

First deployment of eight Acoustic Ice Tethered Platforms (AITP) and two ULS floats above the Alpha Ridge in April and August 2008 respectively from the polar Canadian base Eureka and the chinese icebreaker Xuelong.

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Figure 1. Deployment of the first cluster of 4 AITP (red) + 7 Met buoys (orange) + 3 IMBs (blue) + 2 ULS floats (yellow) in April 2008. Deployment of the second cluster of 4 AITP (white) + one POPS and one IMB in August 2008.

Two arrays of four AITP were deployed successively and successfully above the Alpha ridge region in the central Arctic Ocean. Regarding the first cluster of 4 AITP we operated with a Twin Otter from Resolute Bay and Eureka Canadian polar stations.

This first array was deployed in April 2008 between 90°W and 120°W in addition to seven Meteorological buoys from UNIHAM and three IMB (Ice Mass Balance) from CRREL.

At the end of this period two ULS floats were deployed near the centre of the AITP array. These floats were ballasted for drifting at 50m depth. A second array of four AITP was deployed from the Chinese icebreaker Xuelong in August 2008 between 140°W and 150°W.

On figure 2, the red pins indicate the deployment sites of the AITPs and the yellow pins indicate the recent positions after several months of drift of these AITPs. In addition one POPS (Polar Ocean Profiling System) and one IMB were deployed from Xuelong at the ice camp near 85°N and 144°W, end of August 2008.

When deploying the second cluster of four AITPs, we took advantage of holes throughout the ice resulting from melt ponds developing more and more frequently on ice floes in summer. During springtime most of the AITPs were deployed in leads.



Figure 2. Drifts of the two AITP clusters deployed in April 2008 and August 2008 respectively until October 27, 2008. Red pins represent starting points and yellow pins ending points of the drifts.

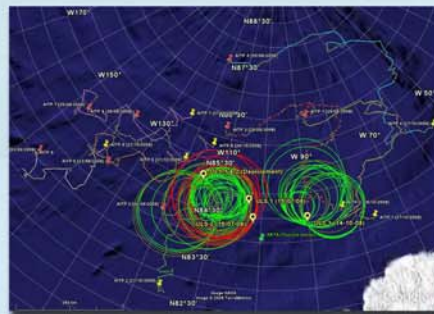


Figure 3. ULS floats localisation first mid July 2008 and second mid October 2008. The two ULS floats were deployed on April 22, 2008 as indicated on the figure.

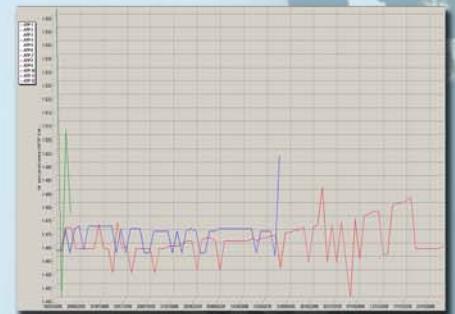


Figure 4. Sound speed deduced from (a) Time Of Arrivals (TOA) of acoustic signals (780hz) transmitted and received every 4 hours by AITP and (b) AITP GPS locations.

On figure 3 we represented ULS floats acoustic signals (1560hz) received at AITPs cruising in the vicinity of the ULS floats (within 100km range approximately). Based on this information we were able to draw a distance separating ULS floats from AITPs represented by red (ULS float 2) and green circles (ULS float 1).

The distance was calculated from the Time of Arrivals (TOA) of the ULS float signals received at the AITP being within the acoustic range of propagation and the sound speed deduced from the AITP acoustic transponding signals (780hz) and GPS locations (figure 4).

An approximate locations of the ULS floats could be estimated around mid-July 2008 and mid-October 2008 (6 months after deployment), based on the hypothesis that ULS floats were moving much slower than surface AITP drifting with sea-ice.

The ULS float signal at 1560hz is only transmitted from time to time (once per day) in order to figure out where the ULS floats might be for safety reasons. The ULS floats are programmed for surfacing and transmitting data to satellites in case open water would be detected by the ULS floats. But in the Alpha Ridge region, open water is rather scarce and this opportunity did not occurred up to now. During the Xuelong cruise, we could not get close by the ULS floats and consequently could not download the data stored inside the floats. These data concern sea-ice thickness, absolute pressure and TOAs from AITP signals (780hz) transmitted every four hours in order to locate ULS floats afterwards. Consequently we are planning to land on sea-ice next spring (one year after deployment) in the vicinity of the two ULS floats if we are still in contact with them like we are now, six months after deployment.



Figure 5. AITP launched from the Chinese icebreaker Xuelong in August 2008 in open water (hole through an ice floe).

