MARINE ACOUSTICS LABORATORY

SCIENTIFIC ACTIVITY IN 2024 - SUMMARY
BASIC AND APPLIED RESERACH

ARCTIC RESEARCH

TASK 2.6.1

TASK 2.6.5

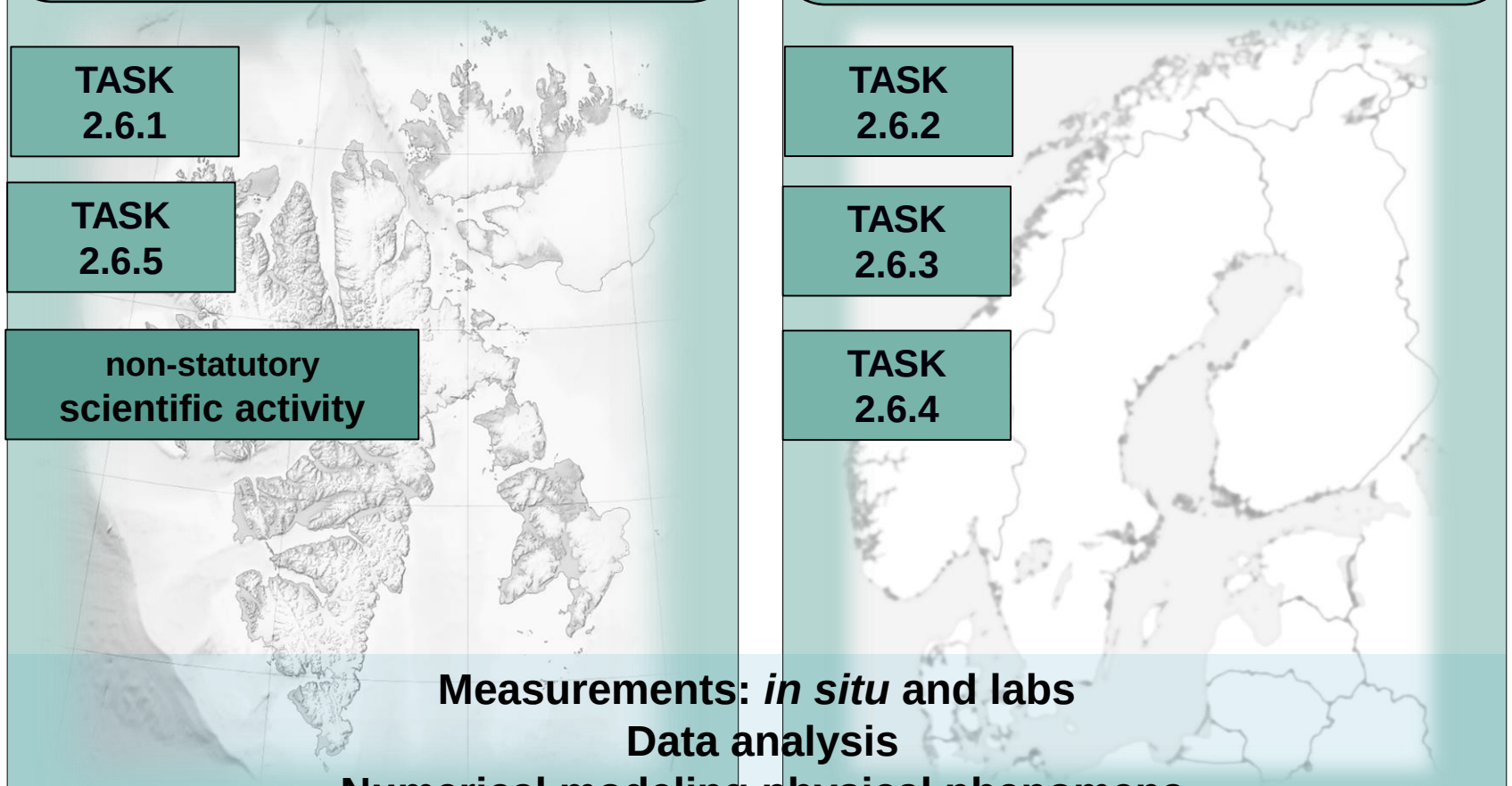
non-statutory scientific activity

BALTIC RESEARCH

TASK 2.6.2

TASK 2.6.3

TASK 2.6.4



Measurements: *in situ* and labs
Data analysis
Numerical modeling physical phenomena

SCIENTIFIC COOPERATION

Instytut Oceanologii Polskiej Akademii Nauk

MIR Morski Instytut Rybacki Państwowy Instytut Badawczy

Akwarium Gdyńskie

Uniwersytet Gdański

Instytut Geofizyki Polskiej Akademii Nauk

Politechnika Gdańska

NOAA National Oceanic and Atmospheric Administration U.S. Department of Commerce

Universität Bonn

ICES CIEM

NUMEROUS PARTNERS OF PROJECTS:

Oceantech, GeoEcoMar, .Ocean nautical innovations, TU Clausthal Clausthal University of Technology, Q.VITEC, Port Oostende, VLIZ, ...

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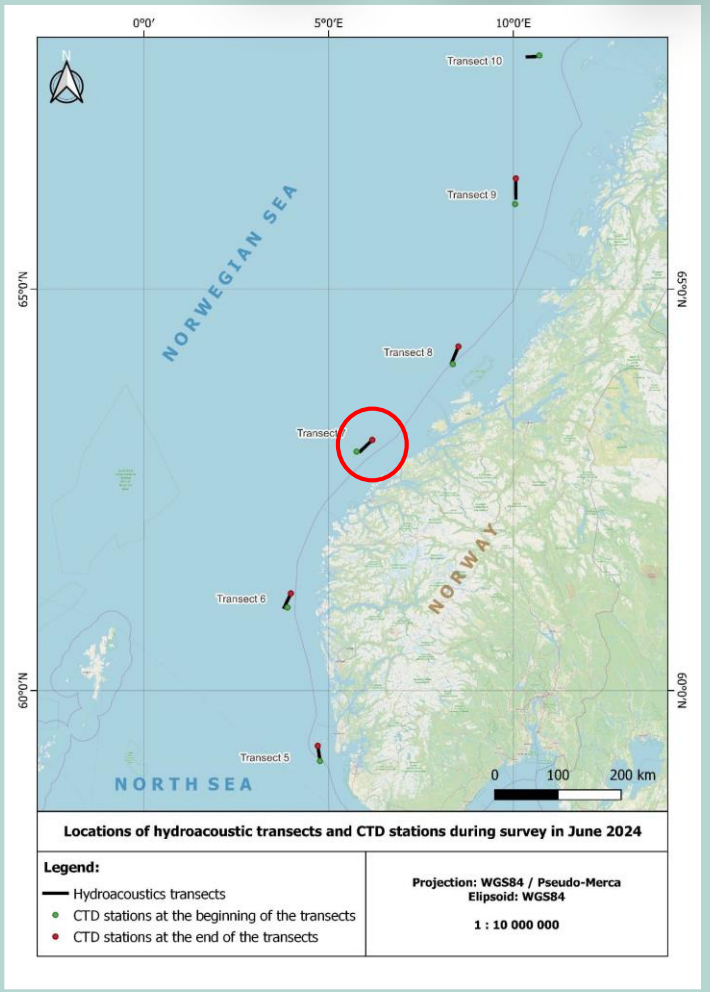
CRUISE TO BODO: BACKSCATTERING PROPERTIES OF ORGANISMS IN THE BALTIC, NORTH AND NORWEGIAN SEAS

TASK 2.6.1



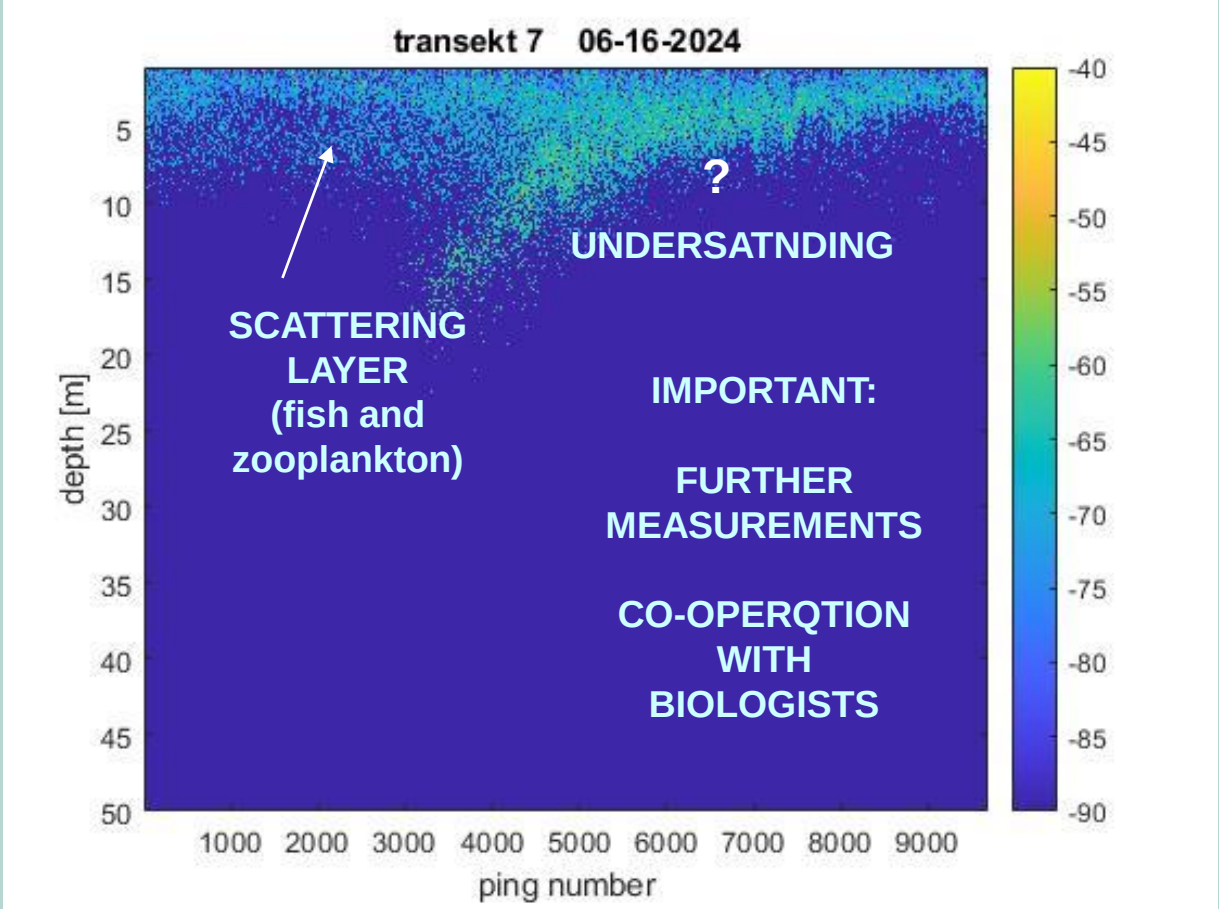
H/A AND CTD – DATA COLLECTION AND ANALYSIS

NOVELTY

1. FROM SOUTH TO NORTH: BACKSACTTERING - STRONGER, LAYERS: THICKER, AND DEEPER

2. EFFECT OF *T* and *S* ON LAYERS

FUTURE PLANS



- PUBLICATION IN COOPERATION WITH UG AND MIR (2025)
- SUBSEQUENT MEASUREMENT CAMPAIGNS (2025, 2026…)

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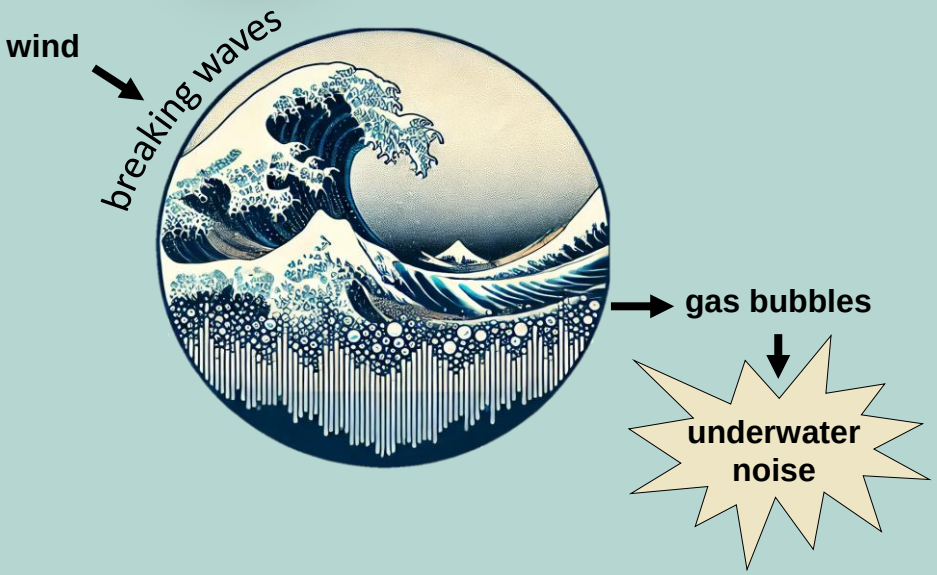
IMPACT OF WIND AND WAVES ON UNDERWATER NOISE IN THE BALTIC SEA

TASK 2.6.2



Open ocean: ***NOISE ~ (WIND SPEED)***

Semi-enclosed
Baltic Sea

Differences:

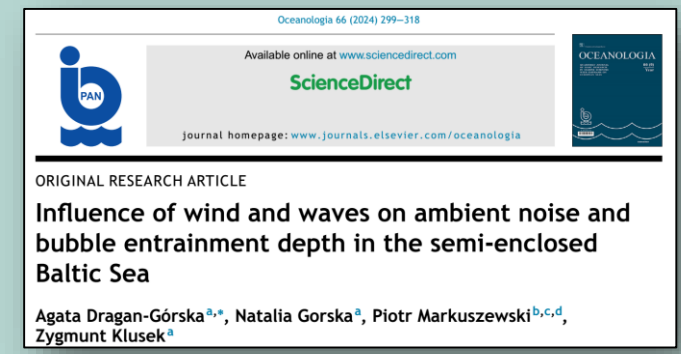
- sound propagation conditions
- proximity to land
- bathymetry

Baltic Sea: ***NOISE ~ (WIND SPEED)*** **is site-specific**

NOVELTY

Use of underwater noise to estimate parameters of different processes at and close to air-sea boundary

Noise-wind-waves-bubbles relations at different Baltic Sea locations.



Oceanologia 66 (2024) 299–318

Available online at www.sciencedirect.com

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journal homepage: www.journals.elsevier.com/oceanologia

ORIGINAL RESEARCH ARTICLE

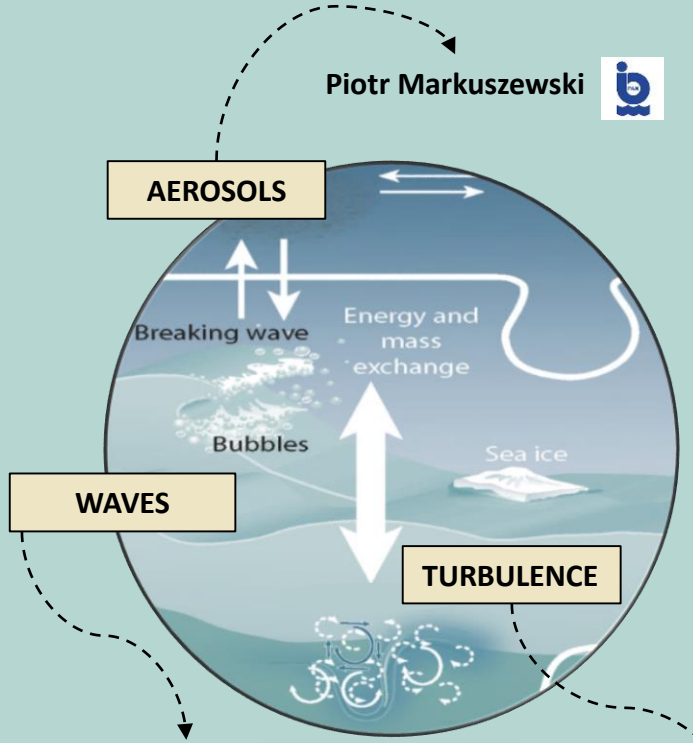
Influence of wind and waves on ambient noise and bubble entrainment depth in the semi-enclosed Baltic Sea

Agata Dragan-Górska[a,*], Natalia Gorska[a], Piotr Markuszewski[b,c,d], Zygmunt Klusek[a]

37th Symposium on Hydroacoustics, May 2024 Łeba, Poland

FUTURE PLANS

Does underwater **noise** hold secrets about subsurface **turbulence** or **aerosol emission**?



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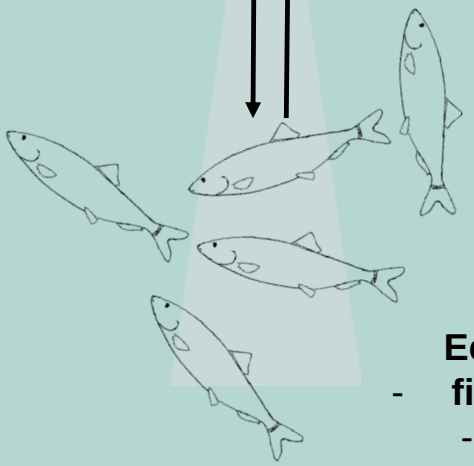
HYDROACOUSTIC DETERMINATION OF SWIMMING ANGLE OF BALTIC HERRING INDIVIDUALS

TASK 2.6.3

ECHOSOUNDER

GENERATED SIGNAL

ECHO



Echo depends on:
- **fish swimming angle**
- **fish biomass**
- **fish species**

Is it possible to obtain Baltic herring swimming angles from echoes?

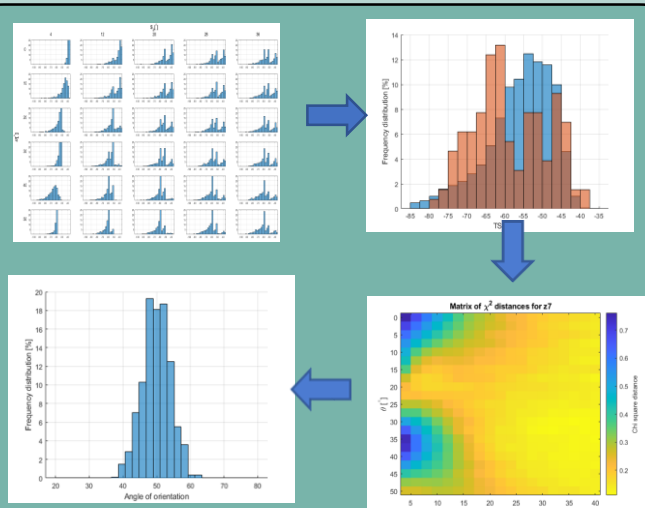
Key question in h/a biomass estimation at Baltic Sea

NOVELTY

New hydroacoustic method of swimming angle determination

It is based on:
- **improved backscattering model**
- **deeper understanding of backscattering**
- **routine data**

(Polish component of ICES BIAS)



SWIMMING ANGLE

MIR Morski Instytut Rybacki Państwowy Instytut Badawczy

Akwarium Gdyńskie

NOAA National Oceanic and Atmospheric Administration U.S. Department of Commerce

PUBLICATIONS

37th Symposium on Hydroacoustics, 14.05.2024-17.05.2024 Łeba, Poland

ICES WGFAST Symposium, 2024, 09.04.2024-12. 04.2024Plouzané, Francja

FUTURE PLANS

Werification of algiorithm in controlled lab– or ex-situ-conditions

HYDROACOUSTIC DISCRIMINATION BETWEEN BALTIC HERRING AND SPRAT

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TASK 2.6.4

ECHOSOUNDER

GENERATED SIGNAL

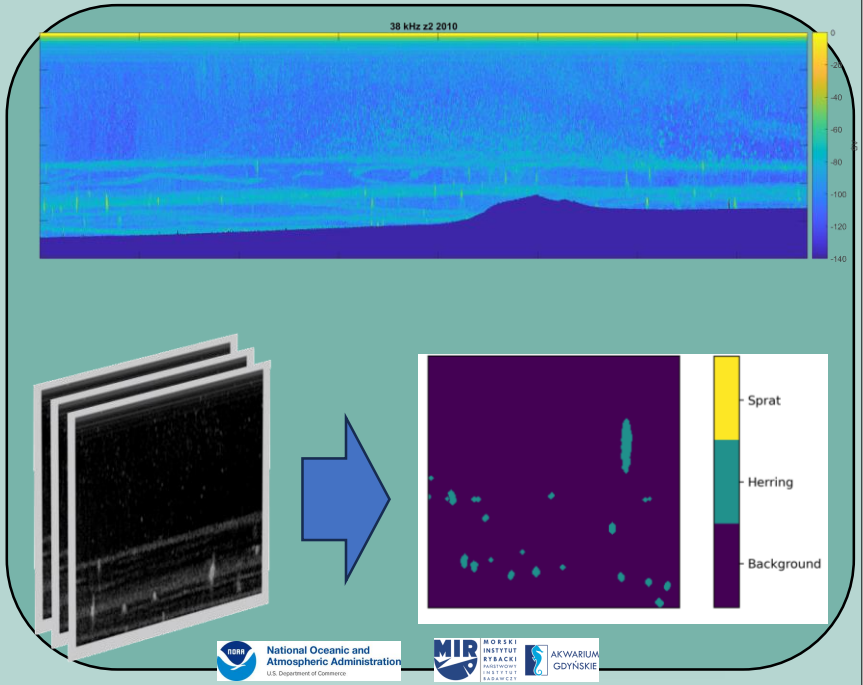
ECHO

Is it possible to discriminate Baltic herring and sprat from echoes?

Key question in h/a biomass estimation at Baltic Sea

NOVELTY

Adopting of image processing algorithms (Convolution Neural Networks) to Baltic herring and sprat identification



FUTURE PLANS

Algoritm improvment

Implimentation in h/a biomass estimation of Baltic herring and sprat (ICES BIAS project)

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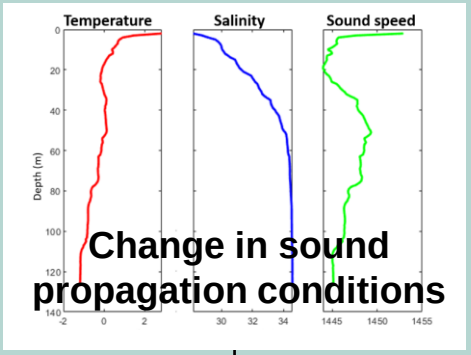
CLIMATE-DRIVEN VARIABILITY OF SOUND TRANSMISSION LOSSES IN HORNSUND (SVALBARD): IMPACT ON NOISE POLLUTION AND MARINE MAMMALS

TASK 2.6.5

Climate warming

↓

Glacier and sea-ice melting in Arctic fjords



Change in sound propagation conditions

Change in underwater noise pollution

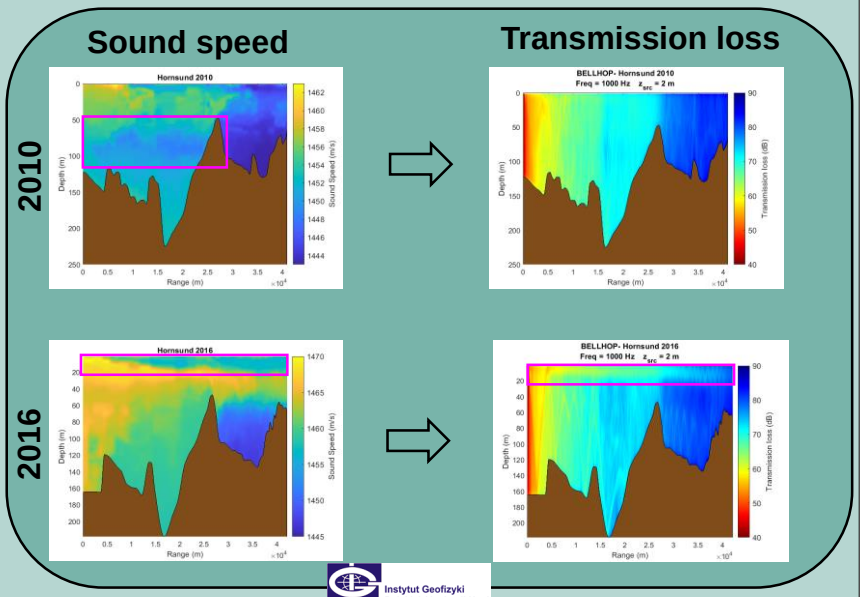
Change of well-being of marine mammals

https://voicesinthesea.ucsd.edu

NOVELTY

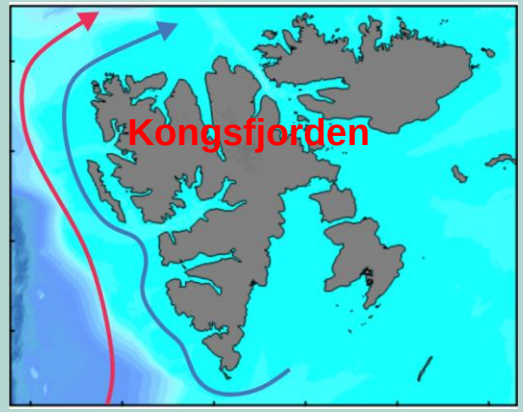
The first longterm study in Hornsund fjord, Svalbard

Climate warming → Better conditions of ship noise propagation → Well-being of marine mammals



Instytut Geofizyki Polskiej Akademii Nauk

FUTURE PLANS



37th Symposium on Hydroacoustics, 14.05.2024-17.05.2024 Łeba, Poland

MARINE ACOUSTICS LABORATORY

DUMPED MUNTION STUDIES WITH THE HYDROACOUSTIC AND GEOPHISICAL METHODS

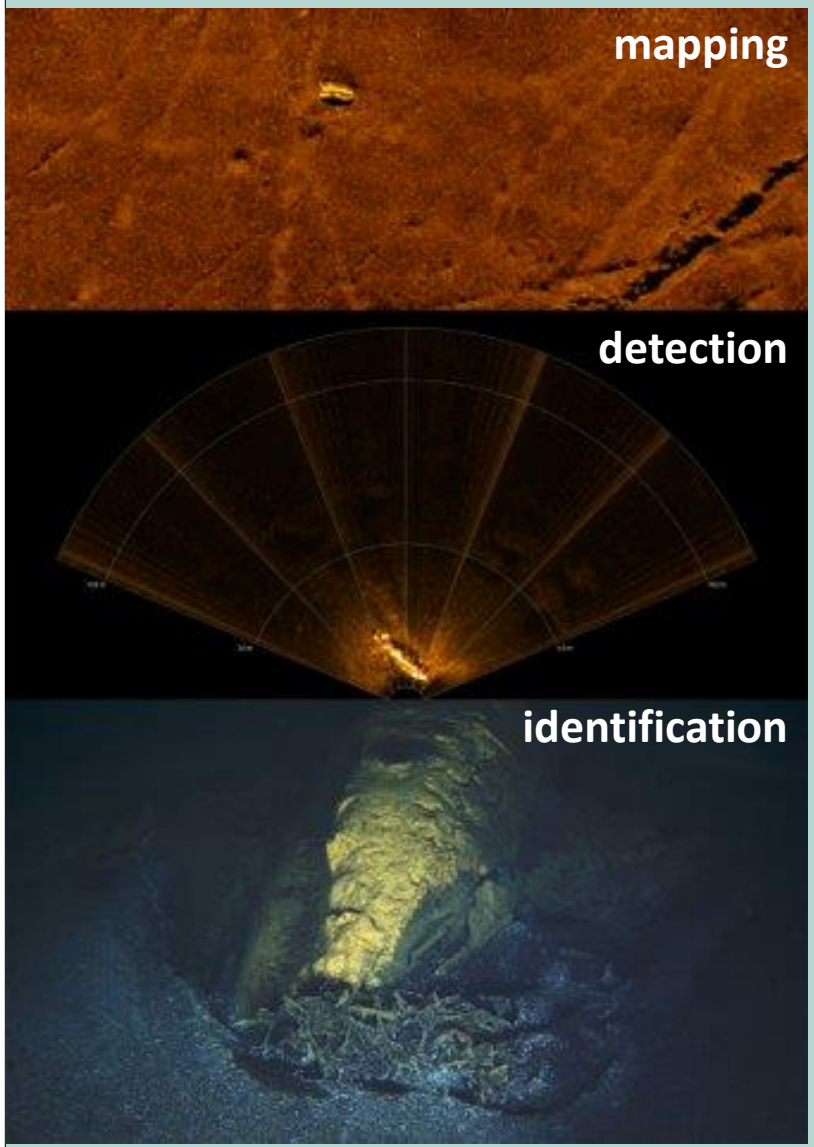
ONGOING PROJECTS

- MarTERA ERA-NET **Enhanced Remote Operated Vehicle interface for munition studies – EROVMUS**; 2021 – 2025; 2.1 M €
- EU Interreg Baltic Sea Region Programme **Baltic Sea Muntions Remediation Roadmap – MUNIMAP** 2024-2027; 3.87 M €
- EU **Mitigation of Risk Due to Submerged Muntions for a Sustainable Development of the Baltic Sea – MUNI-RISK**; 2024 – 2027; 2.48 M €
- HORIZON Research and Innovation Actions **Marine Munition in Europe – Solutions with Economic and Ecological Profits for Efficient Remedtiation – MMinE-SwEEPER**; 2024– 2028; 5.98 M €

UXO AND CWA STUDIES

- **Dumpsites mapping with the AUV (side-scan sonar, magnetometer)**
- **Direct observation of dangerous objects with the ROV (4K videos, photogrammetry, multibeam sonar)**
- **Precise sediment and water sampling with the ROV**
- **Spatial analysis and data management (GIS software)**
- **Databases development (TrueOcean platform, GeoNodes)**
- **Underwater technology development (ROVs, CSSD)**

ACTIONS



ENVIRONMENTAL STUDIES

DECISION

SAFE REMEDIATION