

Groupe hydrographique et océanographique de
l'Atlantique

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- Object** : Hydrographic survey in Norwegian waters onboard French Survey Ship *Beautemps-Beaupré* (S201804600) in August 2018.
- Reference** : a) License to carry out scientific research journal nr. : NPD 18/277/HeHa from 11-05-2018 : Norway.
- Attachment** : 1 appendix : surveyed area

1. TASK.

This report presents the hydrographic activities carried out between the 1st and the 4th of August 2018 by « Groupe hydrographique et océanographique de l'Atlantique », part of Shom (French Hydrographic Office), onboard survey ship *Beautemps-Beaupré* in the EEZ of Norway around Jan Mayen Island. Data are linked to the Shom survey number S201804600.

2. REFERENCES.

- All data in geographical coordinates are referenced to geodetic system ITRF14 epoch @2018.621 that can be assimilated to WGS84 datum with less than 1 meter approximation.
- The vertical reference is **approximately the lowest astronomical tide level (LAT)** with an uncertainty 95% of 2m (Soundings are not corrected from any tide observation).

3. HYDROGRAPHIC DATA.

3.1 Data acquisition.

The survey was carried out by French survey ship Beautemps-Beaupré (A758) equipped with a multibeam echosounder (MBES) Kongsberg EM122 (12kHz) for deep waters (350-5000m) and a Kongsberg EM712 MBES (100kHz) for shallower waters (15-350m). The survey area is given in appendix 1.

3.2 Data corrections.

Processing was done using CARIS HIPS&SIPS 9.1

3.2.1 *Sound velocity correction.*

Sound velocity profiles were regularly measured (at least 4 times per day) using Sippican expendable Bathythermograph (XBT).

Depth values are corrected from sound velocity profile effects.

All the XBT profiles are available in the "HYDROLOGY" folder.

3.2.2 *Position and attitude.*

Positioning and attitude was supplied by an inertial navigation system HYDRINS combined with GNSS system receiving correction from European EGNOS SBAS system.

Accuracy of the ship position is estimated at 3 m at 95%.

Data has been corrected from the lever arms of all the sensors.

3.2.3 *Tide correction.*

EM712 soundings are corrected with a predicted tide. No tide corrections have been applied to EM122 soundings.

3.2.4 *Accuracy and quality*

Soundings are available in Ascii format .glzcp (longitude, latitude, depth, sensor, vessel) in the "BATHYMETRY" folder :

- Soundings from file EEZ_NORWAY_EM712.glzcp were acquired with EM712 MBES.
- Soundings from file EEZ_NORWAY_EM122.glzcp were acquired with EM122 MBES.

The sounding accuracy in meter at 95% is (where D = depth in meter) :

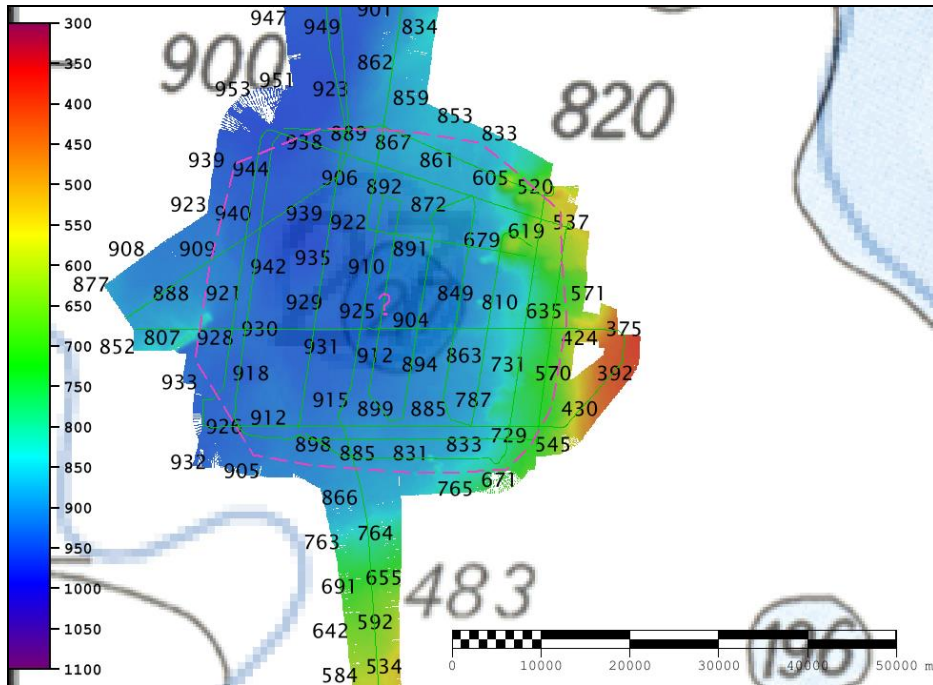
Horizontal: $3\text{ m} + 0.0135 \times D$

Vertical: $2\text{ m} + 0.0055 \times D$

All soundings have been acquired in transit and are thus considered as **unqualified** regarding the standards of the IHO S44 publication. The area covered is qualified as **CATZOC C** regarding the IHO cartographic standards.

4. IMPACT ON NAVIGATION CHARTS.

The 27m sounding that were at position 70° 35.0' N / 009° 36.0' W has been deleted following the full survey of an area covering 3 nautical miles around the position and the UKHO notice to mariners n°5315/2018.



*Area 3Nq around the sounding covered by MBES EM122
- background coming from FR6771 navigation chart.*

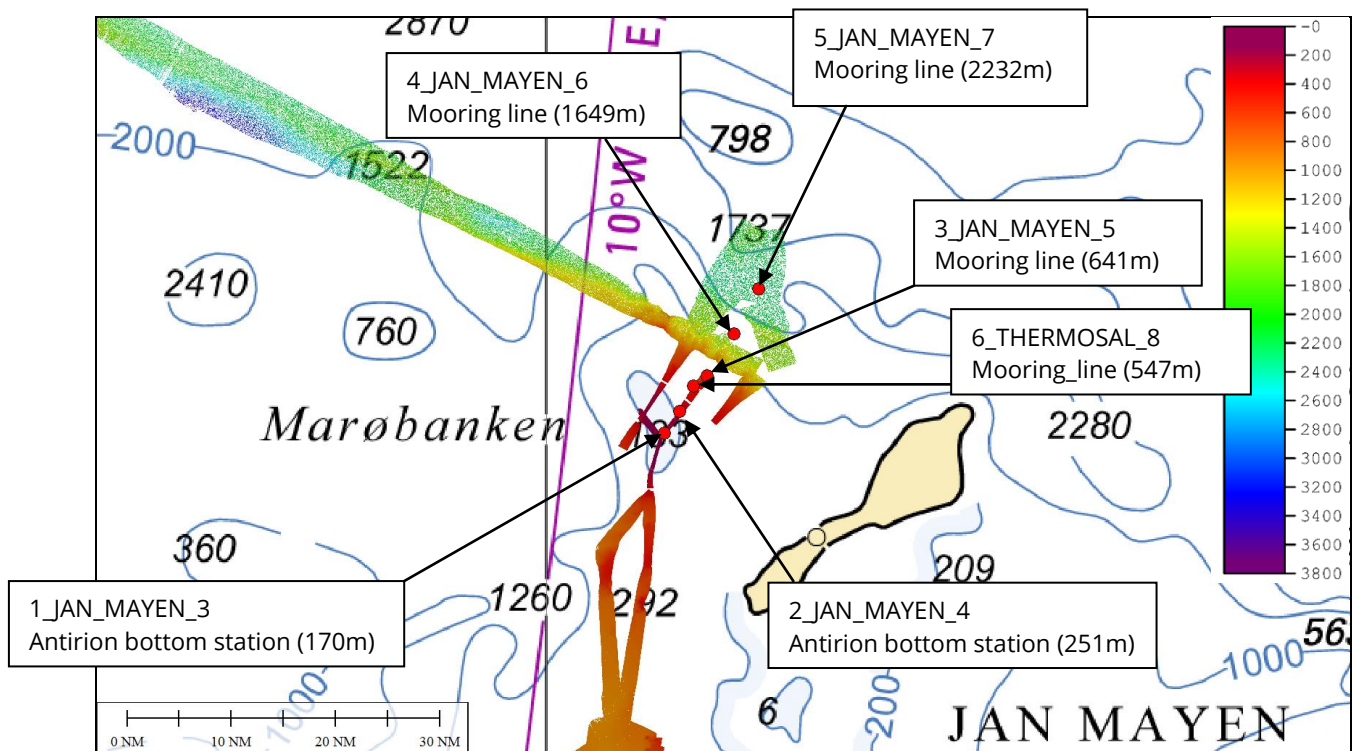
10 significant soundings that are not charted have been reported but not necessarily forwarded by Notice to mariners :

Latitude	Longitude	Depth (m)	
71-26.9378880N	008-58.5632520W	1737	
71-30.5661660N	010-28.9232340W	1600	
71-32.8699200N	010-47.0566140W	1522	
71-48.2017860N	012-29.7612180W	1261	
70-53.9658240N	009-41.4314400W	451	(reported in 5315/2018 Notice to mariners)
70-34.4134920N	009-24.0454740W	423	(reported in 5315/2018 Notice to mariners)
70-55.0898700N	009-28.6285740W	416	
70-51.3571680N	009-31.0849680W	368	
70-51.0390420N	009-31.5932760W	367	
70-50.6418660N	009-31.0150620W	292	(reported in 5315/2018 Notice to mariners)

5. OCEANOGRAPHIC DATA.

5.1 Moorings

Six moorings have been moored 20 Nautical miles off the western coast of Jan Mayen Island in August 2017 by French Oceanographic ship *Pourquoi Pas?*, and then recovered in August 2018 by French survey ship *Beautemps-Beaupré*. The moorings have been measuring current, temperature and salinity along the water column during one year. A notice to mariners was emitted and then cancelled at the recovering of the moorings : see Uk notice to mariners 4976(T)/2017 and Norwegian notice 17/5769(T)/17.



*Position of the six moorings 20Nm off the western coast of Jan Mayen Island
- background coming from FR6771 navigation chart.*

Moorings description schemes and metadata are given in the "JAN_MAYEN_MOORINGS" folder in pdf files.

Adopted instrument immersions have been estimated using the MBES depth measurement and the cable length from sea bottom to instrument (or bottom station height). Comparisons to calibrated SBE depth pressure sensors show an uncertainty of 25 to 50m on the immersion depth value.

Current data are processed using Chersoft Tide database software, and given in Ascii files in the "JAN_MAYEN_MOORINGS" folder.

SBE sensor data is not processed. Raw data is given in Ascii files in the "JAN_MAYEN_MOORINGS" folder.

The following table sums up the moorings and associated sensors :

Position		Description
LON	LAT	
009° 24,790' W	71° 07,397' N	1 JAN_MAYEN_3 – antirion bottom station (170m) : - ADCP Profiler Nortek SIGNATURE 250kHz n°100215 ; - SBE37 n°9329.
009° 20,230' W	71° 09,498' N	2 JAN_MAYEN_4 – antirion bottom station (251m) : - ADCP Profiler Nortek CONTINENTAL 190kHz n°6098 ; - SBE37 n°12932.
009° 11,943' W	71° 12,935' N	3 JAN_MAYEN_5 – mooring line (641m) : - ADCP Profiler RDI LONG RANGER 75kHz n°10308.
009° 04,153' W	71° 16,951' N	4 JAN_MAYEN_6 – mooring line (1649m) : - ADCP Profiler Nortek AQP 400kHz n°6936 (86m) ; - SBE37 n°9350 (105m) ; - SBE37 n°9349 (205m) ; - SBE37 n°10862 (406m) ; - Nortek Aquadopp 2MHz - n°2307 (506m) ; - SBE39 n°403 (802m) ; - Nortek Aquadopp 2MHz - n°1683 (1002m) ; - Nortek Aquadopp 2MHz - n°1842 (1568m) ; - SBE39 n°1364 (1568m).
008° 56,650' W	71° 21,233' N	5 JAN_MAYEN_7 – mooring line (2232m) : - SBE37 n°8292 (88m) ; - SBE39 n°5638 (108m) ; - SBE37 n°10861 (138m) ; - SBE39 n°6041 (188m) ; - SBE37 n°10860 (238m) ; - Nortek Aquadopp 2MHz - n°2070 (338m) ; - SBE37 n°10865 (439m) ; - SBE39 n°0949 (1035m) – No data due to acquisition issue ; - Nortek Aquadopp 2MHz - n°2305 (1535m) ; - Nortek Aquadopp 2MHz - n°1841 (1910m).
009° 16,18' W	71° 11,95' N	6 JAN_MAYEN_8 : mooring line (547m) : - SBE37 n°10859 (104m) ; - SBE39 n°6038 (154m) ; - SBE39 n°6039 (204m) ; - SBE39 n°6040 (254m).

- Glossary :

- ADCP stands for Acoustic Doppler Current Profiler ;
- Aquadopp is a “punctual” (not profiler) acoustic Doppler current meter ;
- SBE 37 probes measure only depth and water temperature ;
- SBE39 probes measure depth, water temperature and water salinity (derived from water conductivity).

5.2 Current in transit.

During the transit, currents along the water column below the ship were observed by two Vessel Mounted Acoustic Doppler profilers (VM-ADCP) :

- Teledyne-RDI Ocean Surveyor 150kHz (300m range) : broadband, 40 cells of 8m ;
- Teledyne-RDI Ocean Surveyor 38kHz (900m range) : broadband, 50 cells of 16m.

VM-ADCP currents are corrected from the vessel speed.

Ascii files are available in the “VM_ADCP” folder

STA files contain “Short Time average” measurements averaged on a 2min period.

LTA files contain “Long Time average” measurements averaged on a 10min period.

5.3 Hydrology.

During the transit, several hydrology measurements were made :

- Water temperature profiles from Sippican expendable Bathythermographs (XBT) ;
- Water temperature and salinity (conductivity) from Sippican expendable CTD (XCTD) ;
- Water temperature and salinity (conductivity) profiles from Teledyne Marine RapidCast system ;
- Surface water temperature and salinity (conductivity) from SBE21 SeaCAT Thermosalinograph (TSG) settled under the keel of the ship, around 2m under the surface.

Ascii files are available in the "HYDROLOGY" folder.

5.4 Sedimentology.

During the transit, data was collected from the Sub-bottom profiler Kongsberg SBP27 (2-9kHz). Data is available in standard Seg-Y format files readable by the free software Kogeo for example. Seg-Y files are available in the "SEDIMENTOLOGY" folder.

6. DATA PROVIDED.

- The present report in pdf format.
- "BATHYMETRY" folder :
 - Soundings in ASCII files.
 - A picture of the survey in GeoTiff format (World Mercator projection).
- "HYDROLOGY" folder :
- "JAN_MAYEN_MOORINGS" folder :
 - Mooring description and metadata in pdf format
 - Current and Temperature/Salinity data in ASCII files.
- "SEDIMENTOLOGY" folder :
 - Sub bottom profiler SBP27 files in Seg-Y format.
- "VM-ADCP" folder :
 - Current measurements from VM-ADCP 38kHz and 150kHz in Ascii file.

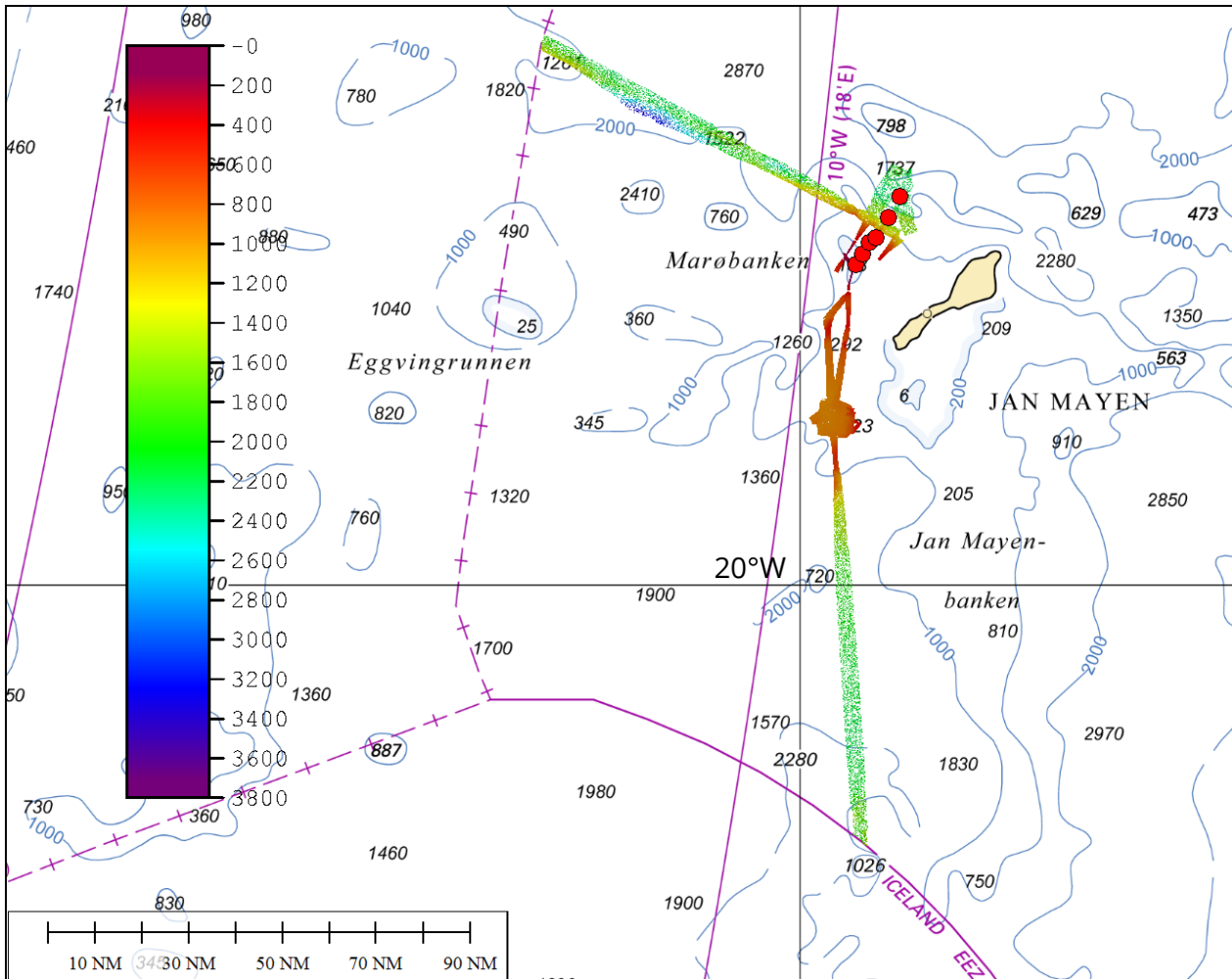
Chief scientist Pierre-Yves Dupuy
Director of groupe hydrographique et océanographique de
l'Atlantique
Signed : Pierre-Yves Dupuy

Destinataire(s) : Norwegian Petroleum Directorate - Directorate of Fisheries - Norwegian Mapping Authority

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APPENDIX: SURVEYED AREA



*Bathymetric data acquired during the survey and moorings (red dots) around Jan Mayen Island
- Background :FR6727 chart.*