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ENSTA BRETAGNE

FEMME
EDINBURGH | 2023

EVALUATION OF THE EM2040P MULTIFREQUENCY MODE FOR BACKSCATTER AND BATHYMETRY IN SHALLOW WATER

FEMME 27.09.2023

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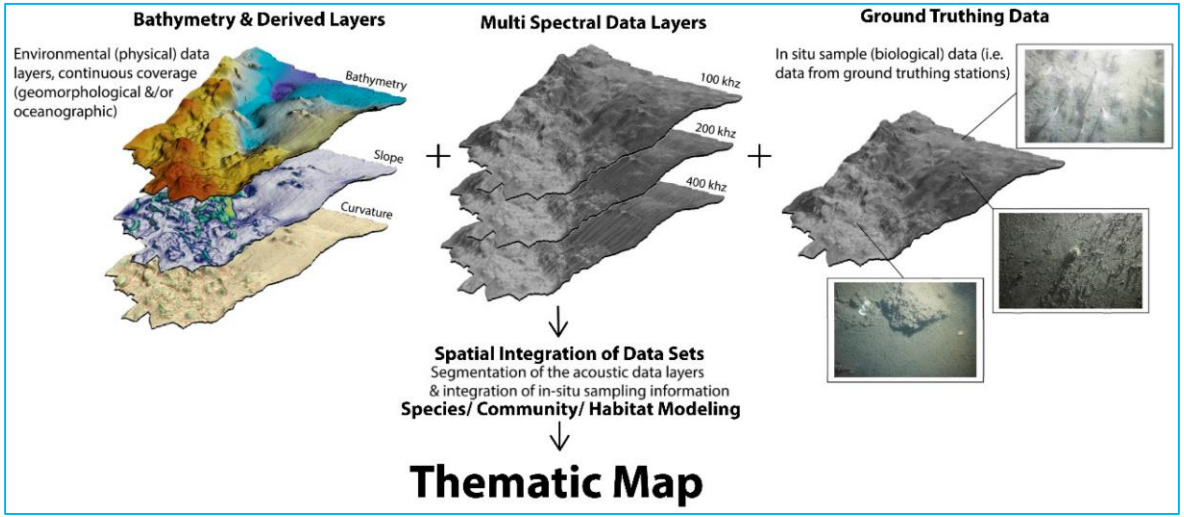
Motivation and objectives

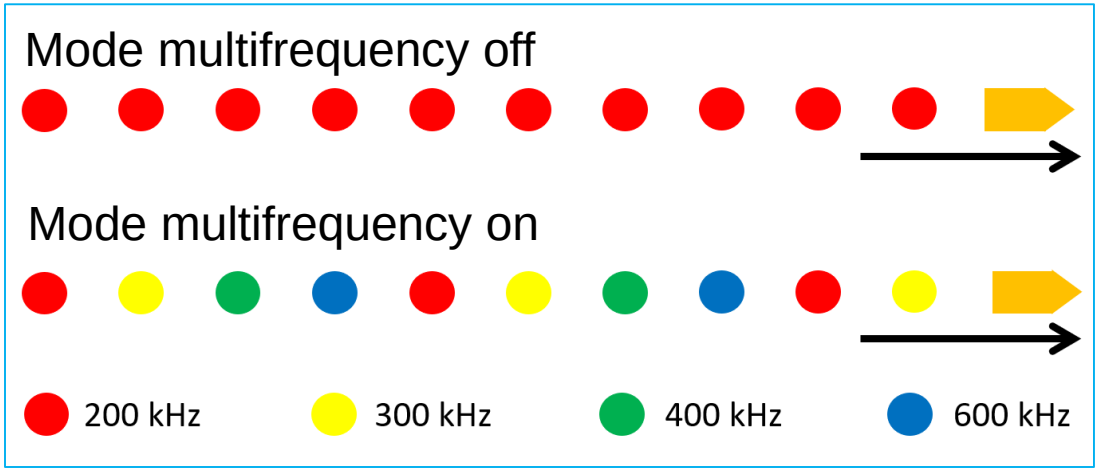


Brown, C.J.; Beaudoin, J.; Brissette, M.; Gazzola, V. Multispectral Multibeam Echo Sounder Backscatter as a Tool for Improved Seafloor Characterization. Geosciences ***2019****, 9, 126. https://doi.org/10.3390/geosciences9030126*

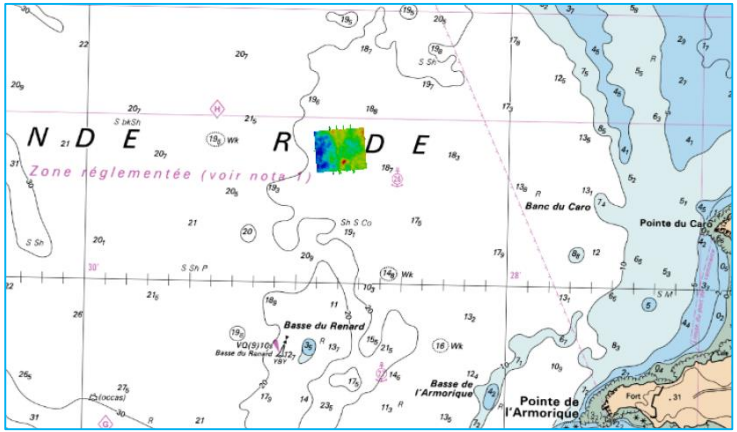
- Multifrequency mode working properly?
- IHO S44 order respected?
- How does each frequency affect reflectivity imagery?

Multiffrequency mode

EM 2040P echo sounder with "new" multifrequency mode



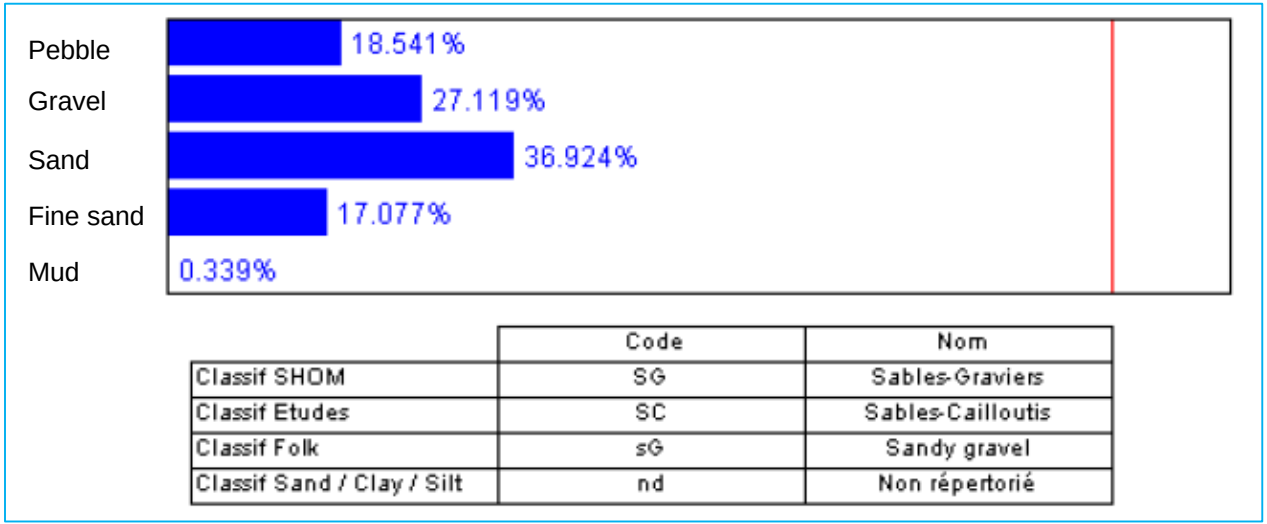
Acquisition protocol



Mode	Fréquence (kHz)	Mode	Fréquences (kHz)
1	200	5	200 300 400 600 700
2	300	6	200 300 600
3	400	7	300 600
4	600	8	300 300 400 300 200

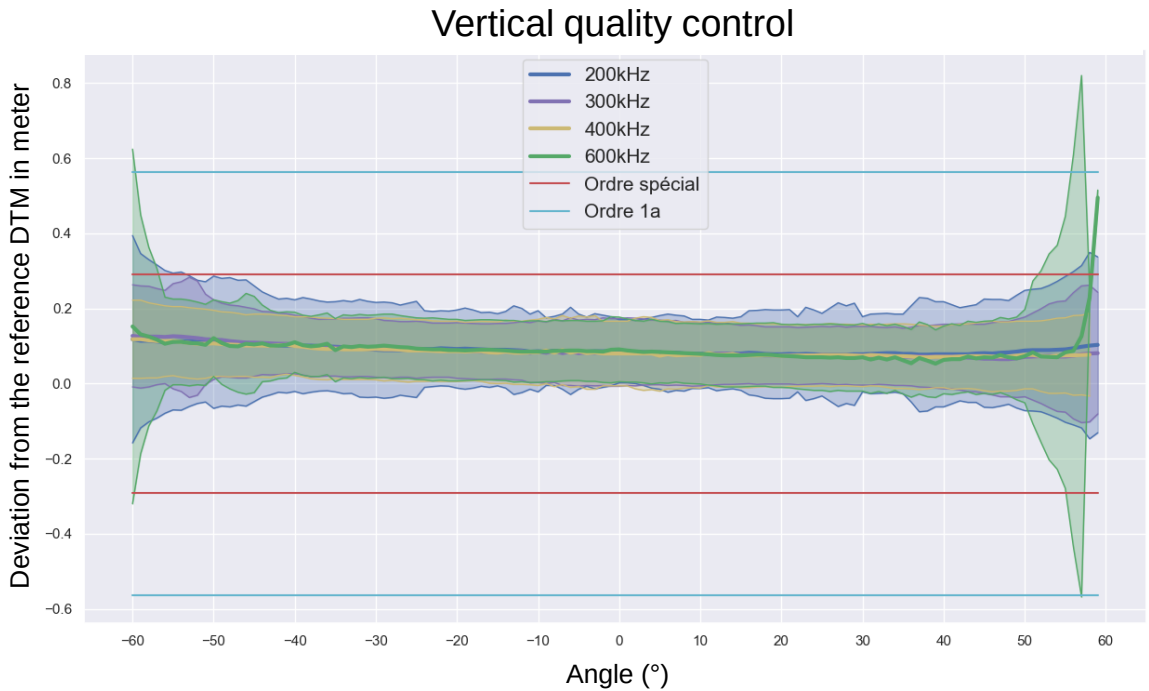
- Four study areas, to ensure maximum diversity in our data
- 100% overlap
- 13 sediment samples Van Veen grab sampler

Sediment analysis

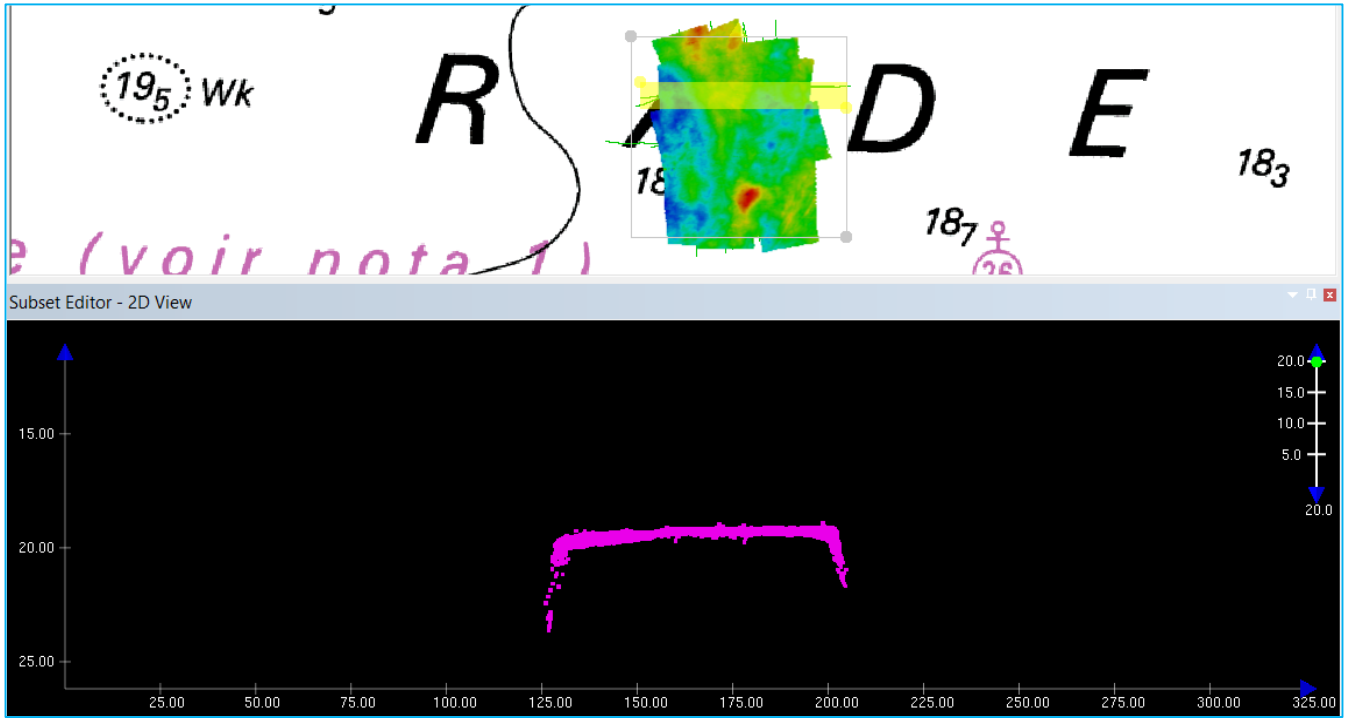


	Code	Nom
Classif SHOM	SG	Sables-Graviers
Classif Etudes	SC	Sables-Cailloutis
Classif Folk	sG	Sandy gravel
Classif Sand / Clay / Silt	nd	Non répertorié

Monofrequency bathymetry



Monofrequency bathymetry



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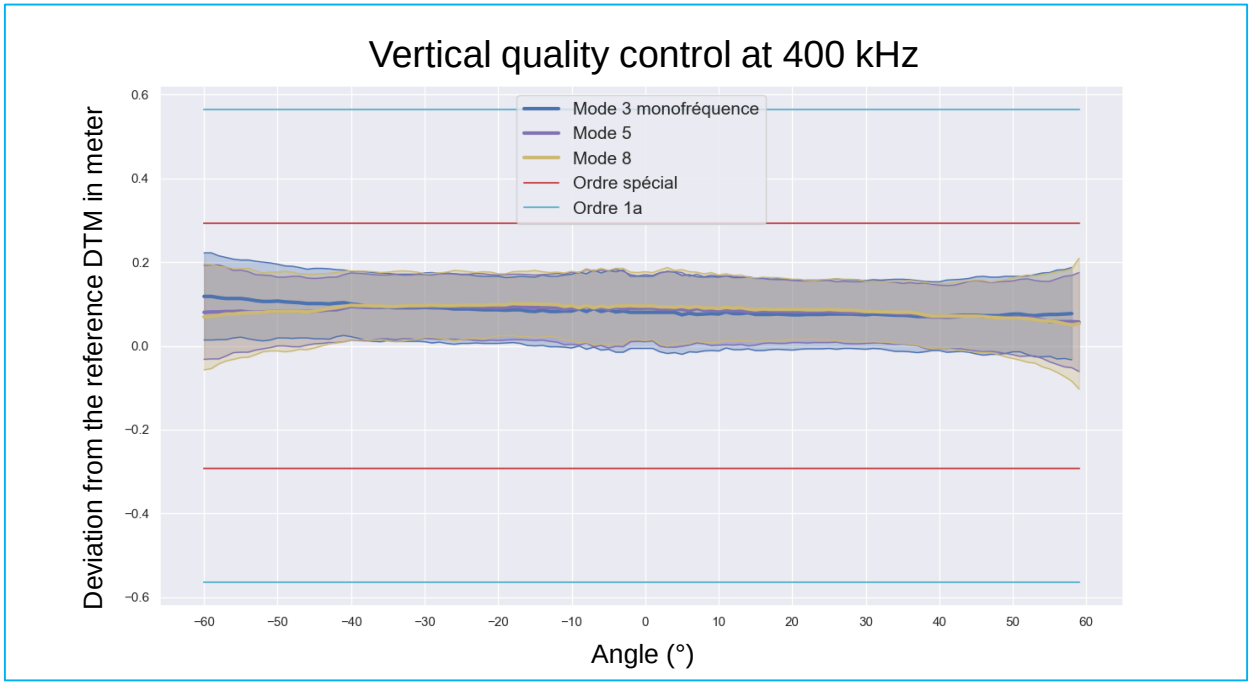

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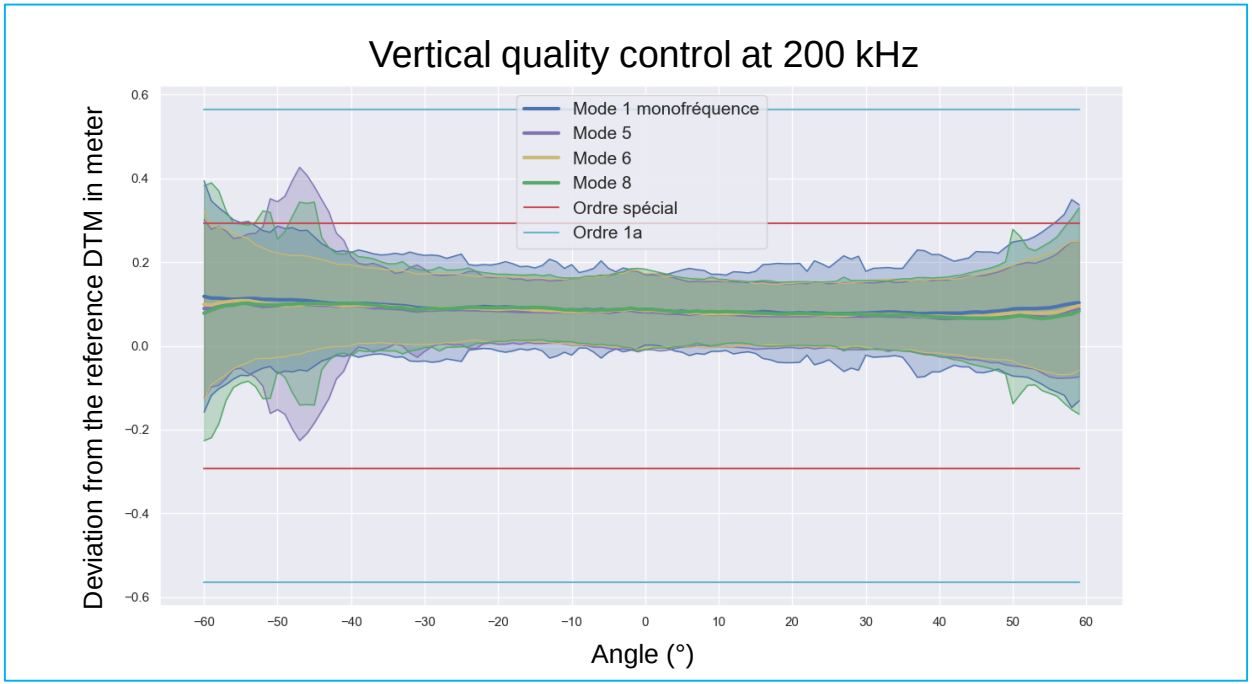

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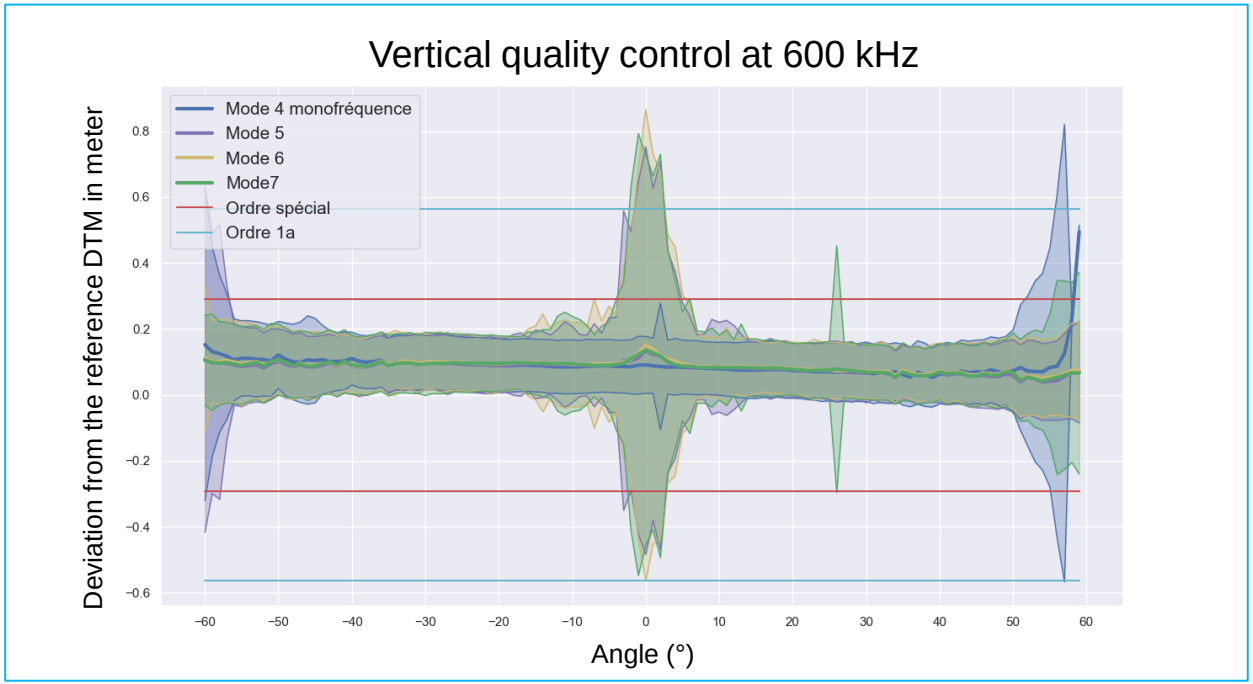

Multifrequency bathymetry

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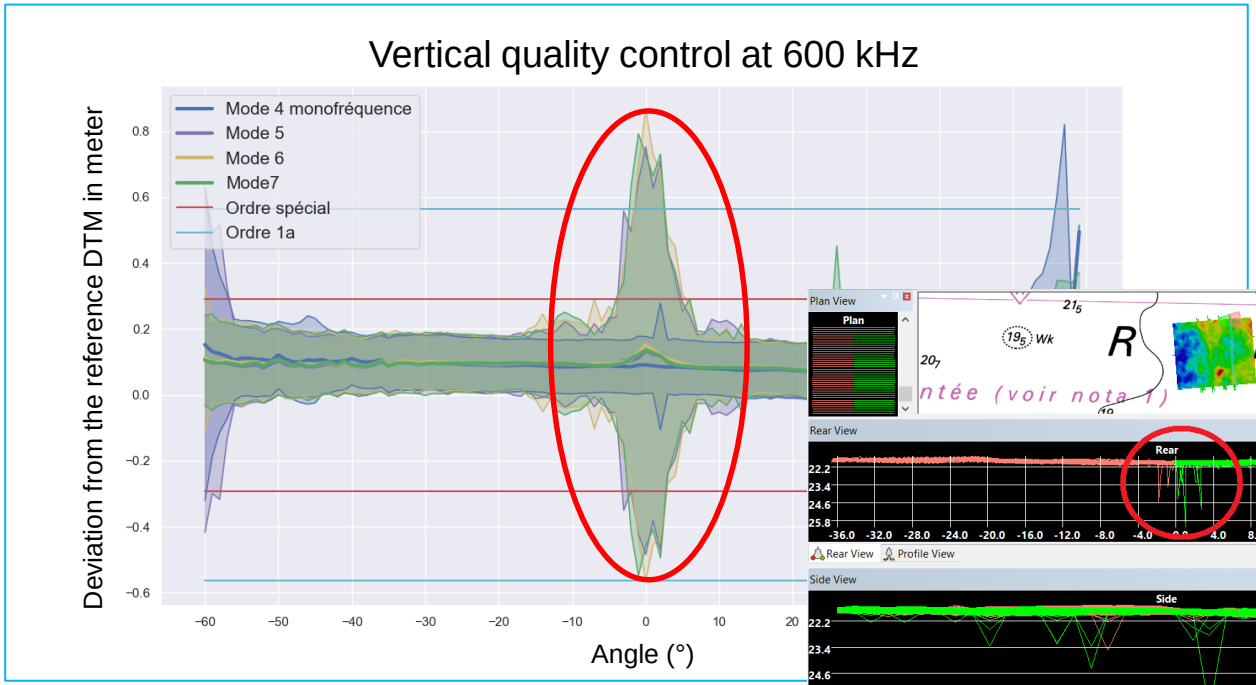
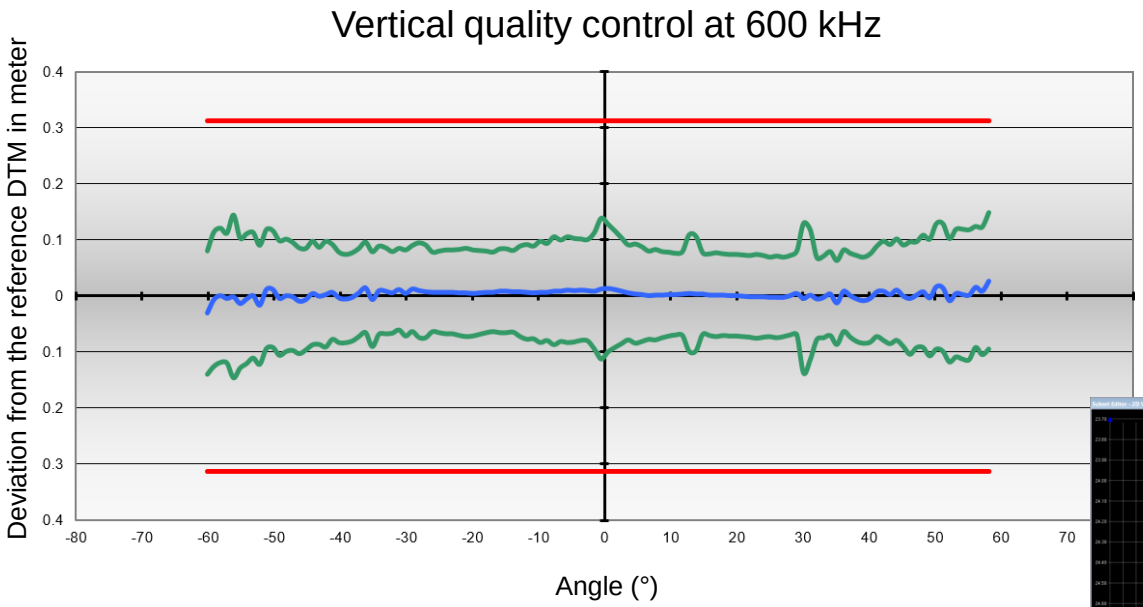
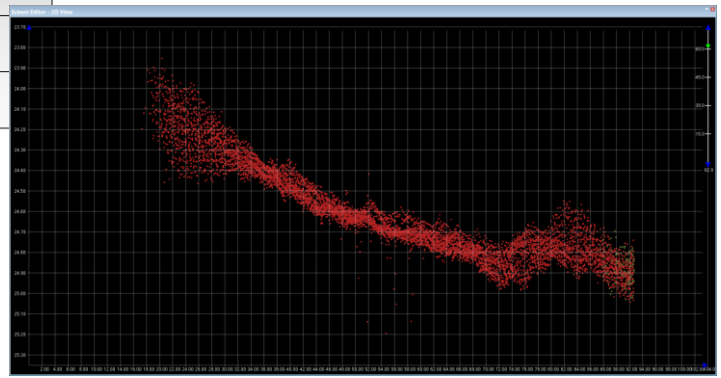


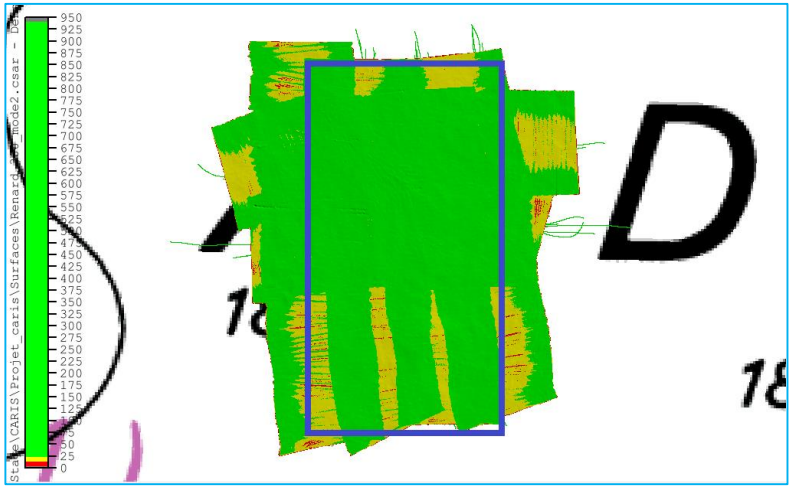
600 kHz after Kongsberg update



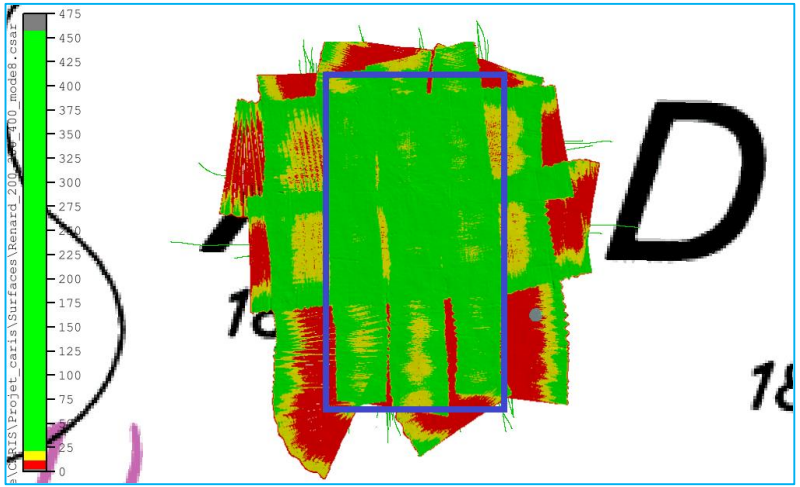


Density map

Mode	Fréquence (kHz)	Mode	Fréquences (kHz)
1	200	5	200 300 400 600 700
2	300	6	200 300 600
3	400	7	300 600
4	600	8	300 300 400 300 200

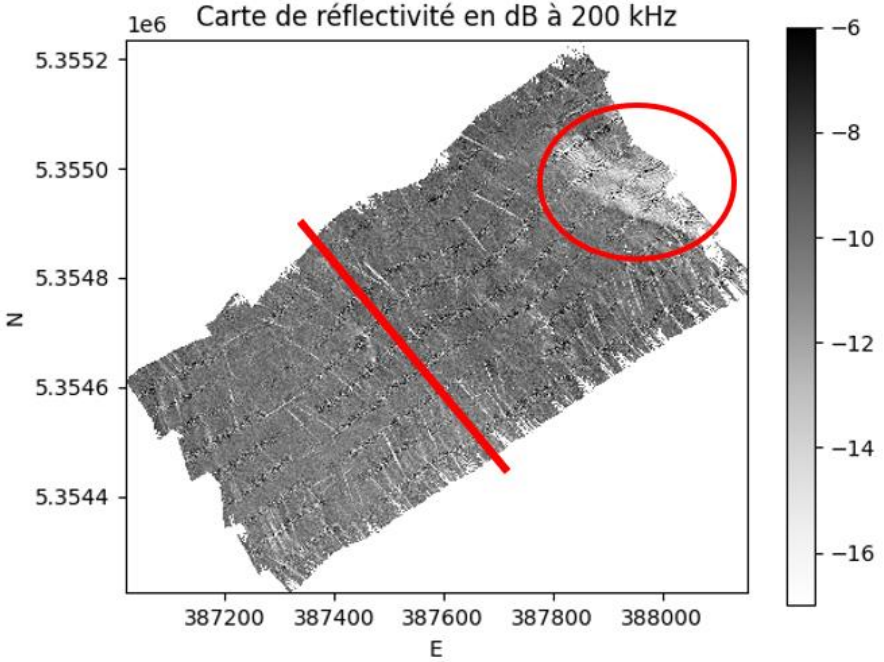


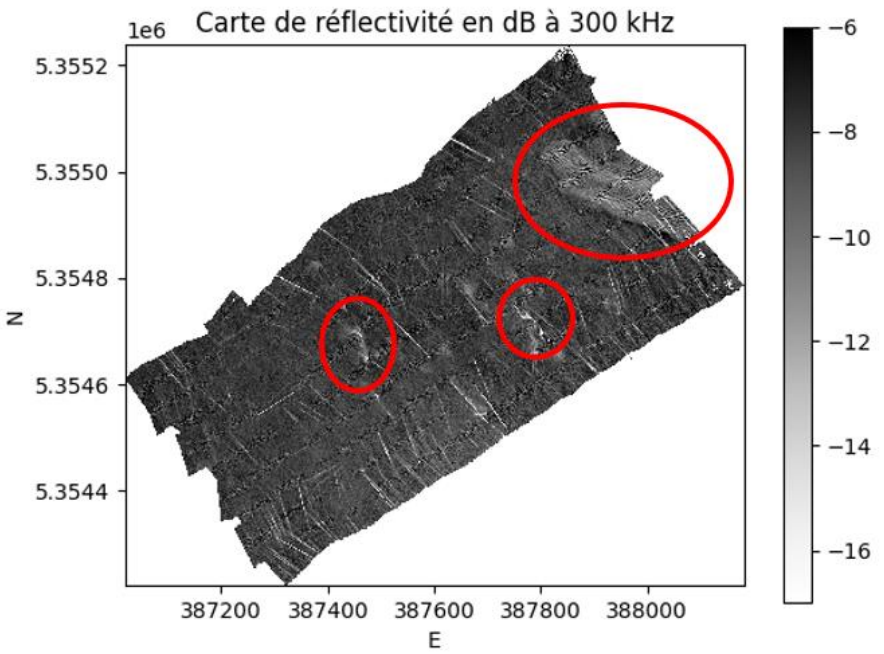
Mode 2 density map monofrequency



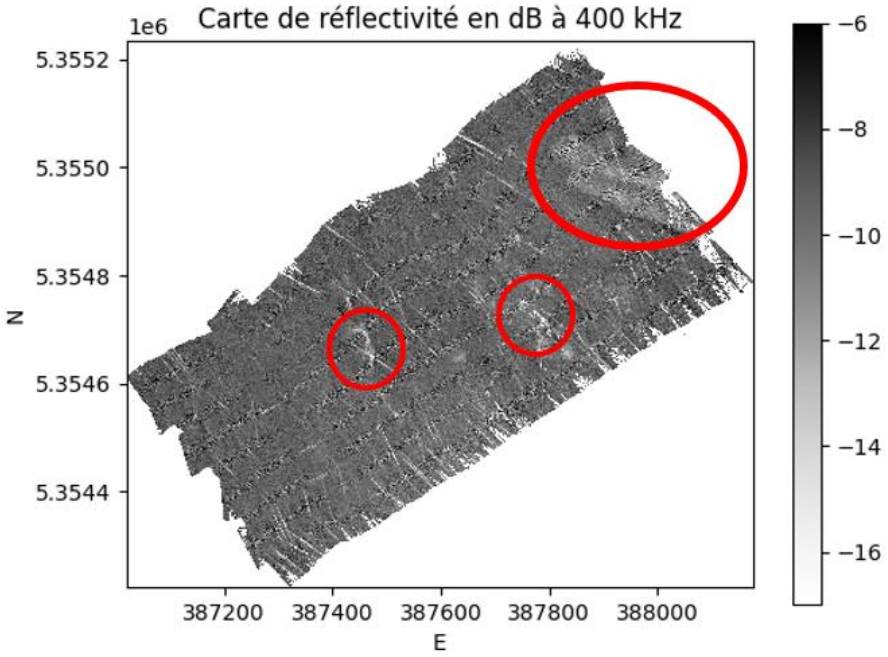
Mode 8 density map multifrequency

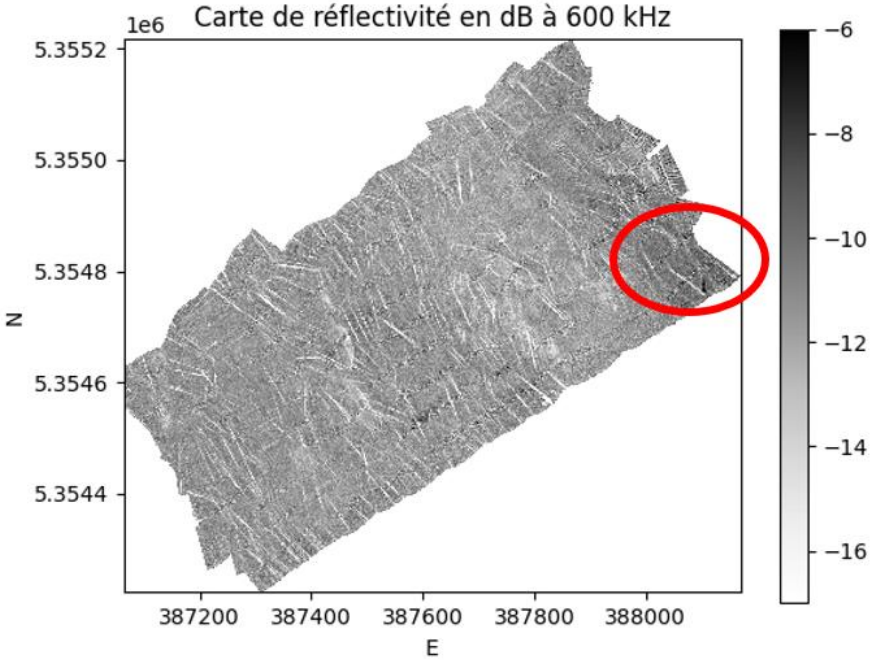
Multifrequency results



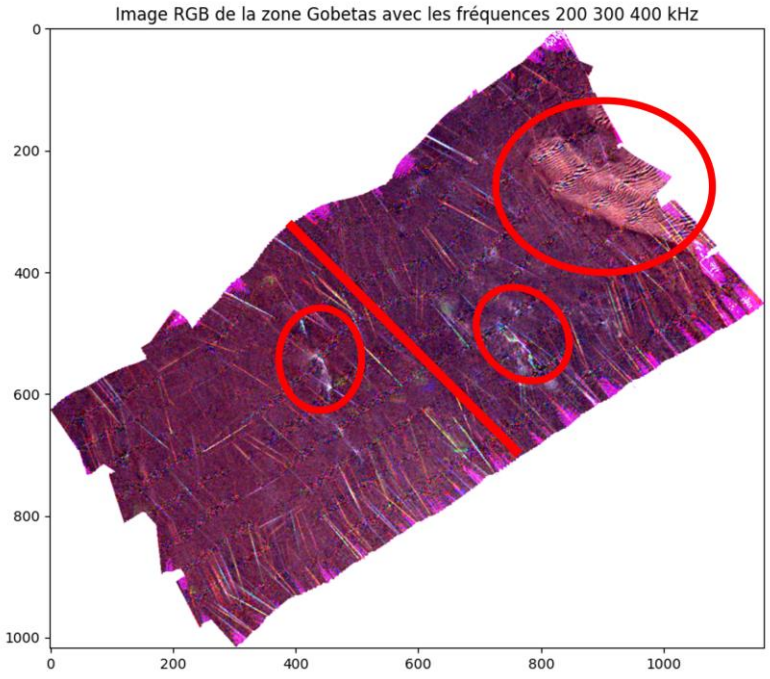


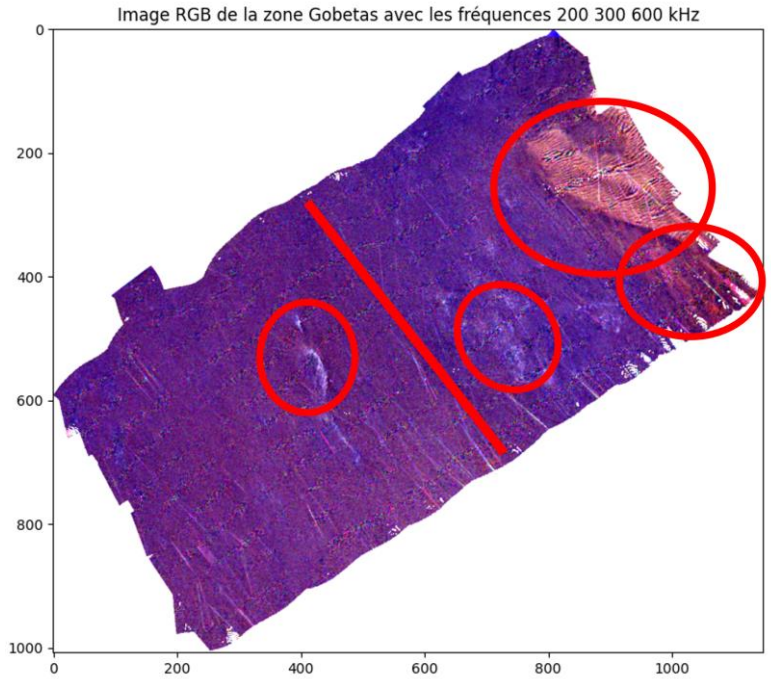
Multifrequency results



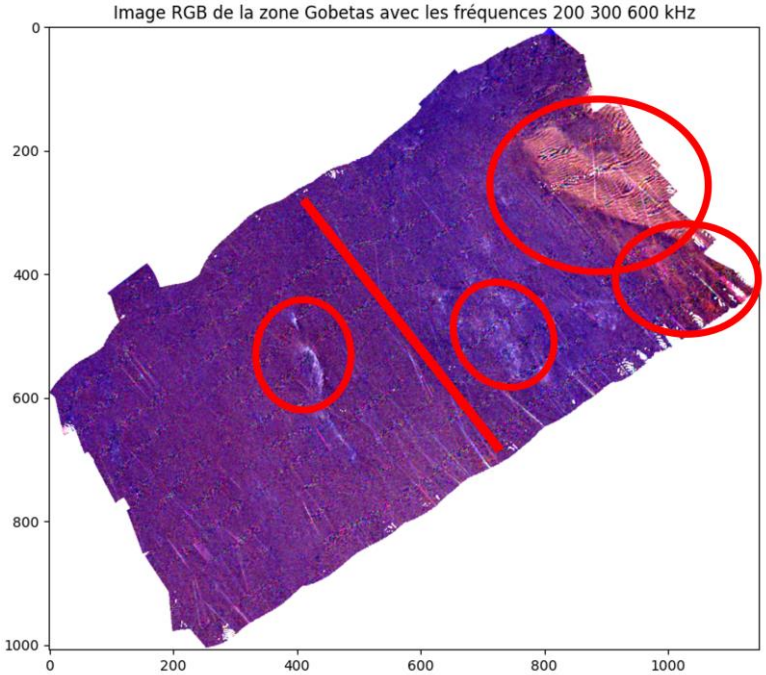


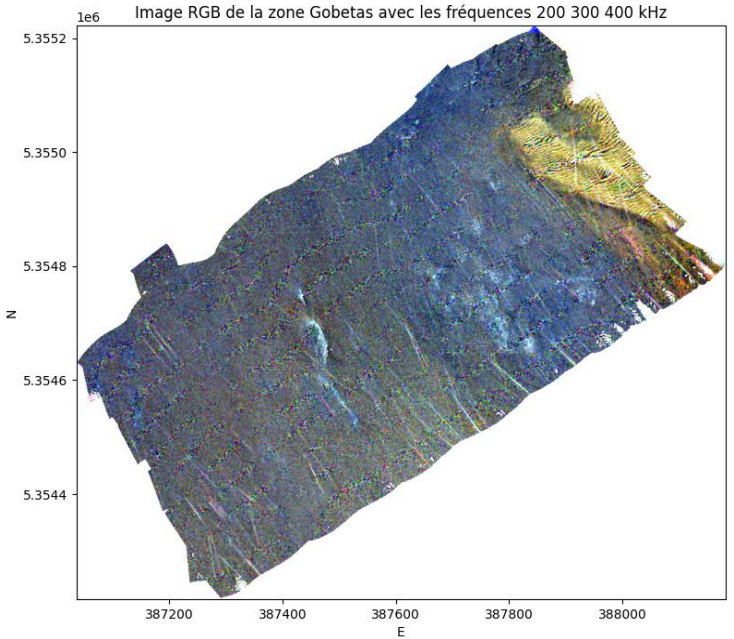
Multifrequency results



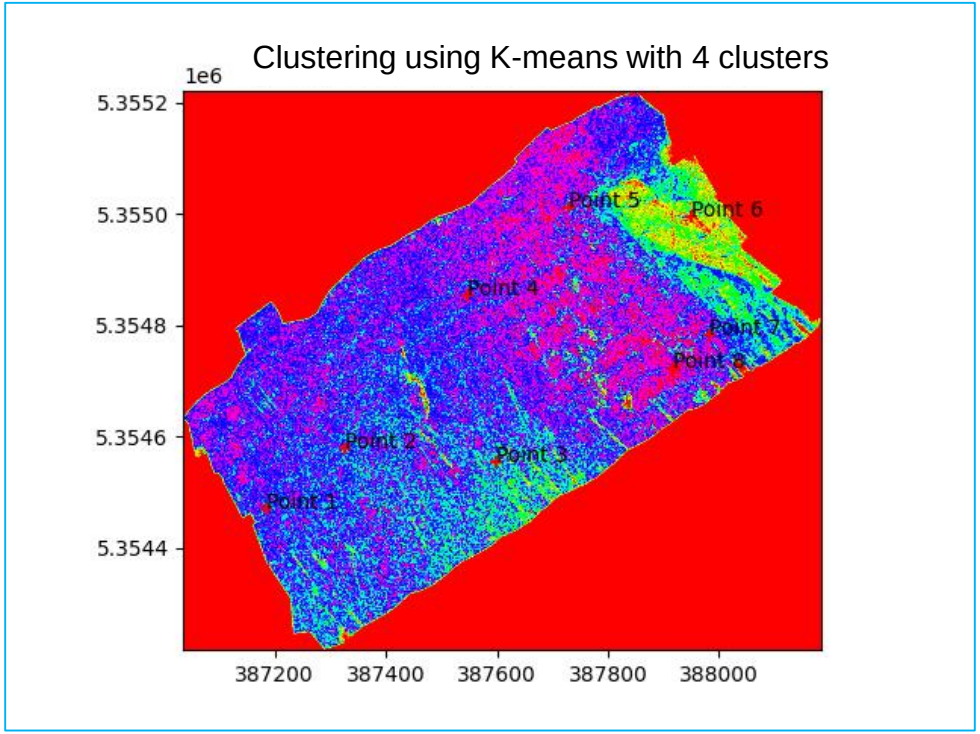


Multifrequency results





Automatic segmentation



Conclusion

The measurements carried out during this project were used to assess the contribution of the multifrequency mode to bathymetry and reflectivity.

Perspectives :

- Acquire more data on areas other than the Rade de Brest
- Test on calibrated sensors
- Test new segmentation and classification algorithms

MERCI !