

ITP 4 Overview

Deployment Location: 9/3/2006, 00:00 UTC at 78° 7.6'N, 148° 59.2'W

Recovery Location: 8/17/2007, 21:00 UTC at 78° 30' N, 139° 34' W

Duration: 348 days

Distance Travelled: 2376 km

Number of profiles: 698 in 349 days

Other instruments: none

ITP4 was deployed on a 3.5 m thick ice floe (with 30 cm of freeboard) in the Beaufort Sea as part of the Beaufort Gyre Observing System (BGOS) during the JWACS 2006 cruise on the CCGS Louis S. St. Laurent. The unit operated on a standard schedule of 2 one-way profiles between 7 and 760 m depth each day, but the inductive modem link between the underwater profiler and surface buoy did not function, so the profiler data (698 casts) were not recovered until the ITP was retrieved the following summer during the JOIS 2007 cruise.

ITP 4 Deployment Operations

After a morning of shipboard mooring operations, the weather and ice conditions on September 2nd, 2006 were too good to pass up the opportunity to deploy ITP 4. An hour-long helicopter survey found a suitable large floe 3.5 m thick, two hours later the 10 inch diameter hole for the ITP profiler was drilled, and just before the day ended (September 3, 00:00 UTC) the profiler was in the water. All deployment operations were completed an hour later.

Unfortunately, difficulty installing the top of the ice tether to the buoy flange apparently resulted in damage to the wires which connected the modem from the surface package to the profiler, so no profiles were transmitted from this instrument. However, daily status messages were sent from the surface buoy so that the system was able to be tracked. This allowed the ITP to be located and recovered the following summer.

ITP 4 Recovery Operations

By the time it was discovered that the ITP modem circuit was not working, it was too late to recover ITP 4 the same year. It became a priority to recover it the next year, as the profiler was probably collecting profiles that could be retrieved. In 2007, the drift of the ITP over the past year brought it close to the cruise track of the JOIS cruise on the CCGS Louis S. St. Laurent. On August 15, a helicopter reconnaissance was unsuccessful in locating ITP4. It was located by the ship on the next day after receiving an updated location, and the recovery operations began on the morning of the 17th.

The way that the icebreaker was positioned in the ice floe allowed for the handling of the recovery gear and people over the side using the ship's crane. In the morning, everything was loaded on the ice, and a 1 m diameter ice core melted through the 3.0 m thick floe containing the ITP tether cable. After lunch, the ice was removed from the core and the profiler recovered. The profiler had been profiling the entire time since it was deployed, and 698 profiles were downloaded from the underwater instrument.

ITP 4 Data Processing

The 698 profiles that were downloaded from the ITP were processed according to the procedures described in the ITP Data Processing Procedures. The processing parameters for ITP4 are shown in the figures to the right. The quality of the profile time series is exceedingly good. No temperature or conductivity spikes needed removing for being obviously corrupted, although some slight conductivity calibration shifts were aligned. There were no instrument resets, and only profiles 4, 77 and 78 were largely incomplete. The lag coefficients were also uniform throughout the entire year.

ITP 4 Data Description

ITP 4 profiler was the first ITP configured to operate with a standard sampling schedule of 2 one-way profiles between 7 and 760 m depth 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. Only daily status information was transmitted to the laboratory, the profiler data were retrieved directly from the instrument after recovery.

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

See the Data Products tab to the left for descriptions of the three levels (I, II, III) of data processing and to access all data.

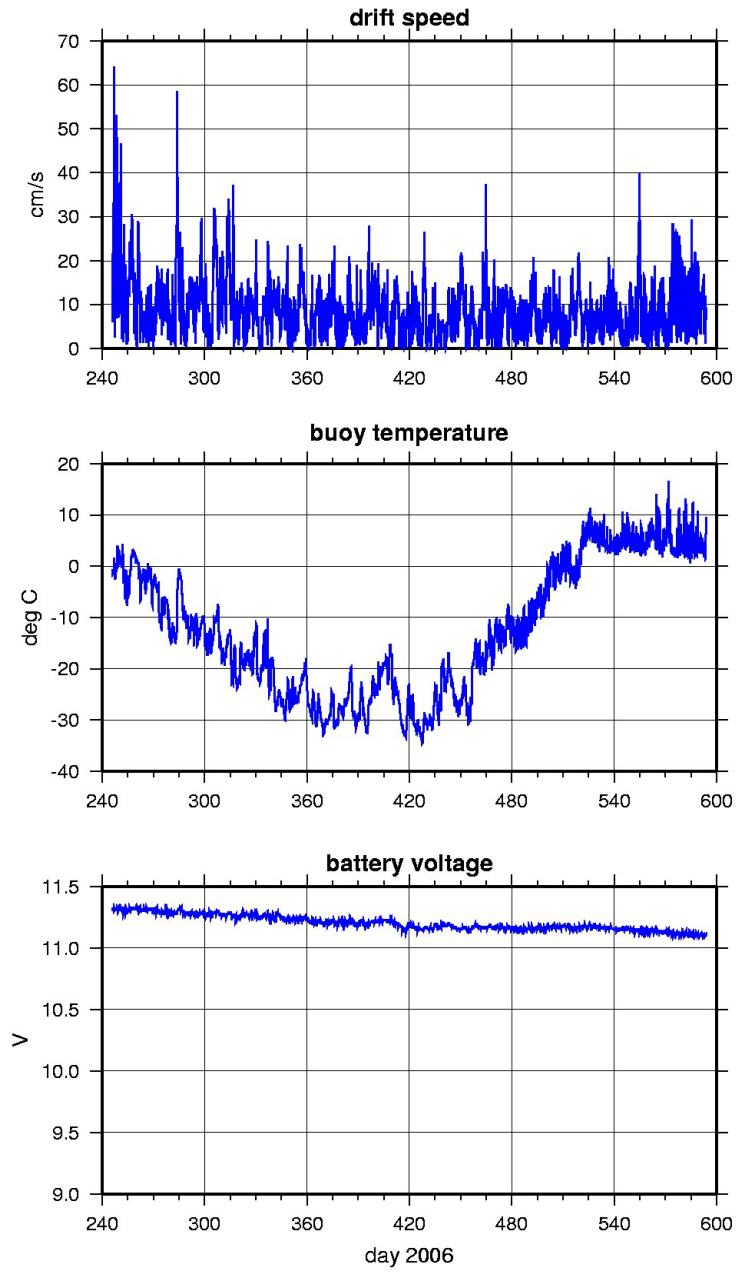
Level II hourly buoy location data in ASCII format: `itp4rawlocs.dat`

Level III 1-Hz processed profile data in MATLAB format: `itp4cormat.tar.Z` or `itp4cormat.zip`

Level III 1-db bin-averaged processed profile data in MATLAB format: `itp4final.mat`

Level III 1-db bin-averaged processed profile data in ASCII format: `itp4final.tar.Z` or `itp4final.zip`

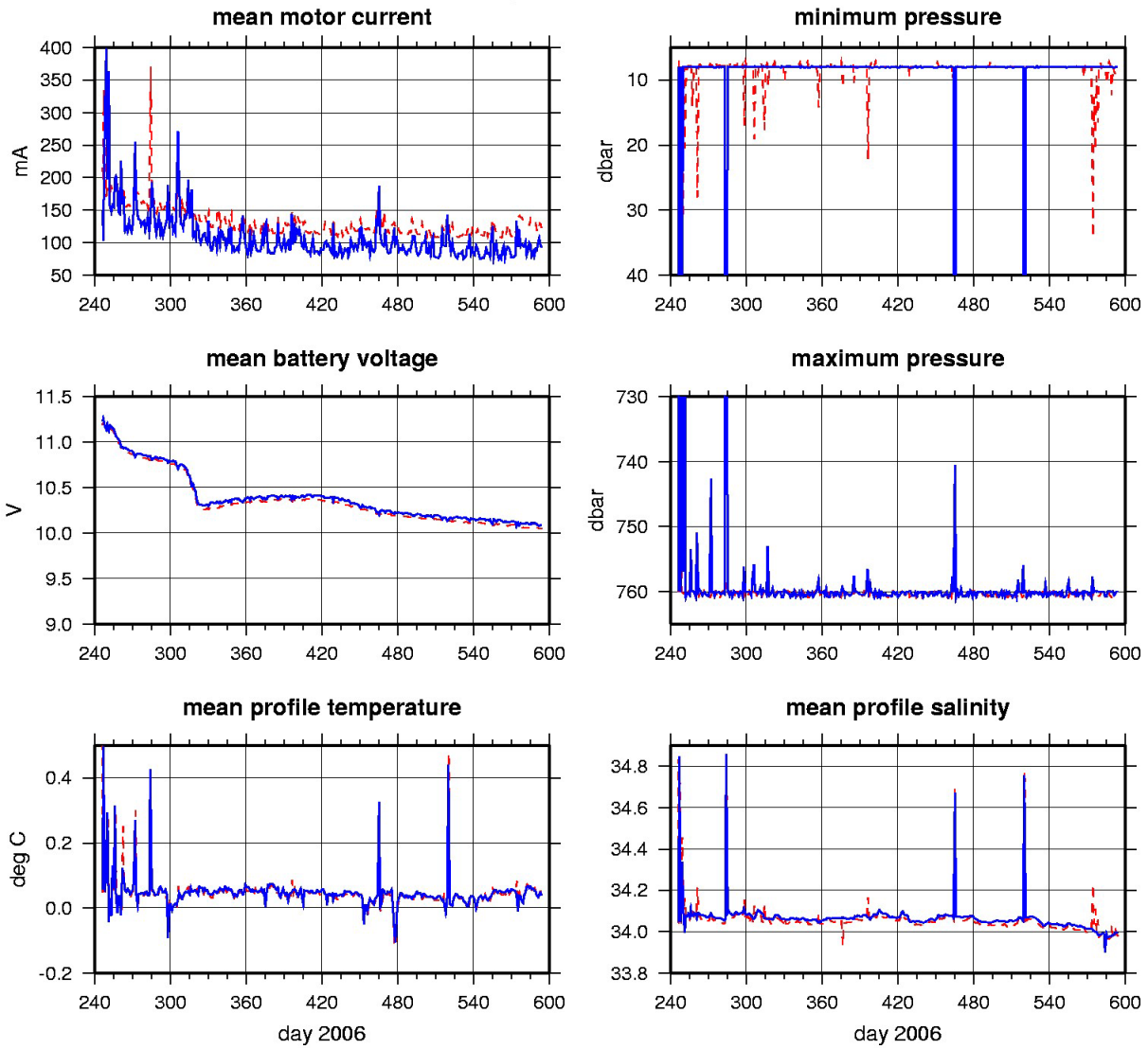
ITP4 Buoy Status (as of 2007/08/16)



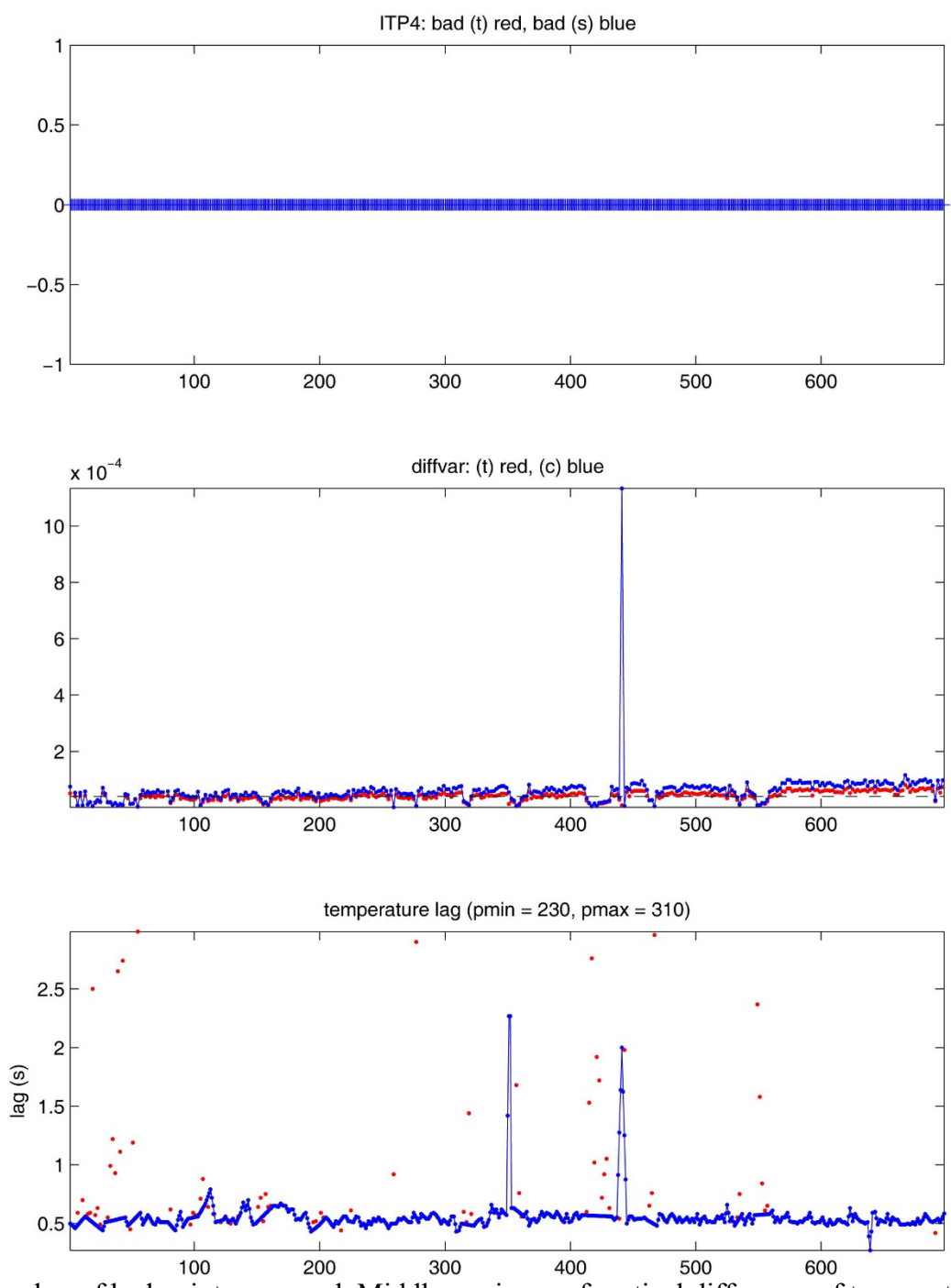
ITP surface buoy status

ITP4 Profiler Status (up to profile 698)

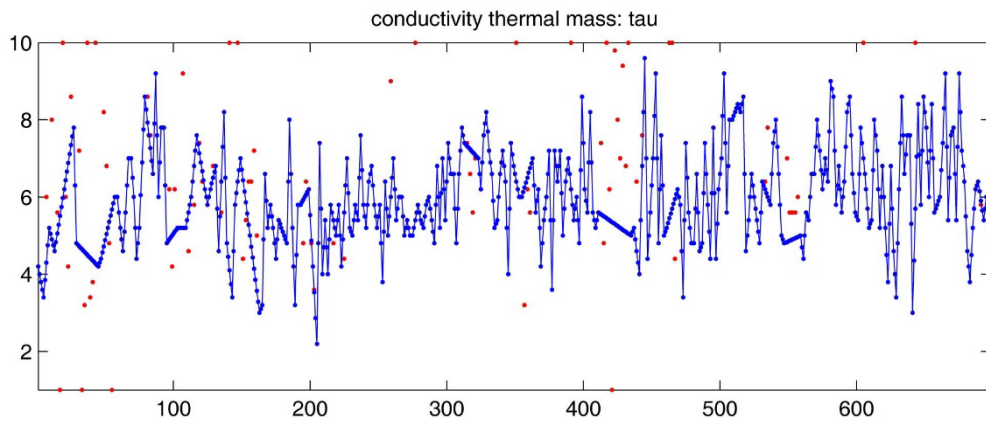
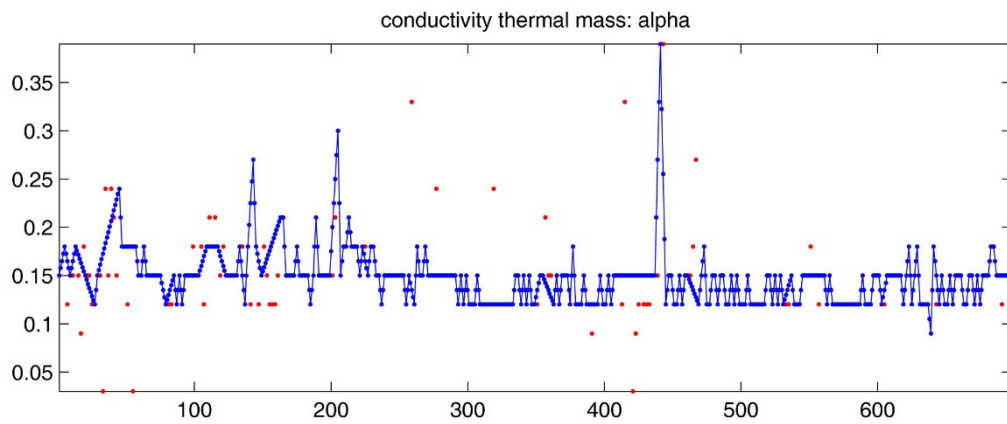
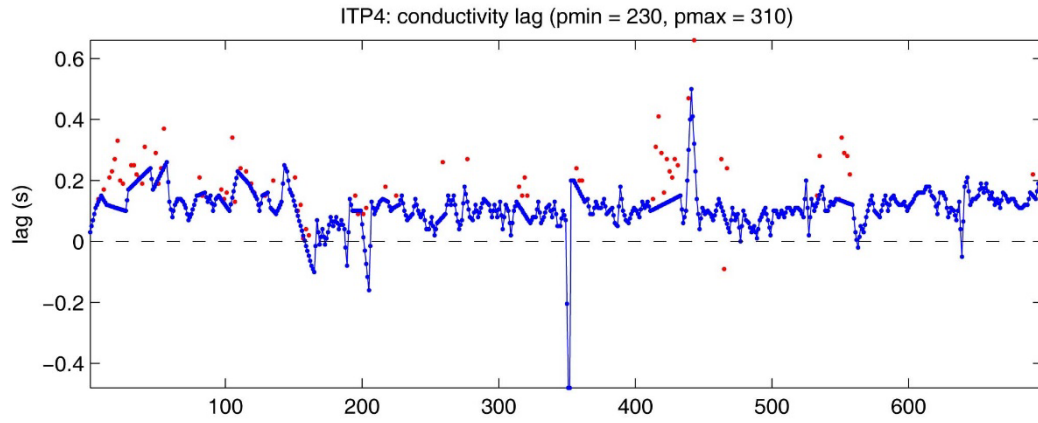
up solid, down dashed



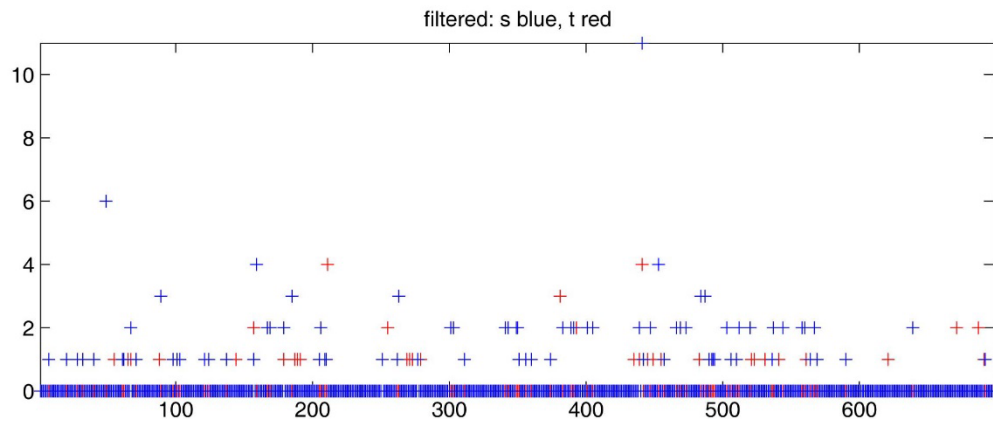
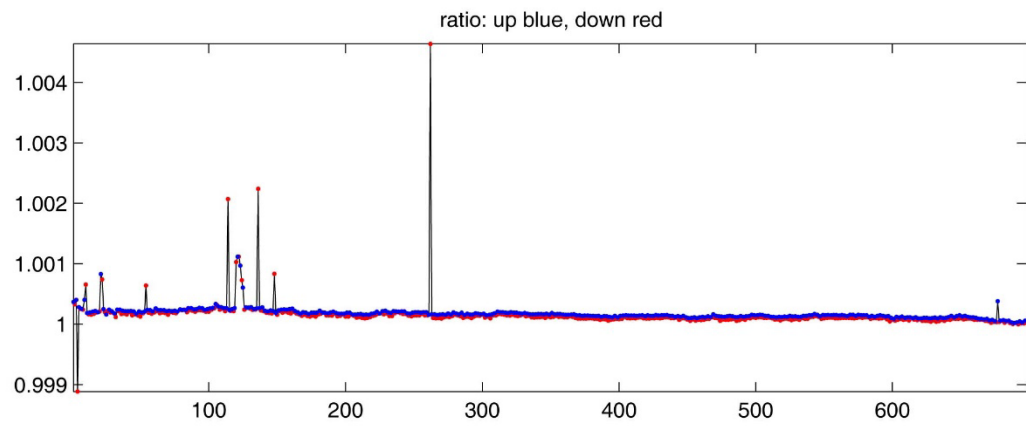
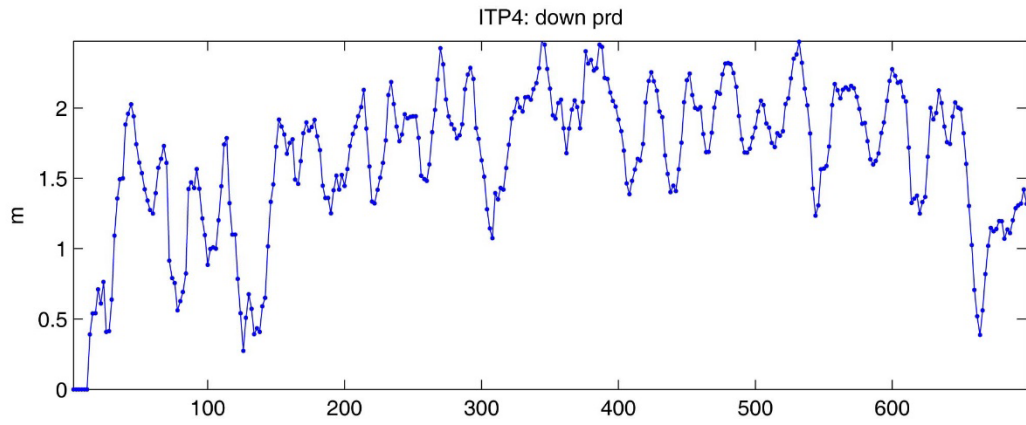
ITP profiler engineering data



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

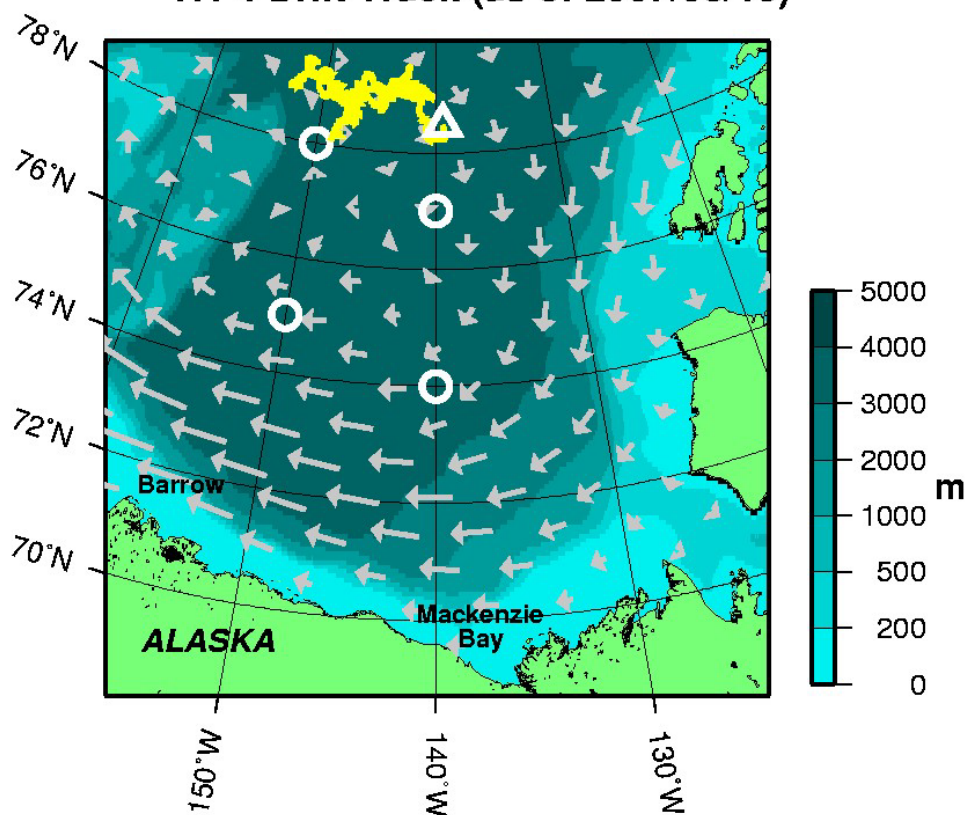


Top: conductivity lag, Middle: conductivity thermal mass amplitude correction, Bottom: conductivity thermal mass lag correction.



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

ITP4 Drift Track (as of 2007/08/16)

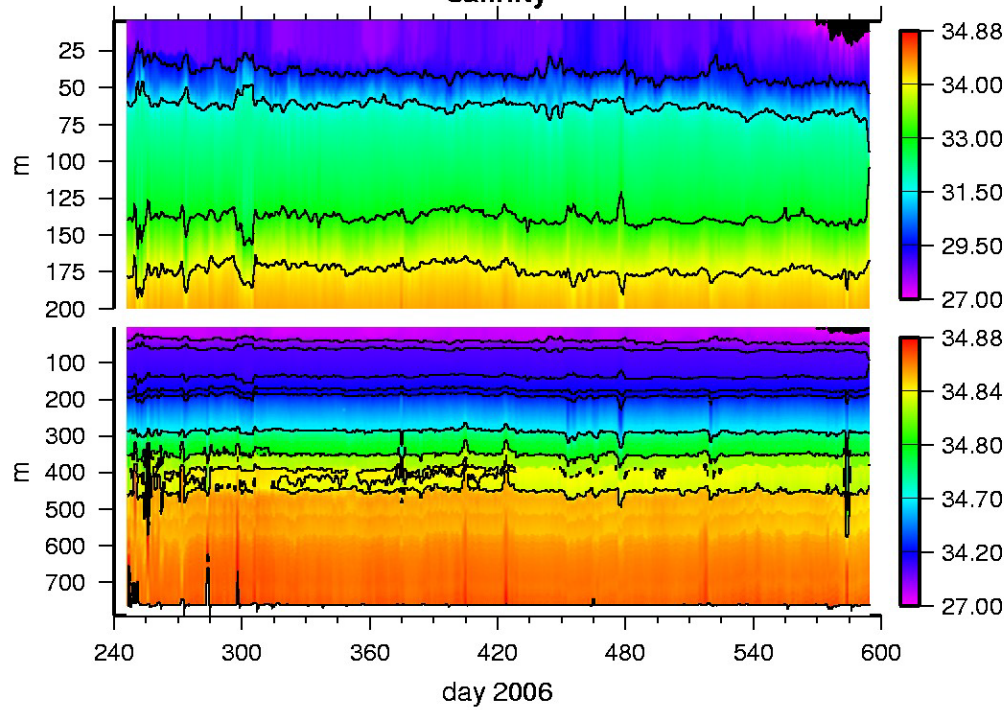
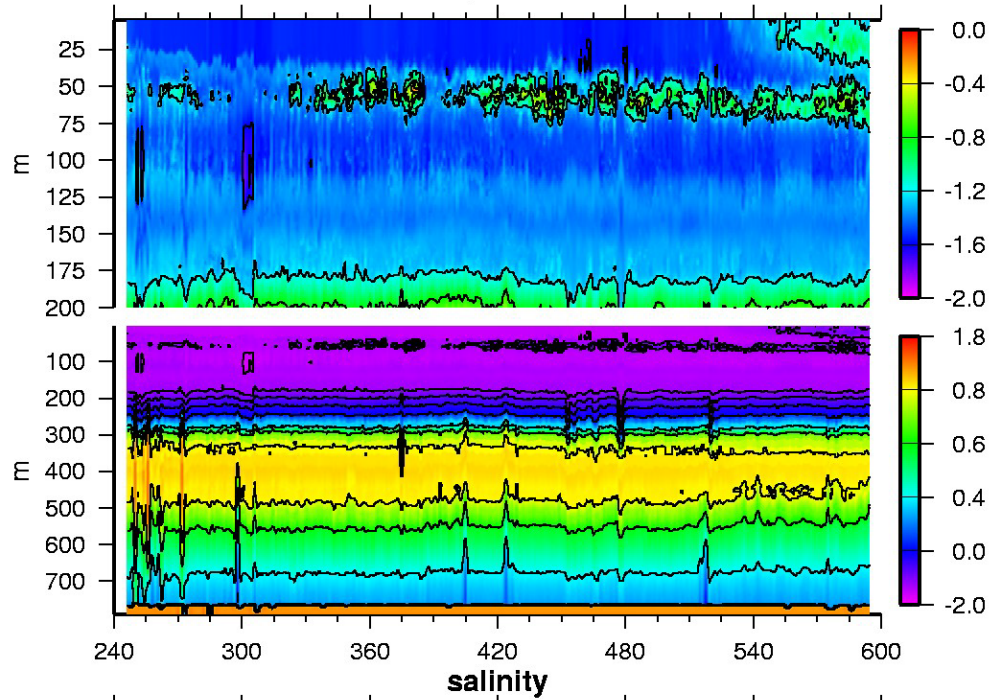


**ITP drift (yellow line) and latest location (triangle),
BGOS moorings (white circles) and annual ice drift from
IABP (grey vectors) on IBCAO bathymetry (shading).**

Plot of buoy locations.

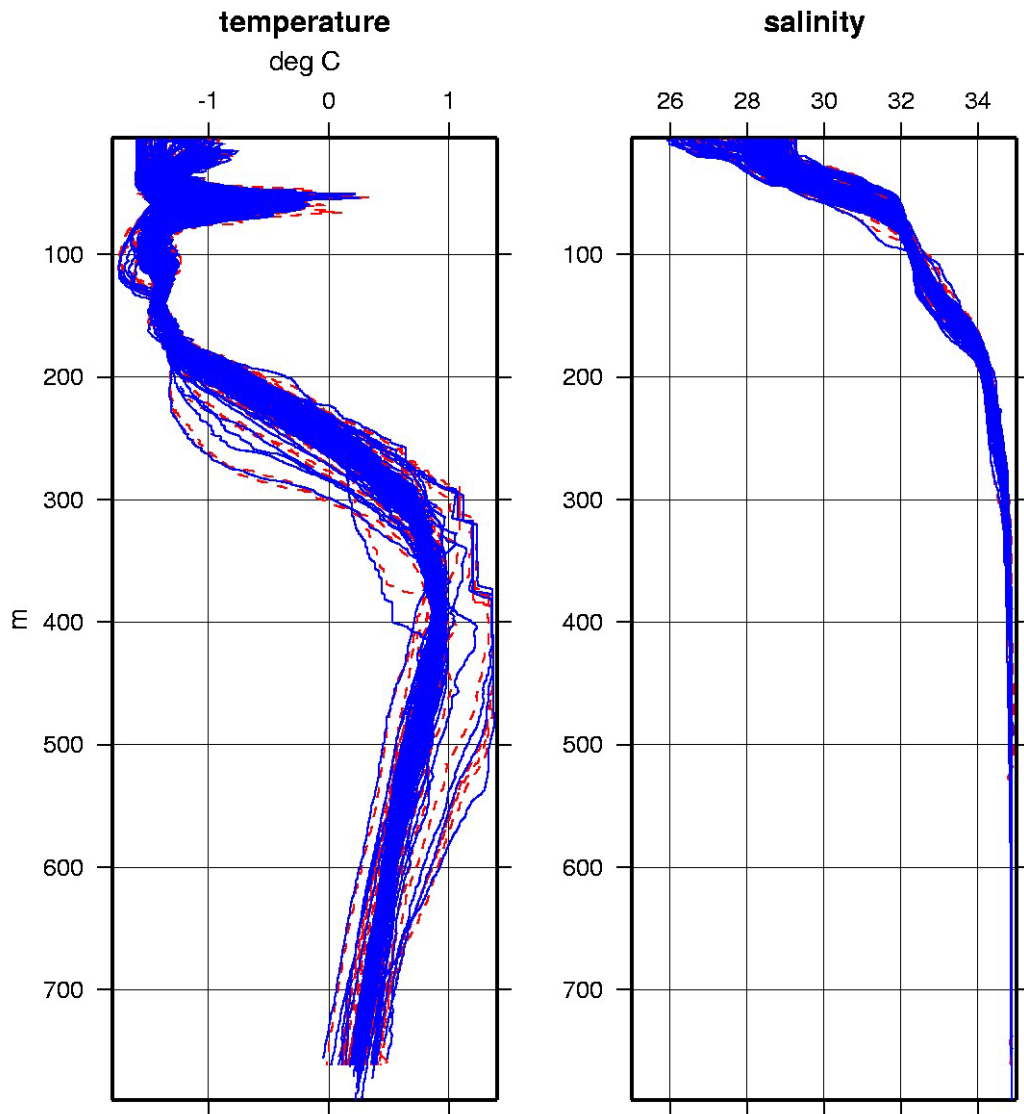
ITP4 Up Profile Contours (to profile 697)

temperature



ITP 4 Temperature and Salinity contours.

All ITP4 Profiles (up to profile 697)



up solid, down dashed

Composite plot of ITP profiles.



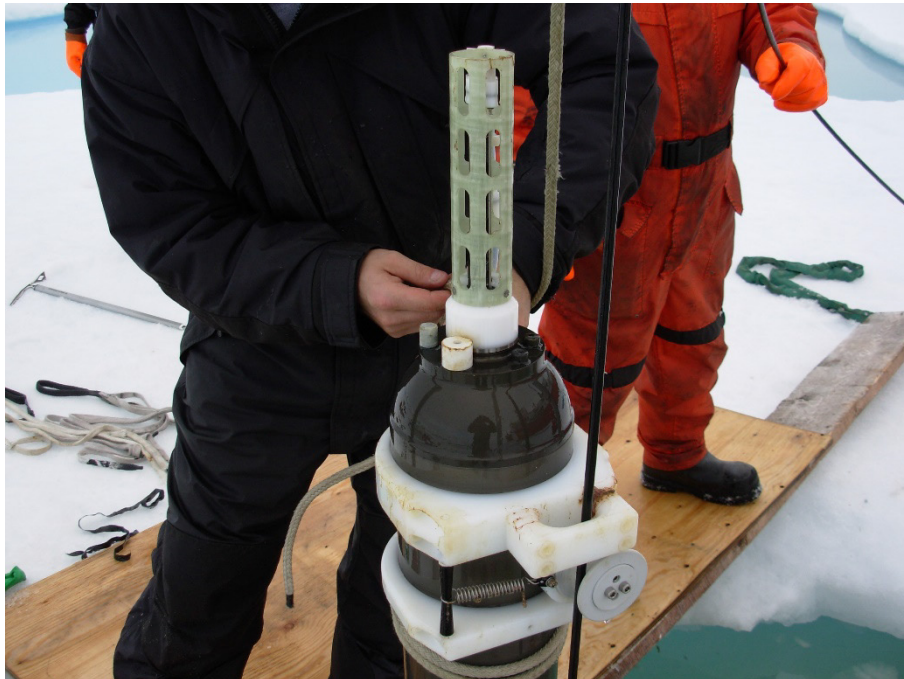
Close-up of ITP 4 with CCGS Louis S. St Laurent after deployment on September 3, 2006. (Rick Krishfield)



The surface buoy for ITP 4 is only partially submersed in the melt pond when it is relocated nearly a year after the deployment.



The wooden staging that was installed under the buoy during deployment seems to only have partially worked at preventing the ITP surface float from melting the adjacent ice.



ITP4 profiler is intact and relatively clean after only one year under the ice and would finally be able to transfer the 698 profiles it had acquired since then. Photos by Rick Krishfield.