



# KONGSBERG'S EM304 (INSTALLATION &) RESULTS ONBOARD RV THALASSA

**SPEAKER: BRIEUC CRÉNAN, [BRIEUC.CRENAN@IFREMER.FR](mailto:BRIEUC.CRENAN@IFREMER.FR)**



# Kongsberg Product Range



**EM304 Multibeam echosounder** is the successor of EM302  
The first system accepted is installed on Ifremer's RV *Thalassa* in Sept. 2018

# EM304 installation planning

**February 2017 :**

Contract signature with Kongsberg

**July 2017 :**

EM304 antenna during modernization works at at **Piriou Naval Service**, Concarneau (France)



**June 2018**

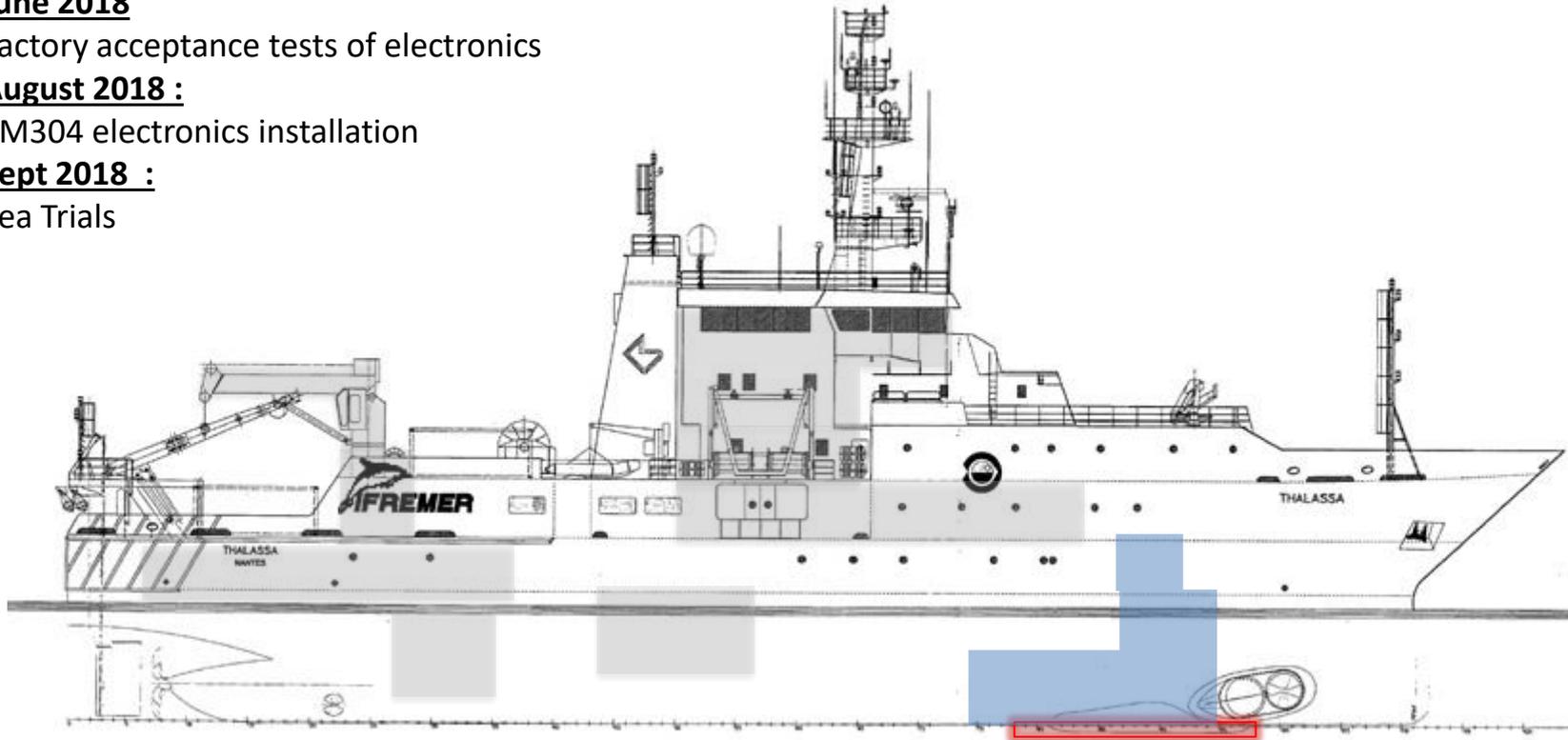
Factory acceptance tests of electronics

**August 2018 :**

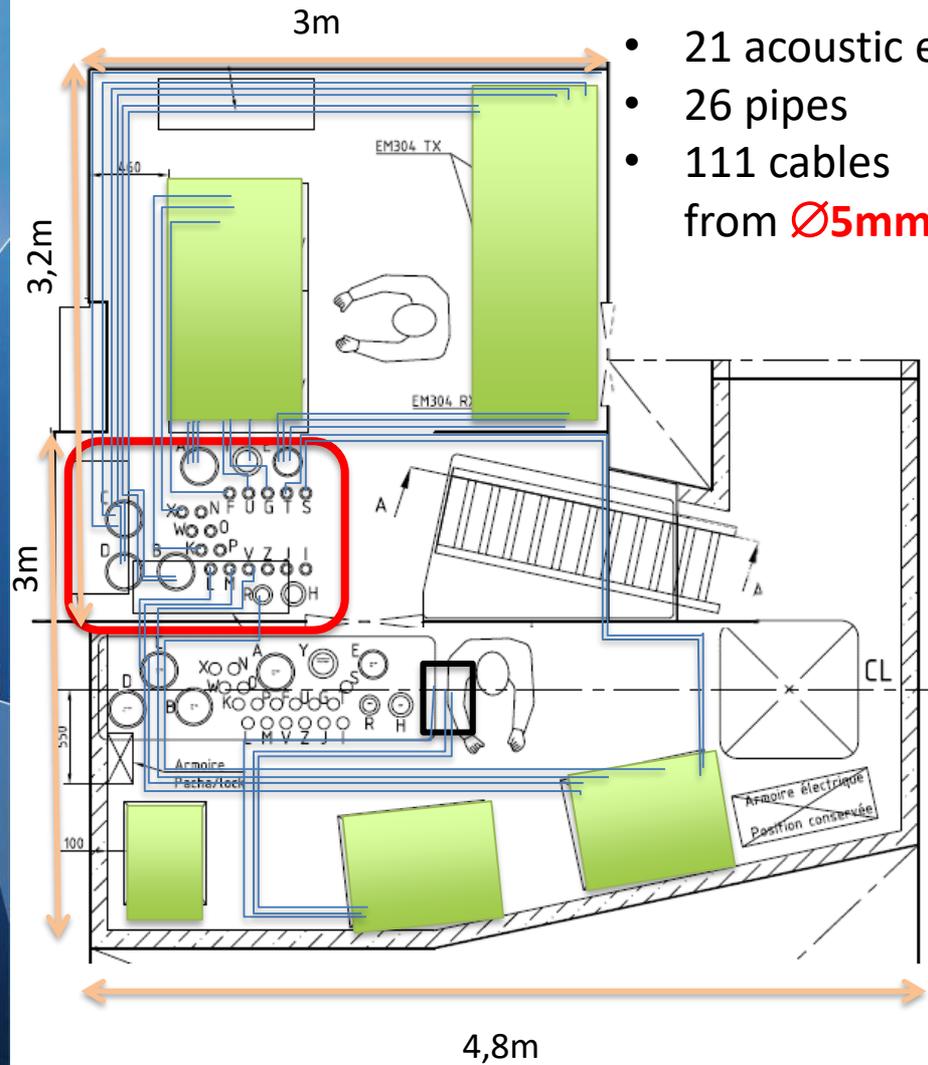
EM304 electronics installation

**Sept 2018 :**

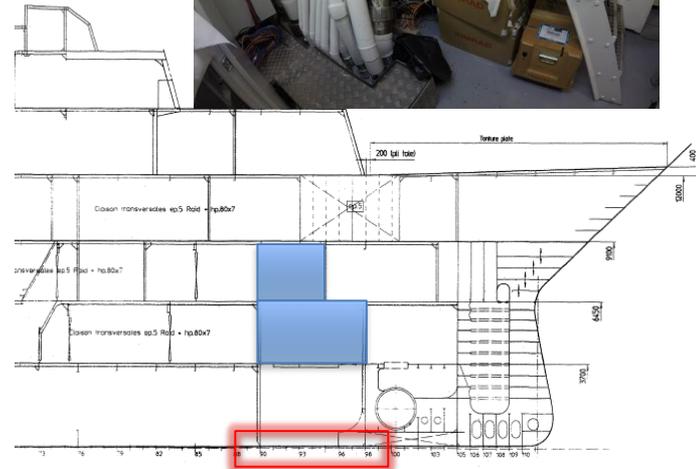
Sea Trials



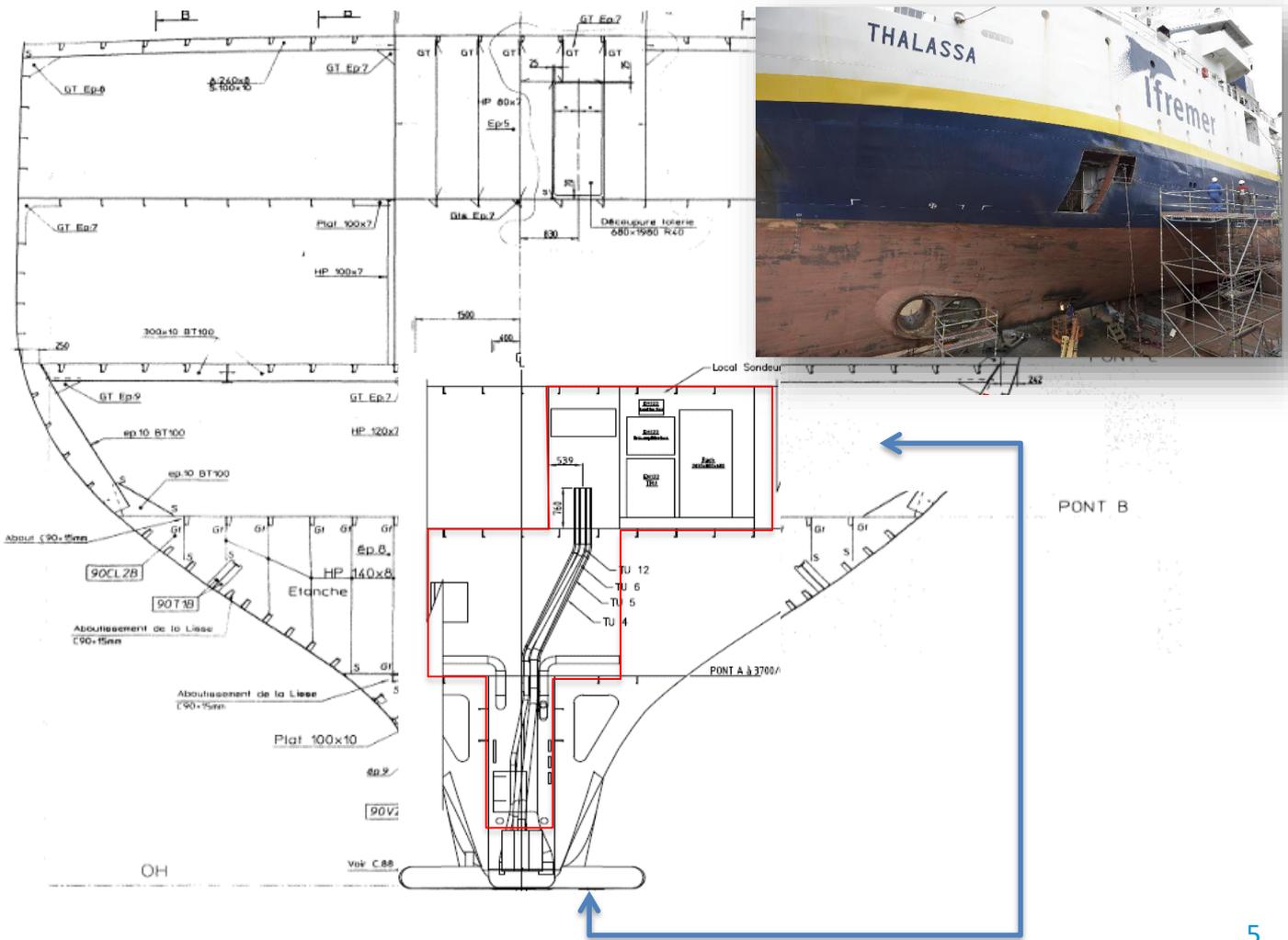
# A Sonar room on 2 decks!



- 21 acoustic equipments
- 26 pipes
- 111 cables from  $\varnothing 5\text{mm}$  to  $\varnothing 20\text{mm}$



# A Sonar room on 2 decks!

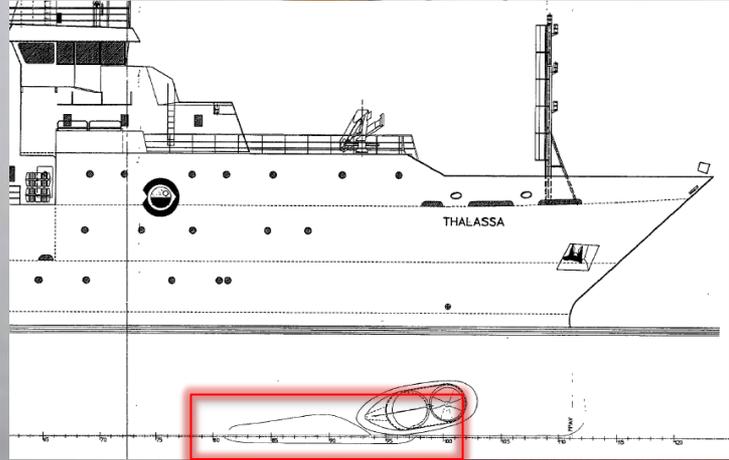


Deck B

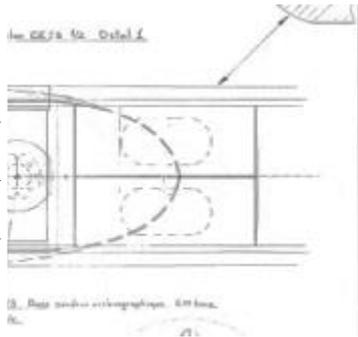
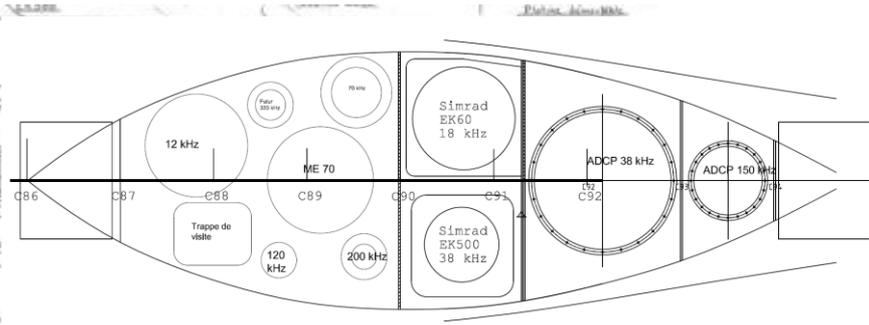
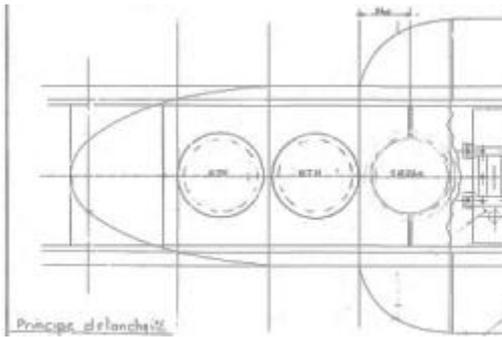
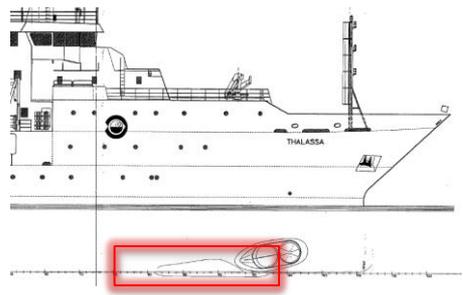
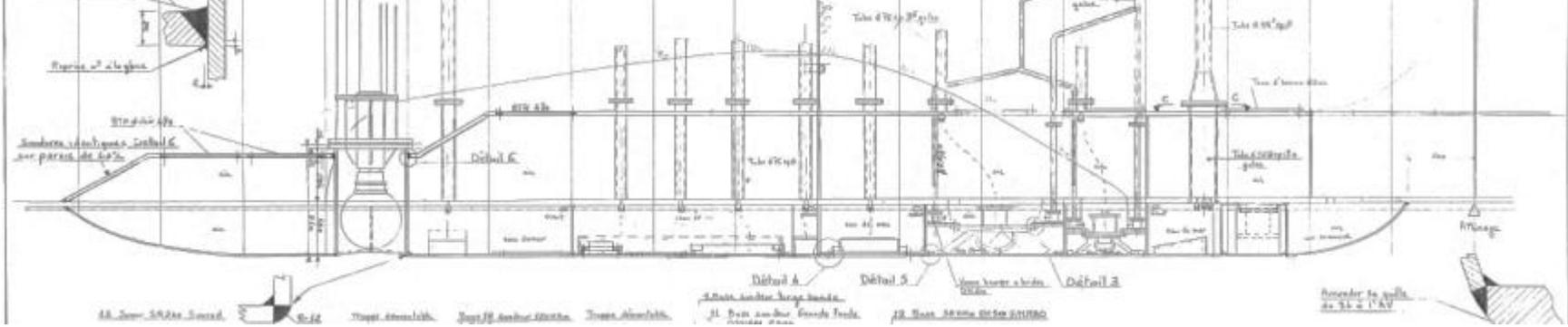
Deck A

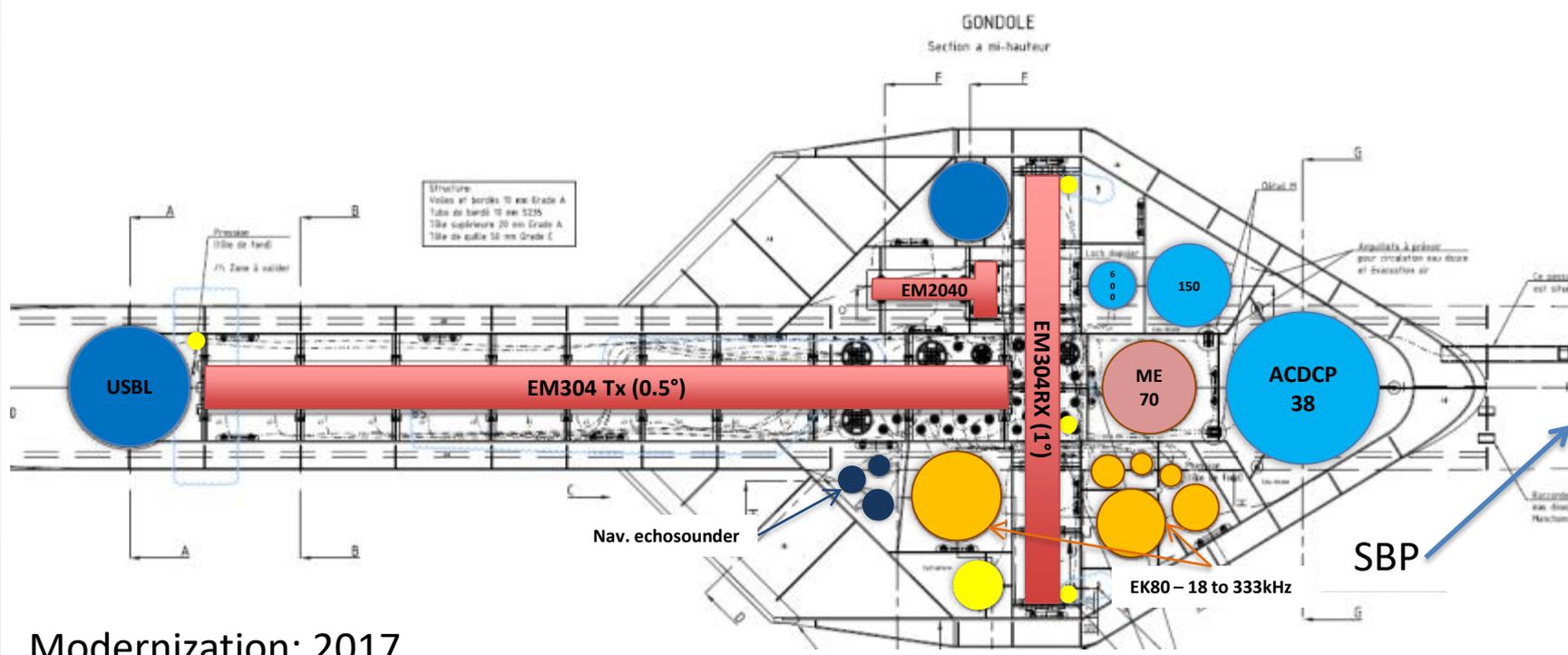
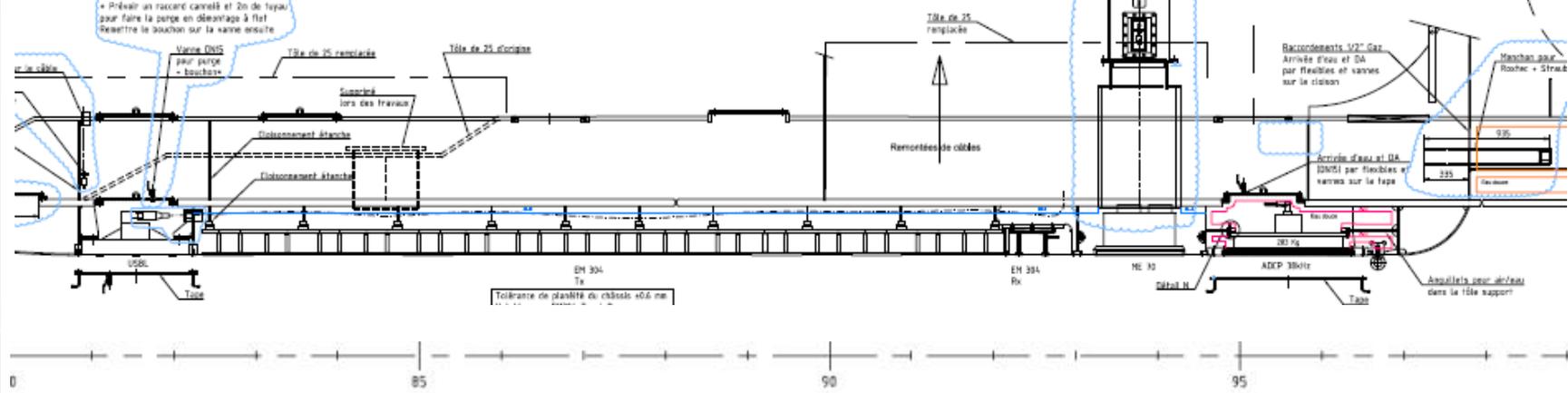
Direct access during drydock thanks to the Port opening

# Integration of the Gondola









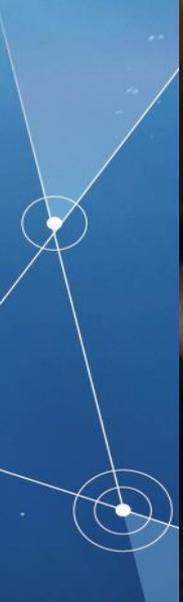






Size : 11m\*4m, + 4m for SBP, 9 Tons.  
Tilt of 5mm on the back  
Rolling 2cm between port & starboard  
No bending "banana" effect on wings

# Transducers & Frame installation







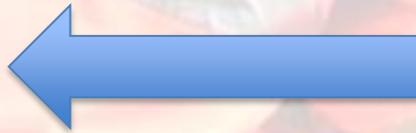


TX: 40 screws

RX: 21 screw

Position accuracy à 0.1mm

Torque: 180 N.m



# Installation of transducers, pulling cables



**VIDEO 1 : MBES**



# Acoustic Equipment integration



EM2040



SBP – IXBLue 3500 (5 transd. instead of 7)



ADCP 38kHz – homemade installation system





16 oct 2018

Picture: Briec CRÉNAN ©IFREMER



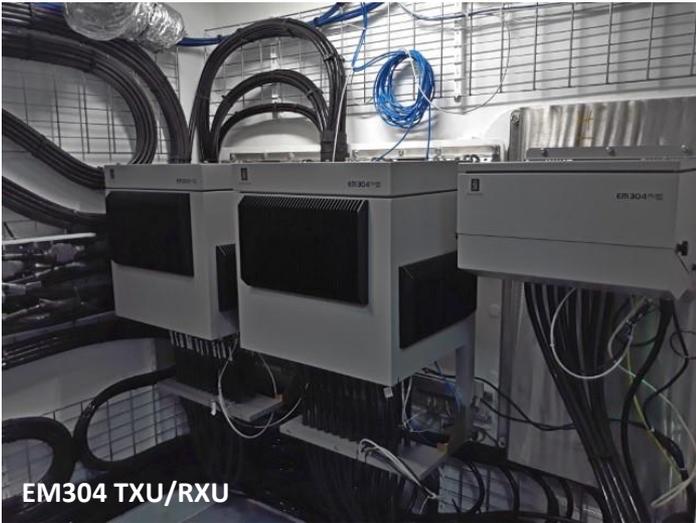
# Sonar Room pictures

DECK B



DECK B

DECK B



DECK A

# EM304

## What's new ?

**Transducers:** identical from EM302 but different

**EM302 305326/A p32:**

### 3.7 Transducer modules

To make the installation of the transducers easier, they are built with standard modules

- All Rx modules are identical
- **Two different Tx modules are used; Tx1 and Tx2**

The two transducer module types are identified by their unique registration numbers, which are moulded into the rear of the element.

**For 0.5 ° system, only Tx2 modules are used**

	EM302	EM304
Tx 1°	4*Tx1 +4*Tx2	-
Tx 0.5°	16*Tx2	8*Tx1 + 8*Tx2
Rx	-	-

R/V Thalassa's EM304 0.5° Tx =  
R/V Le Suroît 1° Tx + 4 new Tx1 + 4 new Tx2

**Electronics :** totally different

Separate small RX and TX units with low noise and high resolution – synchronized by optical cables

Slim Processing Unit (“Slim PU”) connected by Ethernet (**same as EM124, EM712, EM2040 : the new KM's MBES generation**)

**IT:** a revolution

HWS + Acquisition software SIS v5 + .kmall dataformat ( +kmall2all routine)

**New velocity format “KM Binary” (instead of Seapath/SimradEM) → ordered by Ifremer to Ixblue in Jul 2018 for SAT (Sept2018)**

(>= Version 12.1.6.2)

# EM304

0.5°x1° system



# EM304

## Local Electronique Informatique (E03)

Vers Slim PU

157.237.16.12



HWS



## Local Sondeur Haut (B60)

Vers HWS

157.237.14.60

Réseau sondeur

192.168.54.xx

Seapath **b11** UDP Port 301

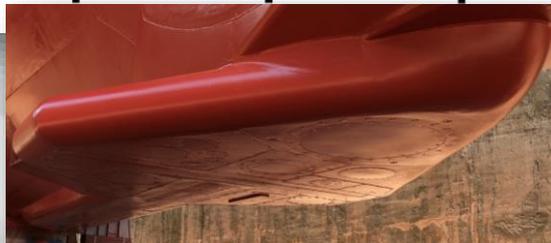


Slim PU

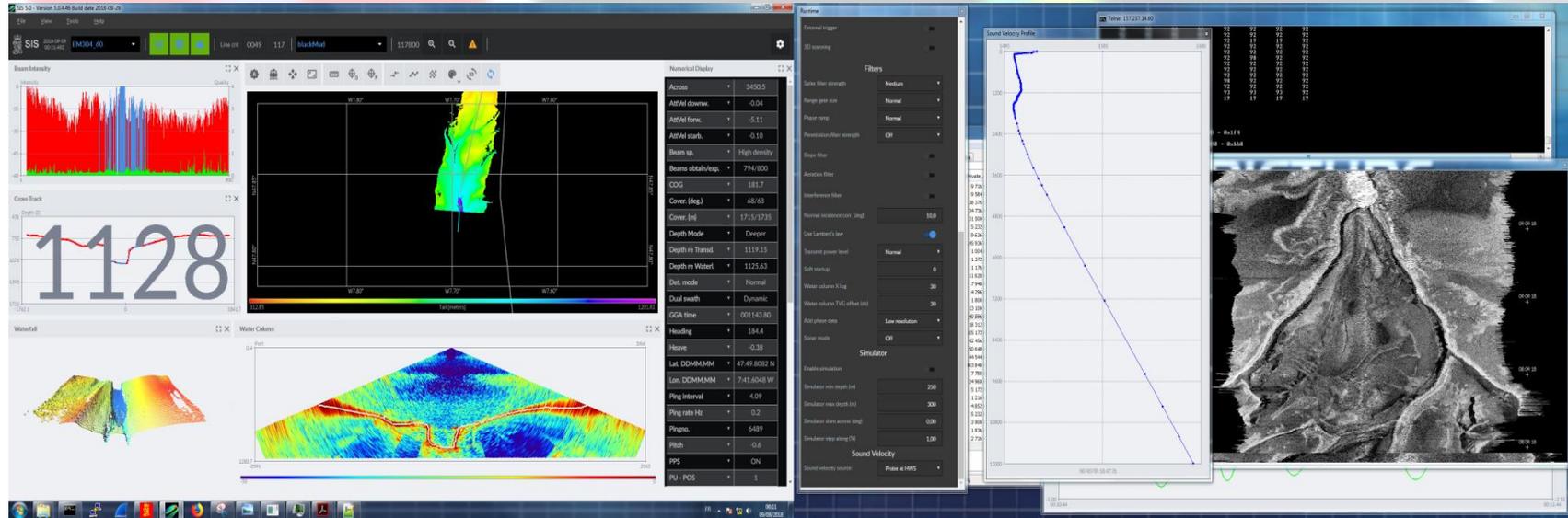
NMEA \$GGA/4800/8/N/1  
NMEA \$\$SimradEM/19200



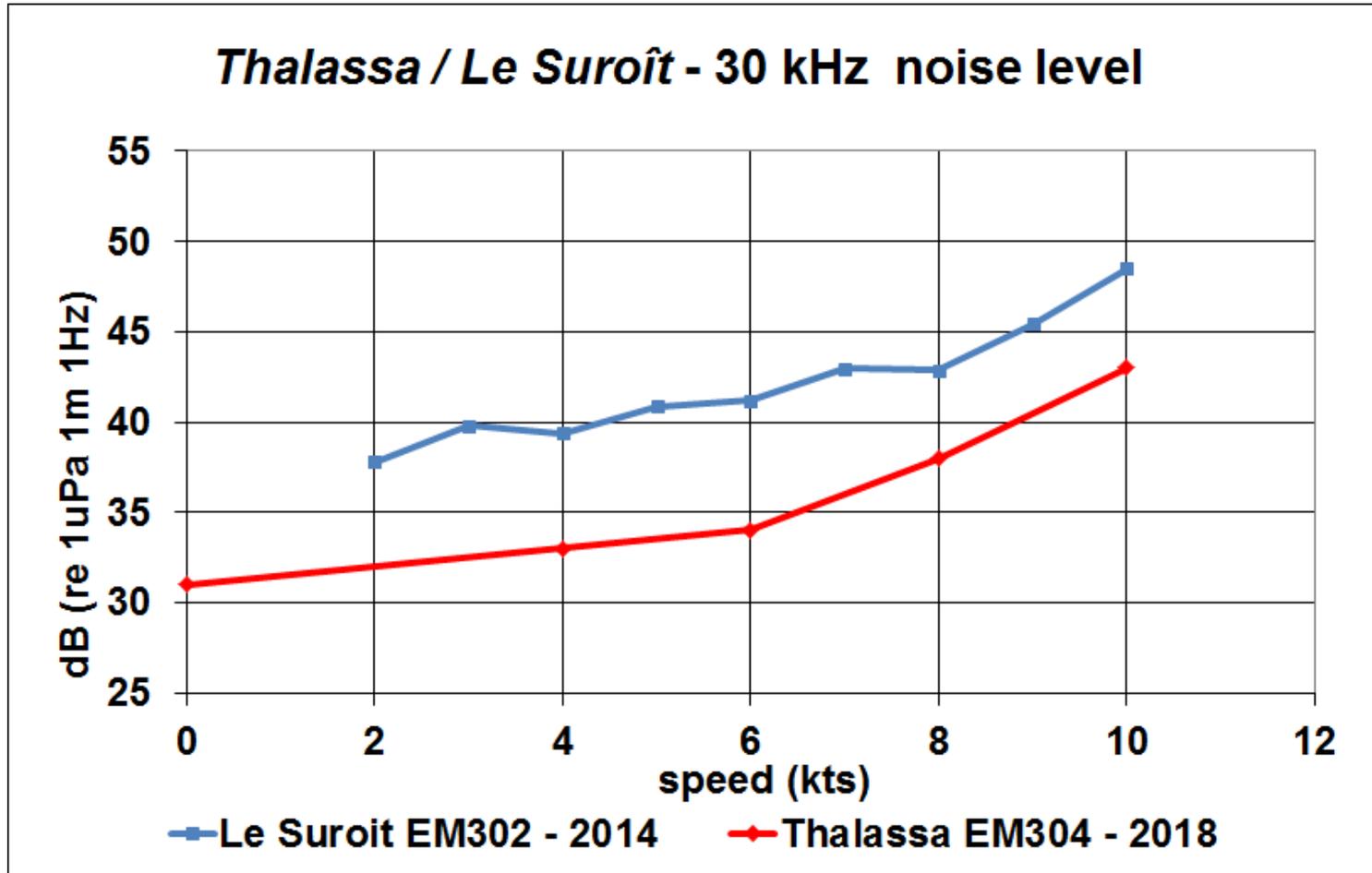
RXU1



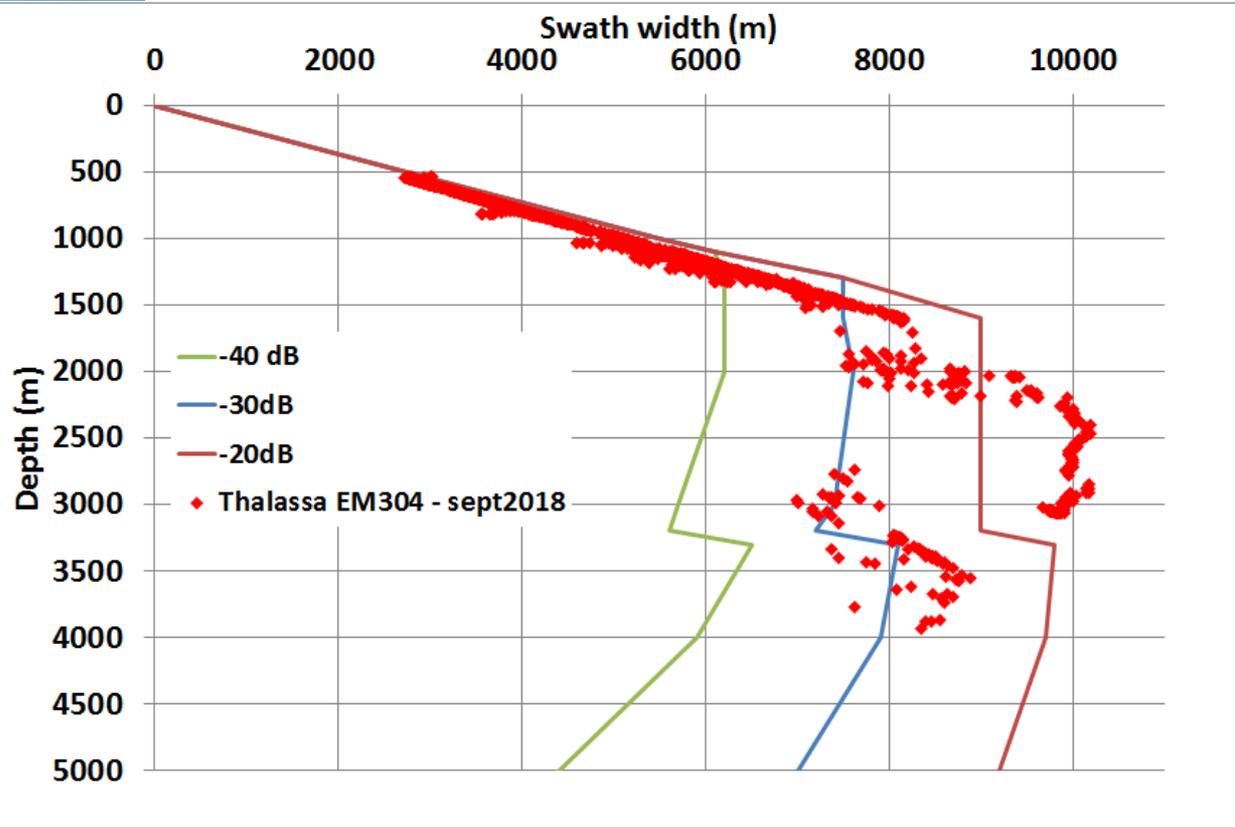
# EM304 – SIS v5 interface



# EM304 – Noise level measurement

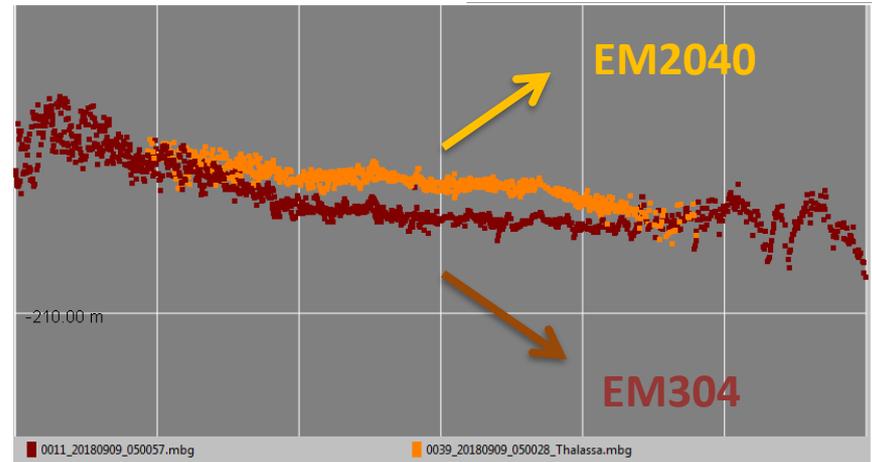
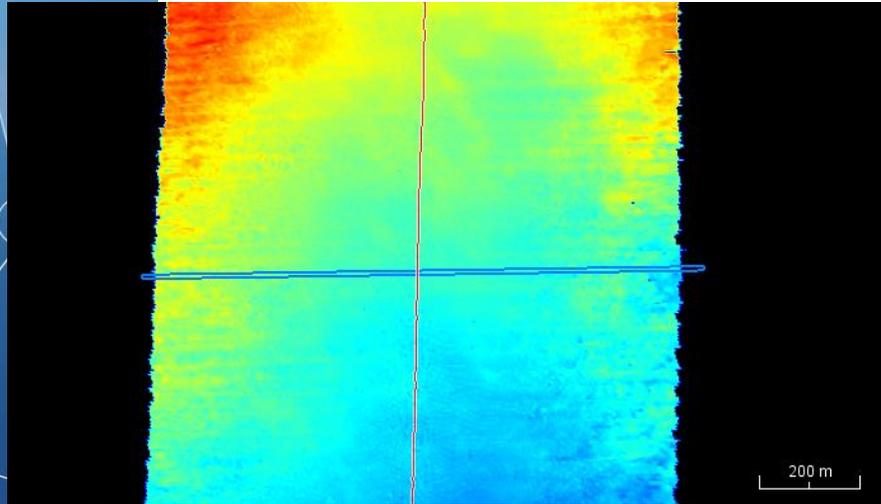


# EM304 – Swath width



- Prediction = KM
  - NL = 43 dB
  - Abs = 4.5 dB/ km
  - BS = -20/-30/-40 dB

# EM304 vs EM2040 (D=200m)

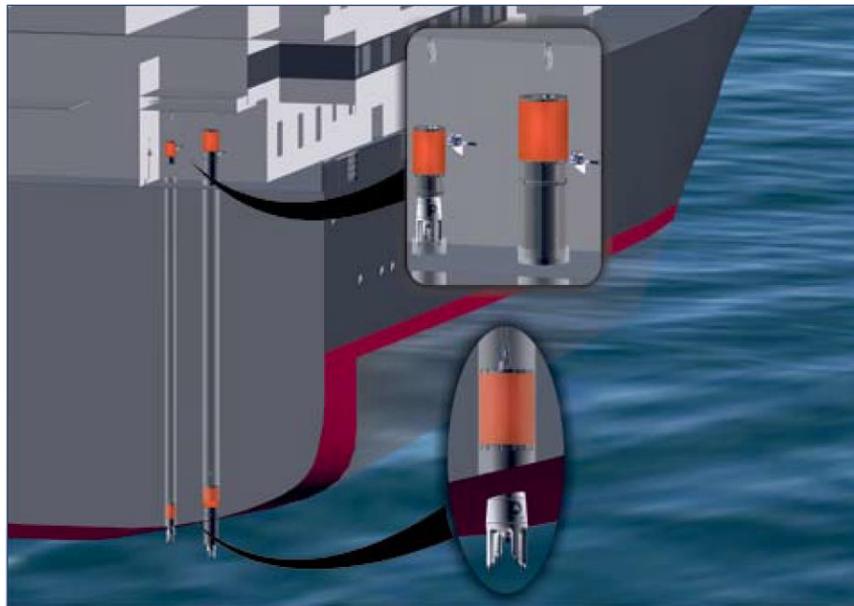


**EM304 is deeper (range error) (approx 80 cm)**

**→ This default was already observed on EM302**

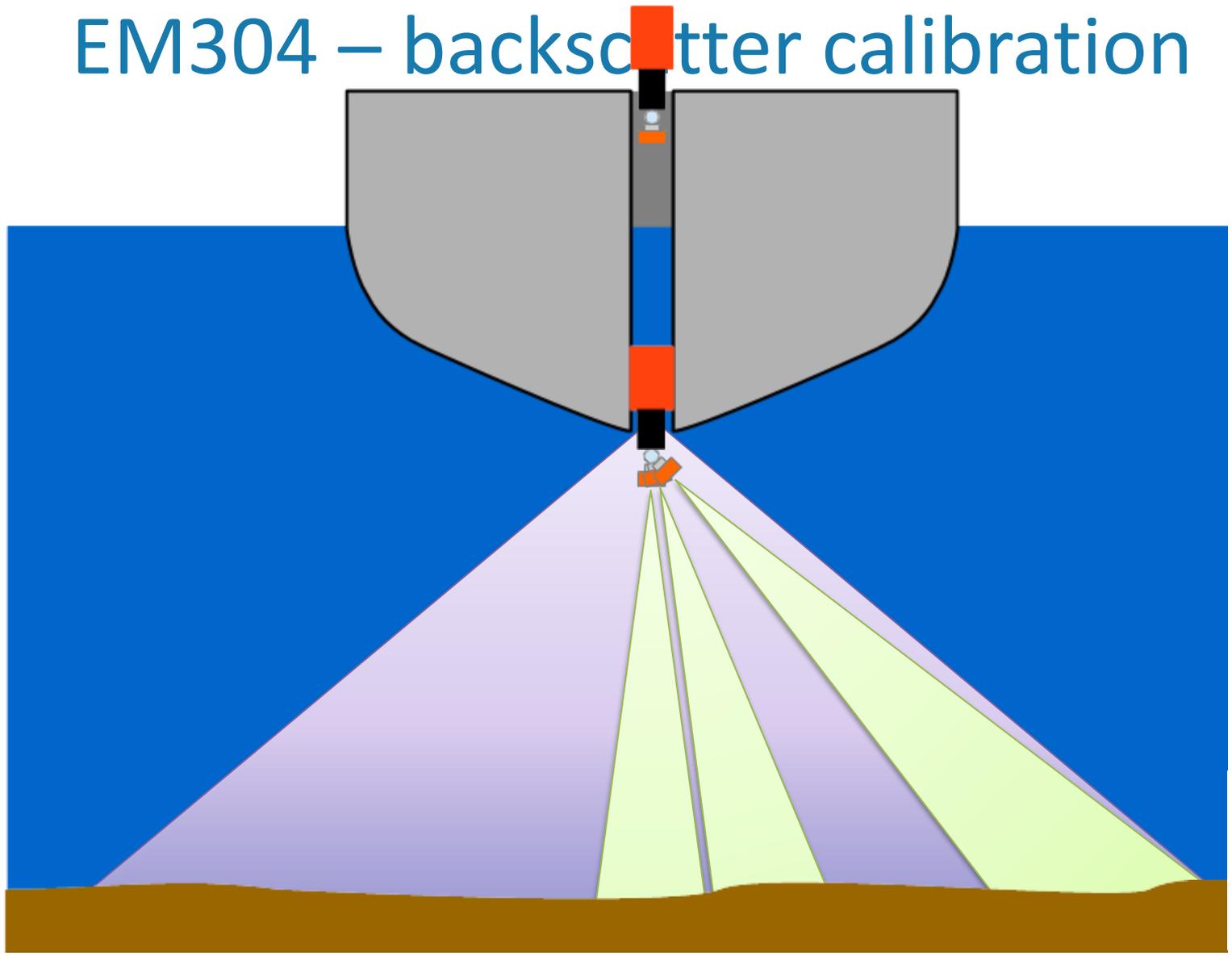
# EM304 – Backscatter Calibration

Use of the “TVO” (hydrophone tube/well)



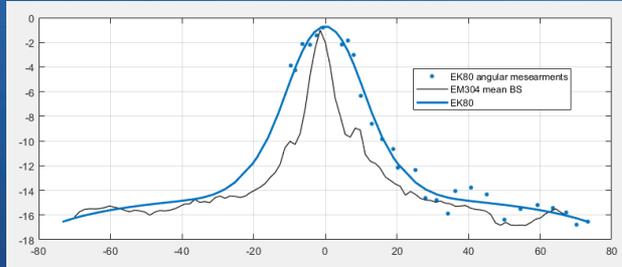
**EK80 38kHz-10°  
on a Pan&Tilt in  
the hydrophone tube  
measurements from 0 to 70 deg**

# EM304 – backscatter calibration

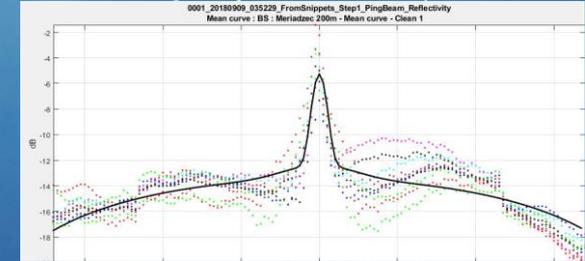
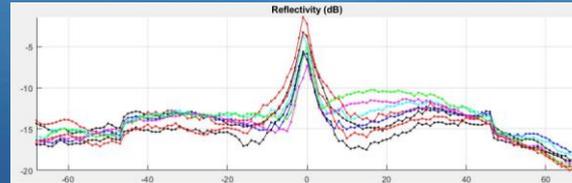


# EM304 – backscatter calibration results

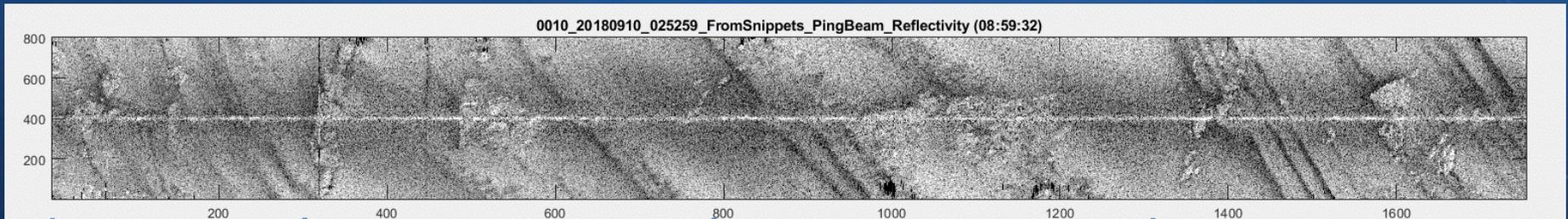
Obtained from a calibrated  
single beam echo sounder (EK80)



Thanks to different routines in Sonarscope Software © Ifremer



No more offsets on the backscatter images !



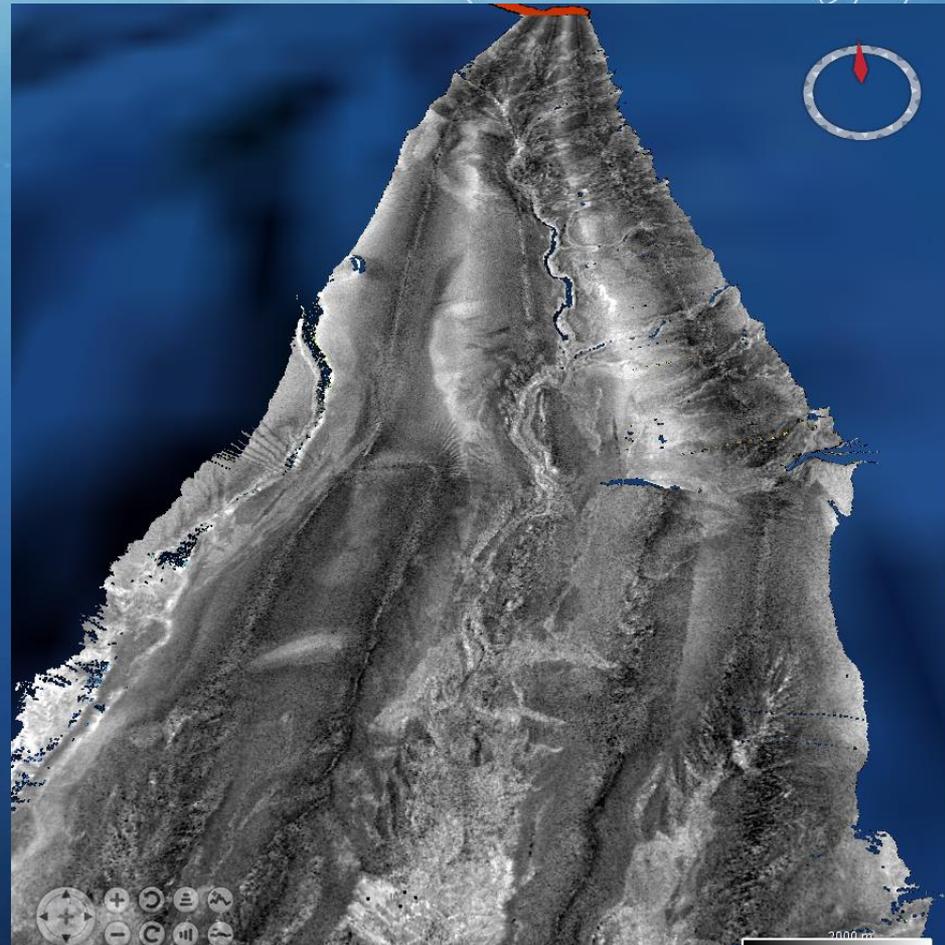
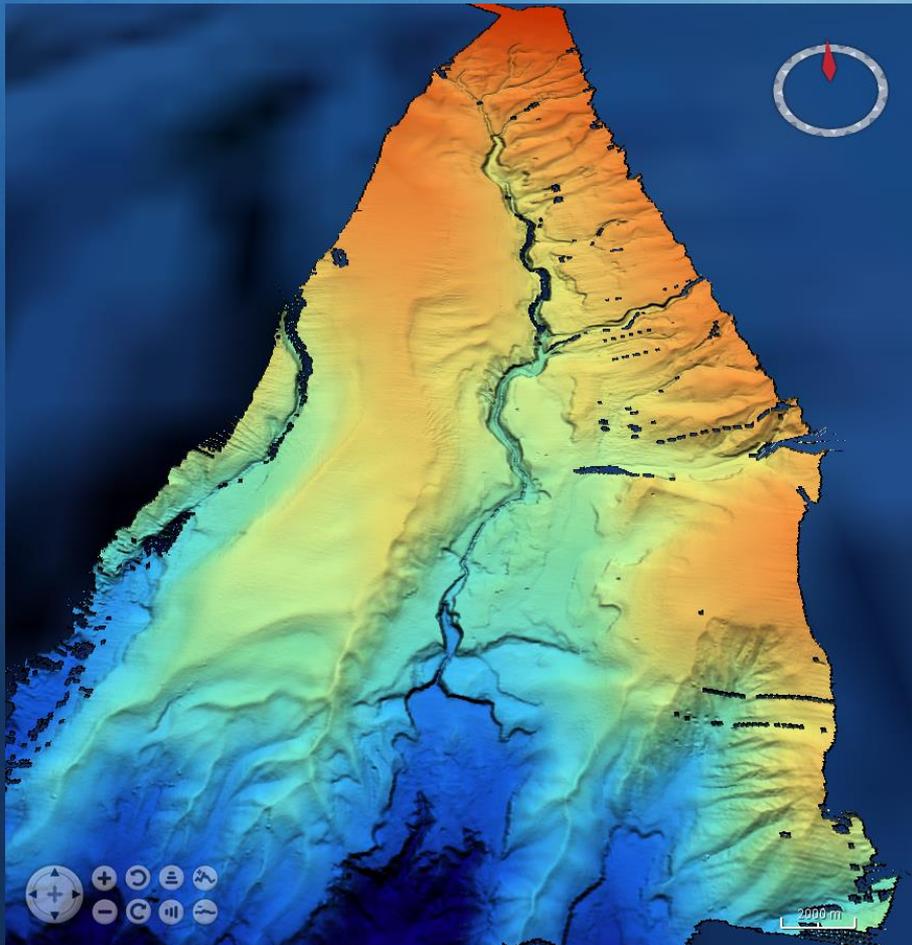
Shallow mode  
+ Single swath

Shallow mode  
+ dual swath

Medium mode  
+ dual swath

Medium mode  
+ single swath

# EM304 – Black Mud Survey



*Merci / Thank you*

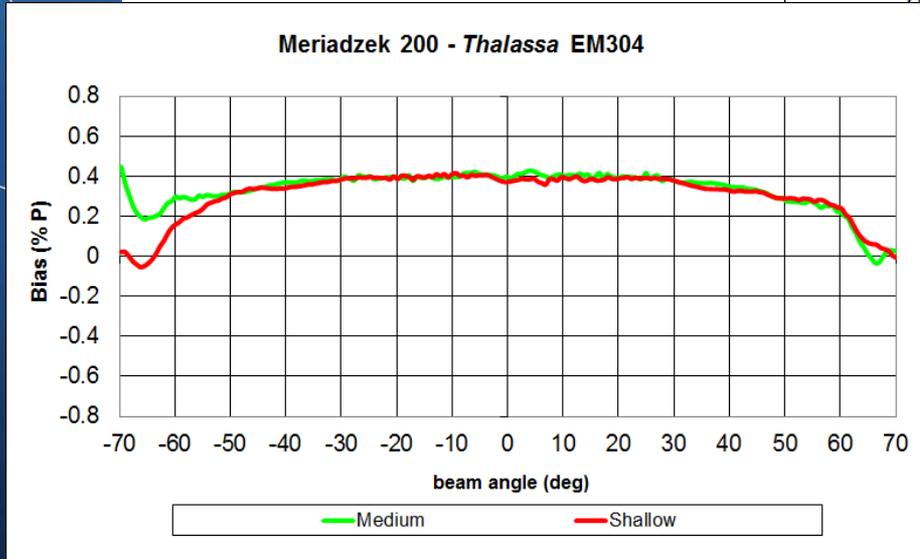
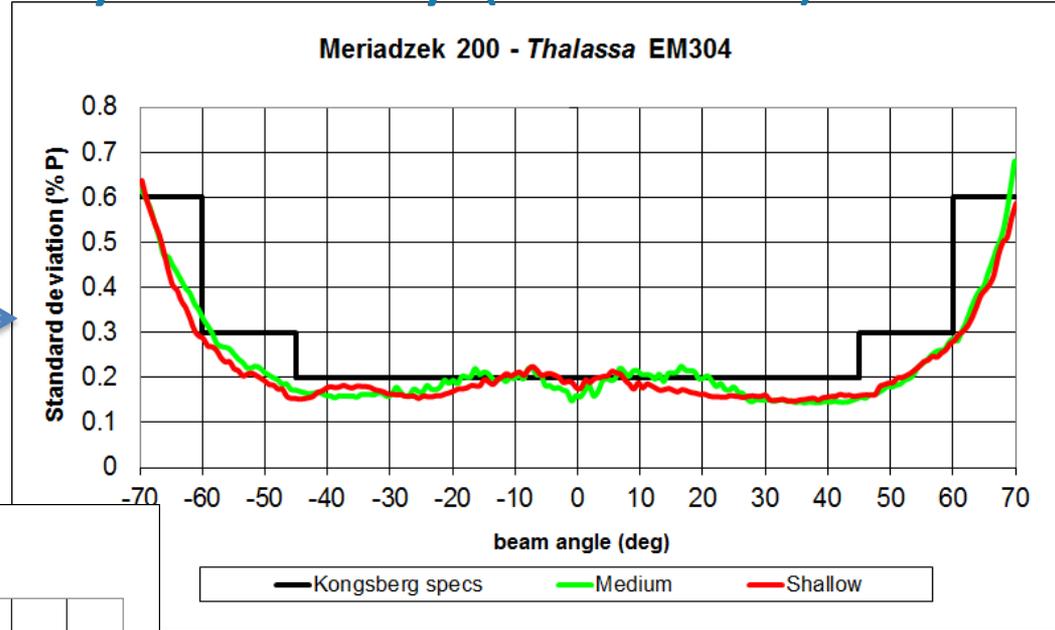


# Questions ?



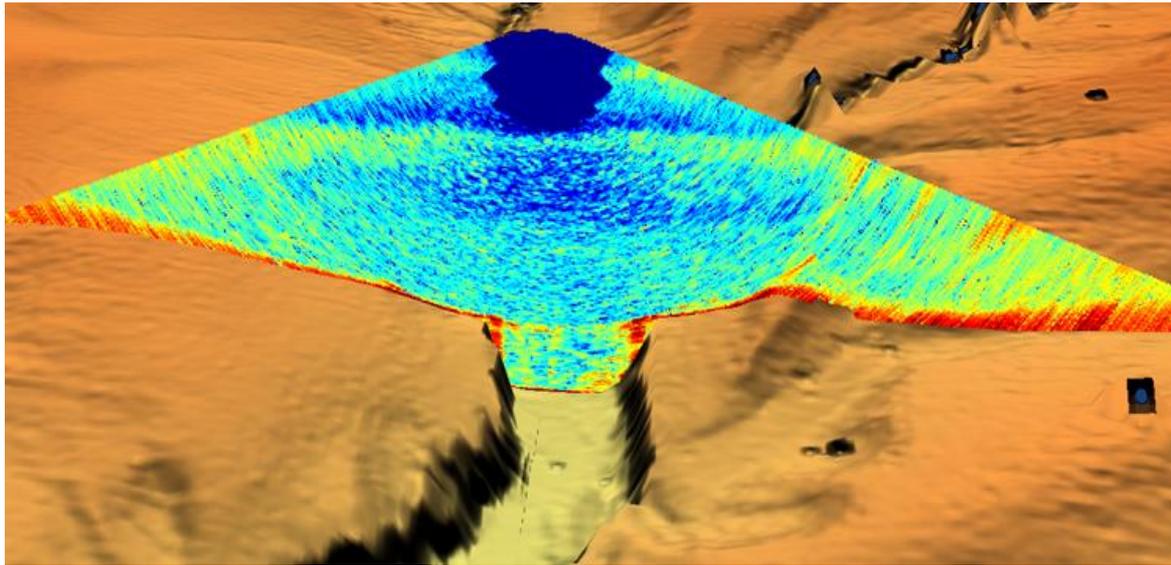
# EM304 – Bathy Accuracy (D=200m)

Standard deviation is OK →



← Offset with the reference terrain model (0.4% = 80 cm on the vertical beams)

# EM304 – Watercolumn data

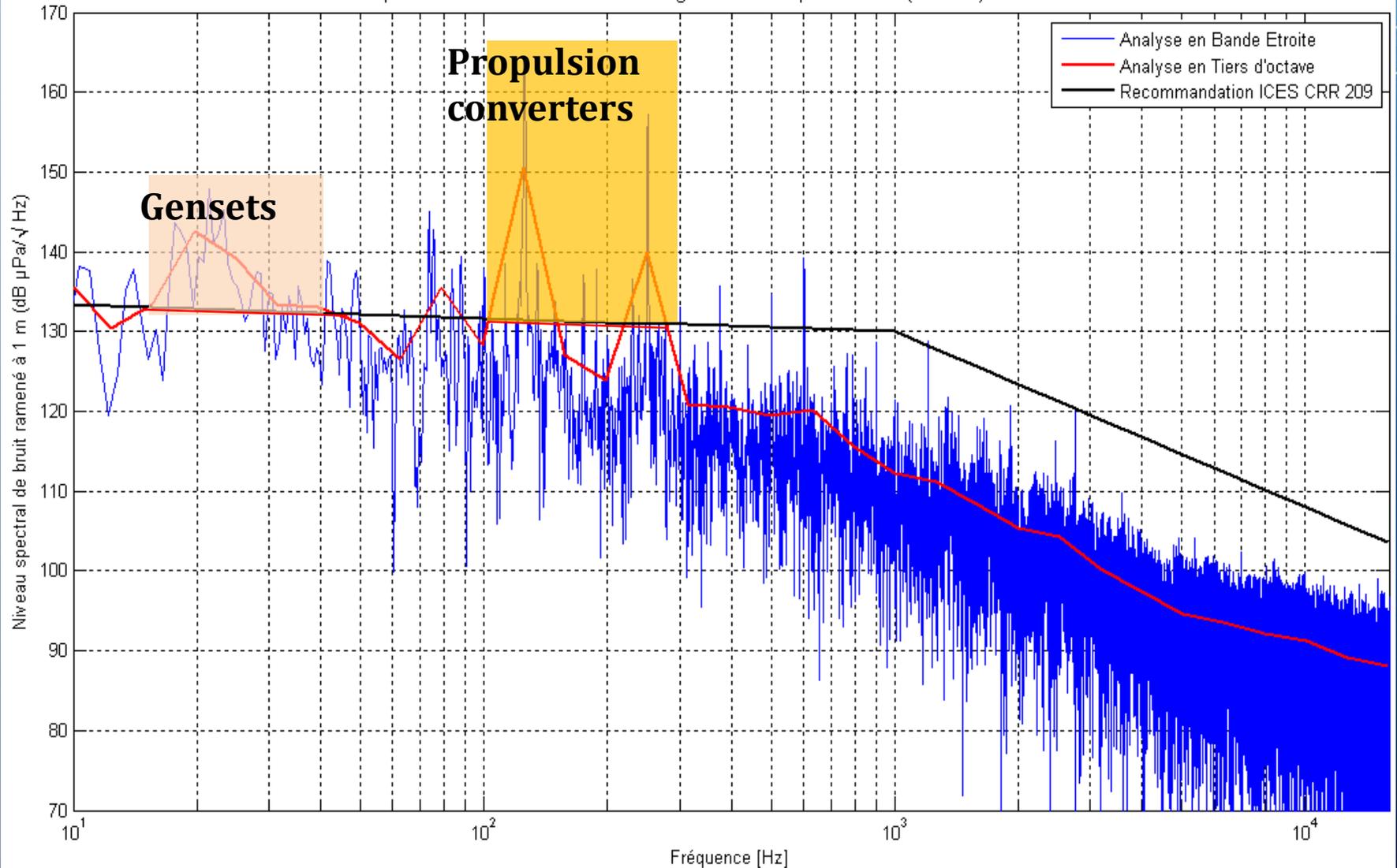


The operator has to be attentive to the WC settings : XlogR / Offset

Water column X log	20
Water column TVG offset (db)	0
Add phase data	Low resolution ▼

SIS v5 is able to log phase data  
(no display available right now)

Thalassa, mesures de bruit Sea-Ear du 22 mars 2010, régime moteur = 105 tours/min, Sh+G=-151 dB V/ $\mu$ Pa  
Spectre des données brutes corrigées du filtre passe-haut (100 Hz) du Sea-Ear



# Thalassa Underwater radiated noise

