

ADCP ice draft data from AUV Ran missions during Nathaniel B. Palmer cruise NBP2202 - data description

This data repository contains ADCP echo intensity data and maps of ADCP-derived ice draft of Dotson Ice Shelf, collected by the autonomous underwater vehicle (AUV) Ran (Kongsberg Hugin) during the Nathaniel B. Palmer cruise NBP2202. The AUV was equipped with an upward-looking 45 kHz ADCP (RDI Pinnacle 45) during three seabed-following missions: 02, 03 and 04. A summary of the missions are available from <https://researchdata.se> (doi: <https://doi.org/10.5878/349w-b176>). The process for deriving ice draft from the ADCP echo intensity data is explained in the following article:

Wahlgren S., Wåhlin, A. & Heywood, K. J (2026). Mapping the ice draft of Dotson Ice Shelf with a long-range ADCP on an autonomous underwater vehicle. *Journal of Atmospheric and Oceanic Technology*, [In review]

Files:

NBP2202_**_ADCP_echo_intensity.nc:

NetCDF4-files with ADCP data collected with the 45 kHz RDI Pinnacle ADCP in narrow-band burst mode, together with AUV navigation data. The ADCP timestamps have been synchronized to the AUV clock post data collection, with the time lag determined by cross-correlating the pressure measurements of the AUV and ADCP, as described in Wahlgren et al. (2026). The AUV navigation data have then been linearly interpolated to match the timing of the ADCP pings. The ADCP heading is measured relative to magnetic north, and a constant, mission-specific correction is added to adjust for magnetic declination (53.0°, 53.8° and 53.9° for missions 02, 03 and 04 respectively). A list of the provided variables is presented in Table 1.

NBP2202_**_ice_draft.csv:

Ice draft derived from the ADCP echo intensity data files. The code for deriving the ice draft is available at <https://github.com/stinawahlgren/auv-adcp-ice-draft>. Note that outliers have not been removed and that the ice draft is not gridded. The data fields are:

latitude	(decimal degrees)
longitude	(decimal degrees)
ice_draft	(m)
beam	(1: starboard, 2: port, 3: forward, 4: aft)
timestamp	(UTC time)
AUV_depth	(m)
AUV_lat	(decimal degrees)
AUV_lon	(decimal degrees)
ADCP_roll	(degrees)
ADCP_pitch	(degrees)
ADCP_heading	(degrees)

Table 1: List of variables in NBP2202_**_ADCP_echo_intensity.nc

Variable	Description	Unit	Dimension
time	UTC time (synchronized with AUV clock)	-	time
range	ADCP instrument-vertical range (mid-cell)	m	range
beam	ADCP beams 1: starboard, 2: port, 3: forward, 4: aft	-	beam
along_beam_range	Along-beam range. Scaled with $1/\cos(20 \text{ deg})$ compared to instrument vertical range.	m	range
intensity	ADCP echo intensity.	counts	beam, time, range
corr	ADCP correlation magnitude.	counts	beam, time, range
longitude	Longitude reported by the AUV navigation system.	deg	time
latitude	Latitude reported by the AUV navigation system.	deg	time
pressure	Pressure reported by the AUV navigation system.	dbar	time
pitch_adcp	Pitch measured by the ADCP.	deg	time
roll_adcp	Roll measured by the ADCP.	deg	time
heading_adcp	Heading measured by the ADCP, corrected for magnetic declination.	deg	time
sound_speed	Sound speed used by the ADCP.	m/s	time
heading_adcp_raw	Heading measured by the ADCP, not corrected for magnetic declination.	deg	time
depth_adcp	Depth reported by the ADCP.	m	time
time_str	UTC timestamp as string. Format: yyyy-mm-ddTHH:MM:SS	-	time