Interreg
North Sea Region
Jomopans
European Regional Development Fund

EUROPEAN UNION

WP7 GES tool

JOMOPANS MID-TERM EVENT, LONDON, 8TH OF OCTOBER 2019

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Aarhus University

Noise – what are the issues?

MSFD D11C1 – impulsive noise

MFSD D11C2 continuous noise

Other sources

Other effects

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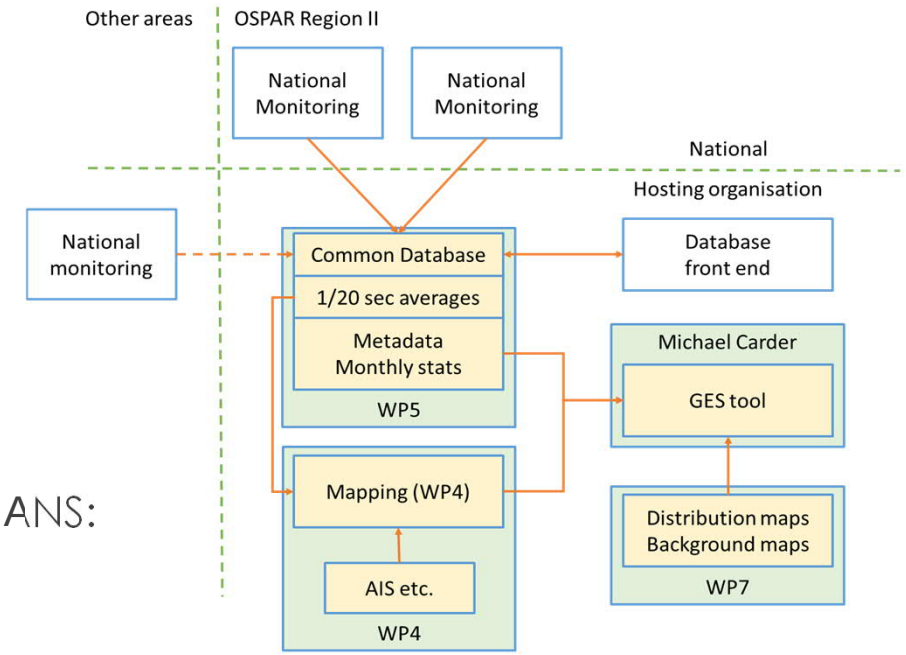
The GES tool

- Accessing results from JOMOPANS:
  - Maps
  - Summary statistics of measurements
- Adressing GES:
  - Do we have GES in the North Sea?
  - If not, where and when is the problem?
  - What sources create the problem?
- More ambitious goals beyond JOMOPANS:
  - Will measure X bring us towards GES?
  - Will Activity Y compromize GES?



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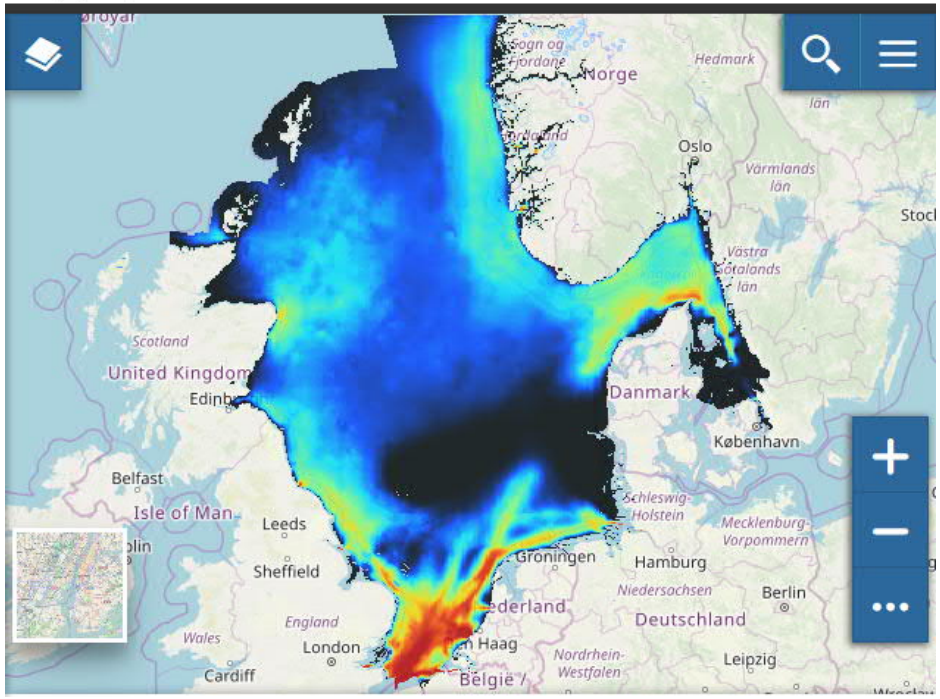
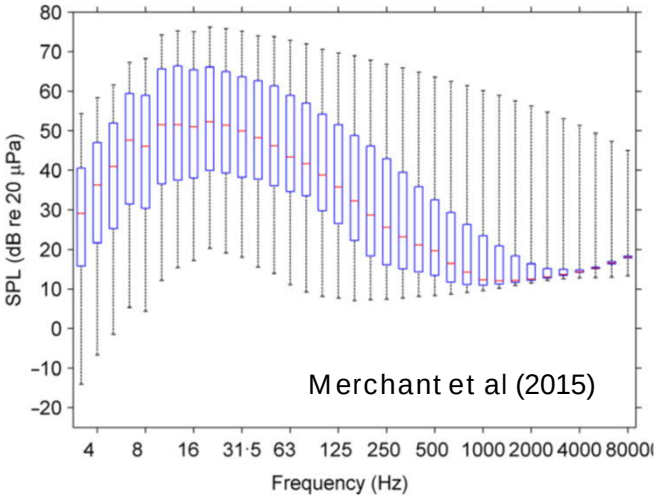
Web interface to tool



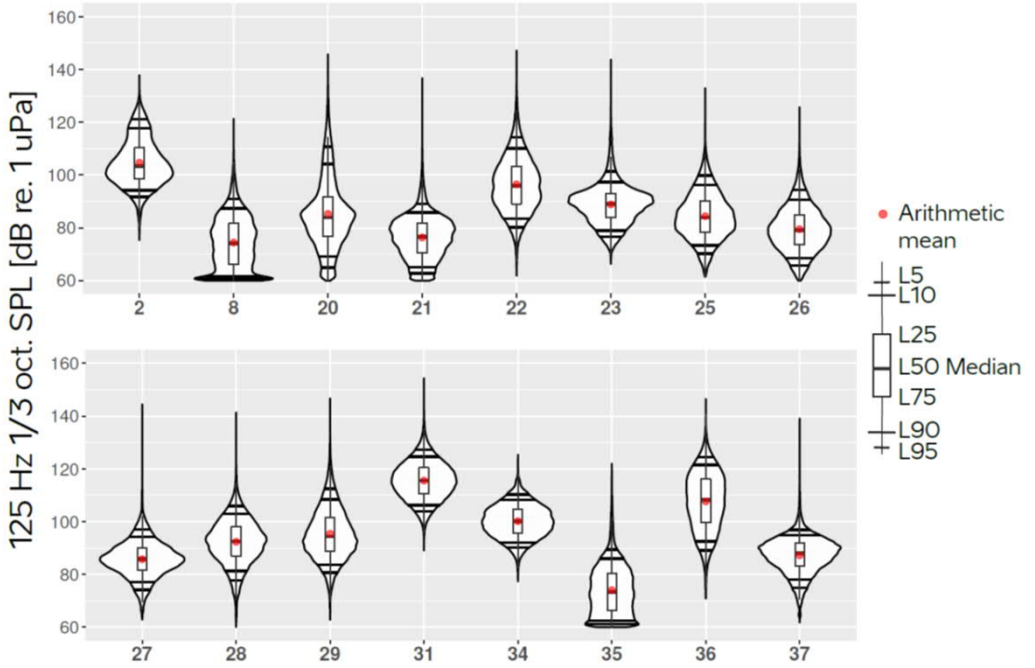
- Browsing of maps
- Export of maps
- Summaries of measurements
- Combine maps with distribution data for sensitive species

Measurements – summary statistics



Merchant et al (2015)

To be delivered by WP5



Mustonen et al (2019)

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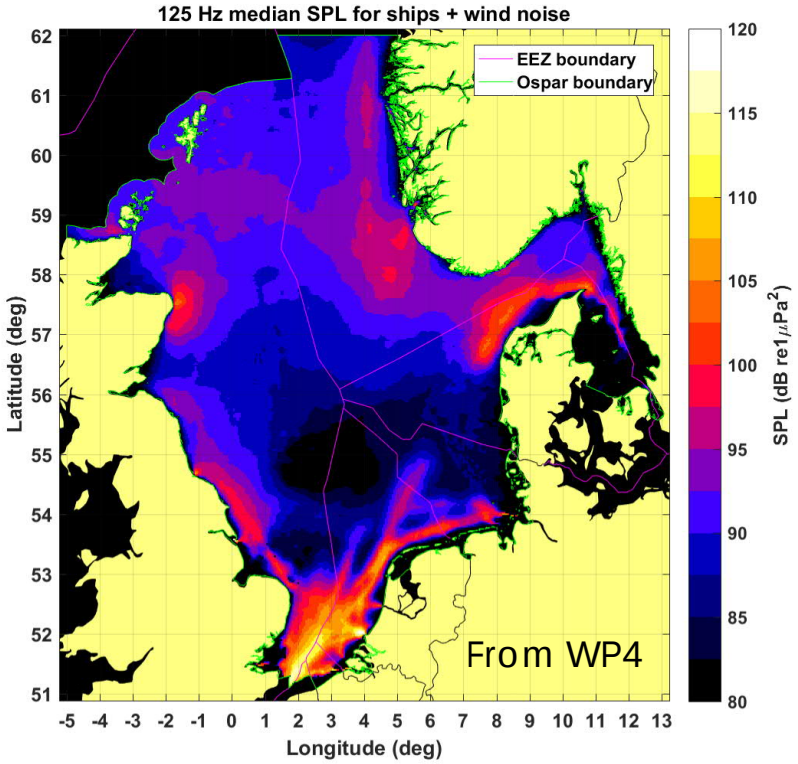
Maps – Total noise



- No separation of natural and antropogenic noise
- No information about sources
- No information about sensitive animals

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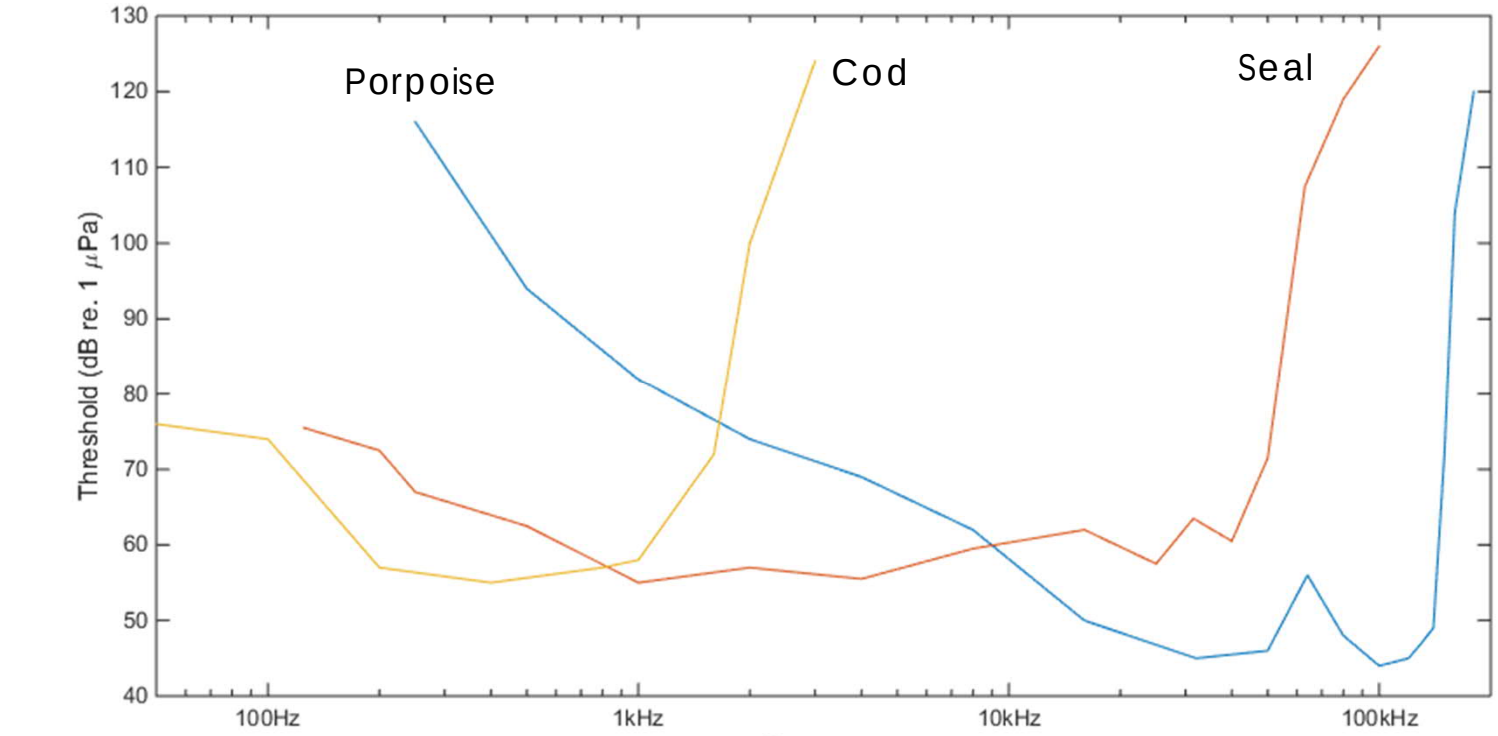
Dealing with frequency



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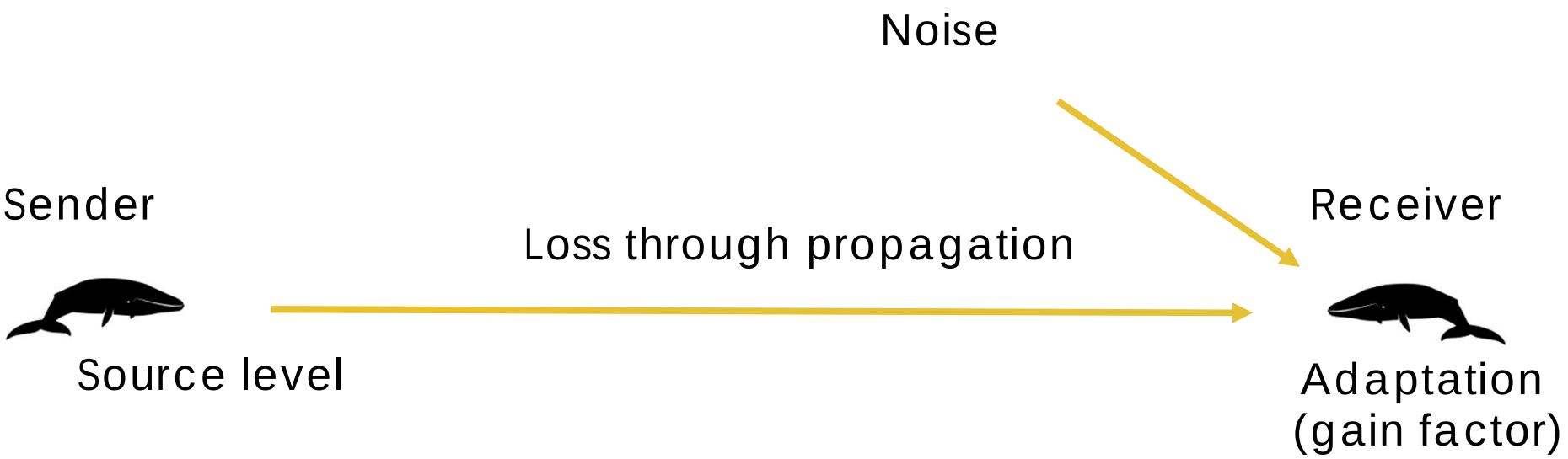
Signal-to-Noise ratio and masking



All factors together determine Signal-to-Noise ratio

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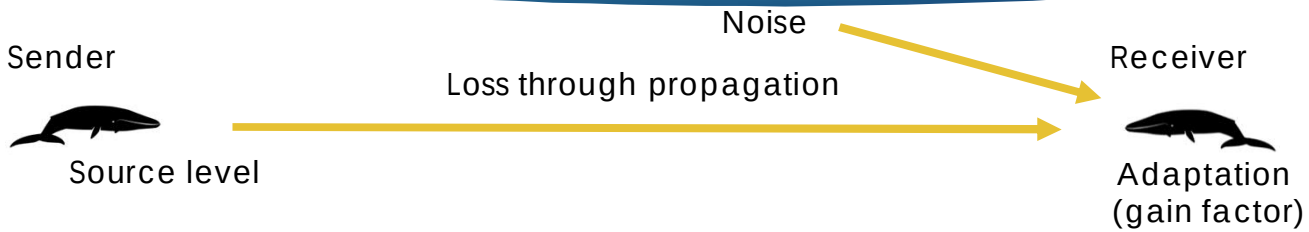
Range reduction



- A minimum Signal-to-Noise ratio is required for communication
- This determines the maximum communication range
- If the noise increases, something else must change to restore communication:
  - Increase source level (Lombard effect)
  - Increase adaptation (behavioural optimisation of reception)
  - Reduce propagation loss (move closer together)
- If source level and adaptation is maximal, an increase in noise of 20 dB leads to a reduction in communication range by 90%
- The best part: we don't need to know the maximum communication distance!

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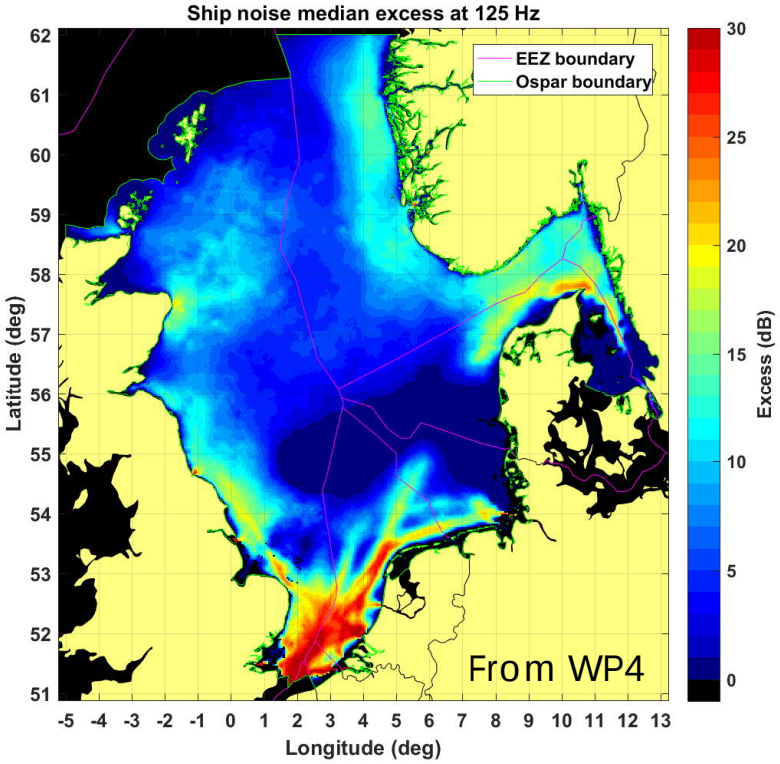
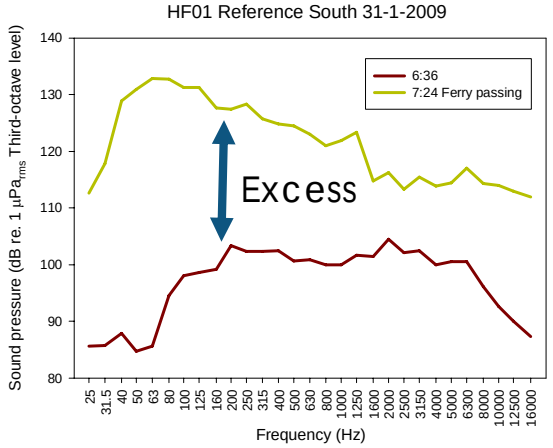
Excess level = total noise – natural ambient





- Excess level ≈ 0: Natural noise dominates
- Excess level ▲ -> Communication range▼
- High excess level most of the time = ship noise dominates
- GES likely compromised

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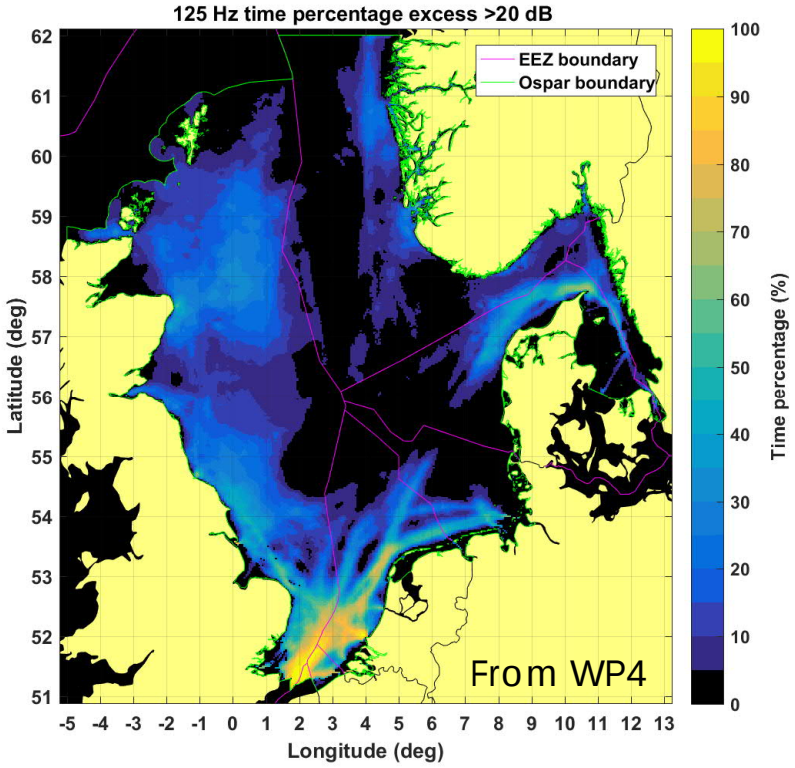
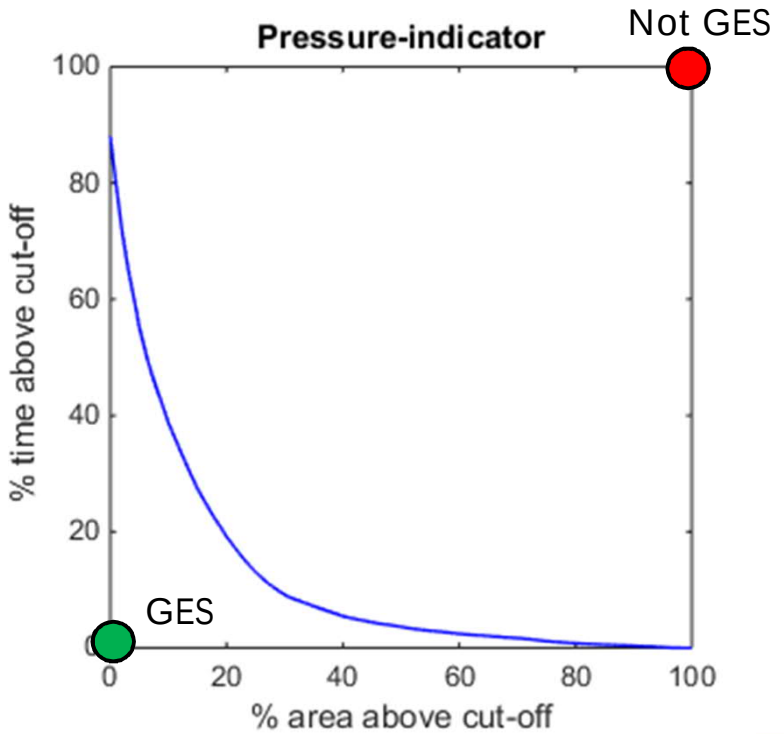
Excess level in time





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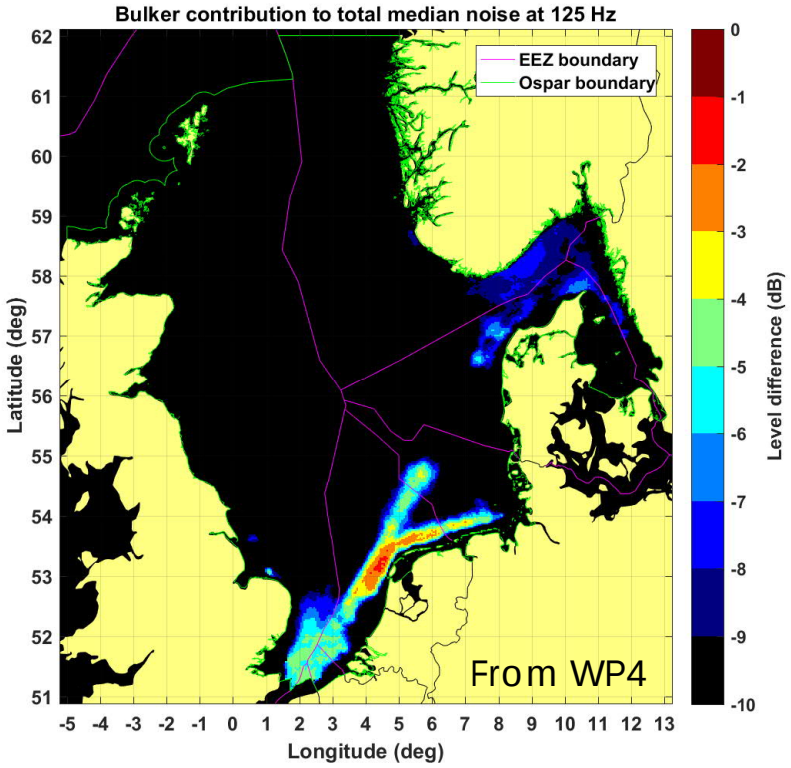
Separation of sources



- Allows for (limited) analysis of what sources dominate

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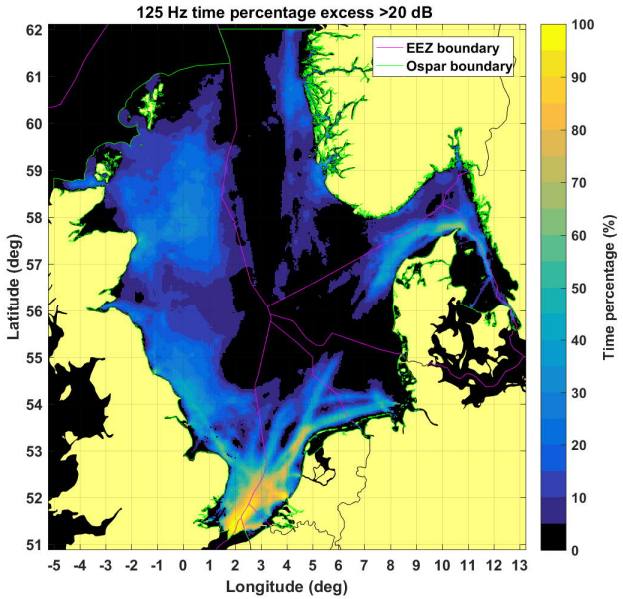
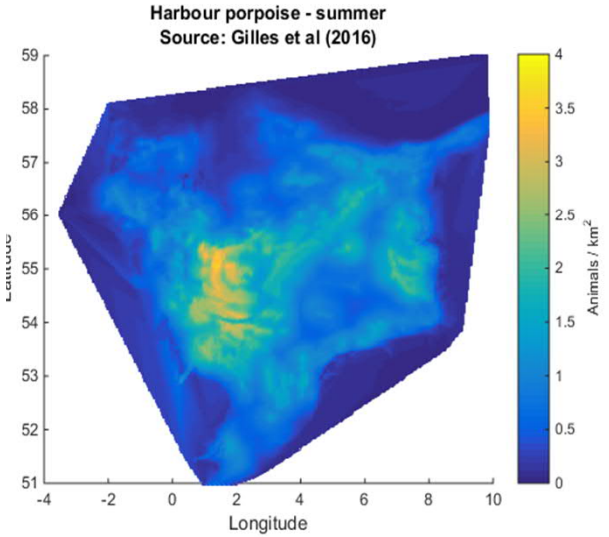
Adding sensitive animals

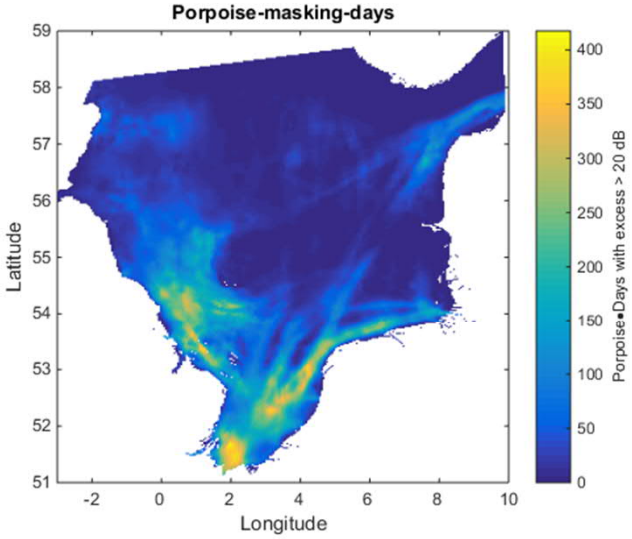
Where is the ship noise?



Where are the animals?



Exposure is where they overlap



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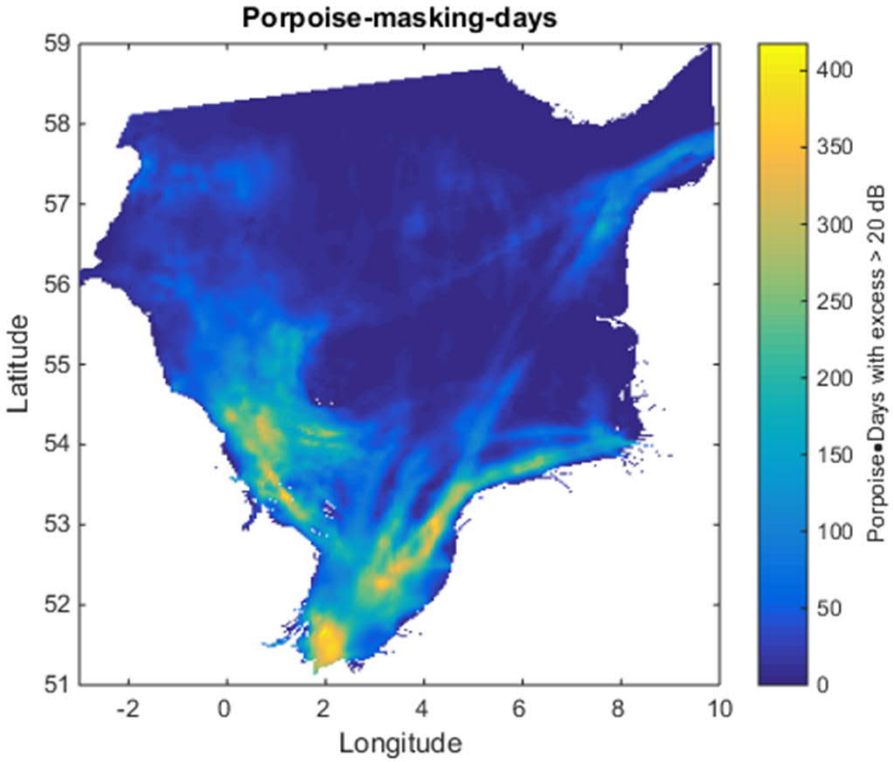
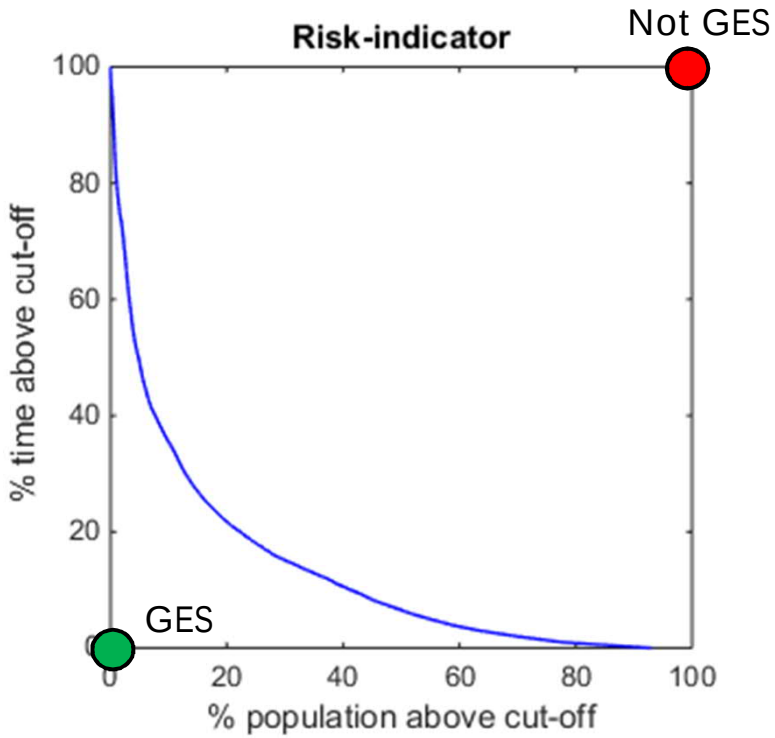
Noise and animals combined





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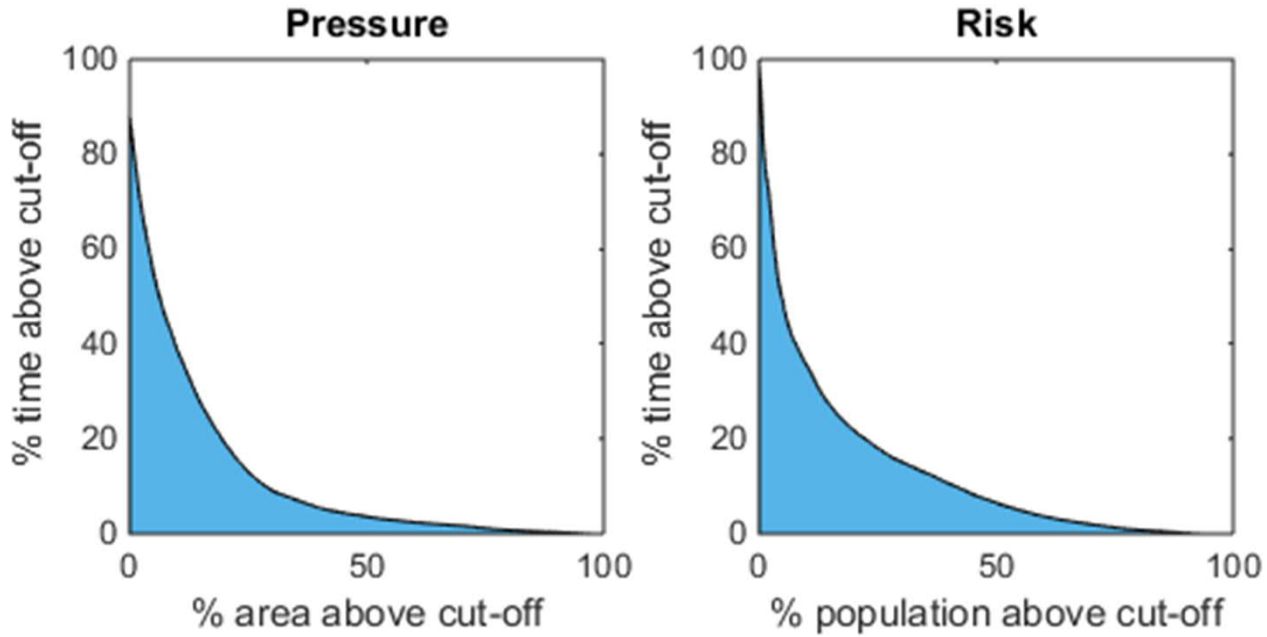
Candidates for GES indicators



Large area below curve: conditions bad
Decreasing area -> movement towards GES

Thank you for your attention

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