Monitoring of an Arctic underwater soundscape (Kongsfjorden, Svalbard) and impact of shipping noise - INTAROS Project

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Background

INTAROS Project

Objective of underwater passive acoustic research in Kongsfjorden :

Describe the soundscape diversity including :

- benthic fauna sounds,
- marine mammals vocalizations,
- ice sounds,
- wind/wave noise.
- boat noise

Kongsfjorden (west coast of Spitzbergen)

- environment not yet influenced a lot by human activities,
- interesting "reference acoustic state".

"Reference acoustic state" needed for :

- monitoring changes over time, and
- studying potential impact of anthropogenic noise on marine fauna.







Long-term deployments :

monitor changes over time, impact of anthropogenic noise on marine fauna.



Increase of cruise ship traffic in Ny-Alesund between 2013 to 2018



Material

How to monitor acoustic impact on biodiversity ?

Long-term deployments at 10 m depth:



Battery pack for long-term recording (several months)



Material

How to monitor acoustic impact on biodiversity ?

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Wildlife Acoustics SM2M2													2013
RTSYS EA-SDA 14									pause				2018
RTSYS EA-SDA 14								_					
LOGGERHEAD LS1													
RTSYS EA-SDA 14													2019
RTSYS EA-SDA 14													
LOGGERHEAD LS1								Recording					
RTSYS EA-SDA 14 RTSYS EA-SDA 14	On the way back												2020
					γ			Recording					

Data during European lock down



Methods

Estimation of vessel acoustic

6





but this required firs a good understanding of the environment

Propagation model considering the Fjord bathymethry and geography in 3D (Bellhop 3D)





Propagation model considering the Fjord bathymethry and geography in 3D (Bellhop 3D)

VS.

Bellhop nx 2D



INTAROS

Perspective

Using 3D propagation model to model transmission loss through AIS locations





TL

Map acoustic footprint in the fjord :







Thank you for your attention Any question ?

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Daily number of vessel from AIS identification

European lockdown

Describe biophony from anthropophony : development of detectors



1) <u>Energy based detector</u>: Average sound exposure level rate within bandwidth of interet (tonal to find), with condition of duration.

2) <u>Contour shape</u> of the energetic event should fit with a regression model (*i.e.* a polynomial regression)



Supp info

6000

5000

4000

3000

2000

1000

Fregeuncy (Hz)

Understand impact on biodiversity



Time

Supp info

Extrapolation of AIS Data





Risk to have a SPL above a threshold (dB) as a percentage of time (among 1 day here with a 60 dB threshold)

