

ITP18 Overview

Deployment Location: 8/16/2007, 21:00 UTC at 78° 56'N, 139° 58'W

Last Location: 10/21/2008, 17:01 UTC at 74° 8.1' N, 143° 20.1' W

Duration: 432 days

Distance Traveled: 3568 km

Number of profiles: 914 in 419 days

Other instruments: AOFB 13, IMB 2007-E

ITP18 was deployed on a 3.3 m thick ice floe in the Beaufort Sea as part of the Beaufort Gyre Observing System (BGOS) during the JOIS 2007 cruise on the CCGS Louis S. St. Laurent. On the same icefloe, a US Army Cold Regions Research and Engineering Laboratory (CRREL) Ice Mass Balance Buoy (IMB 2007-E) and a Naval Postgraduate School Arctic Ocean Flux Buoy (AOFB 13) were also installed. The ITP operated on a standard sampling schedule of 2 one-way profiles between 7 and 760 m depth each day while drifting south from 78 to 74° N over a 14-month period and spent the last 6 weeks in the MIZ or open water.

ITP18 Deployment Operations

For the last day of ice operations to be successful, a better-than-average ice floe was needed to act as the platform for a buoy cluster consisting of an AOFB, IMB, and ITP 18. Fortunately, the ice in the northeast Beaufort Sea contained more patches of remnant multiyear ice patches compared to the thin ice encountered previously to the west. After searching in the helicopter for only half an hour, an outstanding ice floe was spotted and when drilled showed a relatively uniform thickness around 3 m. The site was so close to the ship, that only an hour later, the first personnel and gear were delivered for the deployment. Another hour, and all 16 personnel (including rifle bearer, photographers, and other ice surveyors besides the buoy deployment team) and gear were delivered to the ice and the AOFB sensor head was being lowered through the 10.5-inch hole into the seawater. Meanwhile, the IMB was being installed 20 m away. Half an hour later, the AOFB surface buoy was deployed, and the ITP deployment started near the IMB while the AOFB ice thermistor string was installed, and operation of the buoy and wind generator were verified. Two hours were consumed by the ITP deployment, and then all personnel and gear were returned to the ship exactly 7 hours after the first deployment flight from the ship. Good weather contributed to the efficiency of the field work.

ITP18 Data Processing

The 912 profiles that were recovered from the ITP were processed according to the procedures described in the ITP Updated Data Processing Procedures. The processing parameters for ITP 18 are shown in the figures to the right. From profile 815 to the end, the surface package was

likely in marginal ice zone conditions or open water, and the vertical motion due to surface waves caused the profiler to settle at its neutrally buoyant depth between profiles and produce either up or down half-profiles. Ice motion was not too great, as to prevent profiling due to drag. Forty-five profiles were interrupted due to the profiler software reset error. Some staircases were present frequently throughout the time series so sensor lags could be estimated. The CTD lags were in the typical range as previous systems and displayed only small amounts of drift over the year, while icing or bio-fouling instances were rare.

ITP18 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. After 419 days of reliable operation and data telemetry (including six weeks in a lead, marginal ice or open water), the ITP profiler stopped communicating with the surface package. Less than two weeks later, the surface package ceased transmitting GPS locations and status.

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

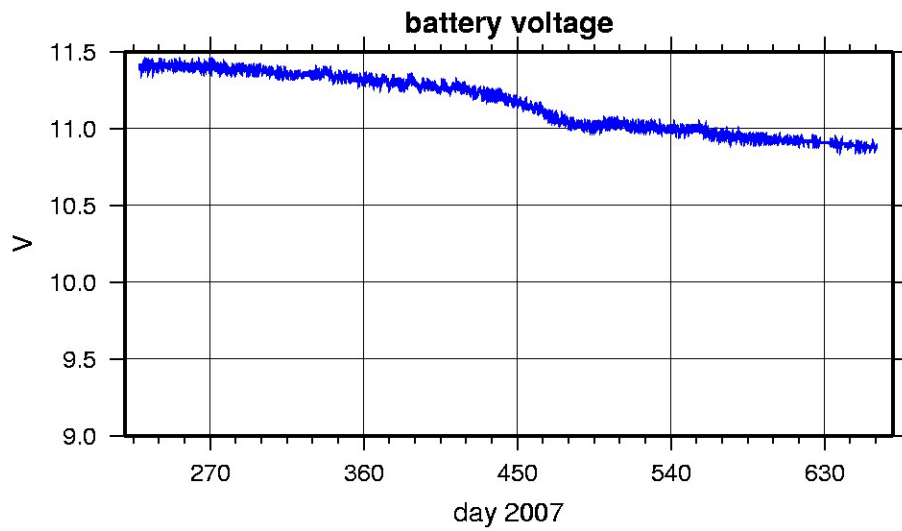
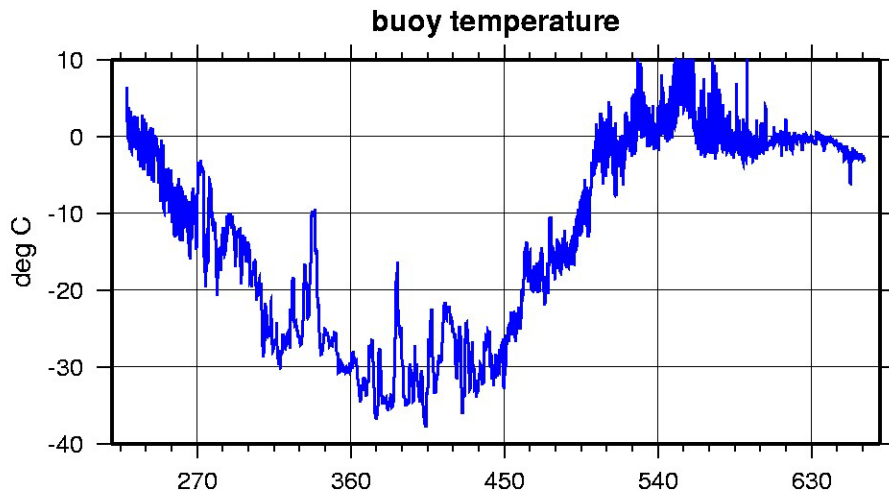
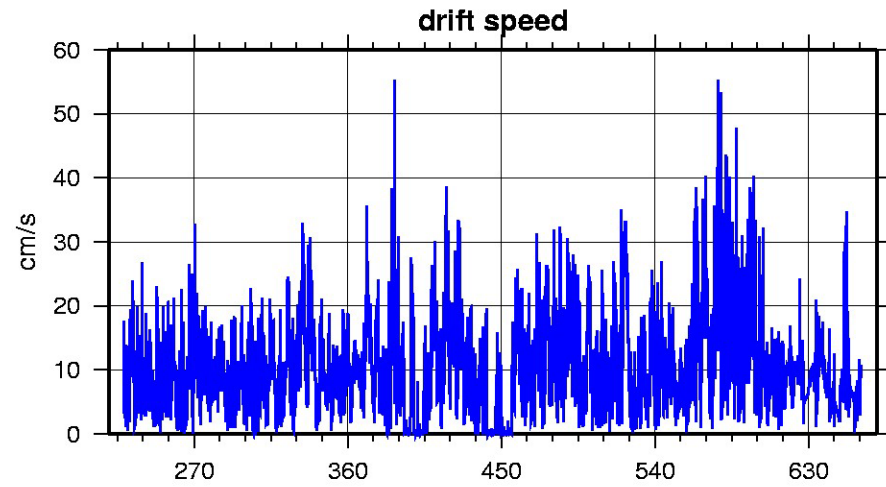
Level II hourly buoy location data in ASCII format: `itp18rawlocs.dat`

Level III 1-Hz processed profile data in MATLAB format: `itp18cormat.tar.Z` or `itp18cormat.zip`

Level III 1-db bin-averaged processed profile data in MATLAB format: `itp18final.mat`

Level III 1-db bin-averaged processed profile data in ASCII format: `itp18final.tar.Z`
or `itp18final.zip`

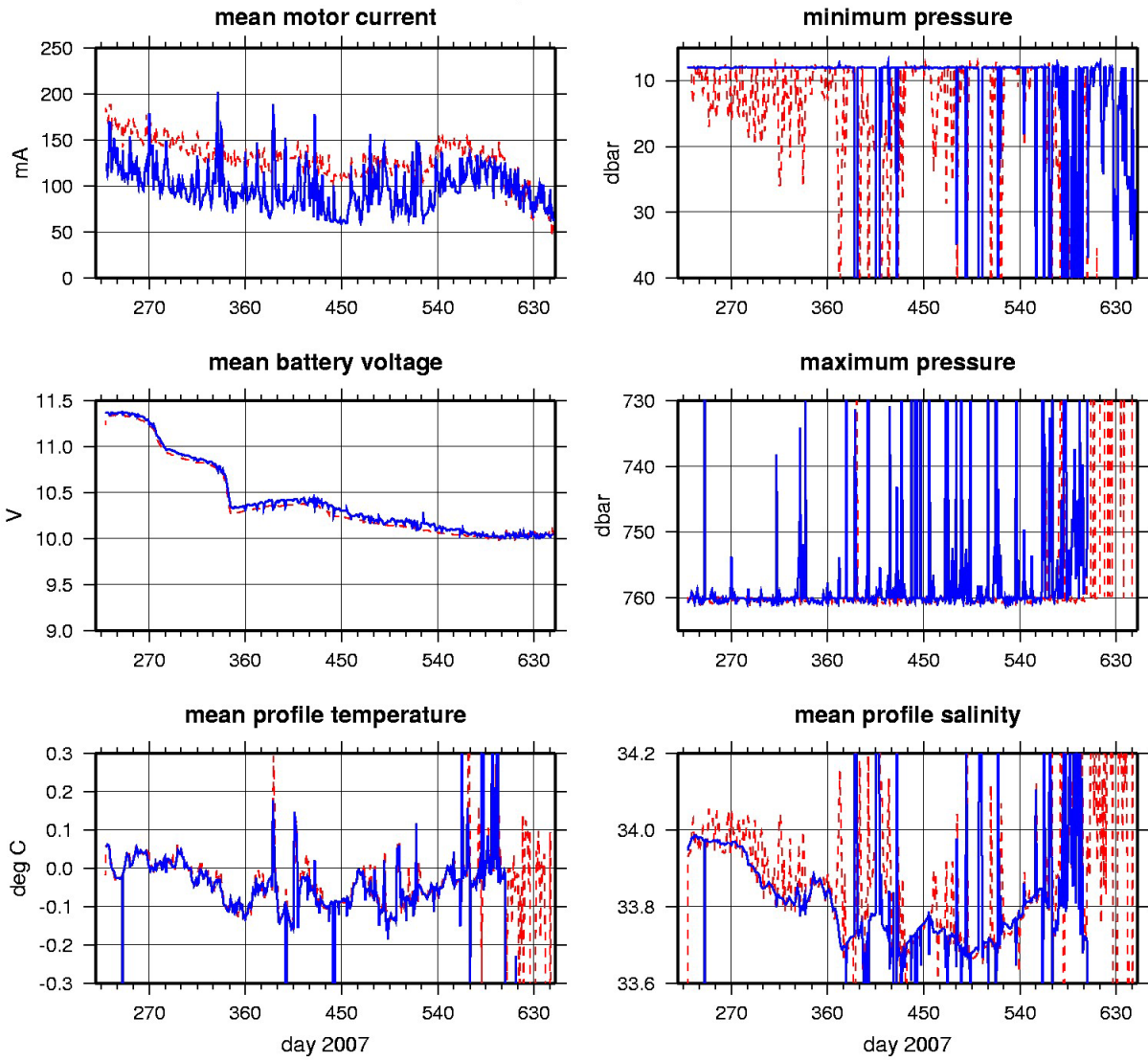
ITP18 Buoy Status (as of 2008/10/21)



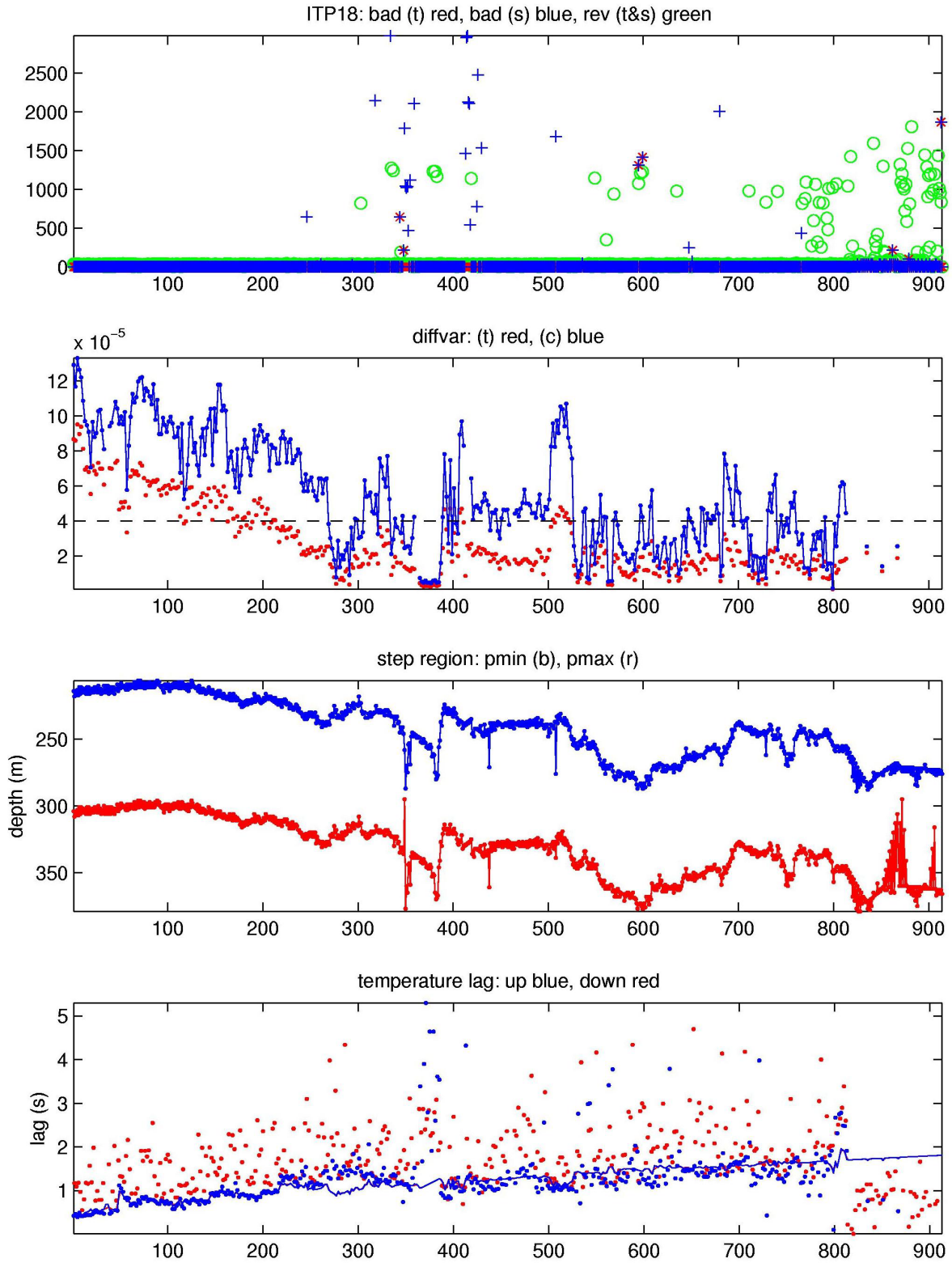
ITP Surface Buoy Status

ITP18 Profiler Status (up to profile 914)

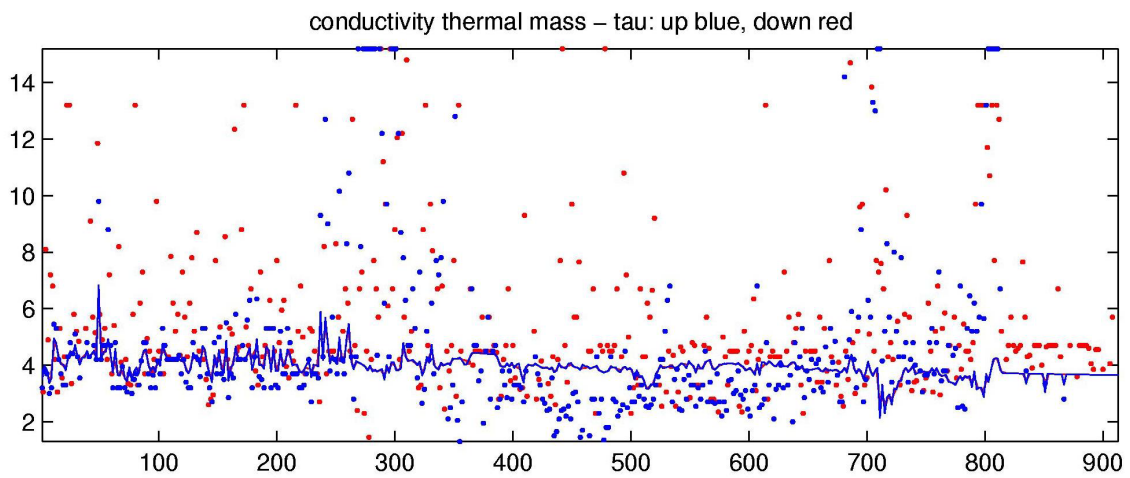
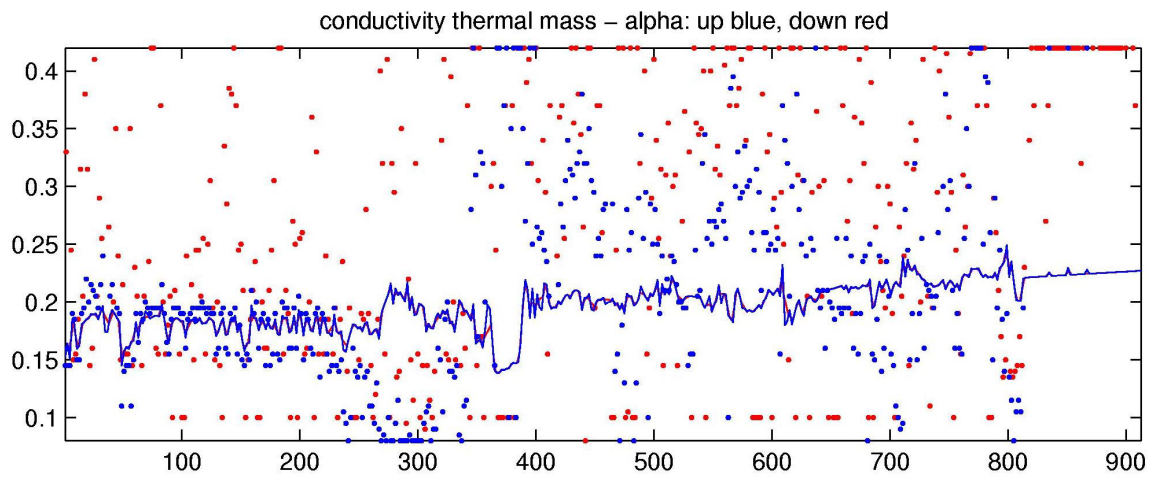
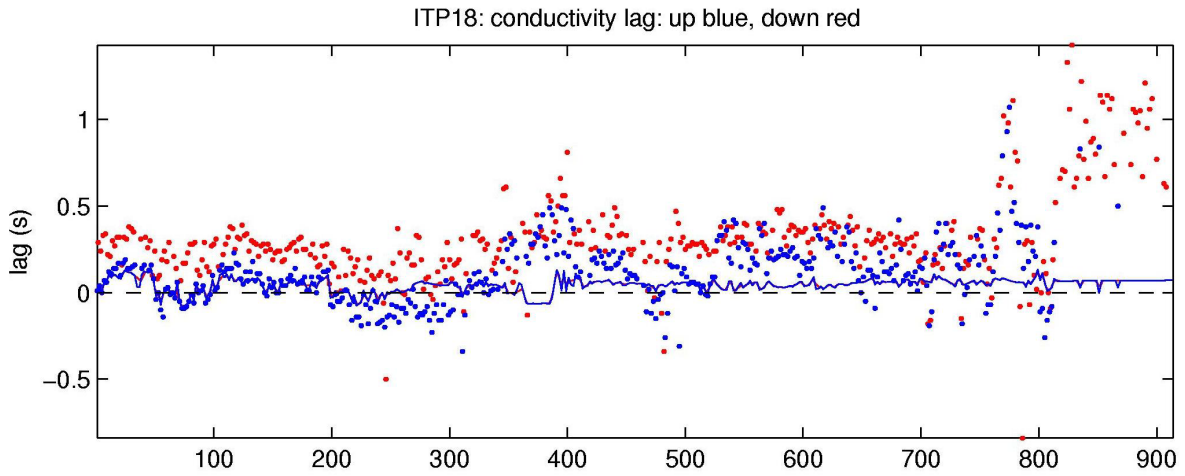
up solid, down dashed



ITP profiler engineering data.

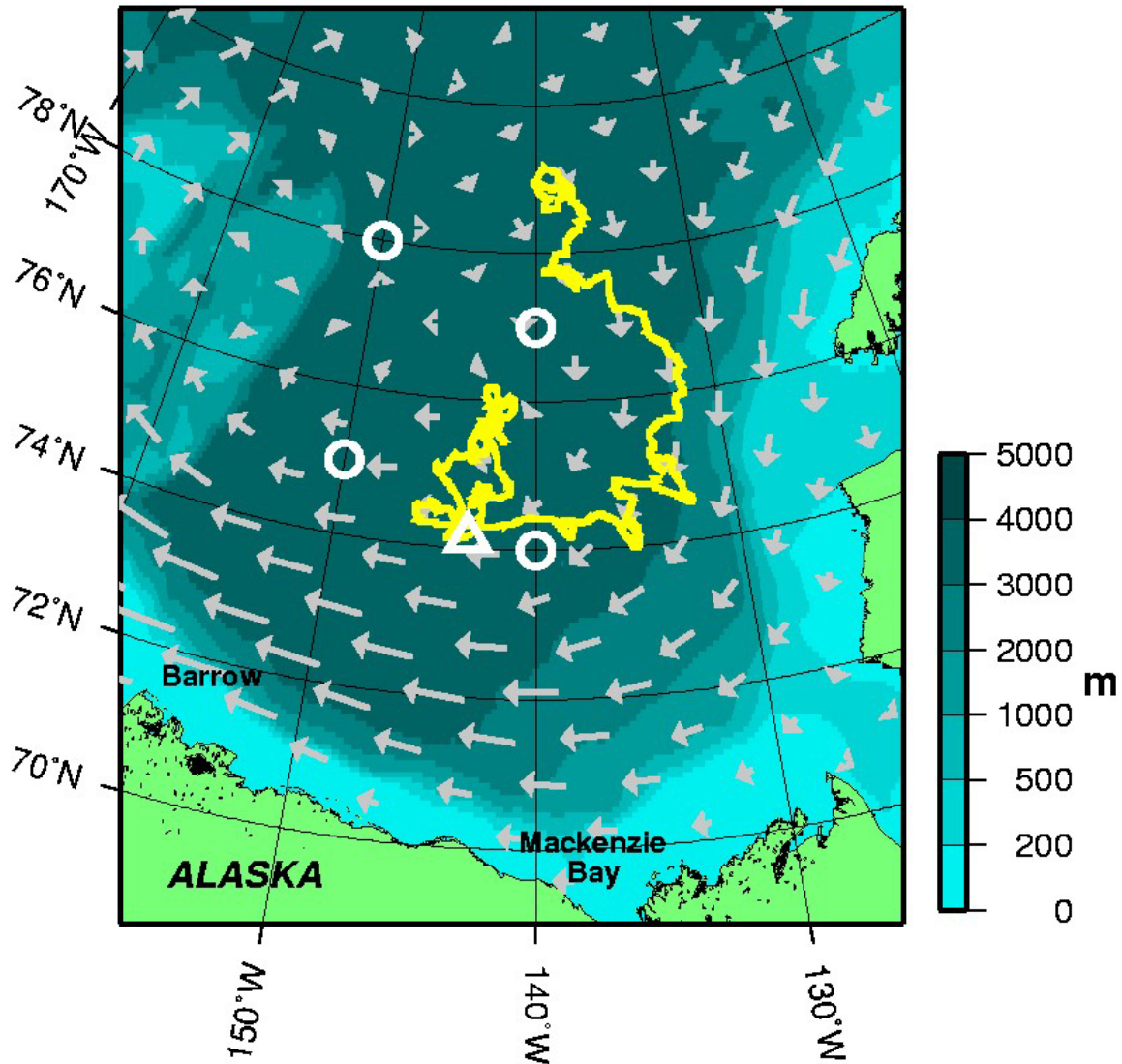


Top: number of bad points removed, Middle: variance of verticle difference of temperature and salinity in step region for up-going profiles, Bottom: temperature lag.



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

ITP18 Drift Track (as of 2008/10/21)

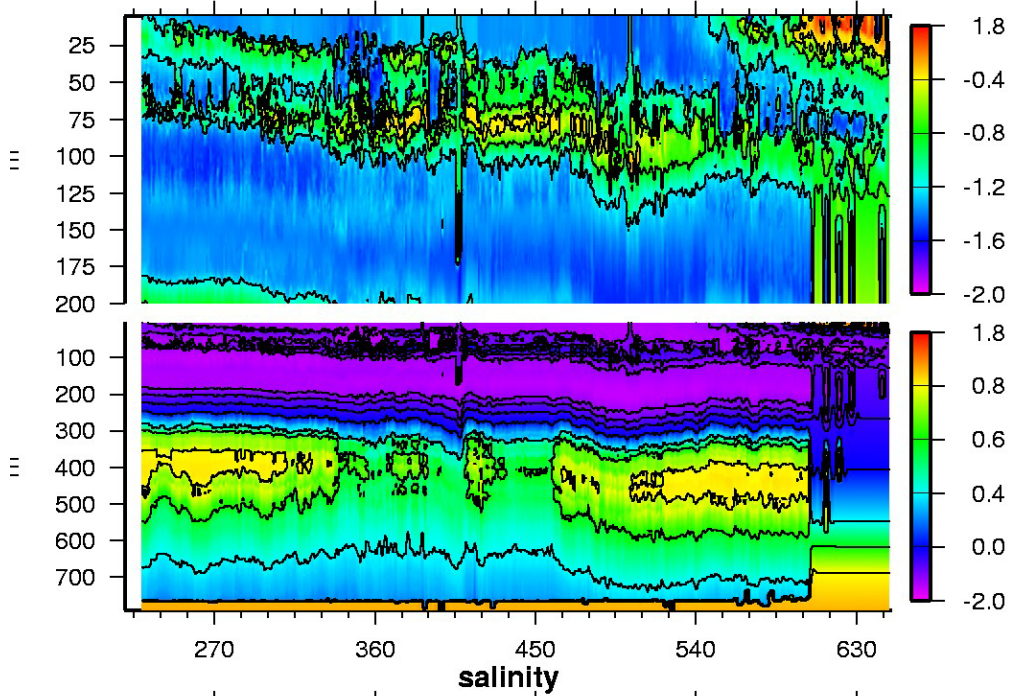


**ITP drift (yellow line) and latest location (triangle),
BGOS moorings (white circles) and annual ice drift from
IABP (grey vectors) on IBCAO bathymetry (shading).**

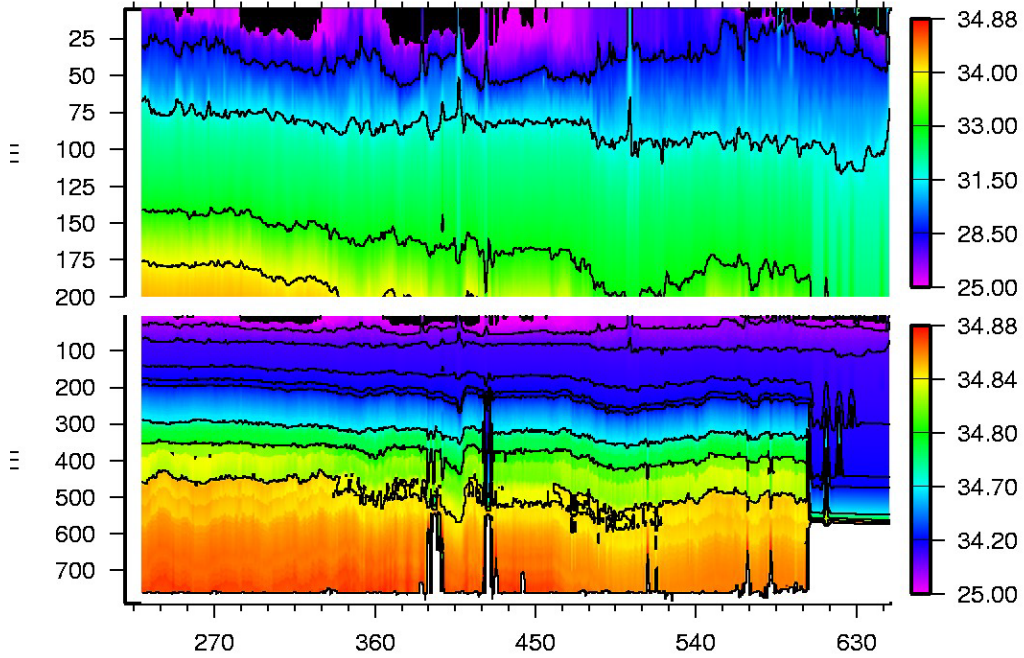
Plot of buoy locations.

ITP18 Up Profile Contours (to profile 914)

temperature



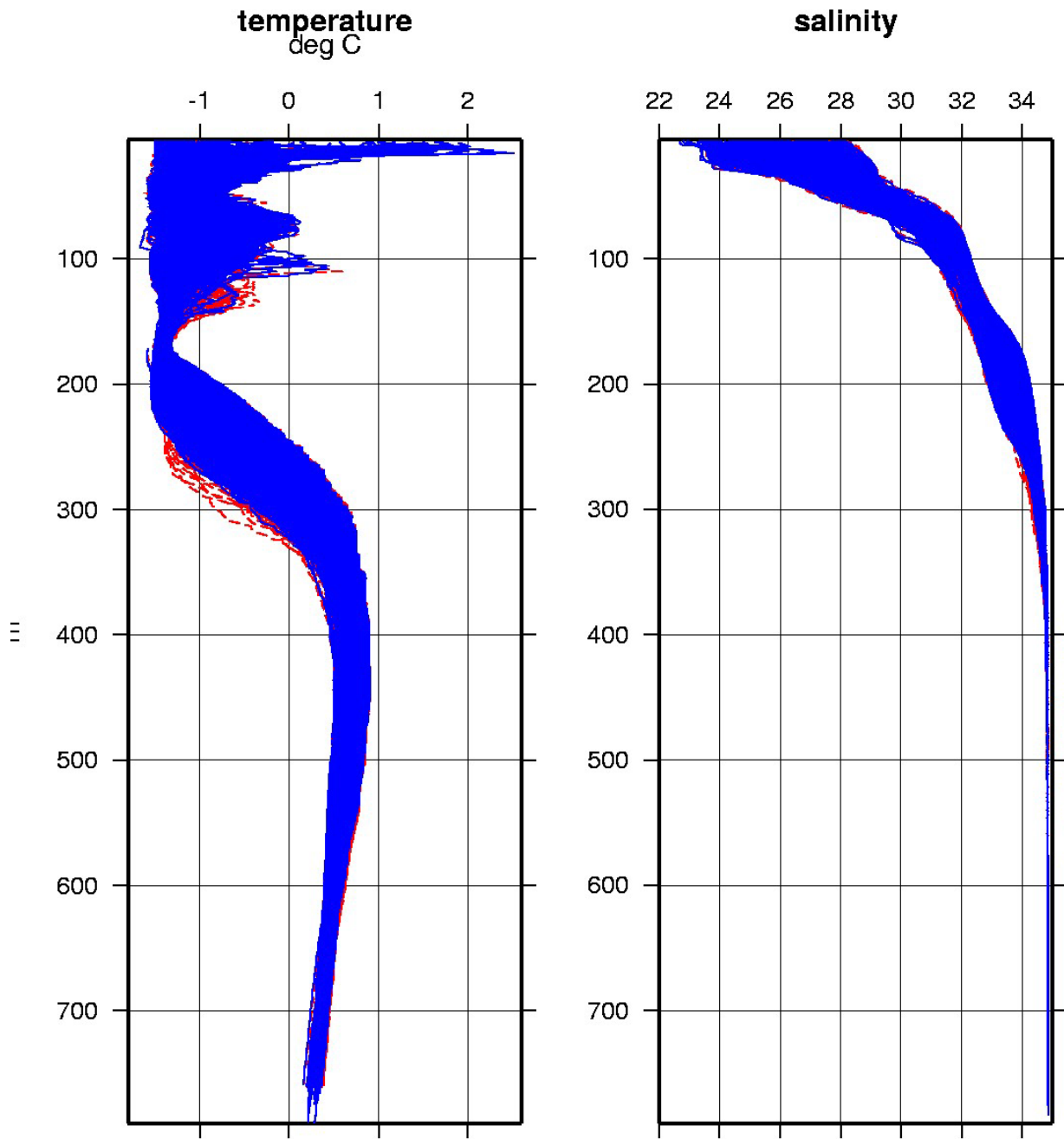
salinity



day 2007

ITP18 temperature and salinity contours

All ITP18 Profiles (up to profile 914)

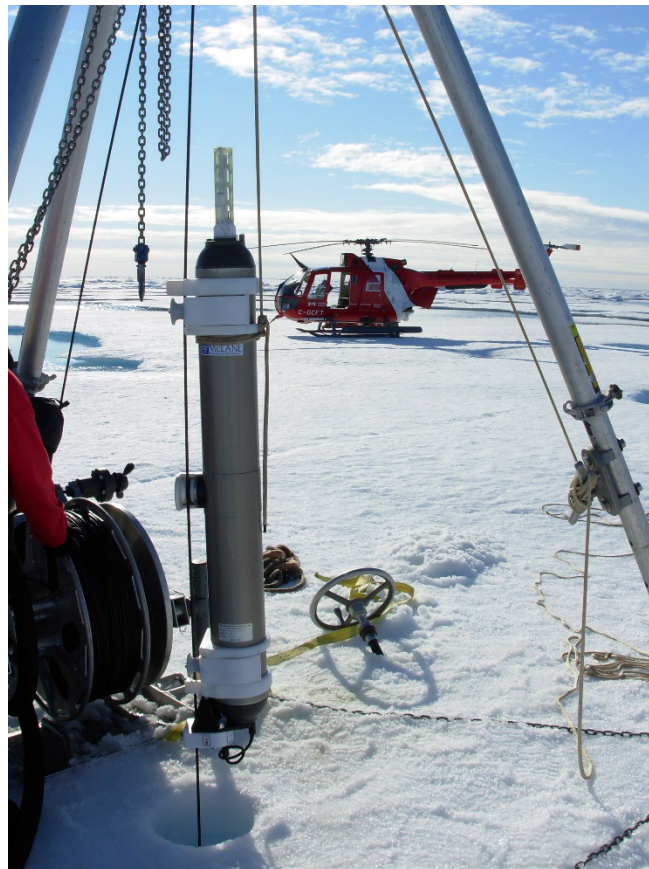


up solid, down dashed

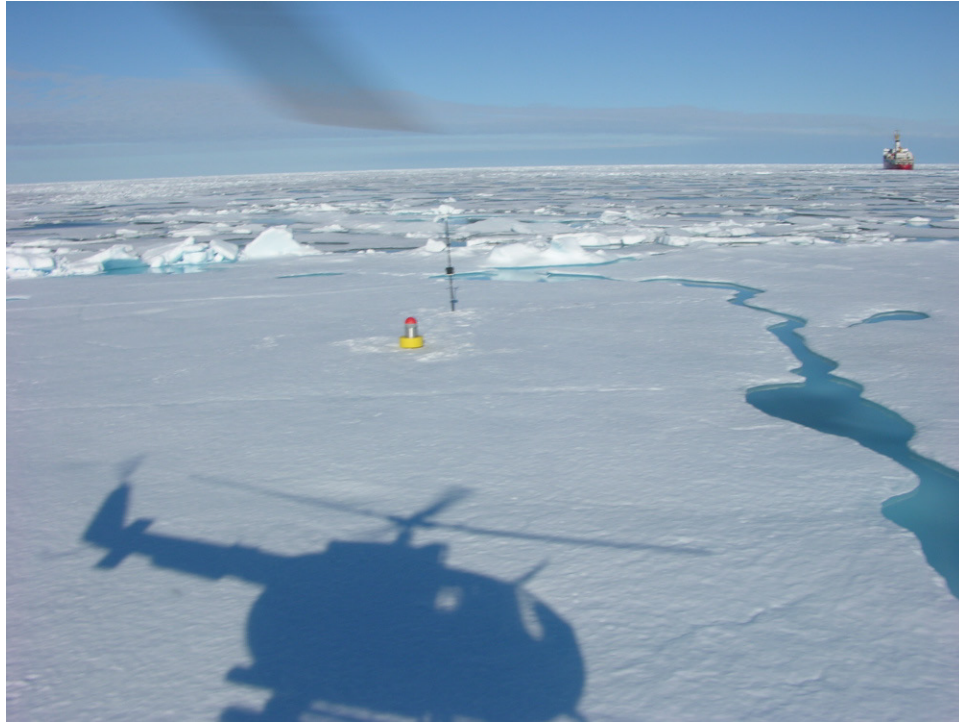
Composite plot of ITP temperature and salinity contours.



The thin ice conditions and light fog on the morning of the final ITP (and ice based observatory) deployment of the JOIS 2012 cruise were somewhat of a concern at the beginning of the ice reconnaissance. (Photo by Rick Krishfield)



ITP 18 profiler suspended on the wire for pre-deployment testing in the sunny afternoon. (Photo by Rick Krishfield)



AOFB with wind generator for enhanced sampling rate from the helicopter passenger seat.
 (Photo by Luc Rainville)

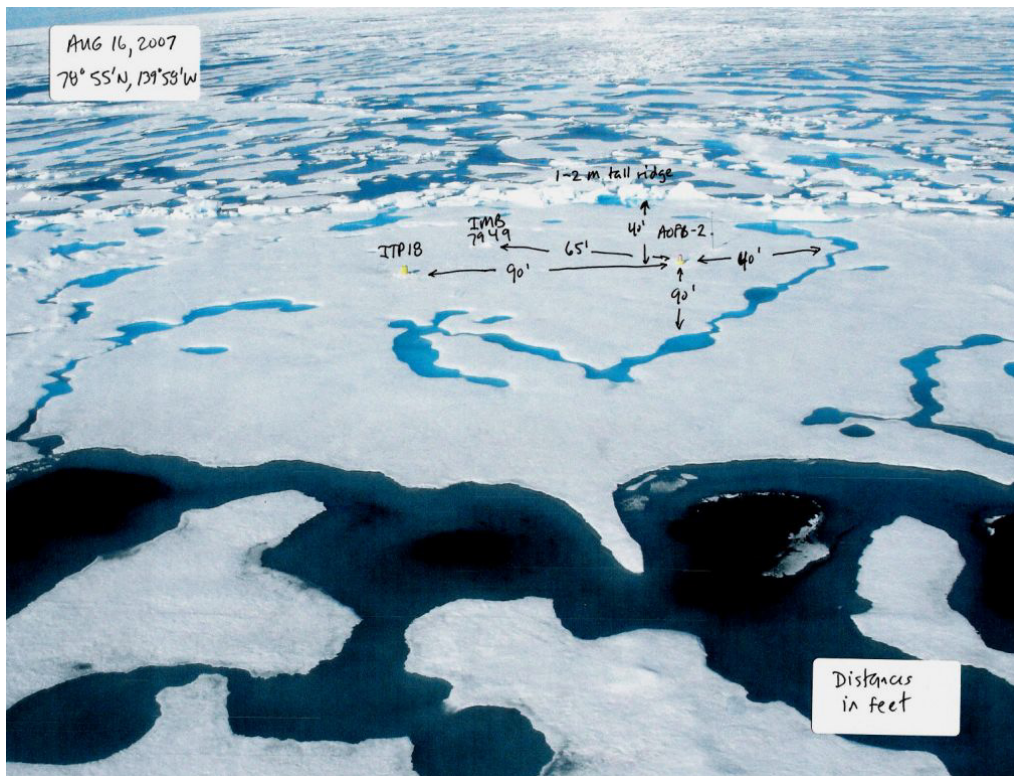


Diagram of distances between AOFB, other buoys and nearest ridges and melt ponds. (Photo by Rick Krishfield)



The buoys are only specs on the outstanding floe as seen from the helicopter on the last flight back to the ship. (Photo by Rick Krishfield)