

## The AXBT observation over a frozen sea with the P3-C aircraft

\*Toshihisa Itano<sup>1</sup>

### 1. National Defense Academy

Direct measurements of underwater temperature (and salinity) are generally carried out by “fixed point observations” using mooring system, or “mobile observations” hanging CTD instruments, dropping XBT/XCTD probes, and/or pulling underwater gliders attaching temperature/salinity sensors from ships. In addition, “automated observations” using autonomous underwater vehicles (AUVs) or autonomous ascending/descending floats (ARGO) are popularized recently. On the other hand, underwater temperature/salinity observations by airplanes, dropping expendable probes from aircrafts, have been established. Although such AXBT/AXCTD observations are quite costly, they have a merit to get temperature/salinity data at desired points nearly “on demand”. Furthermore, they have one additional merit to enable temperature/salinity measurements under a frozen sea, where special ships like icebreakers alone could enter. Here, I’d like to introduce an example of such an AXBT observation carried out over southern part of the Sea of Okhotsk during the winter seasons in 2010-2016 with P3-C aircrafts belonging to Japan Marine Self Defense Force (JMSDF).

The sea ice surveillance over the southern part of the Sea of Okhotsk operated by JMSDF is a four-hour flight, taking off and landing on Hachinohe Airbase by way of Wakkanai, Shiretoko peninsula and Nemuro, and the AXBT observation is carried out over a frozen part of the sea found between Wakkanai and Shiretoko peninsula. We planned such an observation once a year in the wintertime (from late Jan to early Feb) during 2010-2016, and seven observations have executed. As the result, seven AXBT probes (Tsurumi Seiki: HQS-51), which are 91.4cm long, 12.2cm in diameter and 6kg in weight, have been dropped off over the area deeper than 500m (Okhotsk basin) through a free fall chute or a launcher provided on the bottom of the P3-C aircraft. We could have six profiles successfully after the seven trials. Most prominent example obtained under the sea ice zone shows constant temperature layer of  $-1.30^{\circ}\text{C}$  until 200m depth, and rising temperature for the deeper layers. Another example obtained just outside of the area covered by sea ice shows the temperature exceeding  $0^{\circ}\text{C}$  for all layer from the sea surface to at least 600m depth.

Keywords: AXBT, sea ice, aircraft, the Sea of Okhotsk