encountered 25% resets). On the other hand, the temperature and salinity data are remarkably free of errors (only profile 65 was removed because of corrupted data).

Significant variability in the part of the water column where thermohaline staircases have been observed in the past indicate that perhaps some remnants of these features may have been present

early in the time series (profiles 10-50), from which sensor lags could be estimated. These estimates coincided with typical standard lags, so these were applied throughout the series. Rapid drift was a factor at several instances, so that the profiler was unable to climb the wire against the current.

ITP 14 Data Description

Due to the proximity to the Fram Strait, the ITP profiler was configured to operate with an accelerated sampling schedule of 3 one-way profiles each day. In the surface package, the GPS receiver was powered every hour to obtain locations, and buoy temperature and battery voltage status were recorded. The unit was deployed to the east of the Lomonosov Ridge and drifted to the south largely paralleling the ridge. Early on (as delineated in Data Processing section), features perhaps resembling remnant thermohaline staircases were observed, perhaps indicating that the system briefly crossed over a front separating Atlantic and Pacific sectors. Without warning, the underwater unit suddenly ceased ringing the surface unit after 53 days.

The plots below are of the final, calibrated, edited data (as opposed to the raw data presented on the active instrument pages).
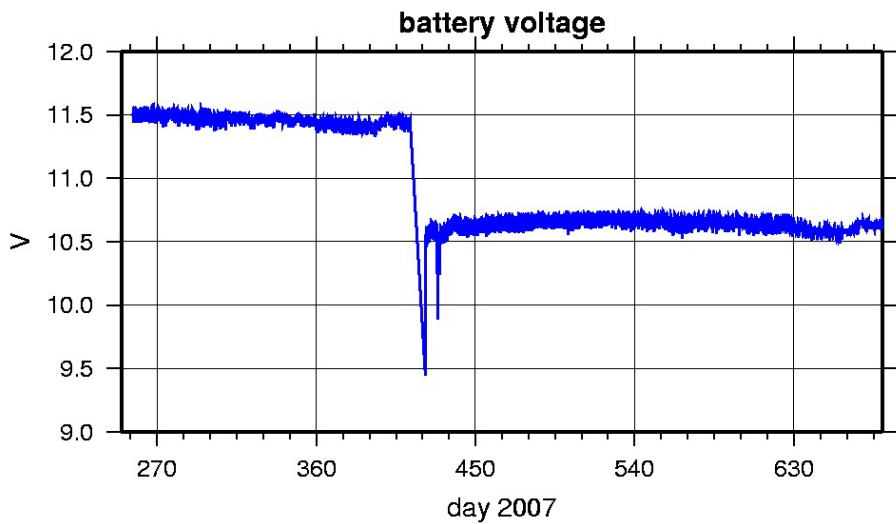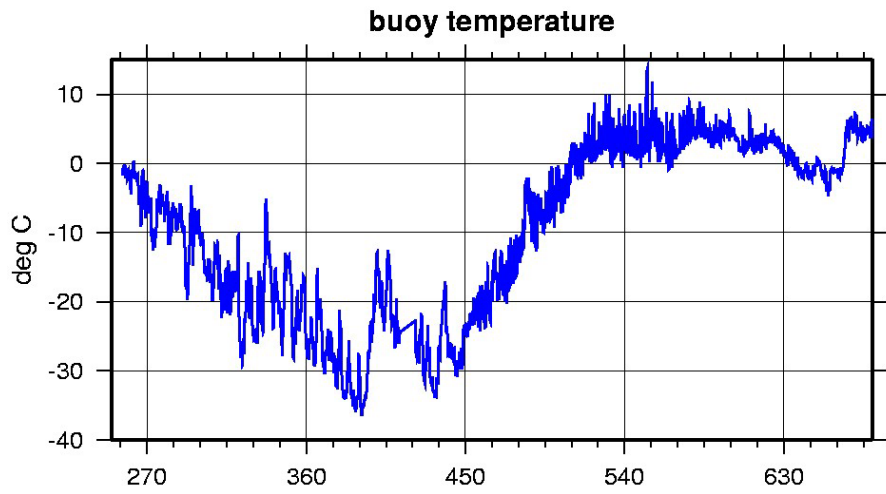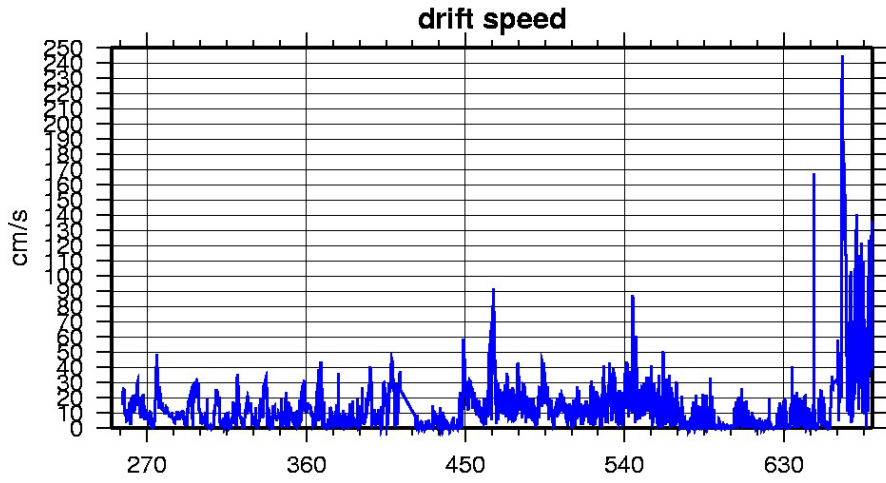
Level II hourly buoy location data in ASCII format: itp14rawlocs.dat

Level III 1-Hz processed profile data in MATLAB format: itp14cormat.tar.Z or itp14cormat.zip

Level III 1-db bin-averaged processed profile data in MATLAB format: itp14final.mat
Level III 1-db bin-averaged processed profile data in ASCII format: itp14final.tar.Z
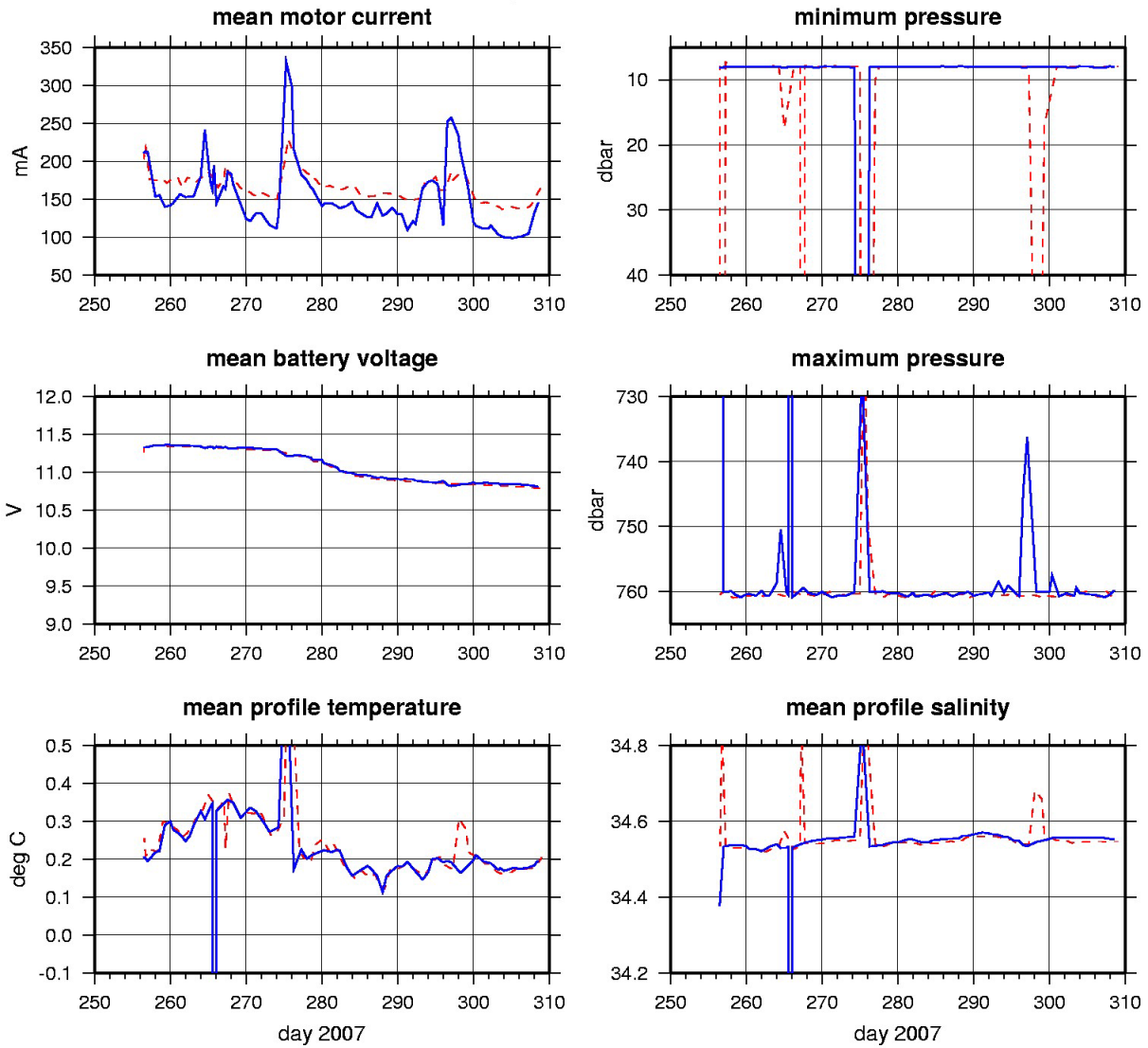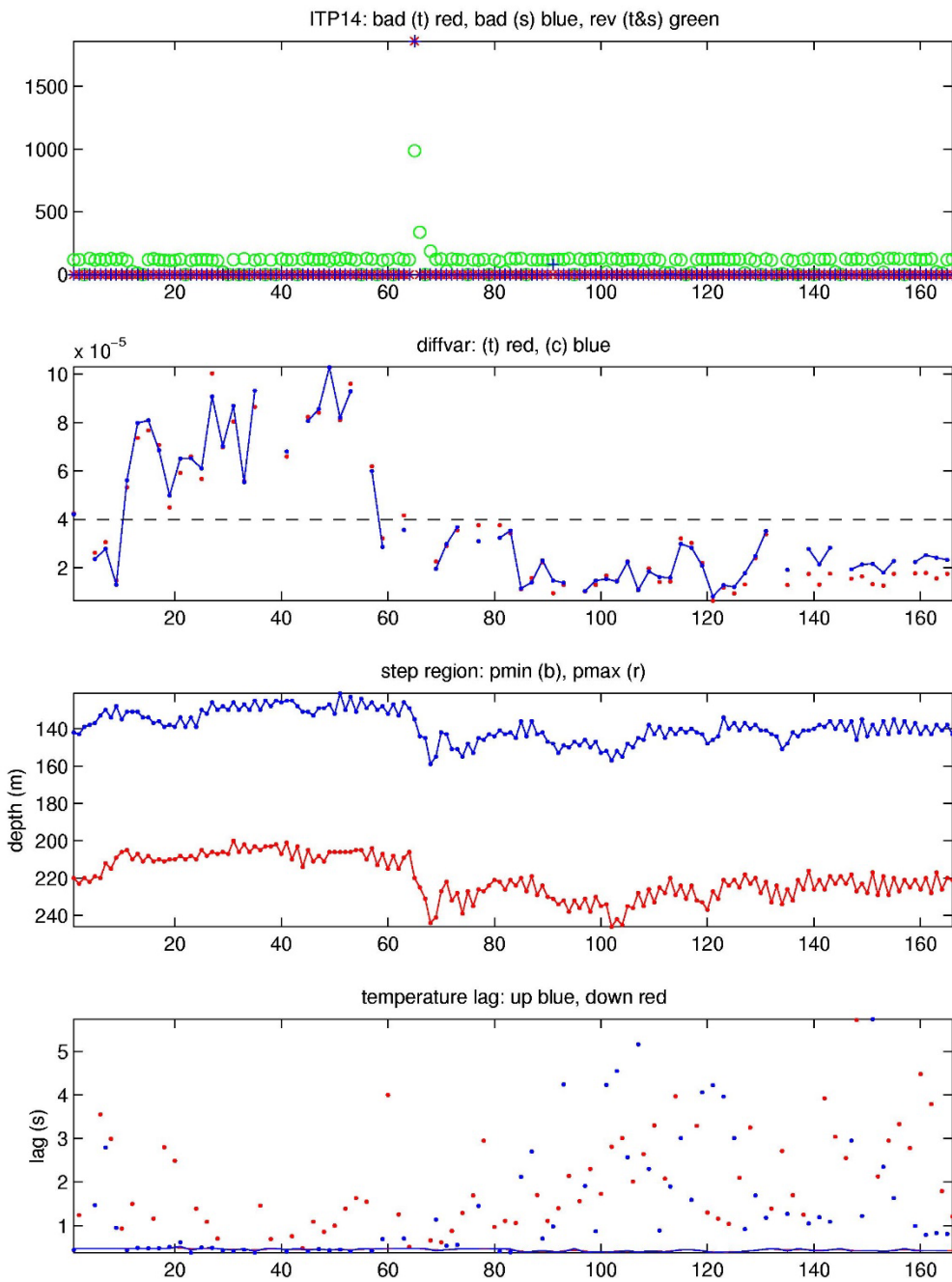or itp14final.zip

ITP14 Buoy Status (as of 2008/11/09)

drift speed

buoy temperature

battery voltage

day 2007

ITP surface buoy data

ITP14 Profiler Status (up to profile 166)

up solid, down dashed

mean motor current

minimum pressure

mean battery voltage

maximum pressure

mean profile temperature

mean profile salinity

day 2007

day 2007

ITP profiler engineering data

Number of bad points removed (top); variance of verticle difference of temperature and salinity in step region for up-going profiles; depth of staircase layer; temperature lag (bottom).
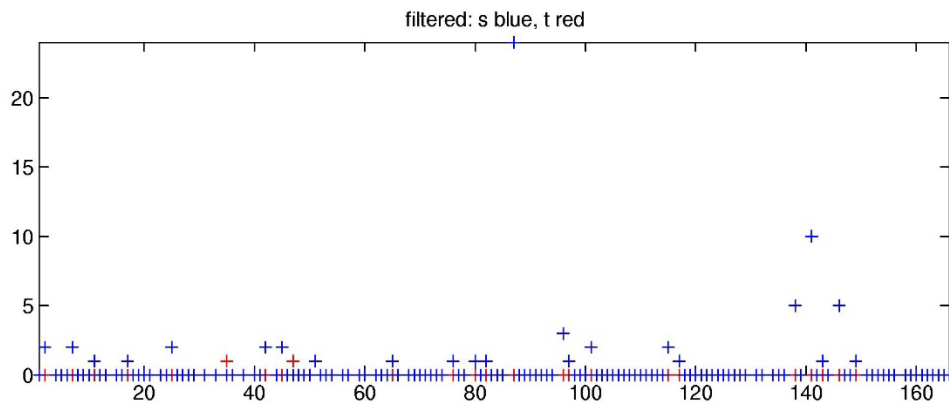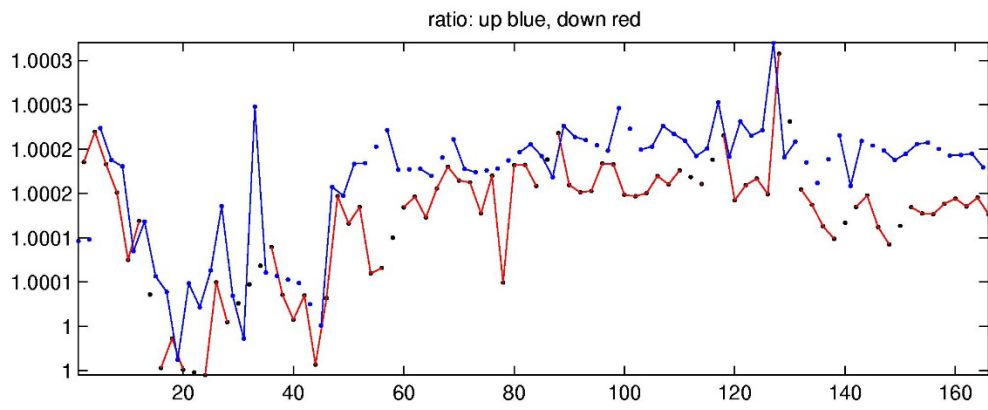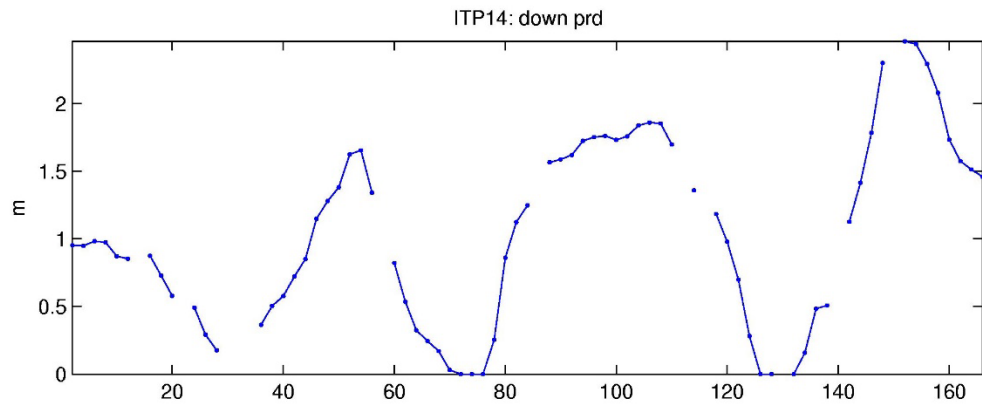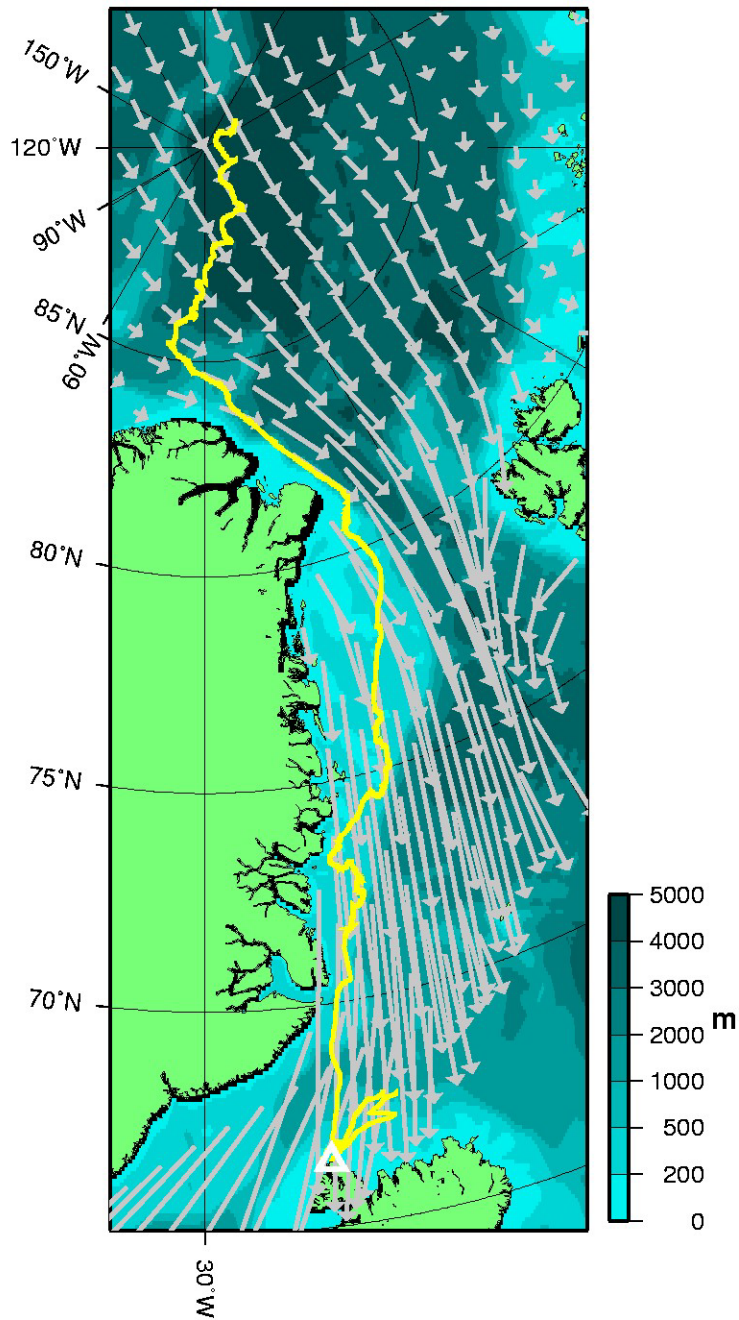
Top: conductivity lag, Middle: conductivity thermal mass amplitude correction, Bottom: conductivity thermal mass lag correction
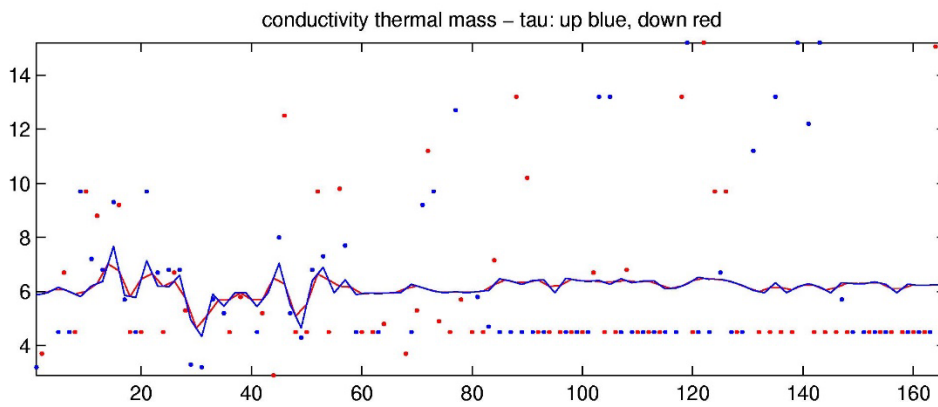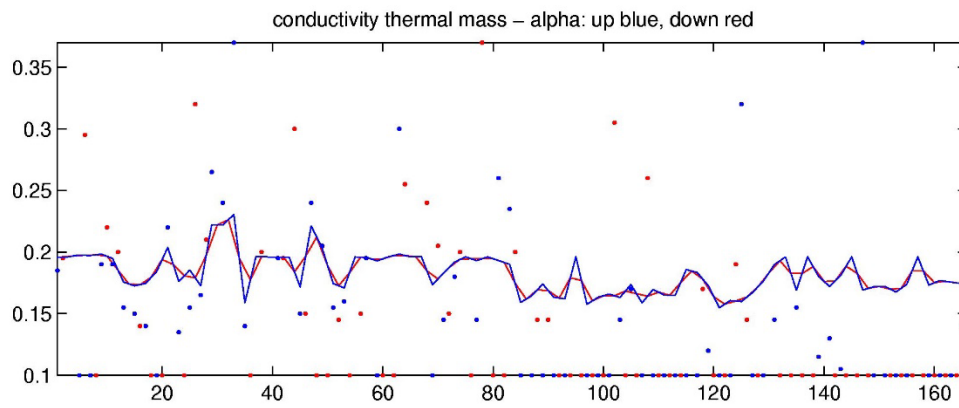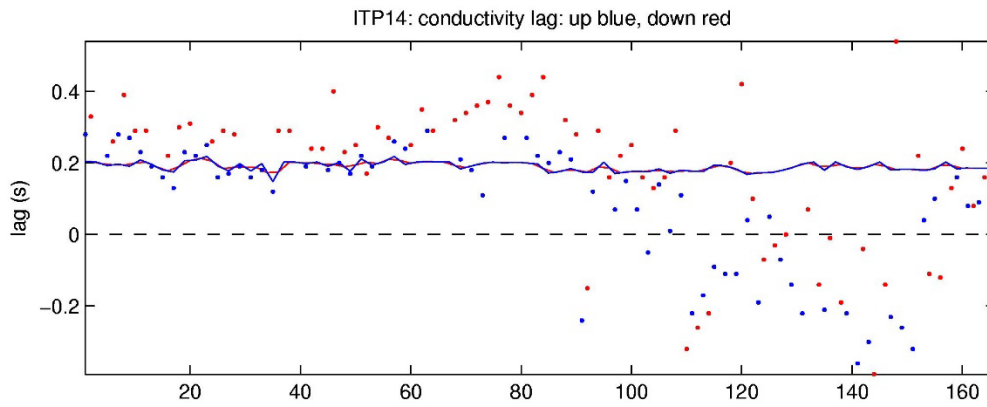
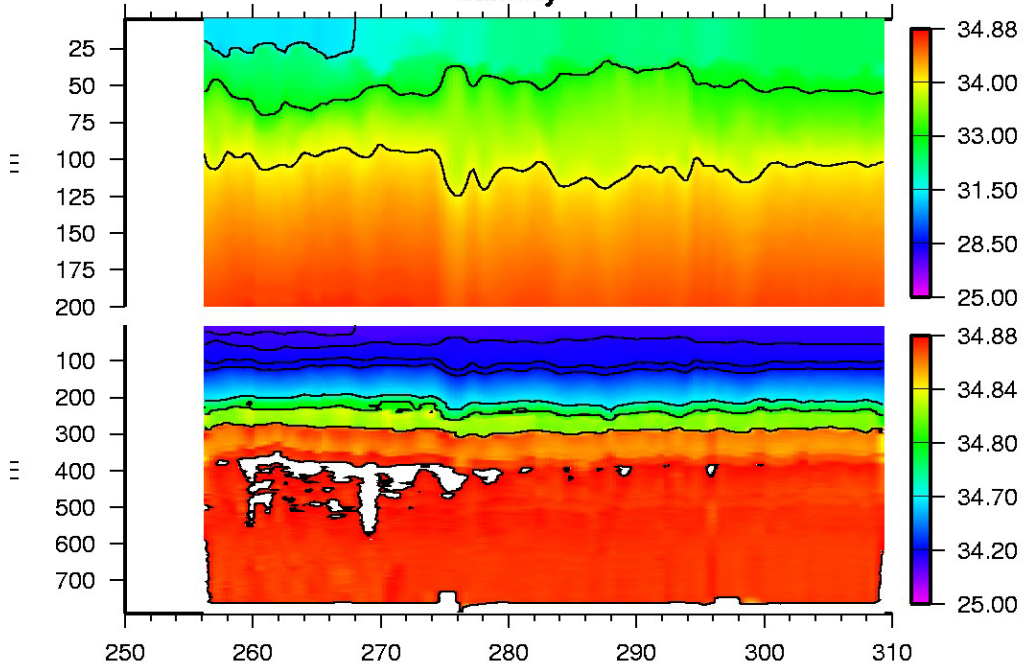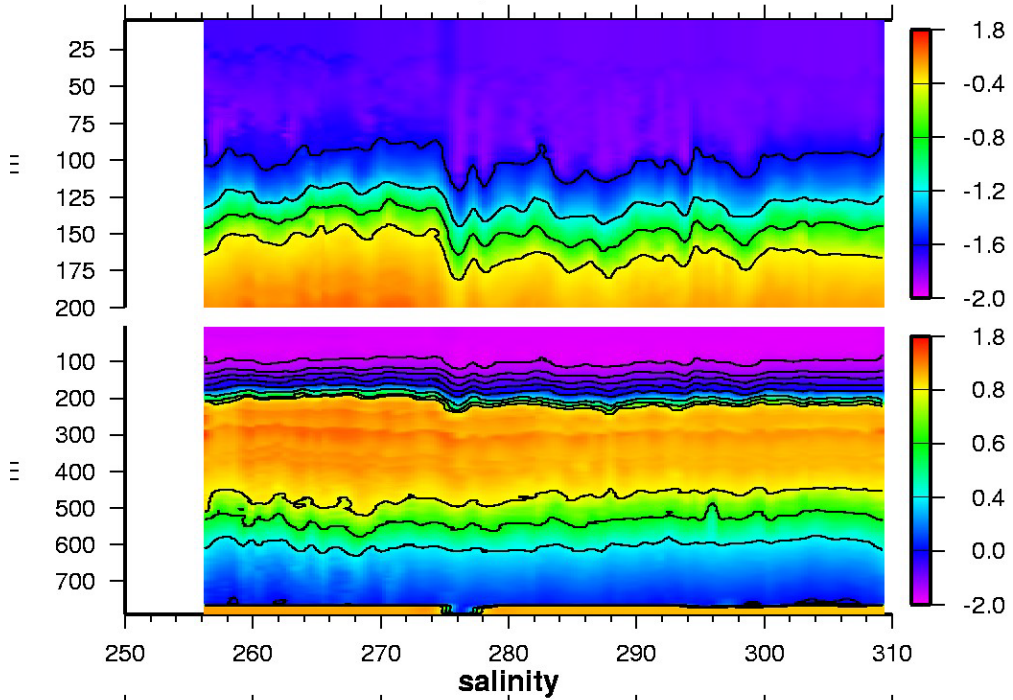Top: down pressure deviation correction, Middle: salinity ratio adjustment, Bottom: number of filtered spikes.

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

Plot of buoy locations.

ITP 14 temperature and salinity contours.

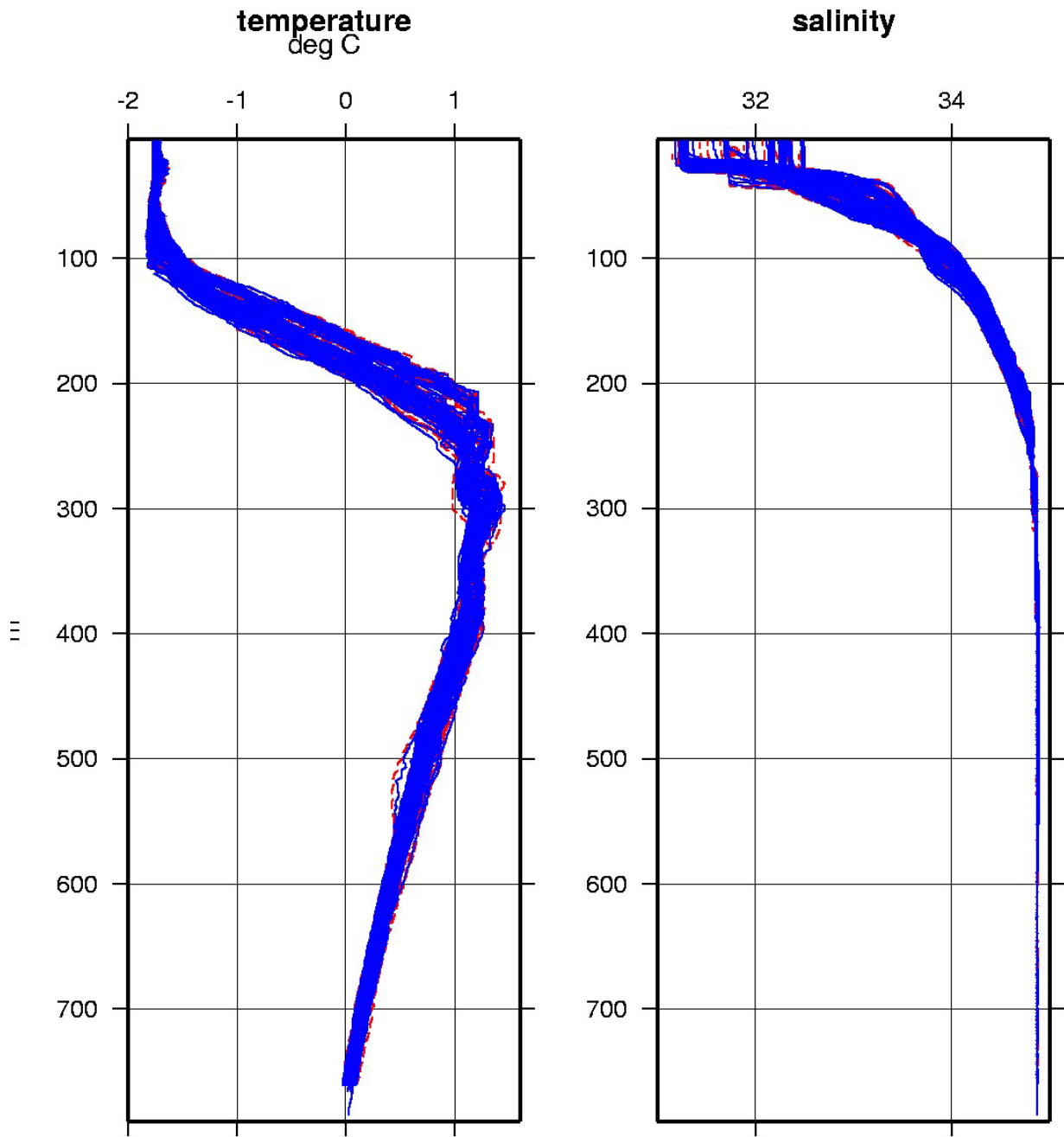# All ITP14 Profiles (up to profile 165)

temperature
deg C

salinity

up solid, down dashed

Composite plot of ITP temperature and salinity profiles.
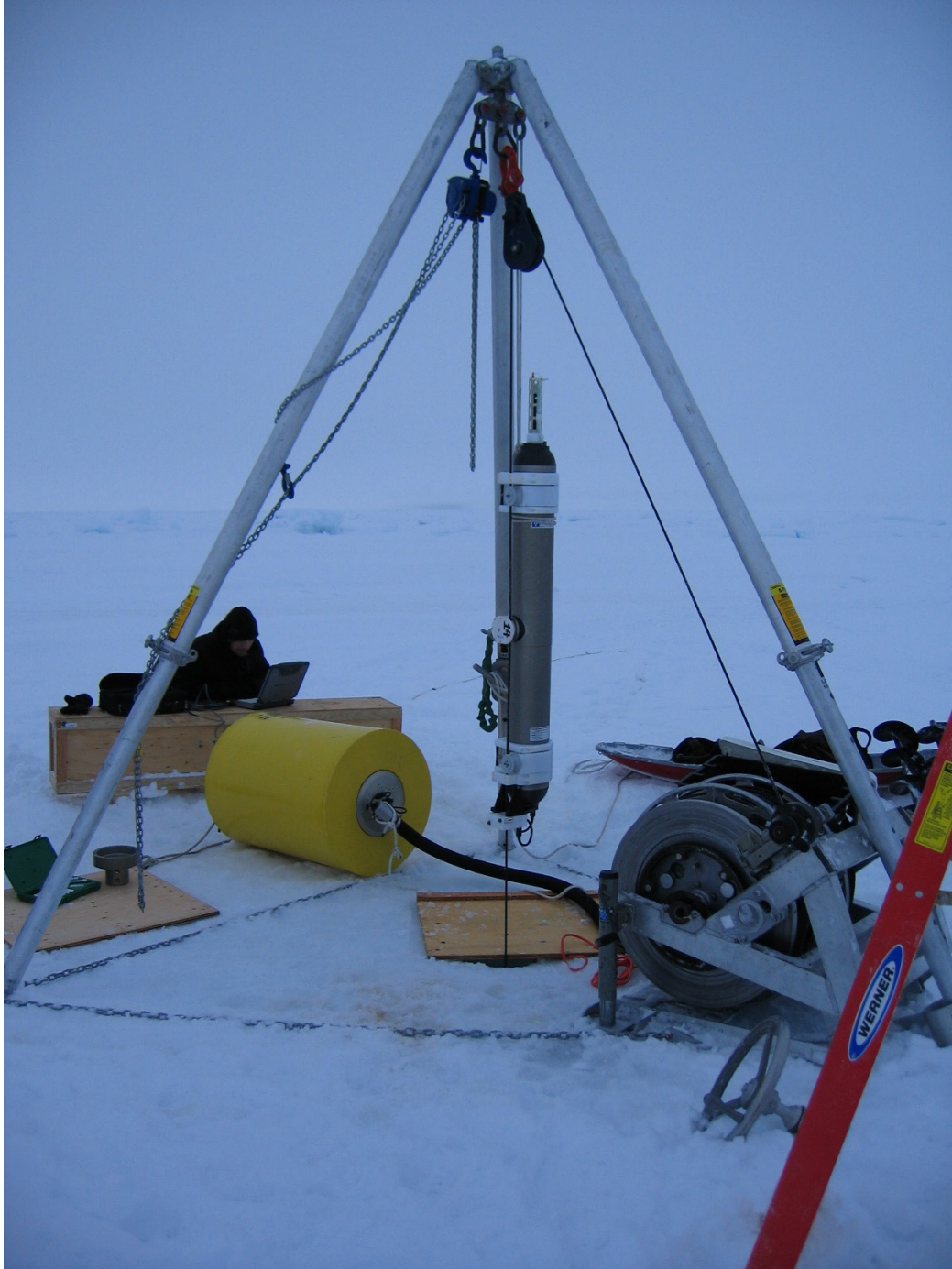
ITP 14 profiler suspended from the deployment tripod apparatus and on the mooring tether just prior to being lowered through the deployment hole in the ice. In the background, Brian Hogue tests the profiler-to-surface package inductive modem network to ensure functionality before the instrument is committed to the ocean. (John Kemp)