





JONAS: the Azores test case

Preliminary noise assessment

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JONAS JOINT FRAMEWORK FOR OCEAN NOISE IN THE ATLANTIC SEAS

Addressing threats to biodiversity from underwater noise pollution on sensitive species in the NE Atlantic by streamlining ocean noise monitoring and risk management on a transnational basis.







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JONAS associated partners

- DHPLG An Roinn Tithíochta, Plenála, agus Rialtais Áitiúil (IR)
- **DRAM** Direção Regional dos Assuntos do Mar, Açores (PT)
- UPV Universitat Politecnica de Valencia (SP)
- MAPAMA Ministerio de Agricultura y Pesca, Alimentacion y Medio Ambiente (SP)
- ► IOC Instituto Español de Oceanografía (SP)



- to address threats to biodiversity from underwater noise pollution on sensitive species in the NE Atlantic,
- to develop a noise monitoring platform,
- to harmonize technical approaches to MSFD and MSP requirements,
- to promote the adoption of quiter operational practices



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)) JONAS areas of interest





OSPAR region



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Cetaceans observation density



source:OBIS-SEAMAP seamap.env.duke.edu

)) The noise mapping process





$$RL(m) = 10 \log_{10} \sum_{i=1}^{I} 10^{SL(i) - TL(i,m)} + W(m)$$
 (dB)

source: Florent Courtois, JONAS meeting, Nantes Sep 2019

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)) Essential data sets



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The main "ingredients"

- AIS: many data sets; coverage; spurious data;
- Source level: very approximate levels by ship type;
- Environment: either measured or modelled T,S profiles; bathymetry; seafloor properties required in coastal areas;
- Acoustic models: computational burden;
- Acoustic data: for model validation and calibration; time-space dependent; standardisation issues;

) The Faial-Pico hotspot: AIS data assessment AIS data June 2018: ship density in dB // 1 ship/h resolution: 10 min × 0.5 nm × 0.5 nm







)) The Faial-Pico hotspot: source level



Source level: mean experimental levels[†]



[†]McKenna et al. Underwater radiated noise from modern commercial ships, JASA 131:92-103, 2012

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)) The Faial-Pico hotspot: bathymetry data



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Bathymetry General Bathymetric Chart of the Oceans (GEBCO)[†] spatial resolution: 1/4 arc-minute



)) The Faial-Pico hotspot: media properties



Water column and bottom properties: generic



Kraken code: two layer model N2D and Delaunay triangulation

Model Parameter	
Sediment speed (m/s)	1650
Sediment density (g/cm^3)	1.9
Sediment att. (dB/λ)	0.8
Sediment thickness (m)	10
Sub-bottom speed (m/s)	1800
Sub-bottom density (g/cm ³)	2.8
Sub-bottom att. (dB/ λ)	0.2



Noise map 30 day movie daily mean of 144 samples 10 min, 63+126 Hz, 20 m depth



)) The Faial-Pico hotspot: discrete locations



marker	name	longitude,latitude
P ₁	south channel	-28.60, 38.50
P_2	seamount	-28.66, 38.37
P ₃	Pico-S.Jorge	-28.20, 38.60



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)) The Faial-Pico hotspot: statistics



Exceedence received level for a given % of time.



)) The Faial-Pico hotspot: noise maps



Noise map percentiles and mean: 63+126 Hz, depth 20 m, resolution 10 min



median

mean



)) The Faial-Pico hotspot: noise maps



Noise map percentiles and mean: 63+126 Hz, depth 100 m, resolution 10 min







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mean

)) The Faial-Pico hotspot: instantaneous



Instantaneous noise maps 63+126 Hz



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Summary

- areas with significant/frequent noise energy
- bathymetry effects are notorious

TODOS

- time-space variability of media (water column & bottom)[†]
- extend frequency band up to 1 kHz
- add other noise contributions (wind, construction,...)
- validation / calibration with measurements
- risk assessment, SEL maps & cross with cetacean population distribution[†]
- [†] in collaboration with Mónica Silva and Manuela Juliano





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THANK YOU 😜 iFADO FOR THE INVITATION !

