

Arctic Makarov Basin : IAOOS14, IAOOS15 and IAOOS25 ocean CTD-DO profiles in 2015 and 2017

IAOOS14, IAOOS15 and IAOOS25 were deployed from the Korean Icebreaker R/V *Araon* during cruises in the northern Chukchi Sea. IAOOS14 and IAOOS15 were deployed 300 m apart on the same floe on 12 August 2015 in the Makarov Basin (80.8°N;173°E) and they drifted together, remaining always less than 6 km apart. IAOOS25 was deployed on 15 August 2017 south-west Mendeleev Ridge (77.7°N;180°E) and drifted westward to the continental slope of the East Siberian Sea. IAOOS14 and IAOOS25 stopped transmitting on 9 October 2015 and 19 November 2017 respectively, likely due to the loss of their profilers while crossing relatively shallow shelves. IAOOS15 dataset ends in 15 October 2015.

IAOOS profilers were set to perform two upward profiles per day of temperature, salinity and dissolved oxygen (DO) from 300 m (IAOOS15), 430 m (IAOOS25) and 800 m (IAOOS14). Ocean profilers were PROVOR SPI (from French manufacturer NKE) equipped with a Seabird SBE41 CTD (Conductivity, Temperature, Depth) and a dissolved oxygen (DO) Aandera 4330 optode. Temperature, salinity and DO from IAOOS14 and IAOOS15 were very consistent. IAOOS25 provided 191 temperature and salinity profiles and no DO data.

IAOOS platforms first profiles were compared to the ship CTD profiles closest to the ice camp. Temperature and salinity were in good agreement (at depth, $\delta S_A < 6 \cdot 10^{-4} \text{ g.kg}^{-1}$, and $\delta \Theta < 1.2 \cdot 10^{-3} \text{ }^\circ\text{C}$), however differences in dissolved oxygen concentration were notable ($23 \mu\text{mol.kg}^{-1}$ at depth), likely resulting from sensor drift before deployment. We tentatively applied a constant offset. In the IAOOS25 dataset, six salinity profiles from 12 to 16 November 2017 exhibited an anomaly low values from 50 to 400 m. They were corrected by applying an offset over the entire profile of about 0.48 psu, which corresponded to the salinity difference values with the surrounding Atlantic waters sampled at 400m (Figure 1). After quality control, temperature and salinity have an accuracy of 0.005 °C and 0.02 psu respectively. Data were interpolated to 0.5 m vertical resolution. Description of the IAOOS experimental setup and data processing are given in Athanase et al. (2019).

Reference :

Athanase, M., Sennéchaël, N., Garric, G., Koenig, Z., Boles, E., & Provost, C. (2019). New Hydrographic Measurements of the Upper Arctic Western Eurasian Basin in 2017 Reveal Fresher Mixed Layer and Shallower Warm Layer Than 2005–2012 Climatology. *Journal of Geophysical Research: Oceans*, 124(2), 1091–1114. <https://doi.org/10.1029/2018JC014701>

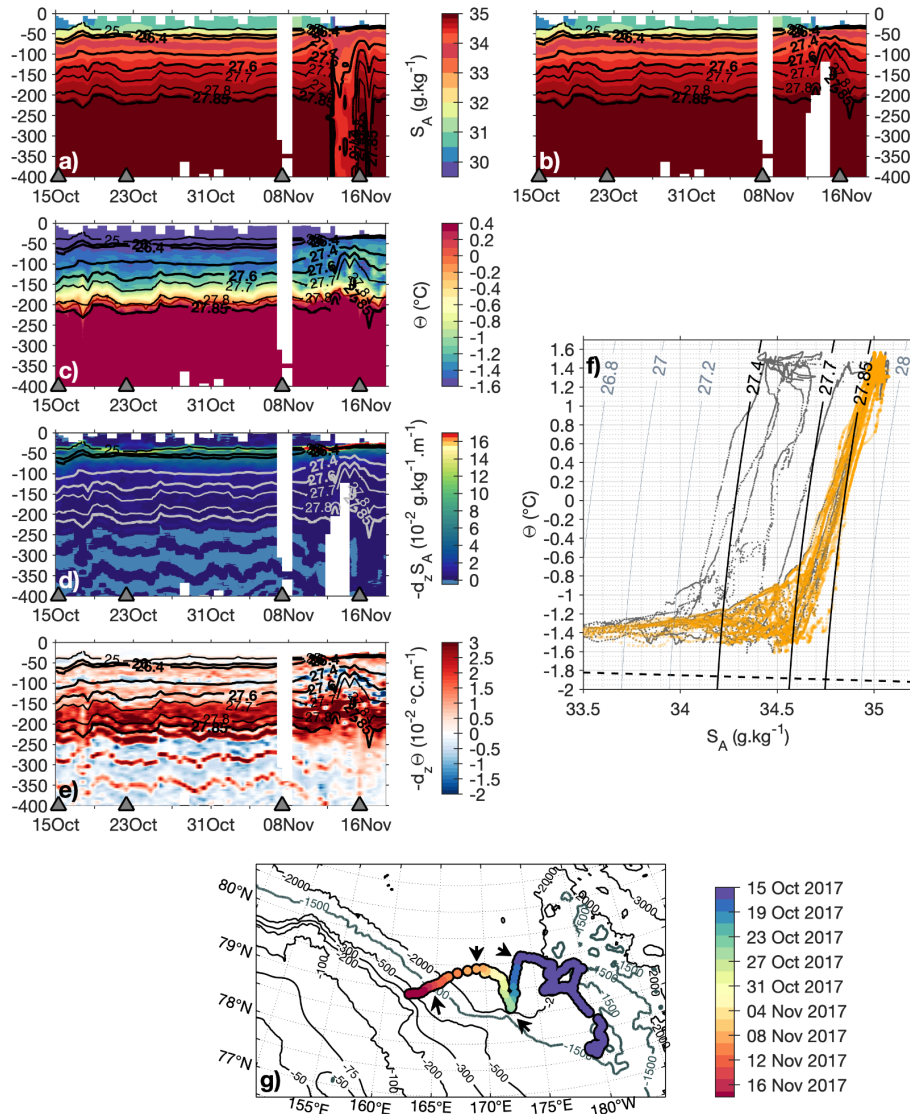


Figure 1 : (a) Raw and (b) corrected absolute salinity S_A ($\text{g}\cdot\text{kg}^{-1}$), (c) conservative temperature Θ ($^{\circ}\text{C}$), (d) vertical derivative of absolute salinity ($10^{-2} \text{g}\cdot\text{kg}^{-1}\cdot\text{m}^{-1}$) and (e) vertical derivative of conservative temperature ($10^{-2} \text{ }^{\circ}\text{C}\cdot\text{m}^{-1}$) along the second part of the IAOOS25 trajectory. (f) Θ - S_A diagram. Profiles before correction are in gray and corrected profiles are in yellow. (g) Time along the trajectory in color; small black arrows indicate positions marked by small triangles in the above panels to help the reader.