DY081 EM-122 REPORT

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This data release includes 56,432 square kilometers of multibeam swath bathymetry collected during a 2017 (June – August) research expedition onboard the RRS Discovery, DY081, in the North Atlantic Ocean. DY081 was the first fieldwork component of a European Research Council funded project, ICY-LAB, led by Dr. K. Hendry from the University of Bristol to study nutrient cycling in the North Atlantic. Four sites of interest were surveyed with an EM-122 echosounder prior to scientific operations such as CTD deployment, sediment coring, and/or ROV dives. The four sites were Orphan Knoll off the coast of Newfoundland, and Nuuk, Nasrsaq, and Cape Farewell off southwest Greenland *(Figure 1).* Multibeam data was also recorded and processed during transit between locations.

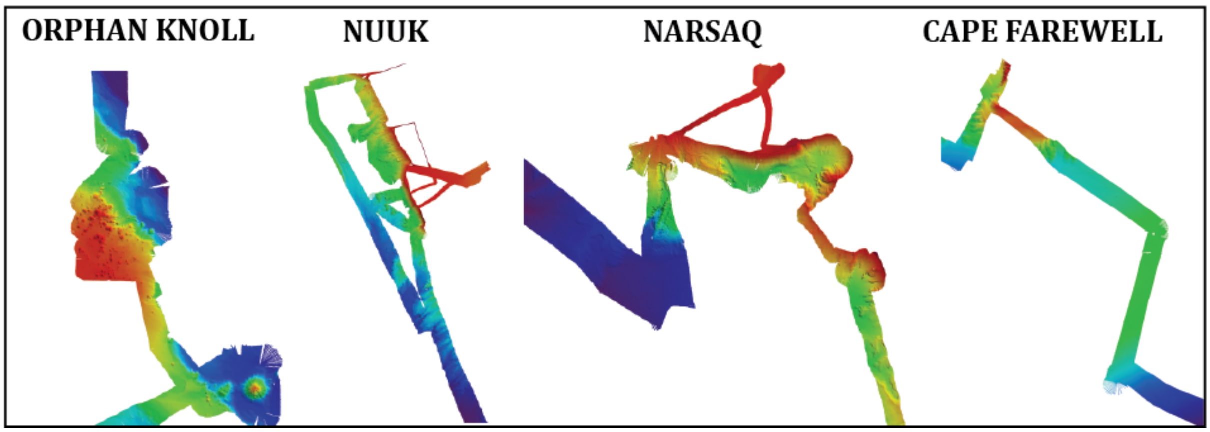


Figure 1. Bathymetry from the four study sites.

Within this data release, the navigation, EM-122 raw, and processed gridded data for the four study sites and transits are provided *(Figure 2).* The navigation data for the expedition is given as both a shapefile and as a .kmz (readable by Google Earth). The EM-122 raw files (.all) are separated into five zipped files (EM_122_raw_1.zip includes files from the beginning of the expedition and this sequentially proceeds until EM_122_raw_5.zip). The gridded data are provided in both geotiff (.tif and accompanying .tfw file), and ASCII (.asc and accompanying .prj file). Details of the gridded datasets are provided in Table 1. Acquisition and processing settings follow.

Location	EM122 Lines Contained	Acquired Projection	Released Projection*	Resolution (m)
TRS 1	0000 - 0055	WGS84 UTM 22 - 23 N	WGS84	25
Orphan Knoll	**0056 - 0147**	**WGS84 UTM 23 N**	**WGS84 UTM 23 N**	**25**
TRS 2	0147 - 0317	WGS84 UTM 22 - 23 N	WGS84	25
Nuuk	**0318 - 0479**	**WGS84 UTM 22 N**	**WGS84 UTM 22 N**	**25**
TRS 3	0478 - 0531	WGS84 UTM 22 N	WGS84	25
Narsaq	**0530 - 0637**	**WGS84 UTM 23 N**	**WGS84 UTM 23 N**	**25**
TRS 4	0636 - 0653	WGS84 UTM 23 N	WGS84	25
Cape Farewell	**0653 - 0688**	**WGS84 UTM 23 N**	**WGS84 UTM 23 N**	**25**
TRS 5	0687 -0904	WGS84 UTM 23 - 28 N	WGS84	25

*Table 1. Information about the provided grids. * Transit grids were compiled from multiple grids, some of which spanned multiple UTM zones. These grids were reprojected to WGS84 when merged.*

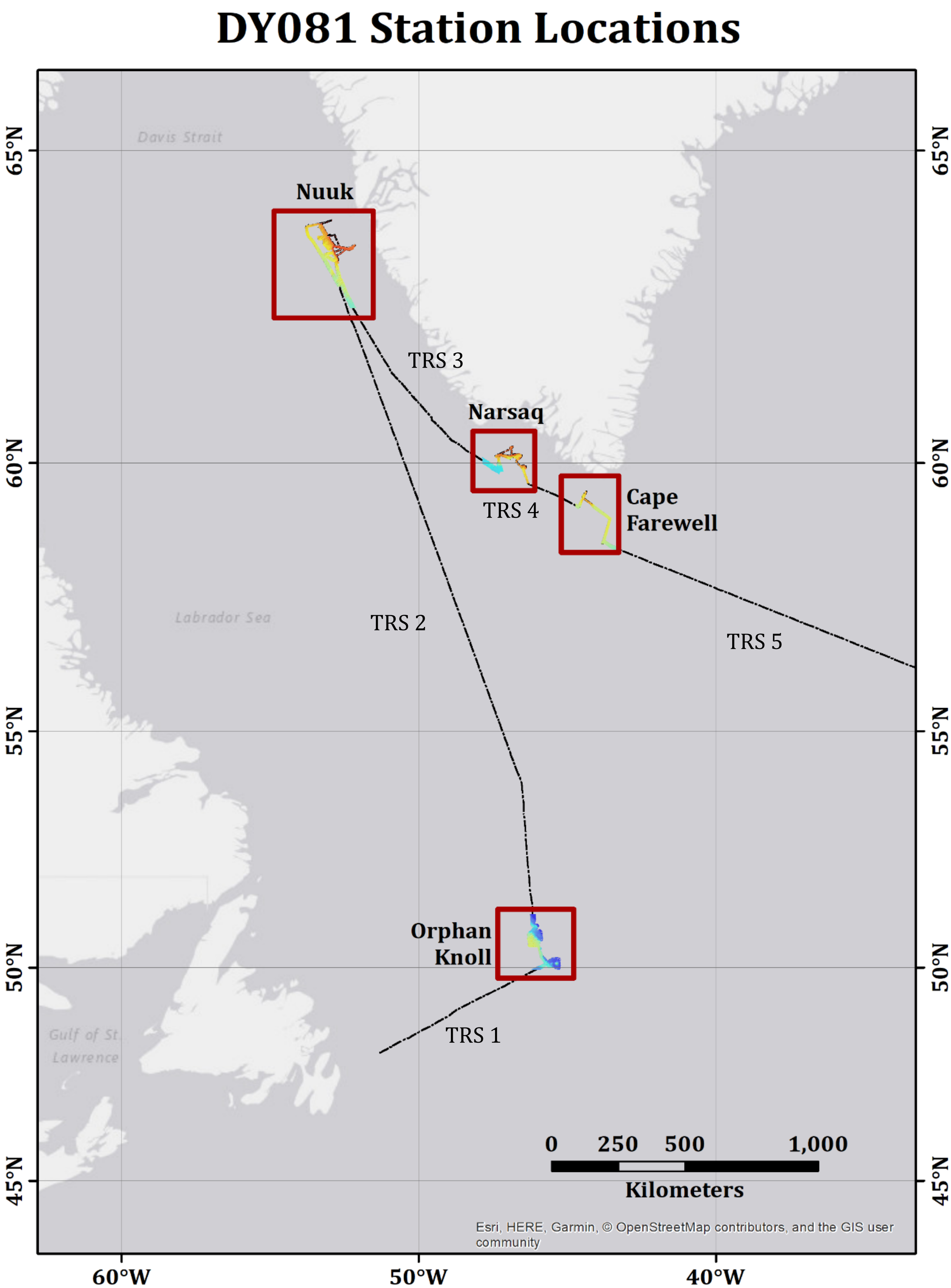


Figure 2. Locations of gridded data.

Acquisition

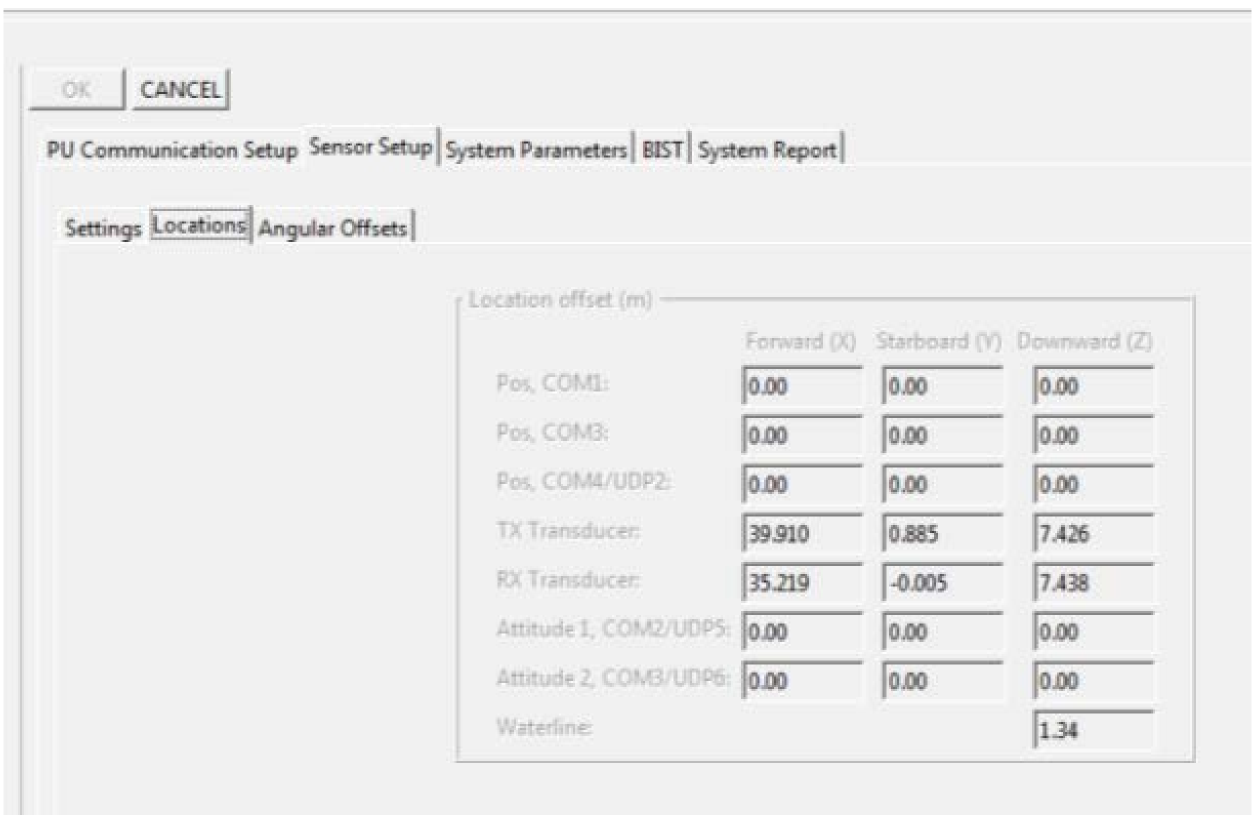
Vessel speed: specific surveys were carried out at 8kn, otherwise data were collected at the speed that was most appropriate for the vessel (e.g. 10-11 kn during transit).

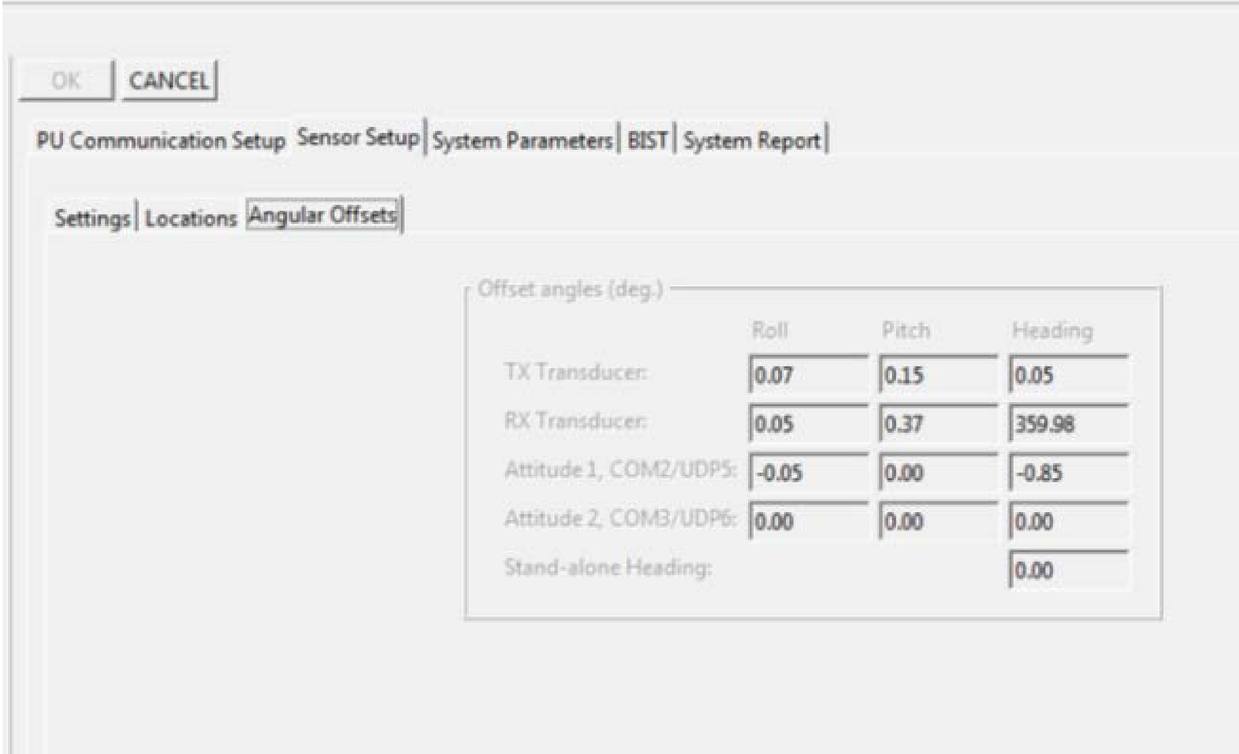
Swath angle: 60°, except in cases when overlap was insufficient, e.g. when the course had to be altered because of ice.

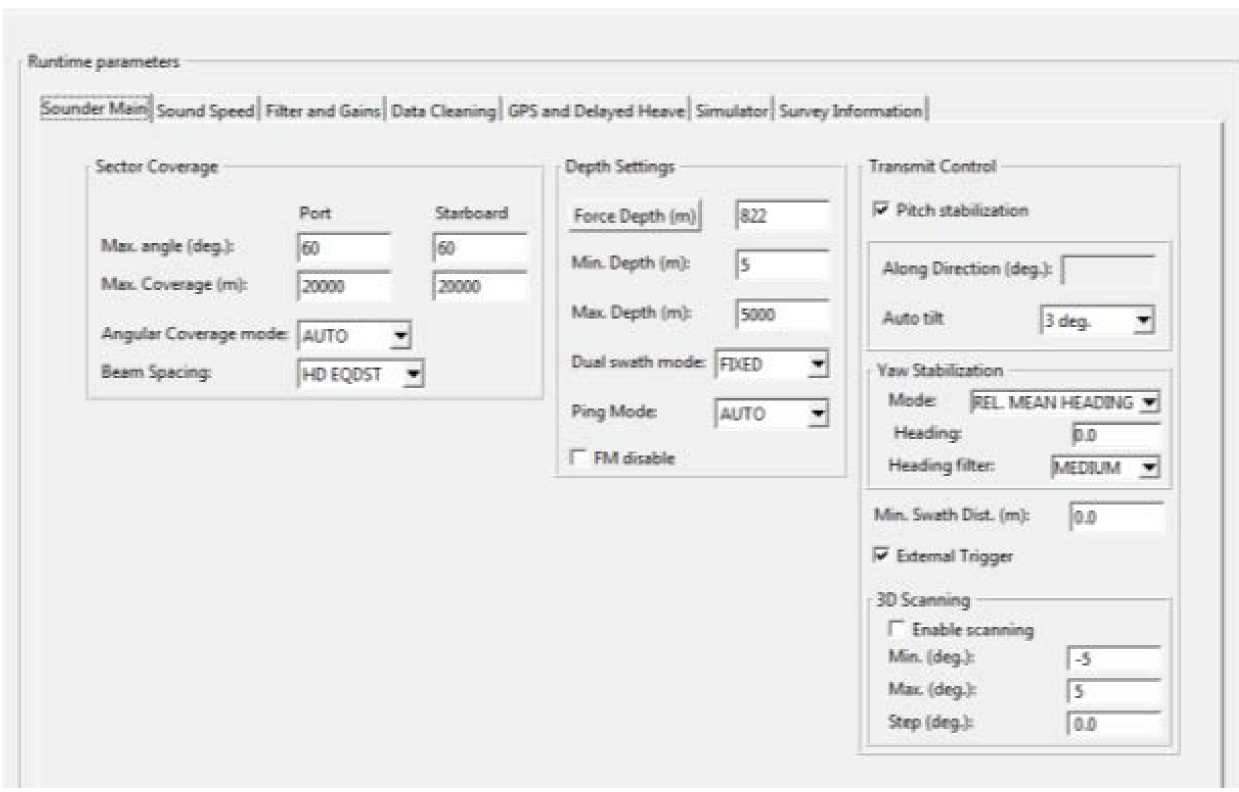
Data format: data were stored as Kongsberg .all files

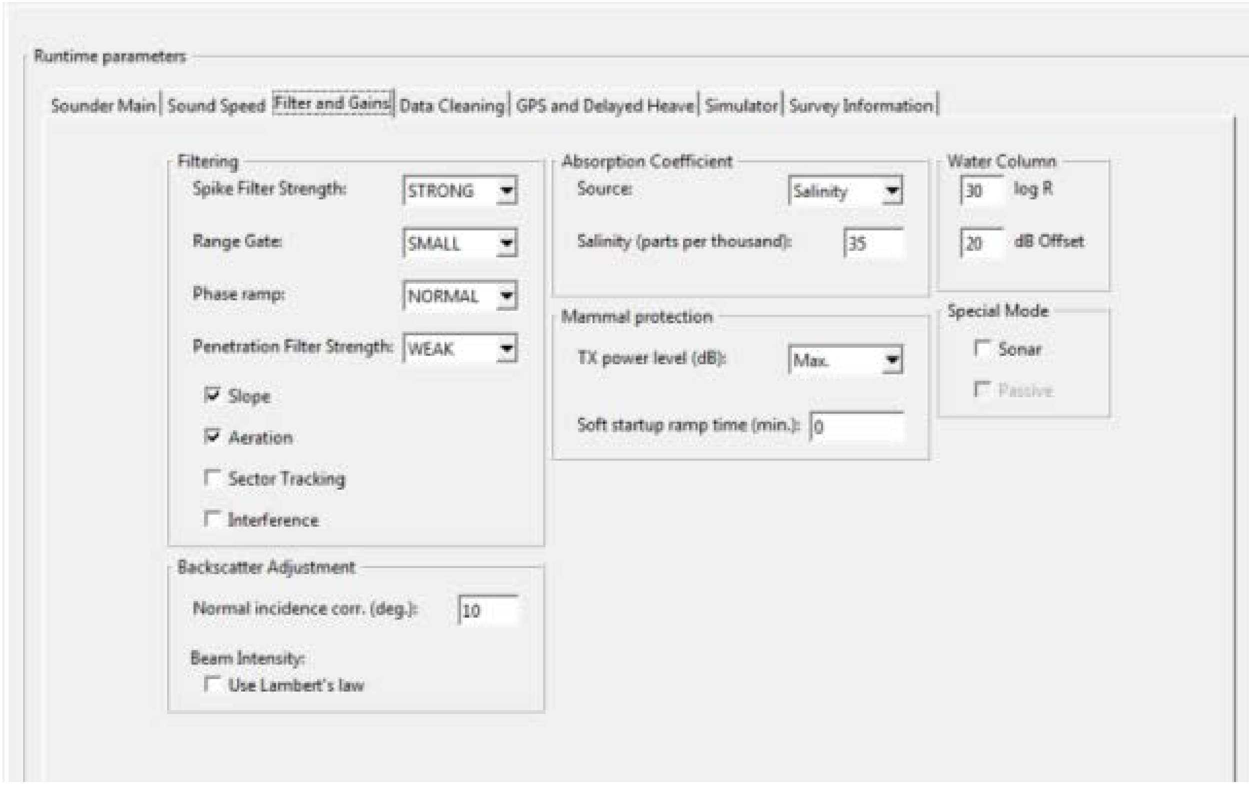
Navigation: GPS data from the POS-MV system (the usual SeaPath GPS had problems at the start of the cruise, hence the POS-MV was used for the duration of the expedition)

Further settings for the acquisition software (Seafloor Information Systems, SIS) are provided in the following figures:




OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Settings
Locations
Angular Offsets
Offset angles (deg.)
Roll
Pitch
Heading
TX Transducer:
0.07
0.15
0.05
RX Transducer:
0.05
0.37
359.98
Attitude 1, COM2/UDP5:
-0.05
0.00
-0.85
Attitude 2, COM3/UDP6:
0.00
0.00
0.00
Stand-alone Heading:
0.00


Runtime parameters
Sounder Main
Sound Speed
Filter and Gains
Data Cleaning
GPS and Delayed Heave
Simulator
Survey Information
Sector Coverage
Port
Starboard
Max. angle (deg.):
60
60
Max. Coverage (m):
20000
20000
Angular Coverage mode:
AUTO
Beam Spacing:
HD EQDST
Depth Settings
Force Depth (m)
822
Min. Depth (m):
5
Max. Depth (m):
5000
Dual swath mode:
FIXED
Ping Mode:
AUTO
FM disable
Transmit Control
Pitch stabilization
Along Direction (deg.):
Auto tilt
3 deg.
Yaw Stabilization
Mode:
REL. MEAN HEADING
Heading:
0.0
Heading filter:
MEDIUM
Min. Swath Dist. (m):
0.0
External Trigger
3D Scanning
Enable scanning
Min. (deg.):
-5
Max. (deg.):
5
Step (deg.):
0.0


Runtime parameters
Sounder Main
Sound Speed
Filter and Gains
Data Cleaning
GPS and Delayed Heave
Simulator
Survey Information
Filtering
Spike Filter Strength:
STRONG
Range Gate:
SMALL
Phase ramp:
NORMAL
Penetration Filter Strength:
WEAK
Slope
Aeration
Sector Tracking
Interference
Absorption Coefficient
Source:
Salinity
Salinity (parts per thousand):
35
Water Column
30
log R
20
dB Offset
Mammal protection
TX power level (dB):
Max.
Soft startup ramp time (min.):
0
Special Mode
Sonar
Passive
Backscatter Adjustment
Normal incidence corr. (deg.):
10
Beam Intensity:
Use Lambert's law


Runtime parameters
Sounder Main
Sound Speed
Filter and Gains
Data Cleaning
GPS and Delayed Heave
Simulator
Survey Information
Sound Speed Profile
Use Sound Speed Profile
DY081_CTD020_SVP_30m_processed.asvp
Abs. coeff. files, salinity
\svp\DY081\DY081_CTD020_SVP_30m_processed_salinity_03500
Abs. coeff. files, CTD
D:\sisdata\common\svp_abscoeff\default
Sound Speed at Transducer
Source
SENSOR
Sound Speed (m/sec.):
1493.0
Sensor Offset (m/sec.):
0.0
Filter (sec.):
60

Sound velocity information was taken from the various CTD casts carried out throughout the cruise, which were applied to the data as soon as they were available. In addition, the sound velocity at the transducer was also used. It was noted that, as a result of working in shallow conditions close to river and meltwater inputs, the sound velocity at the transducer was often significantly different from the surface water sound velocity in the SVP profiles (red alarm on SIS).

Processing

Bathymetry data were processed on-board with the Caris HIPS & SIPS software v.8, using standard settings and procedures (data import, navigation and attitude check, application of a "zero tide", gridding into a 25mx25m pixel BASE surface). Each bathymetry grid, as well as an interpolated surface, was exported to an ASCII grid, a GeoTiff, as well as a Fledermaus SD object. The vessel file Disco_EM122_POS_MV.hvf was used for processing, with the following offsets:

Time Corr: 0.00

X (m): -0.005

Y (m): 35.219

Z (m): 7.438

Pitch (deg): 0.00

Roll (deg): 0.00

Yaw (deg): 0.00

While post processing on-board, some errors were apparent in the bathymetric grids. These could be either due to the rapidly changing water masses, or to some systematic offset. Further processing is required to determine and fix these errors.