Impact of Covid-19 lockdown on shipping underwater noise in the Mediterranean Sea

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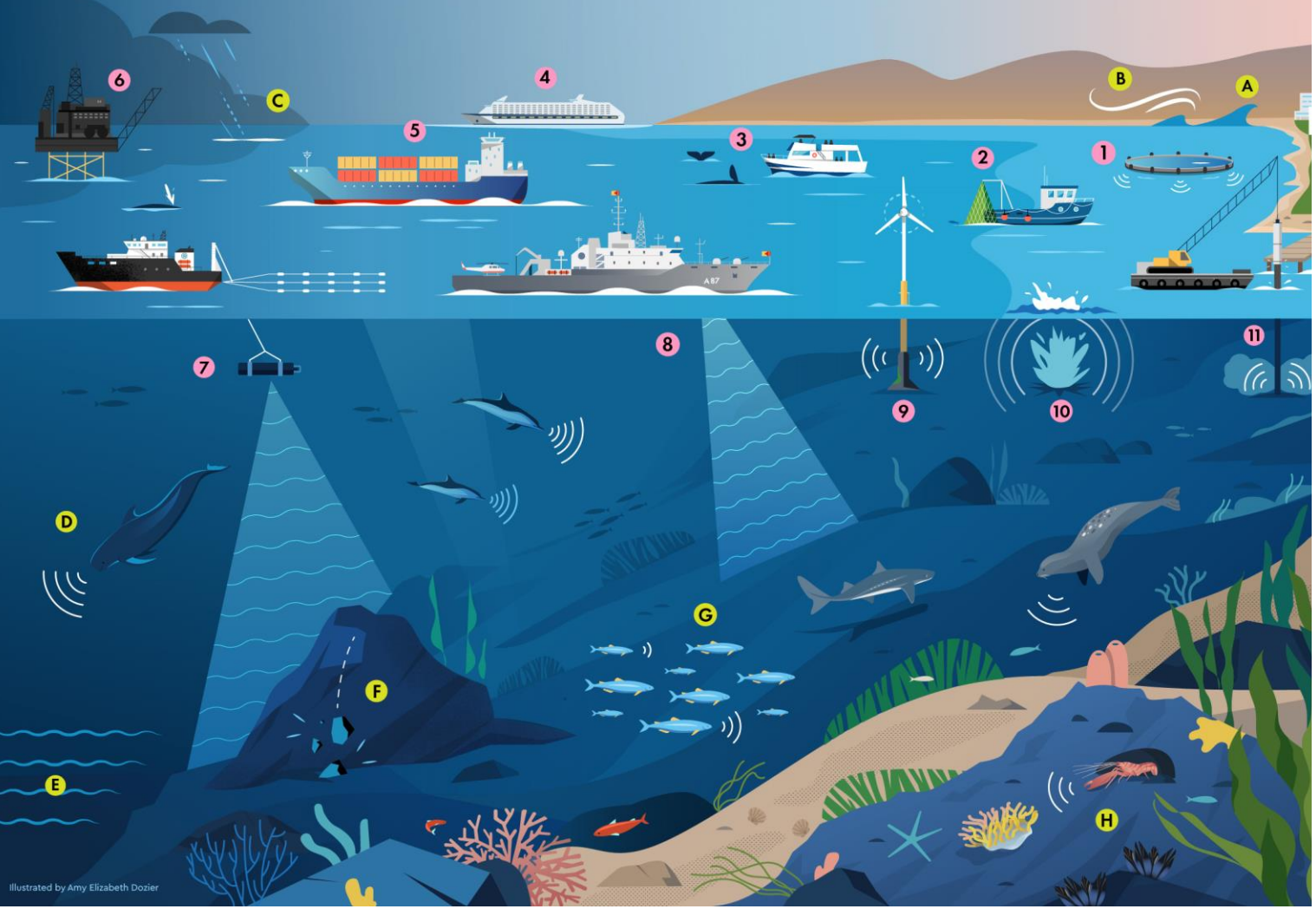

Risks of marine noise pollution :

- Acoustique masking
- Behavioral modification
- Physiological damages (temporary or permanent)

jonas
Joint Framework for Ocean Noise in the Atlantic Seas

European MARINE BOARD
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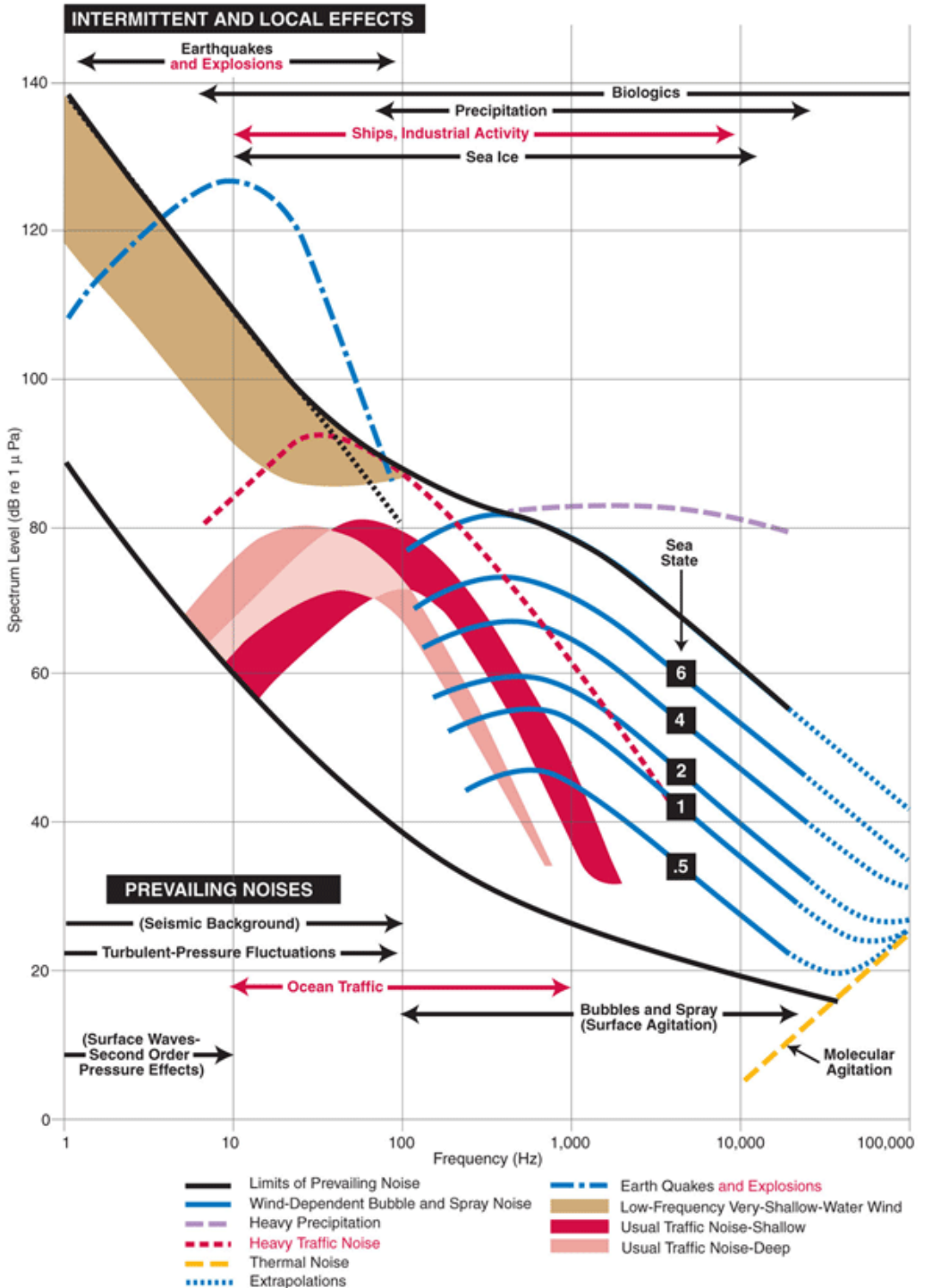
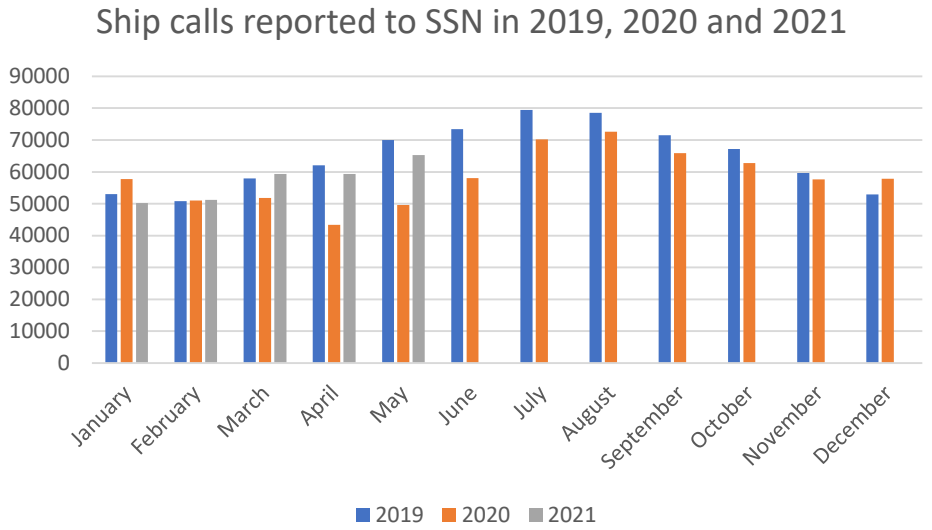


Traffic density reduction during Covid-19 lockdown

General trend: Marine traffic increase

of 300 % in 20 years

(Tournadre, 2014)



Ship calls reported to SSN in 2019, 2020 and 2021 in the member states
- from : EMSA report: COVID-19 – impact on shipping, June 2021

Covid19 pandemic = realistic case story of traffic decrease

quiet seas

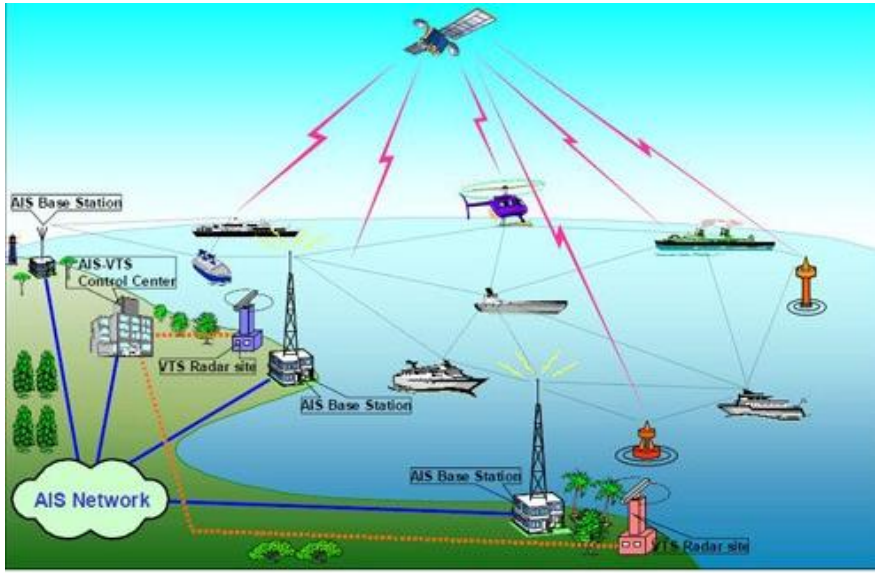
Evaluating shipping noise

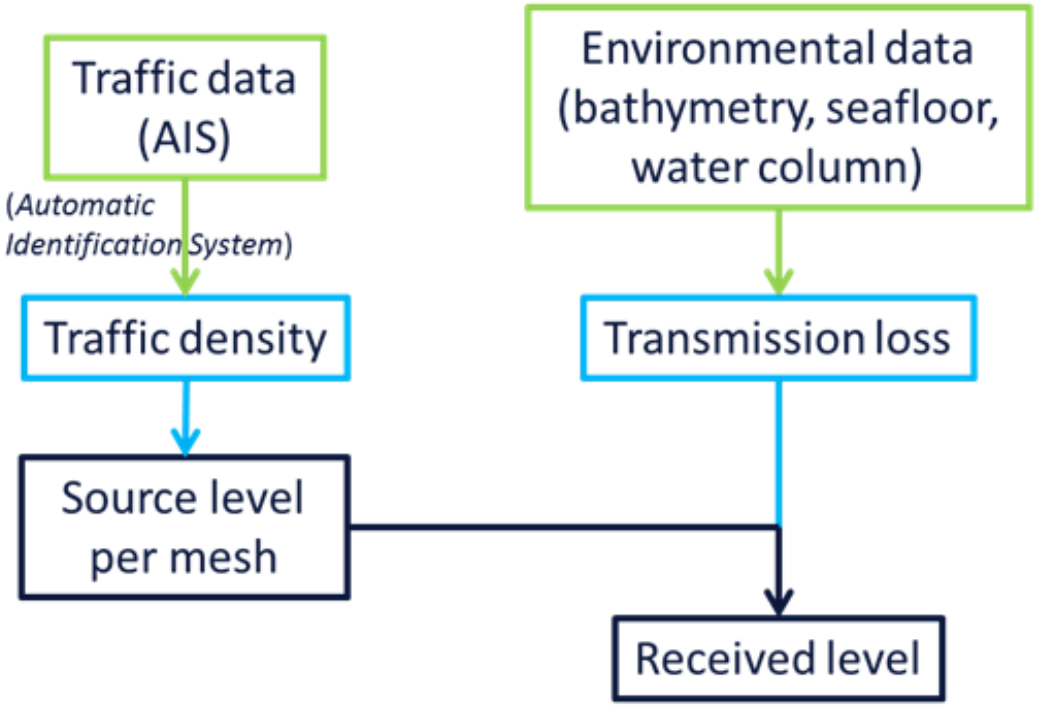
Automatic Identification System (AIS):

- Vessel information (category, length, MMSI)
- Navigation data (position, heading, speed…)

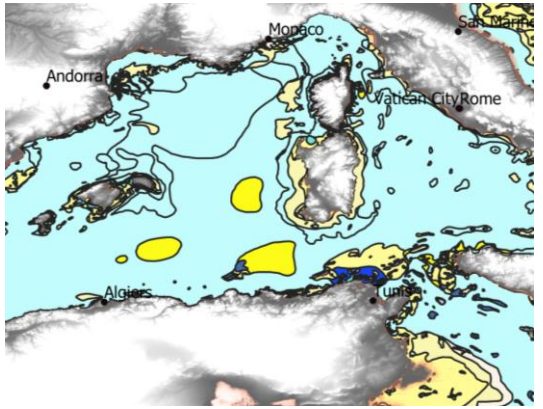
AIS data set:

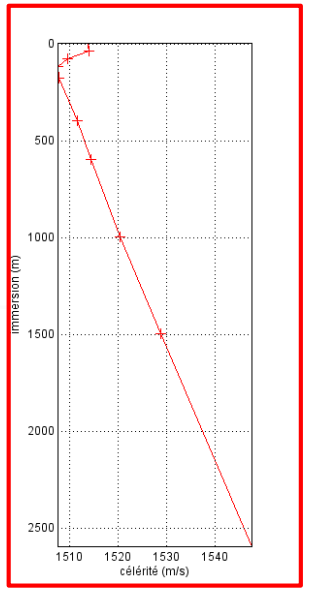
- ExactEarth
- Terrestrial and satellite
- Two full years : 2019 & 2020
- Mediterranean sea + Black sea





Environmental data

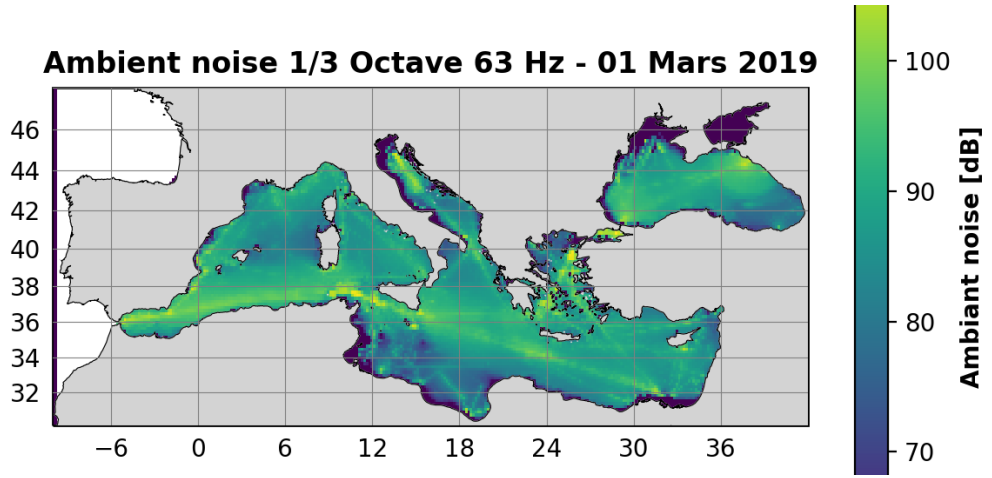




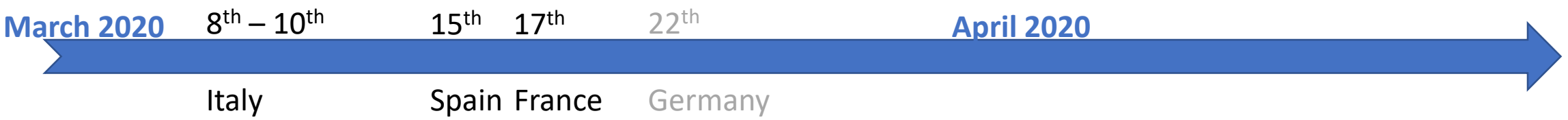
Transmission losses :

HF >300 Hz : acoustic rays propagator PRAMM

LF < 300 Hz : parabolic equations solver RAM



Comparison of month maps

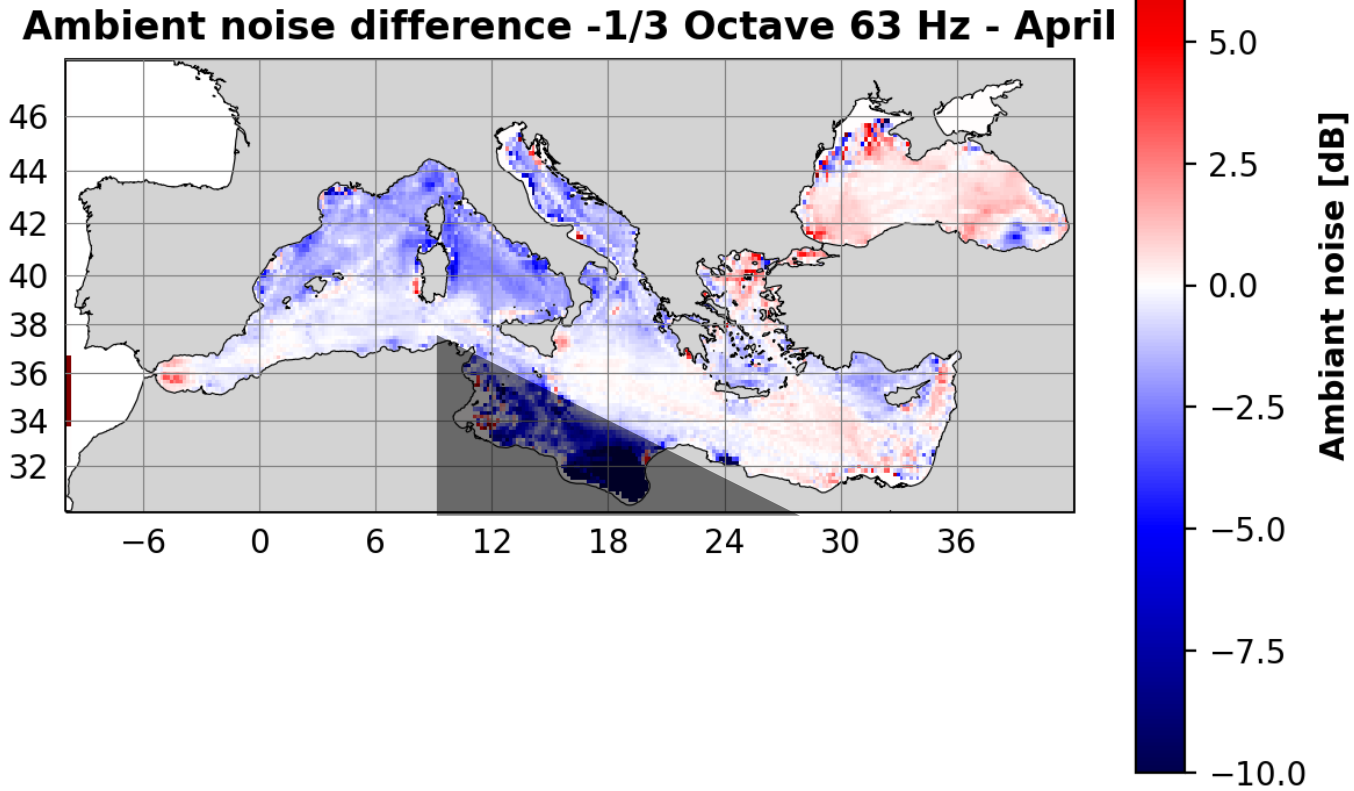


- Computation of ambient noise month to month
- Comparison between ambient noise in 2019 and 2020

$$\Delta A = A_{noise}^{2020} - A_{noise}^{2019}$$

$\boldsymbol{\Delta A < 0} \Rightarrow$ Shipping noise has decreased

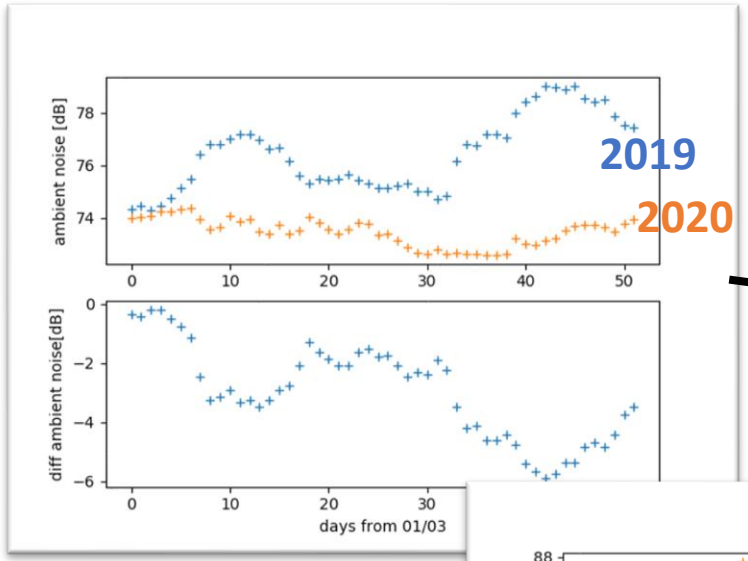
$\boldsymbol{\Delta A > 0} \Rightarrow$ Shipping noise has increased

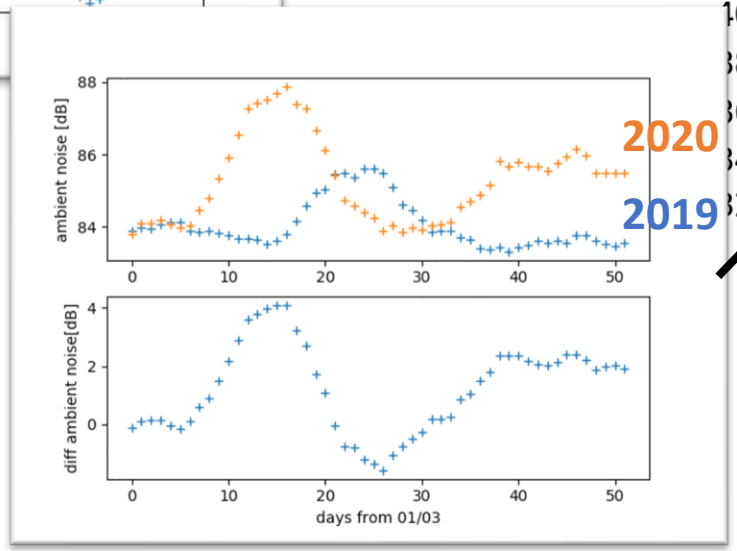


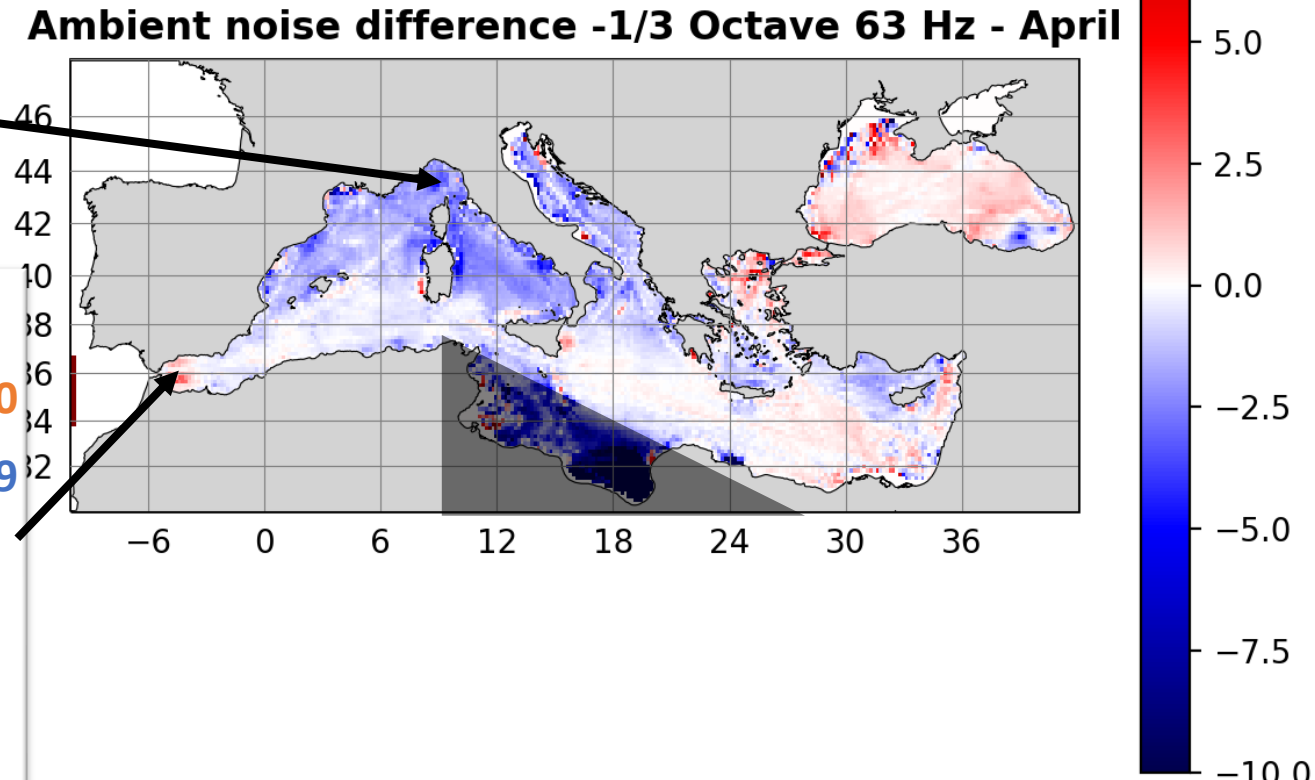
Comparison of month maps

March — 8th – 10th — 15th — 17th — 22nd — April

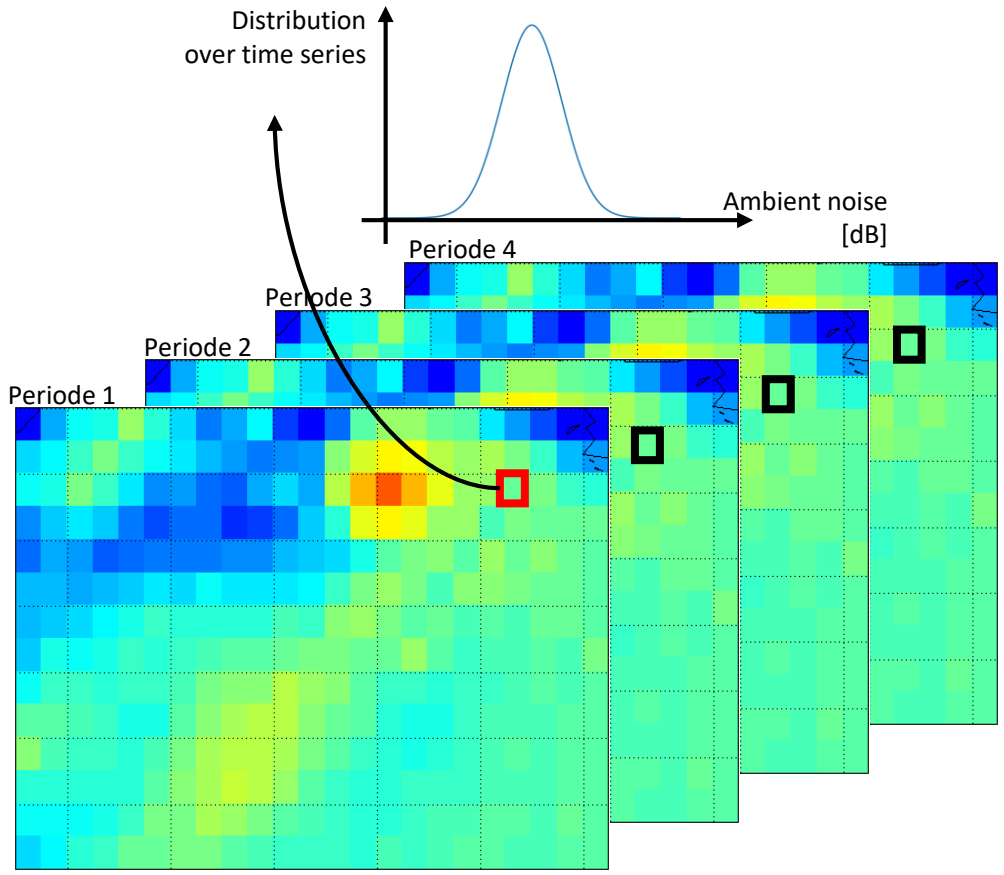
Italy — Spain — France — Germany



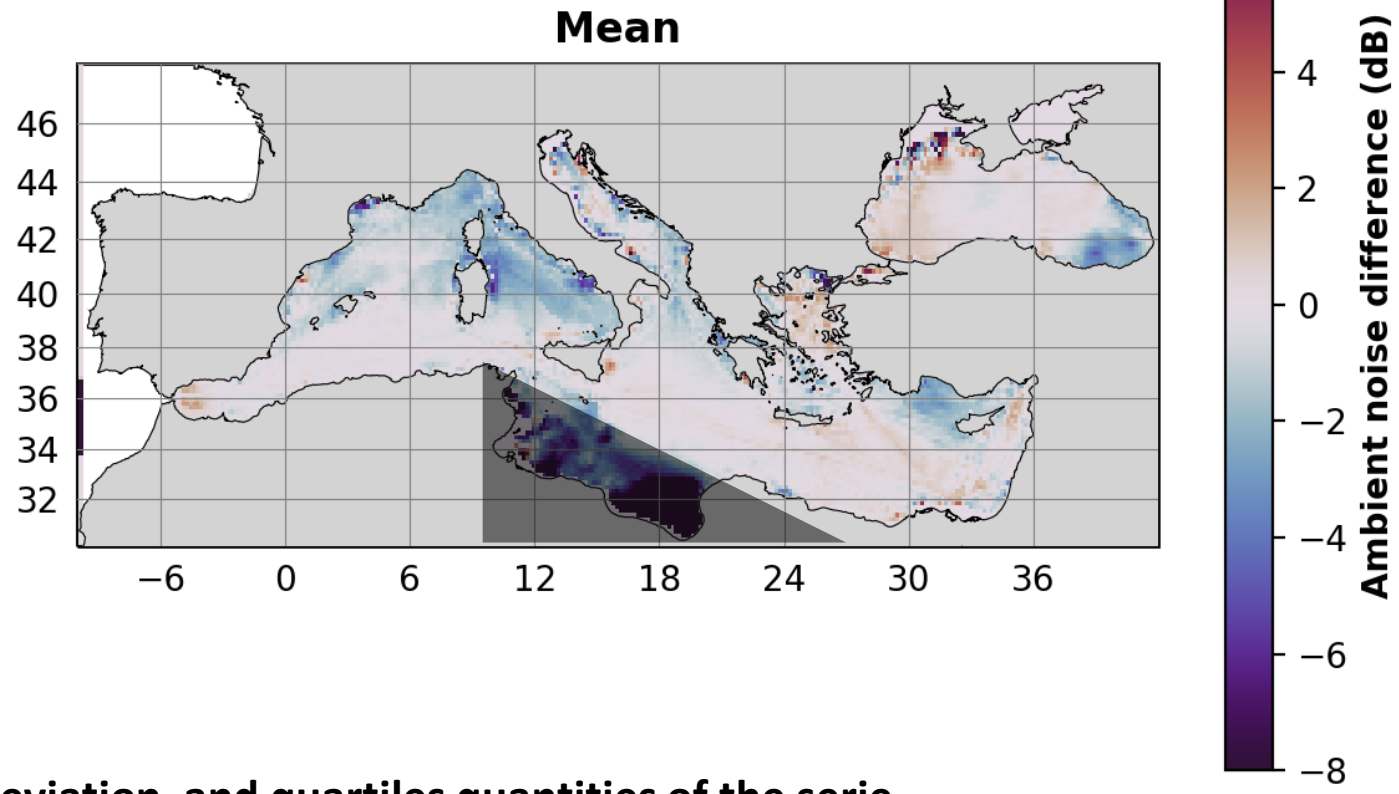




Comparison of daily maps

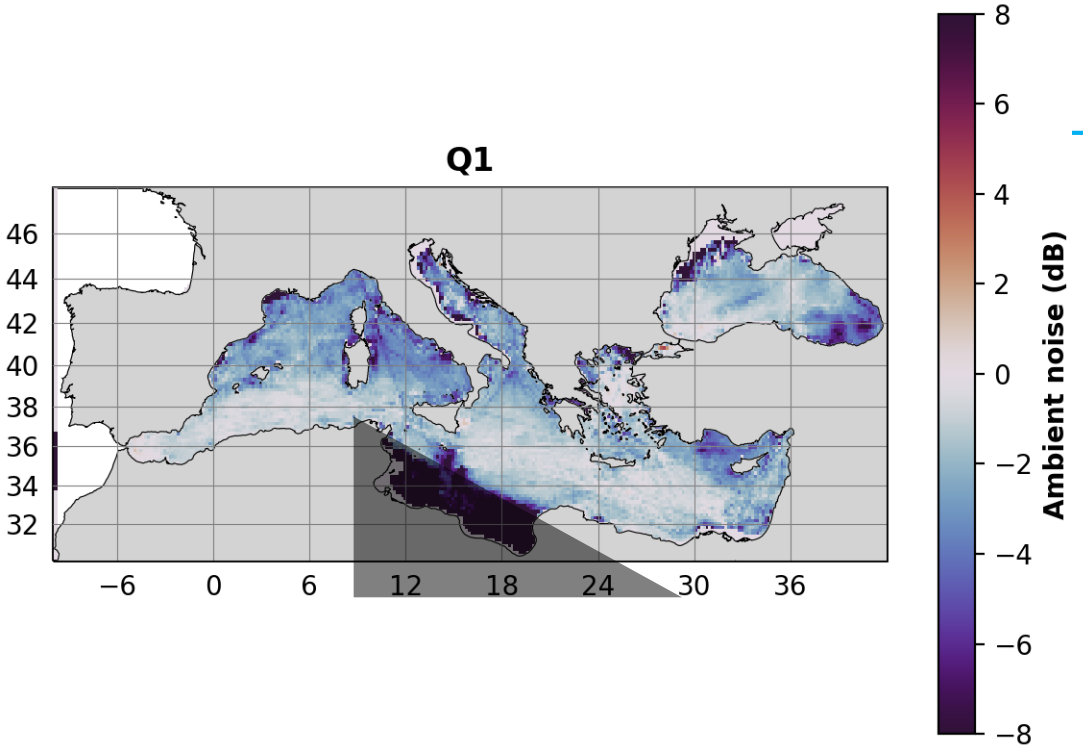


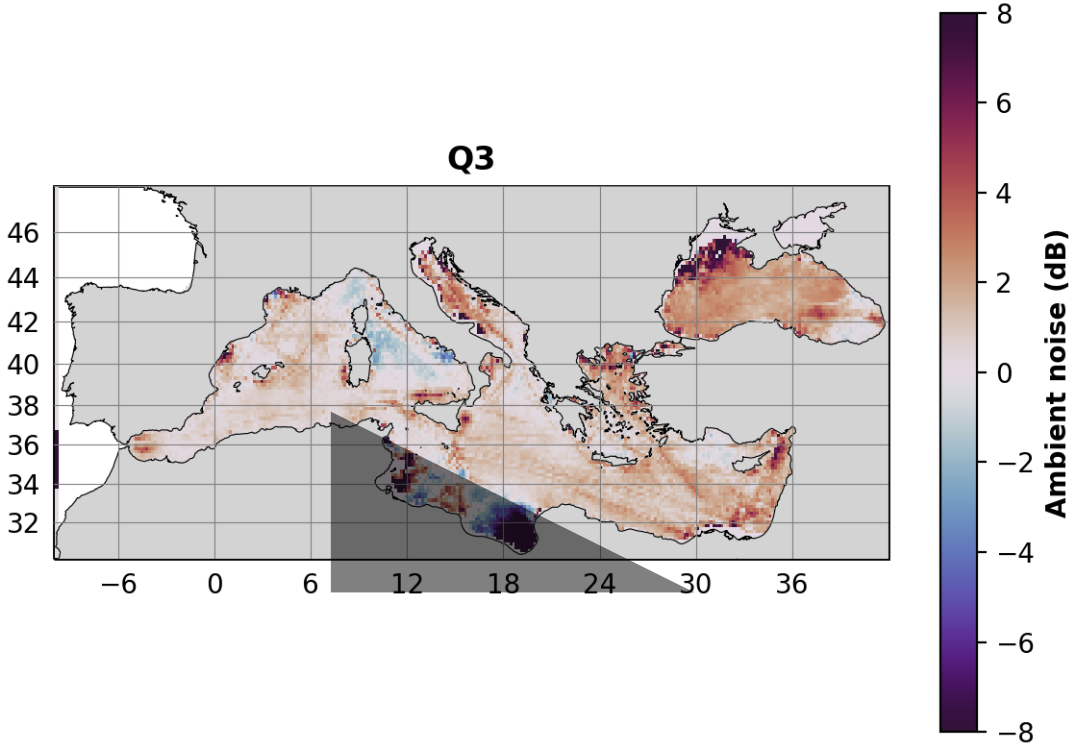
Over the month of April

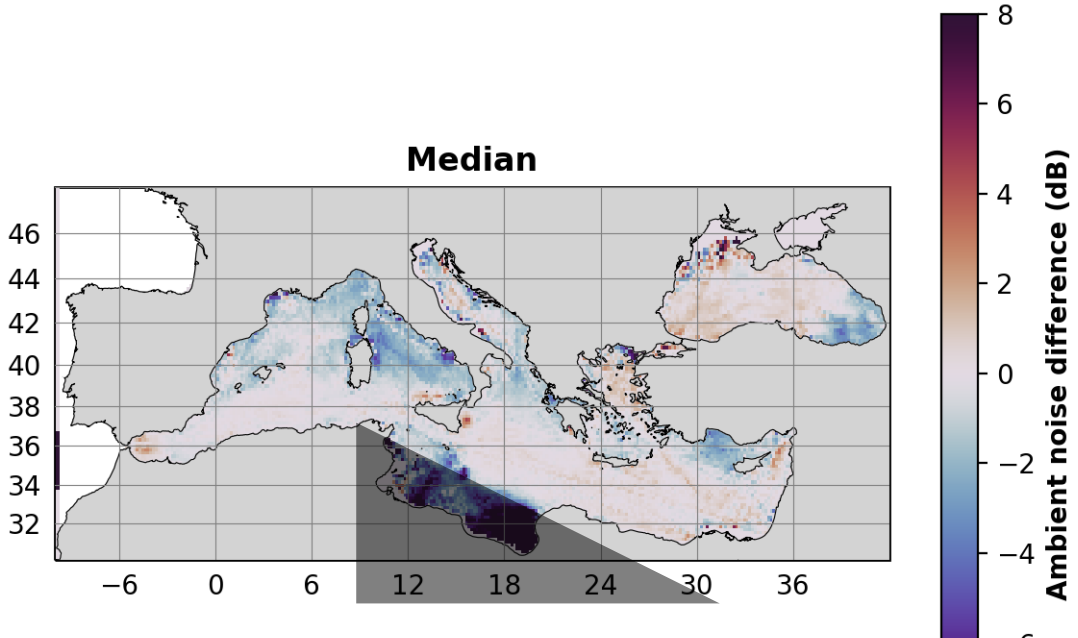


Computation of mean, standard deviation, and quartiles quantities of the serie

Comparison of daily maps







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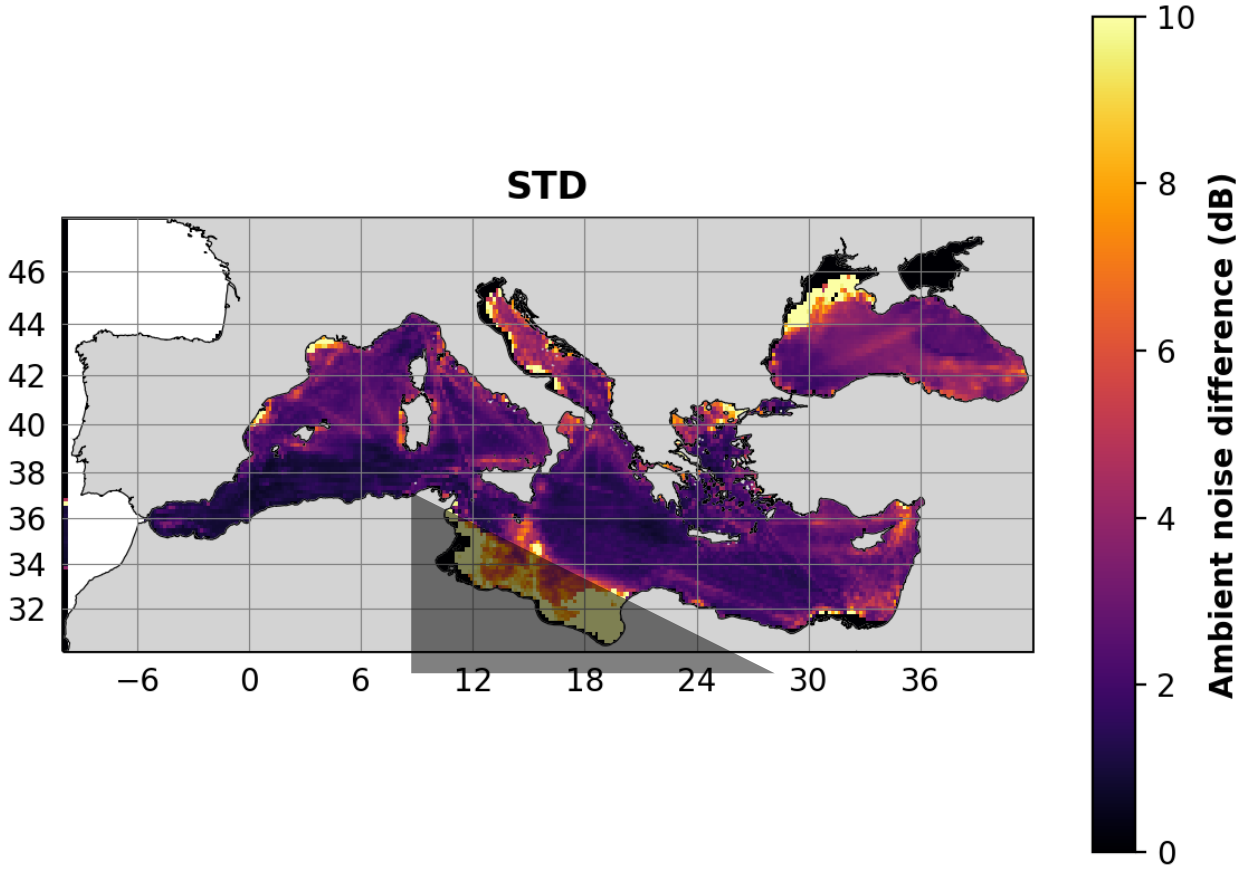

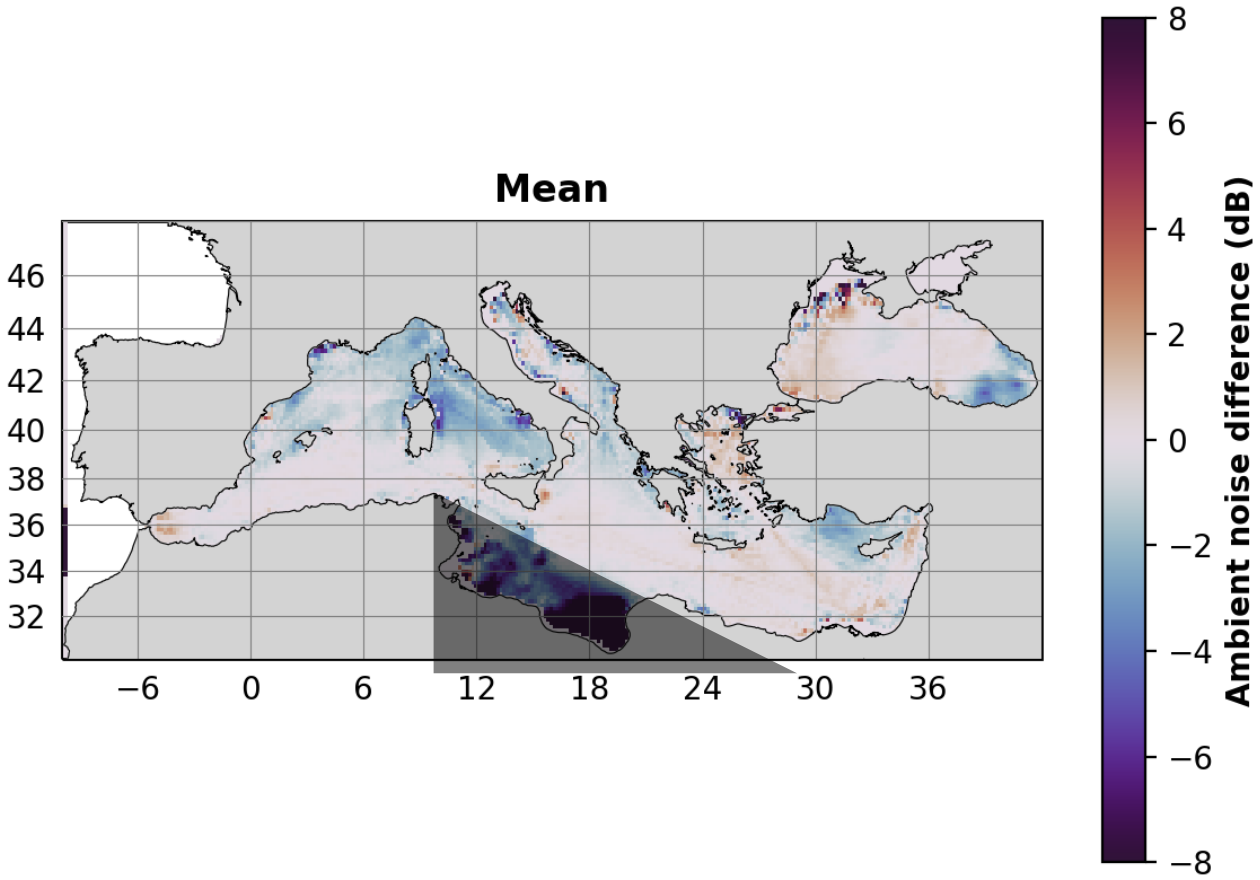

Conclusions

- First evaluation of the effect of a shipping decrease on noise pollution

but

- Marine traffic is very complicated: different paths, different contributions, high temporal variability
- Transiant effects at the (progressive) onset of lockdowns: need to look at longer time-series ?
- Effective decrease of ambient noise dependant upon environmental factors ?

  ⇒Shallow water vs deep water

  ⇒Level of local traffic density

- Preliminary ways of exploiting the results: exploring thinner technics of analysis of the maps

Thanks for attending !