

Mooring operations in polar waters – further reading material:

There are no dedicated books on oceanographic mooring operations in polar waters but some information can be found in the following sources.

Moored observatories in the European Arctic:

Website of FRAM, including **the eastern Fram Strait moored system:**

<https://www.awi.de/en/expedition/observatories/ocean-fram.html>

(some papers based on mooring measurements are listed on the website)

Website of the Fram Strait Arctic Outflow Observatory, including **the western Fram Strait mooring system:**

<https://www.npolar.no/en/projects/fram-strait-arctic-outflow-observatory/>

(some papers based on mooring measurements are listed on the website)

Website of **the A-TWAIN mooring array north of Svalbard:**

<https://www.npolar.no/en/projects/a-twain/>

Some more recent A-TWAIN news:

<https://arvenetternansen.com/nla-twain-mooring-cruise-2021/>

<https://arvenetternansen.com/mooring-service-cruise/>

Some A-TWAIN papers based on mooring measurements:

Pérez-Hernández, M. D., Pickart, R. S., Torres, D. J., Bahr, F., Sundfjord, A., Ingvaldsen, R., Renner A.H.H., Beszczynska-Möller A., von Appen W.-J., 2019. Structure, transport and seasonality of the Atlantic Water Boundary Current north of Svalbard: Results from a year-long mooring array. *Journal of Geophysical Research: Oceans*, 124. <https://doi.org/10.1029/2018JC014759>.

Renner, A. H. H., A. Sundfjord, M.A. Janout, R. Ingvaldsen, A. Beszczynska-Möller, R. Pickart, and M. Perez-Hernandez, 2018. Variability and redistribution of heat in the Atlantic Water boundary current north of Svalbard. *J. Geophys. Res., Oceans*, 123, 6373–6391, doi: 10.1029/2018JC013814.

Website of the NABOS system, including **moorings in the Eastern Eurasian Basin:**

<https://uaf-iarc.org/nabos/>

Other sources:

Lee, C. M., Starkweather, S., Eicken, H., Timmermans, M.-L., Wilkinson, J., Sandven, S., et al., 2019. A framework for the development, design and implementation of a sustained arctic ocean observing system. *Front. Mar. Sci.* 6:451. doi: 10.3389/fmars.2019.00451.

More recent paper on designing and implementing in situ measurements in the Arctic

Beszczynska-Möller A., R. Woodgate, C. Lee, H. Melling, M. Karcher, 2011. A synthesis of exchanges through the main oceanic gateways to the Arctic Ocean. *TOS Oceanography*, 24(3): 82–99, doi: 10.5670/oceanog.2011.59.

Older paper focused on a synthesis of mooring measurements in the Arctic gateways

Mikhalevsky, P. N., Sagen, H., Worcester, P. F., Baggeroer, A. B., Orcutt, J., Moore, S. E., et al., 2015. Multipurpose acoustic networks in the integrated arctic ocean observing system. *Arctic* 68, 11–27. doi: 10.14430/arctic4449.

Older paper focused on the idea of an array of acoustic moorings in the Arctic

Woodgate, R.A., K.M. Stafford, and F.G. Prah. 2015. A synthesis of year-round interdisciplinary mooring measurements in the Bering Strait (1990–2014) and the RUSALCA years (2004–2011). *Oceanography* 28(3):46–67, doi: 10.5670/oceanog.2015.57.

Older paper focused on a synthesis of mooring measurements in the Bering Strait

Aagaard, K., and J.M. Johnson. 2011. The North Pole Environmental Observatory mooring. *Oceanography* 24(3):100–101, <http://dx.doi.org/10.5670/oceanog.2011.60>.

Older paper on a mooring next to the North Pole in 2001-2010

Books on ocean observations including mooring technology:

J.H. Steel, S.A. Thorpe, K.K. Turekian (Eds) 'Measurement Techniques, Sensors, and Platforms. A Derivative of Encyclopedia of Ocean Sciences 2nd Edition' (Elsevier, 2009)
Excellent overview of different measurement methods with a separate chapter dedicated to ocean moorings (including detailed parts on subsurface moorings).

R. Venkatesan, Amit Tandon, Eric D'Asaro, M.A. Atmanand 'Observing the Oceans in Real Time' (Springer, 2018)

Book focused on NRT (near-real time) ocean observing but with a chapter devoted to subsurface measurements. Good overview of different observing methods, most of them also applied in the polar oceans

J. Corredor 'Coastal Ocean Observing - Platforms, Sensors and Systems' (Springer, 2018)

Book focused on coastal observations in low latitudes but provides good overview of sensors and platforms used for ocean physical and biogeochemical measurements

M. Le Menn 'Instrumentation in Metrology and Oceanography' (Wiley, 2012)

Somewhat older book but provides a good introduction to in situ measurements in oceanography, including moorings and moored sensors.