ITP50 Overview

Deployment Location: 9/6/2011, 5:00 UTC at 84° 4.7'N, 164° 11.4'W

Last Location: 9/17/2012, 15:00 UTC at 84° 53.7' N, 96° 54.5' W

Duration: 378 days

Distance Traveled: 2331 km

Number of profiles: 0

Other instruments: none

ITP 50 was deployed on a 3 m thick ice floe in the Transpolar Drift during the ARK-XXVI/3 cruise (TransArc) on the *R/V Polarstern* as a contribution to the Hybrid Arctic/Antarctic Float Observation System (HAFOS). The ITP included a dissolved oxygen sensor and was programmed to operate on a standard sampling schedule of 2 one-way profiles between 7 and 760 m depth each day. Unfortunately, the underwater profiler did not communicate with the surface unit, so no profile data were obtained.

ITP50 Deployment Operations

The first ITP deployed during the ARK-XXVI/3 expedition was ITP 50. The site was about 20 m away from ridges on two sides, frozen-over melt ponds (likely without bottom) on one side, and about 50 m away from a large crack on the fourth side. While the ice thickness at the ITP site was 3 m, other nearby thickness measurements were 1.5 m so there was an obvious thickness gradient, but it was the best ice floe in the area.

After the 10.5" diameter hole through the ice floe was drilled, the anchor was lowered but obstacles at the bottom of the hole needed to be removed. Then the profiler had trouble going through the hole, but the remainder of the deployment proceeded smoothly. Unfortunately, the inductive modem circuit test after installation did not verify communications.

ITP50 Recovery Operations

One year after deployment of ITP 50, the opportunity to visit and potentially recover the problematic system, occurred from the Russian nuclear icebreaker *Rossiya*, enroute to recovering the Russian North Pole-39 ice camp. On September 17, 2012, the icebreaker was with 3.8 km of ITP 50 and the heavy Russian helicopter MI-8 started to search out the buoy. The helicopter team included chief pilot Jury Melnikov, second pilot Sergey Obuchovsky, and flight mechanic Sergey Chagin. (from the helicopter company named "Karelia" that situated in the city "Petrozavodsk"). Three scientists of the expedition: Tomash Petrovsky (AARI), Anatoly Klein (AARI) and Sergey Pisarev (SIO), were on a board of helicopter as well.

The yellow conical flotation collar of ITP 50 was found 1.6 km away from the last buoy coordinates. A hummocked ice ridge blocked the floatation from the view of the helicopter delaying the discovery. The scientific group was to attach the slings to the surface floatation of the ITP and to prepare for recovery of the system from the icebreaker while the helicopter conducted other operations.

Photos taken by the scientific party just after helicopter flew away show the ITP cable covered by snow, a break of the cable just 1.5 m from where it attached to the surface electronics, and deformation of the hole through the flotation collar by the cable. The landscape of the ice floe was clearly different than when the ITP was deployed. The plywood pallet that was installed under the flotation was not found but likely was destroyed or carried away previously when the tether was severed. The tether had been forcefully embedded into the foam collar, attesting to large forces operating on the surface package and wire, presumably during an ice rafting or ridging event. It was clear that the underwater package was long gone. After one hour on the ice floe examining the site and preparing the surface package for transport, the helicopter returned to the site, picked up the scientific group and the remaining parts of ITP50 surface package.

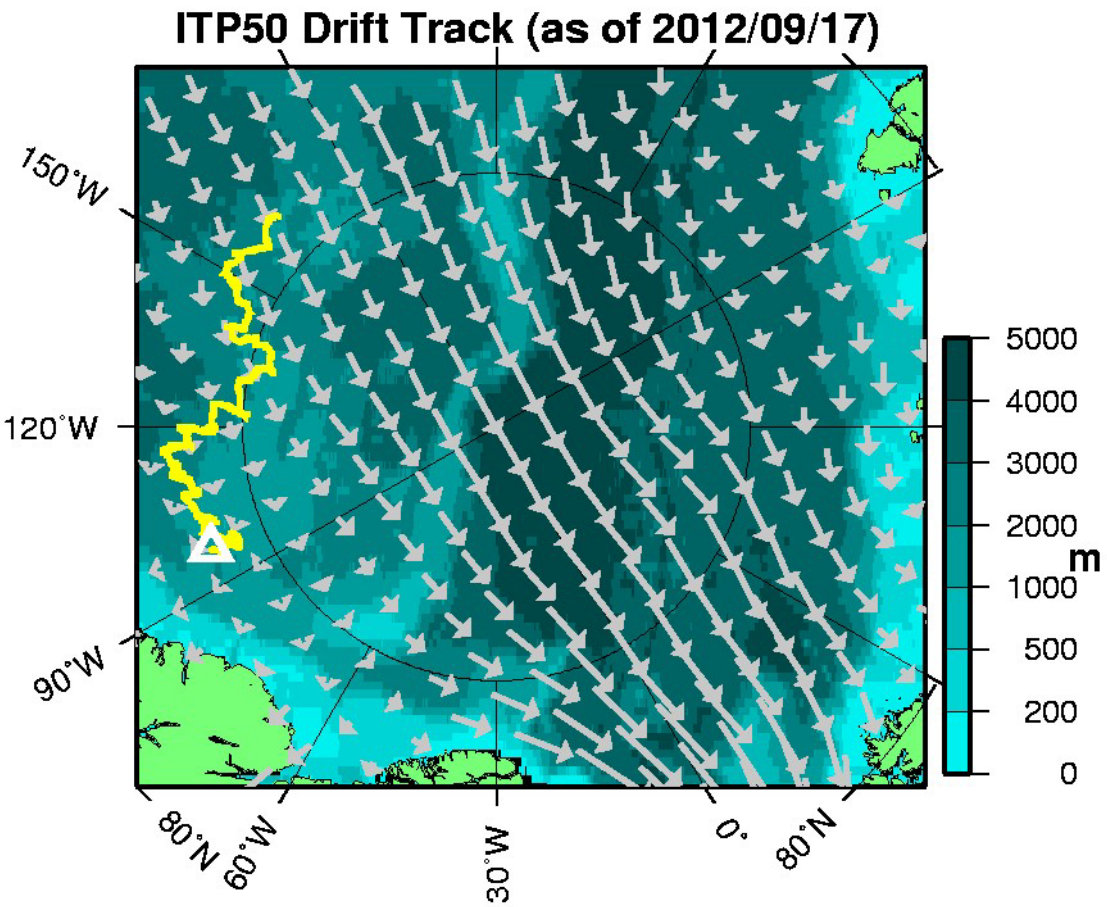
ITP50 Data Description

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 but the underwater profiler did not communicate with the surface unit, so no profile data were obtained. 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 generally east with the Transpolar Drift along 85°N until it was recovered from the nuclear ice breaker *Rossiya* one year later.

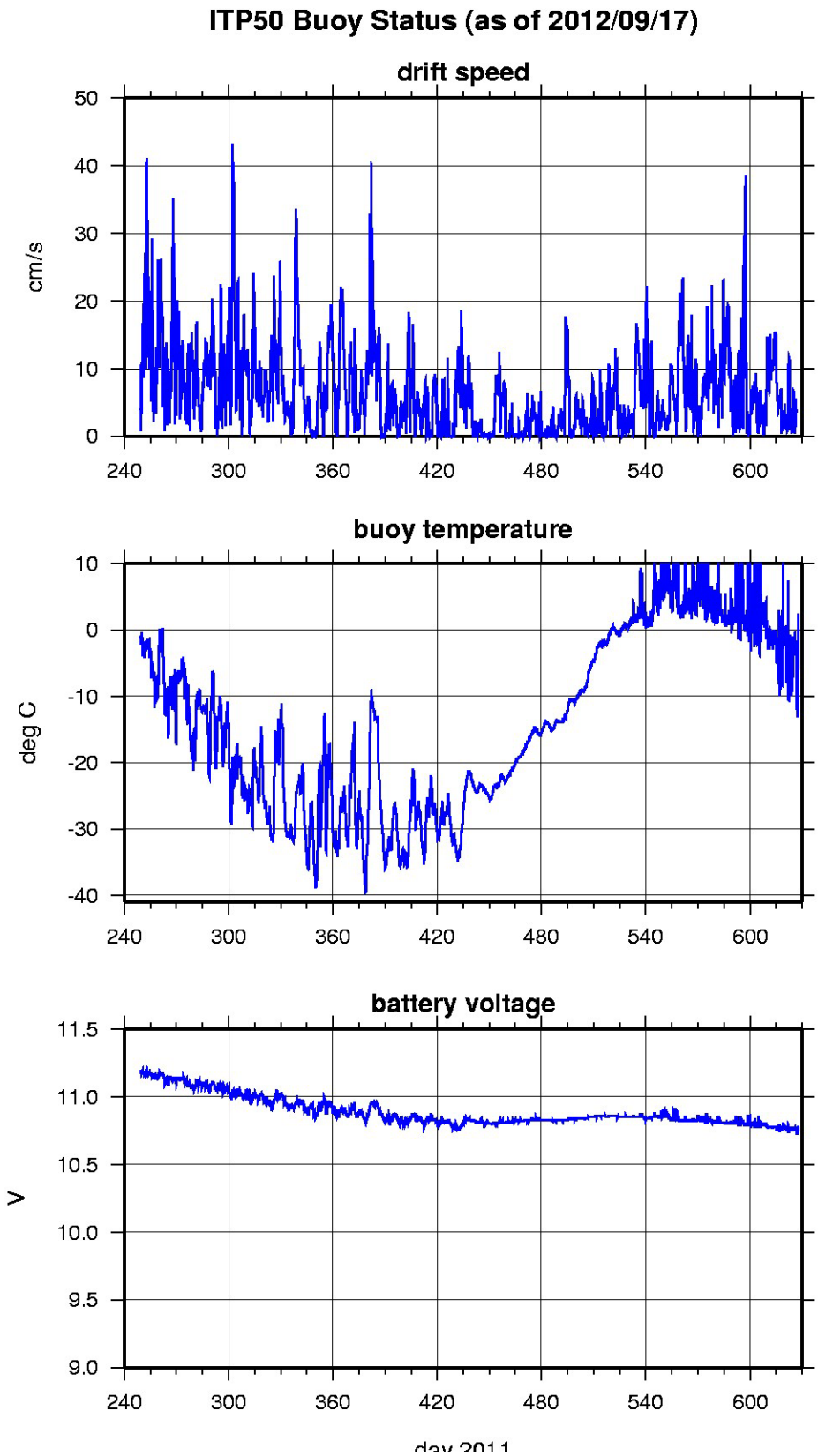
ITP 50 location data can also be found at the link below:

Level II hourly buoy location data in ASCII format: itp50rawlocs.dat



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

Plot of buoy locations.



Composite plot of ITP temperature and salinity contours.