



Orchestra

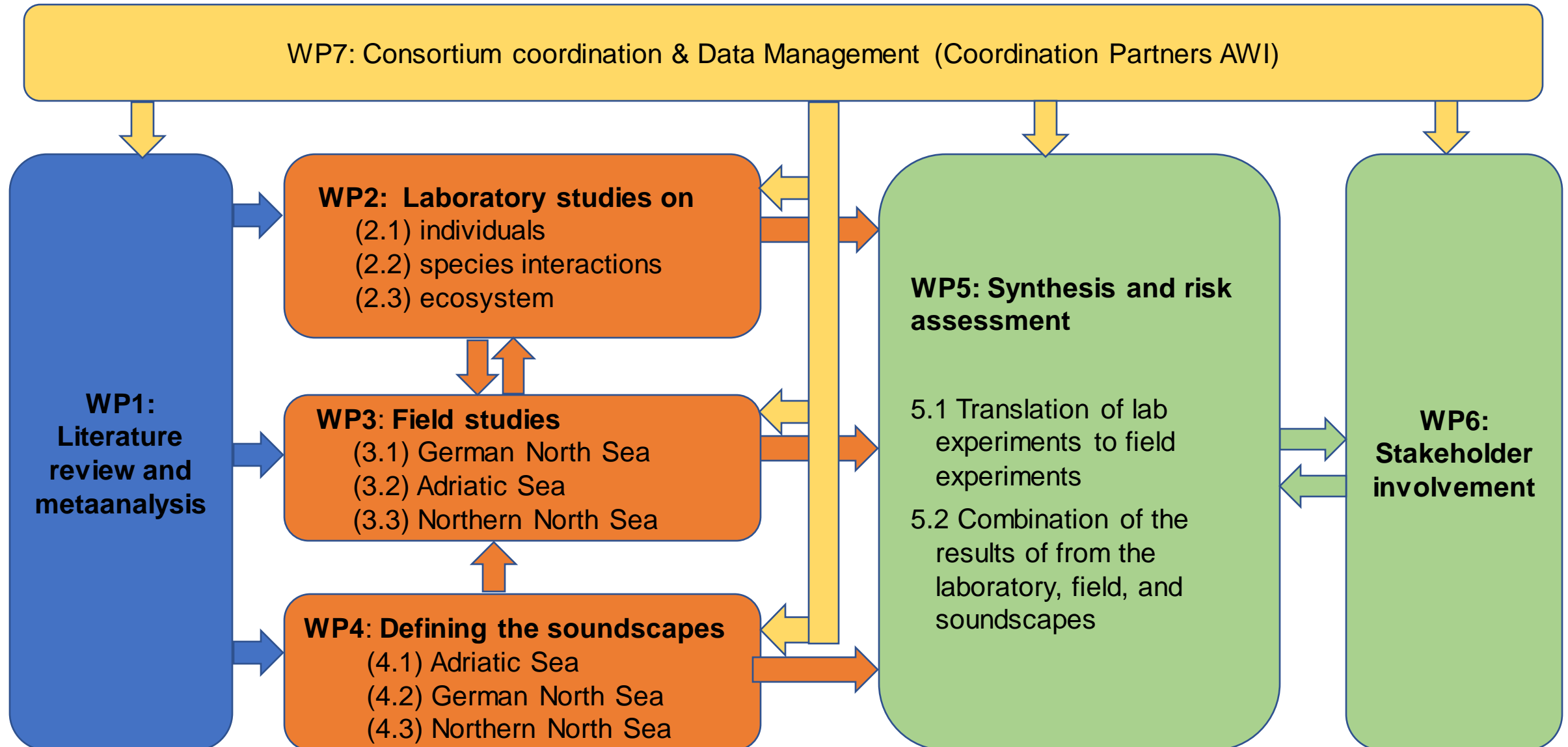
ecOsystem Responses to Constant offsHorE
Sound specTRA

Karen de Jong, Maarten Boersma, Katja
Heubel, Alessandro Bergamasco, Tom Moens

ORCHESTRA PARTNERS

- Alfred-Wegener-Institut, Helmholtz-Zentrum für Polar- und Meeresforschung (AWI)
- Kiel University (CAU), Research and Technology Center West Coast (FTZ)
- Institute of Marine Research (IMR)
- Italian National Research Council (CNR), The Institute of Marine Sciences (ISMAR)
- University of Padova (UNIPD)
- Ghent University (UGENT)

ORCHESTRA: ecOsystem Responses to Constant offshorE Sound specTRA





ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR-
UND MEERESFORSCHUNG



ELSEVIER

Environmental Pollution

Volume 310, 1 October 2022, 119899





Environmental Pollution



Volume 291, 15 December 2021, 118108



Noisy waters can influence young-of-year lobsters' substrate choice and their antipredatory responses ☆

Laura Leiva^a  , Sören Scholz^b, Luis Giménez^{a c}, Maarten Boersma^{a d}, Gabriela Torres^a, Roland Krone^e, Nelly Tremblay^a

Low-frequency noise pollution impairs burrowing activities of marine benthic invertebrates ☆

Sheng V. Wang^{a b}  , Alexa Wrede^{a c d}, Nelly Tremblay^{b e}, Jan Beermann^{a c}

Methods in Ecology and Evolution



Application  Free Access

The noise egg: a cheap and simple device to produce low-frequency underwater noise for laboratory and field experiments

Karen de Jong , Gregor Schulte, Katja U. Heubel



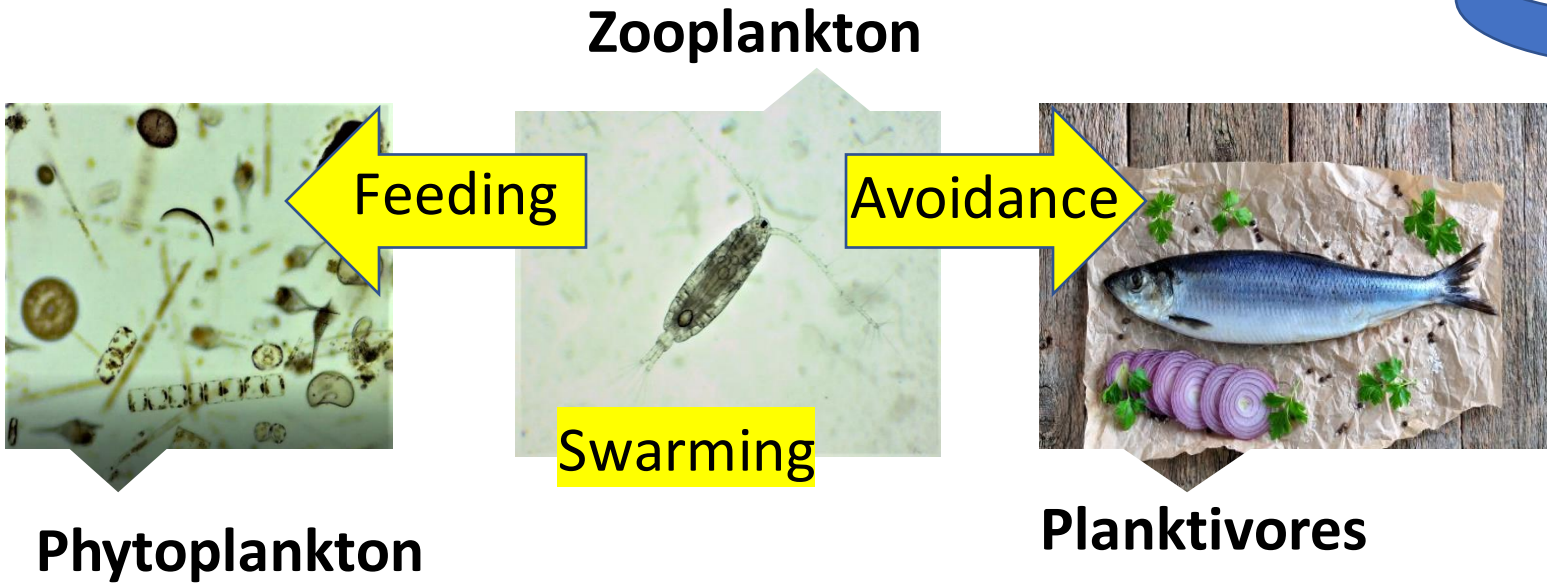
Kiel University (CAU) Research and Technology Center West Coast (FTZ)

Katja Heubel (PI) and Saskia Kühn (Postdoc)



Focus on the effect of continuous underwater noise on zooplankton

Translation into real world



Lab experiments WP2

Field experiments WP3

The field experiments section features a map of Europe with several institutional logos overlaid: the logo of the Institute of Oceanography and Fisheries (IOF), the logo of ANI (Associazione Nazionale Impianti), the logo of the University of Genoa (UNIVERSITÄ GENT), the logo of ISMAR (Istituto di Scienze Marine), and the logo of the University of Trieste.

Stressors:

The stressors section contains four circular icons: a ship on the water, two wind turbines, a red thermometer, and a blue thermometer.

Responses:

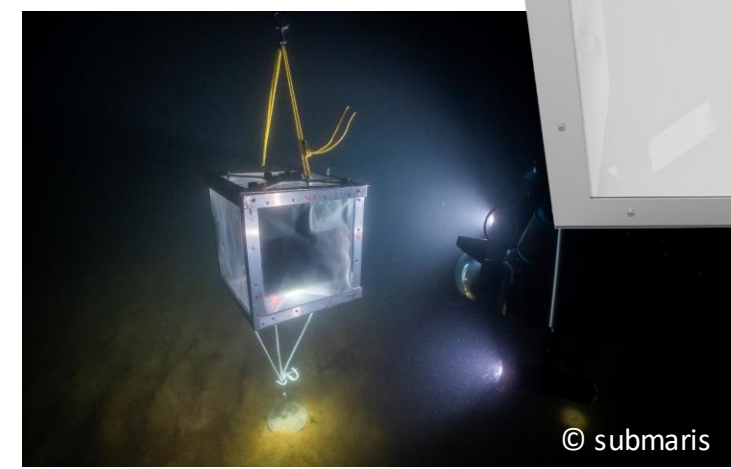
- behavioural
- physiological

Zooplankton Swarming/Feeding/Antipredator behaviour

Laboratory experiments:
Aquaria with plankton wheel

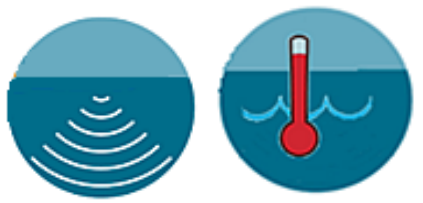


Field experiments:
Zooplankton Cage



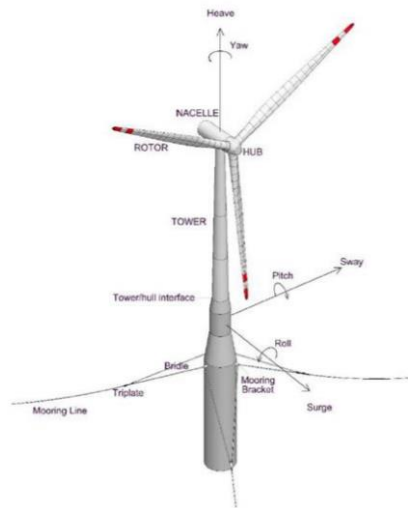
© submaris

Stressors:



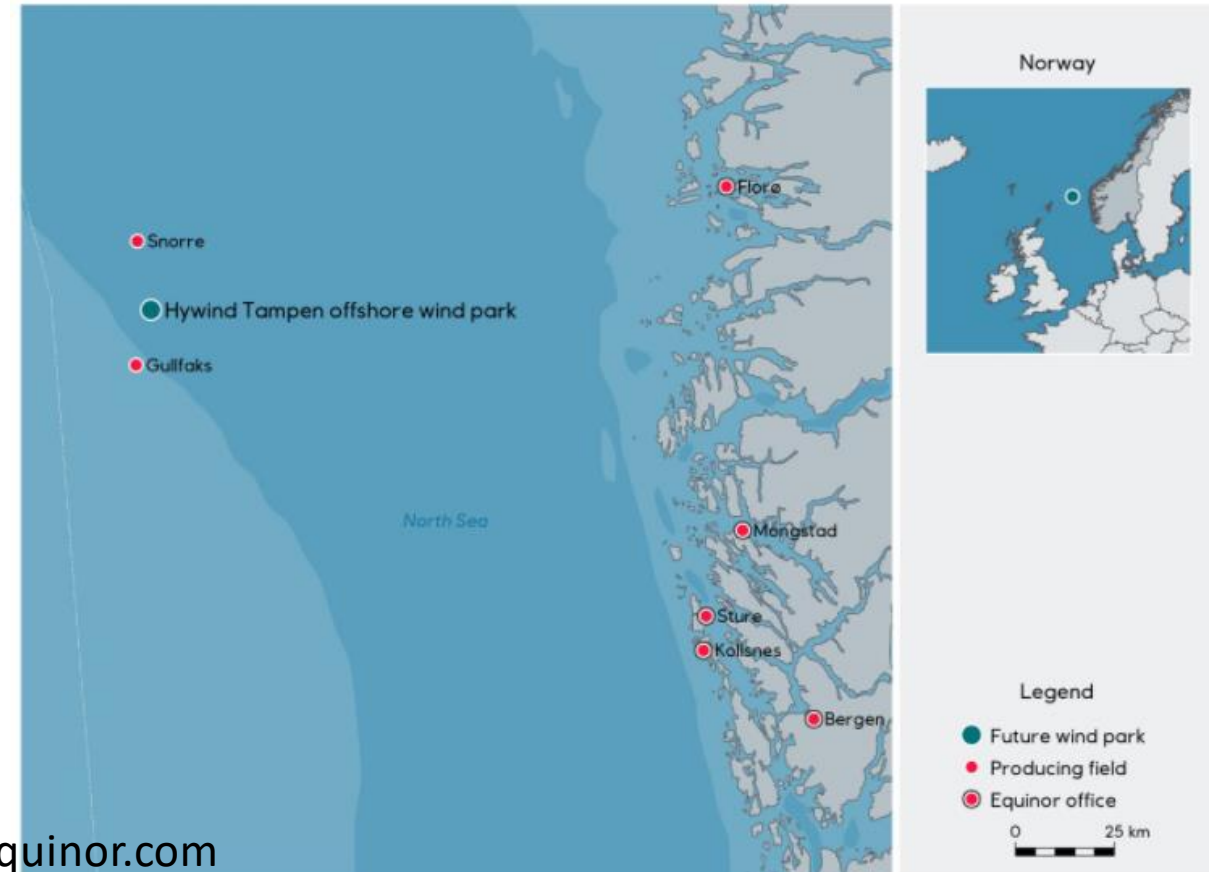
IMR: Hywind Tampen (WindSys)

- The world's first major floating offshore wind farm
- 300m water depth
- Right next to important fishing grounds
- Some before-studies available



Figur 2-4 Illustrasjon av Hywind vindturbin.

Equinor.com

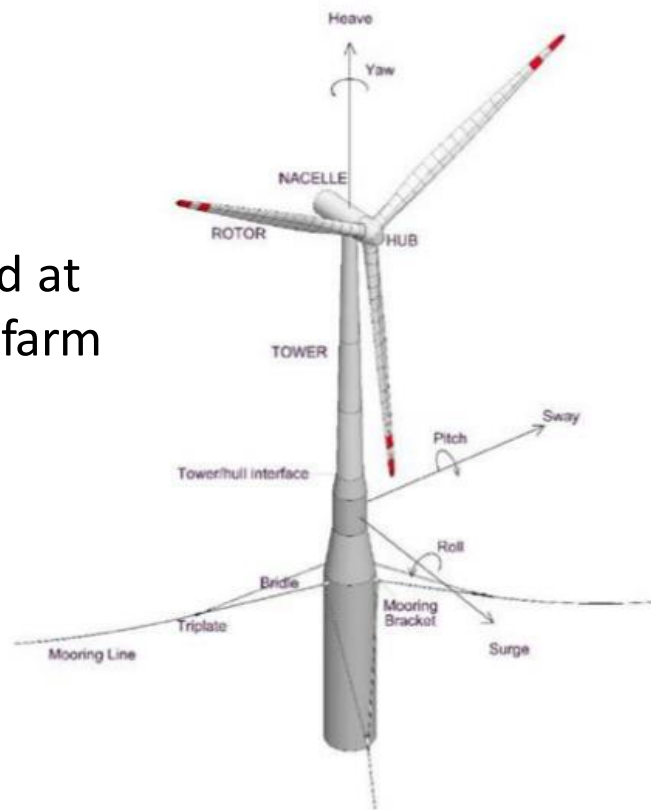
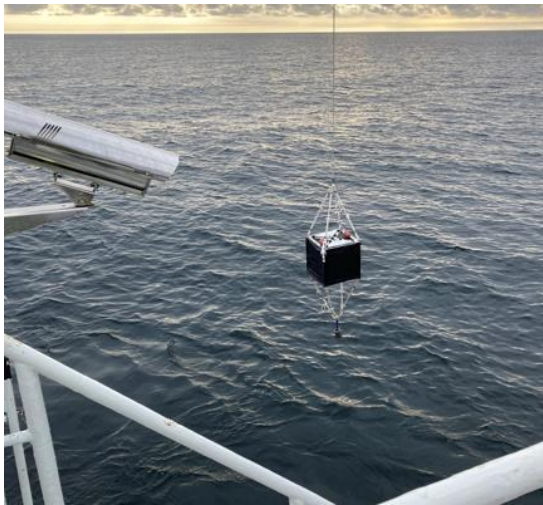


Activities

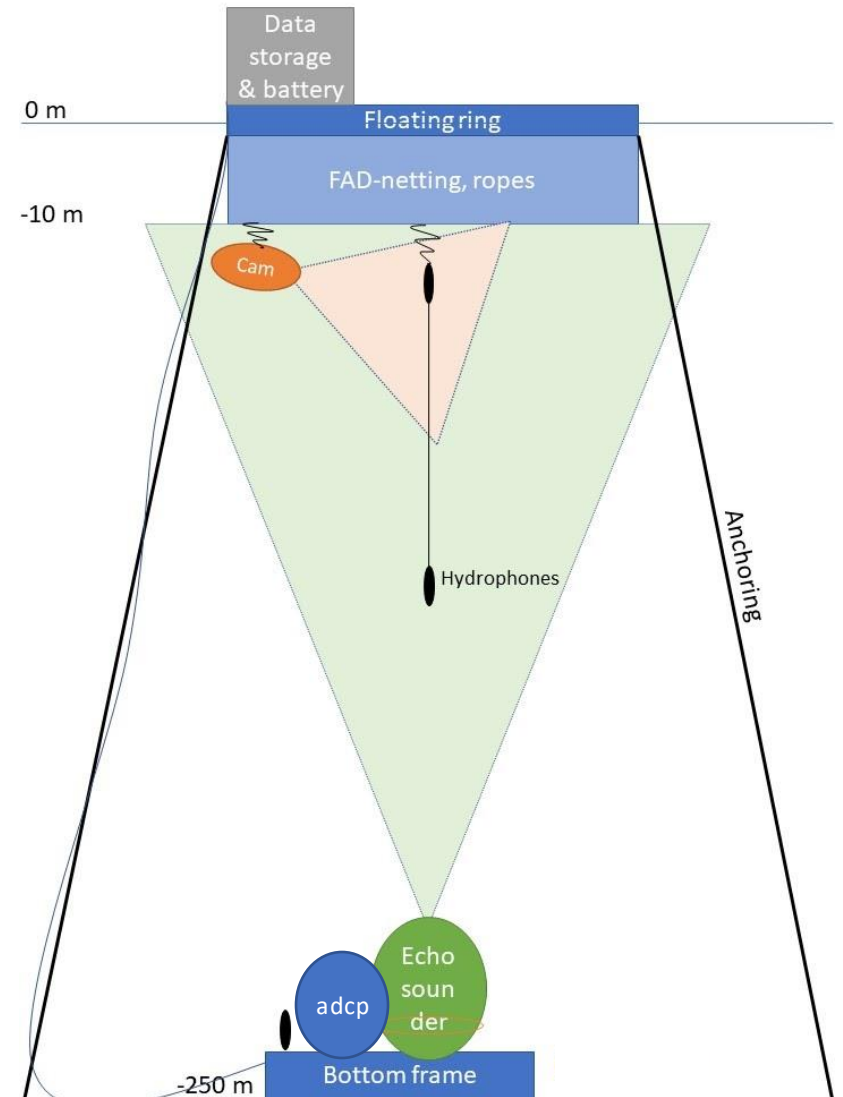
- Stationary observation platform within the wind farm
- Soundscape and current measurements
- Traditional Surveys
- Autonomous surveys

Aim for orchestra

- Repeat lab experiments in the field at different distances from the wind farm



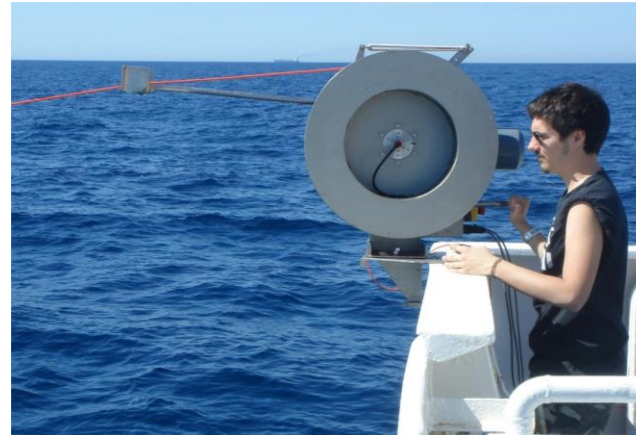
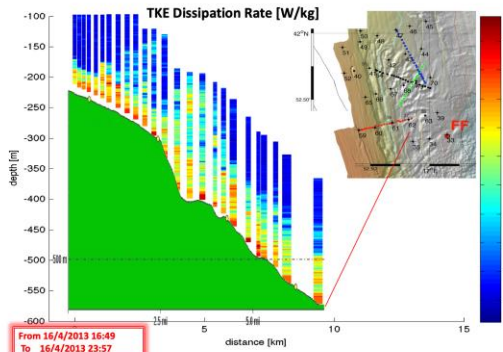
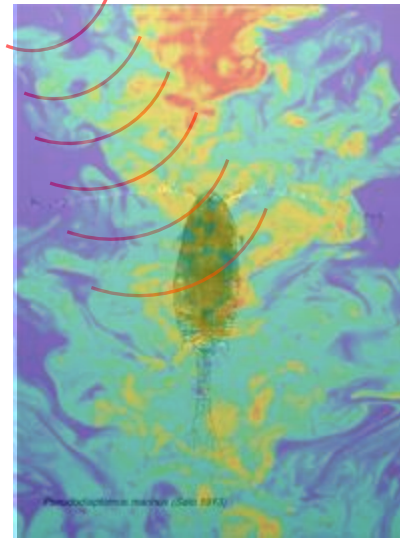
Figur 2-4 Illustrasjon av Hywind vindturbin.





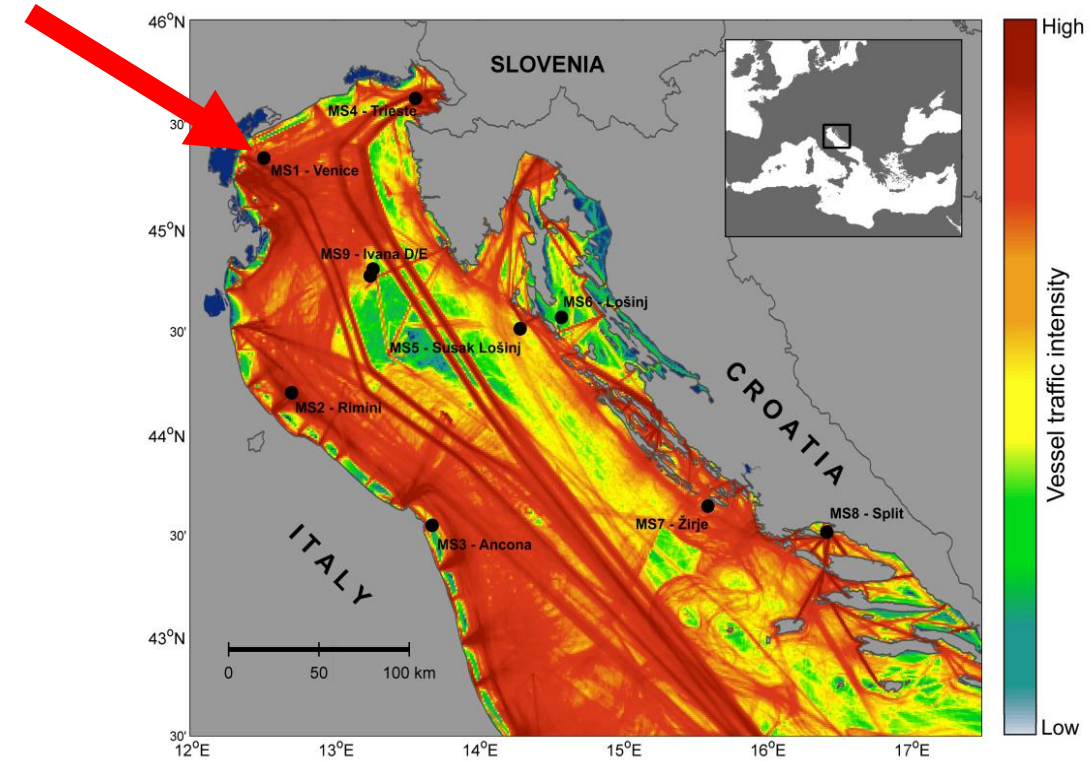
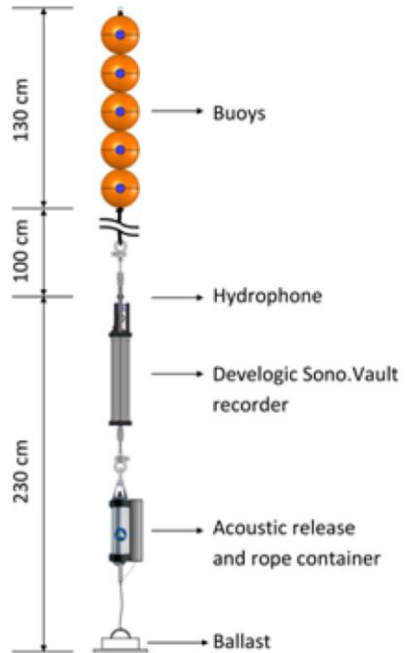
Combined effect on zooplankton behaviour of AUN and turbulence (changes in the vertical small-scale physical structure of the surface mixed layer)

Scaling from lab to sea: Turbulence measurements with MSS90L probe before/during field mesocosm experiments by ORCHESTRA partners





Past/present background AUN records at the CNR's Oceanographic tower "Acqua alta" to assess natural/anthropic causes (e.g. maritime/fishing traffic) in a coastal shallow site (18m depth)



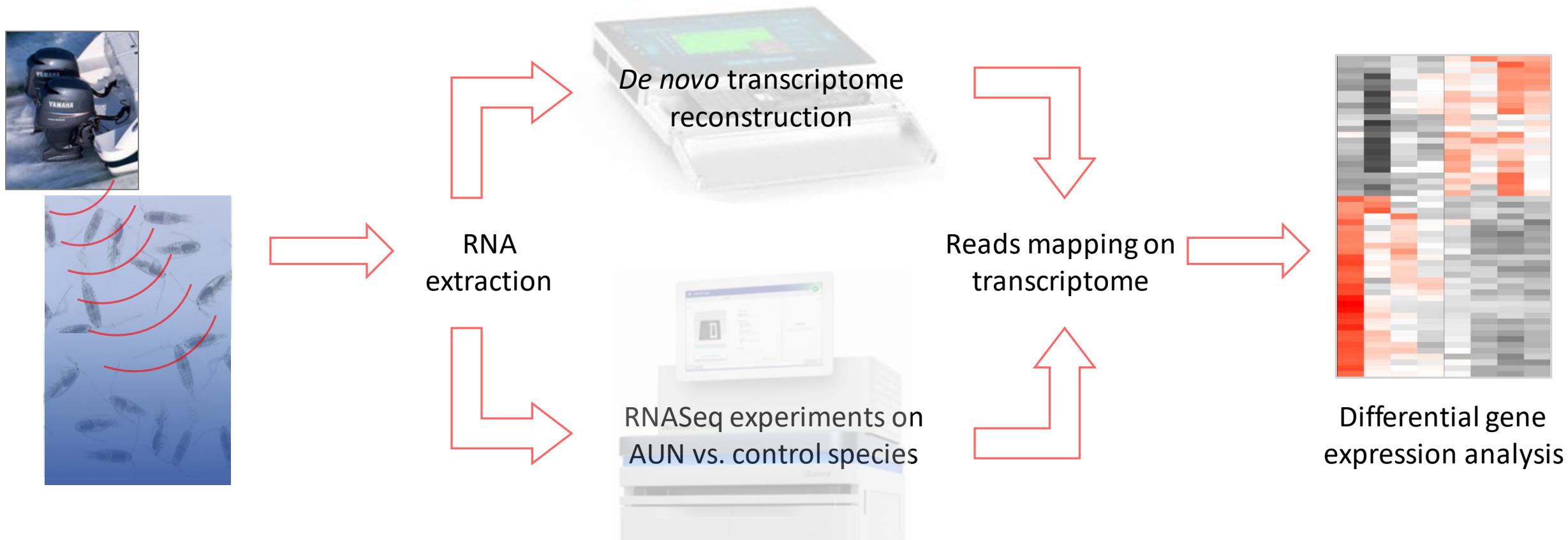
First atlas on underwater noise
12 monthly and 1 annual North Adriatic
Sea maps

QUONOPS-Online Service
(qos.quiet-oceans.com/)

Database and processing tools available

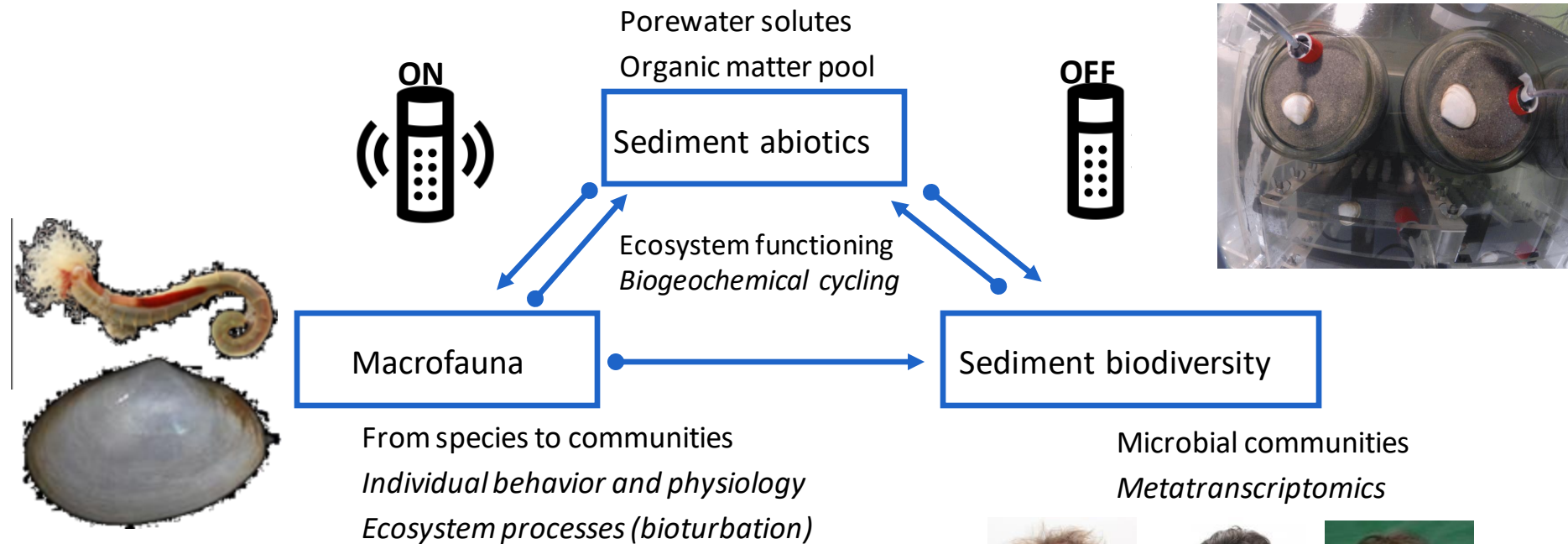


Differential gene expression analysis in *Acartia spp.* exposed to AUN



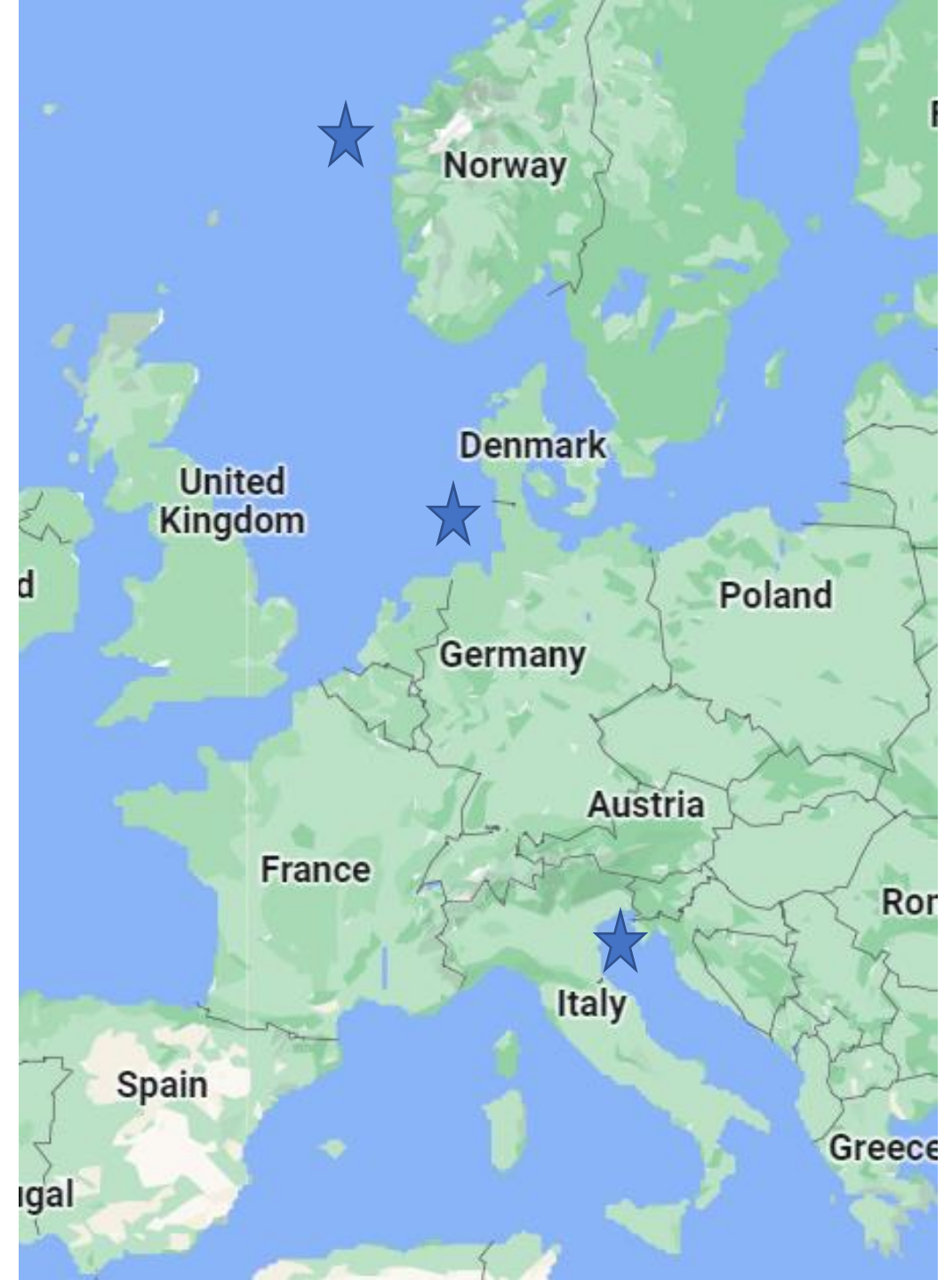
Partner 6

- Understanding AUN effects on benthic ecology: Individual to community
 - *Behavioral and physiological responses of key benthos species*
 - *Investigating knock-on effects on benthos biodiversity and ecosystem functioning*



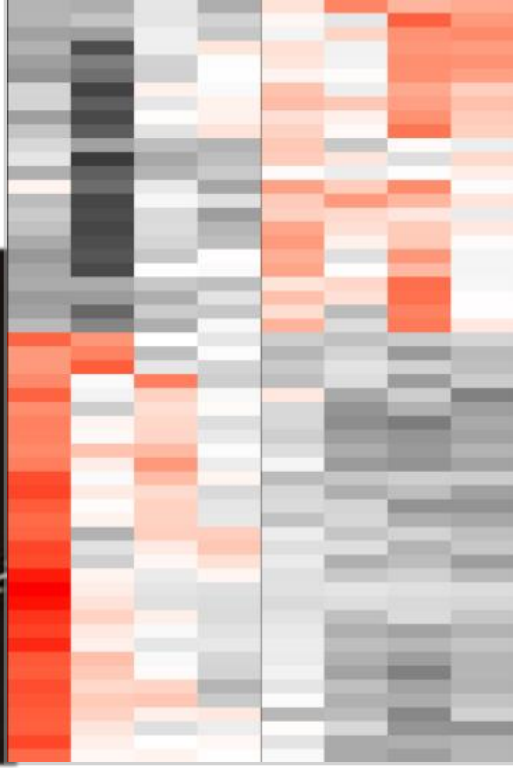
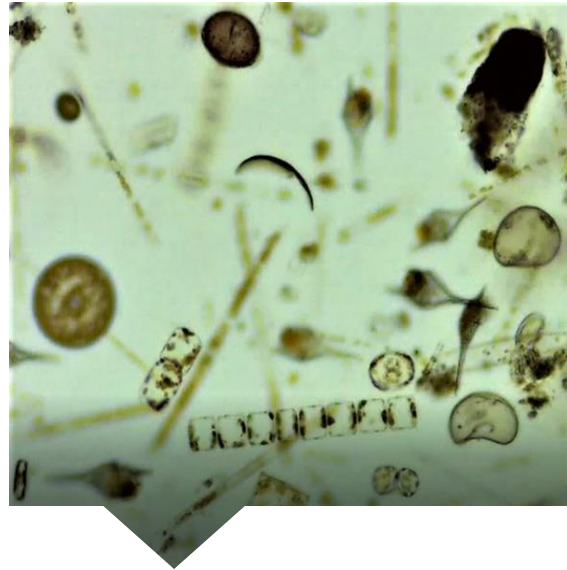
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- Cross-basin approach



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- Ecosystem approach
- From individual to community



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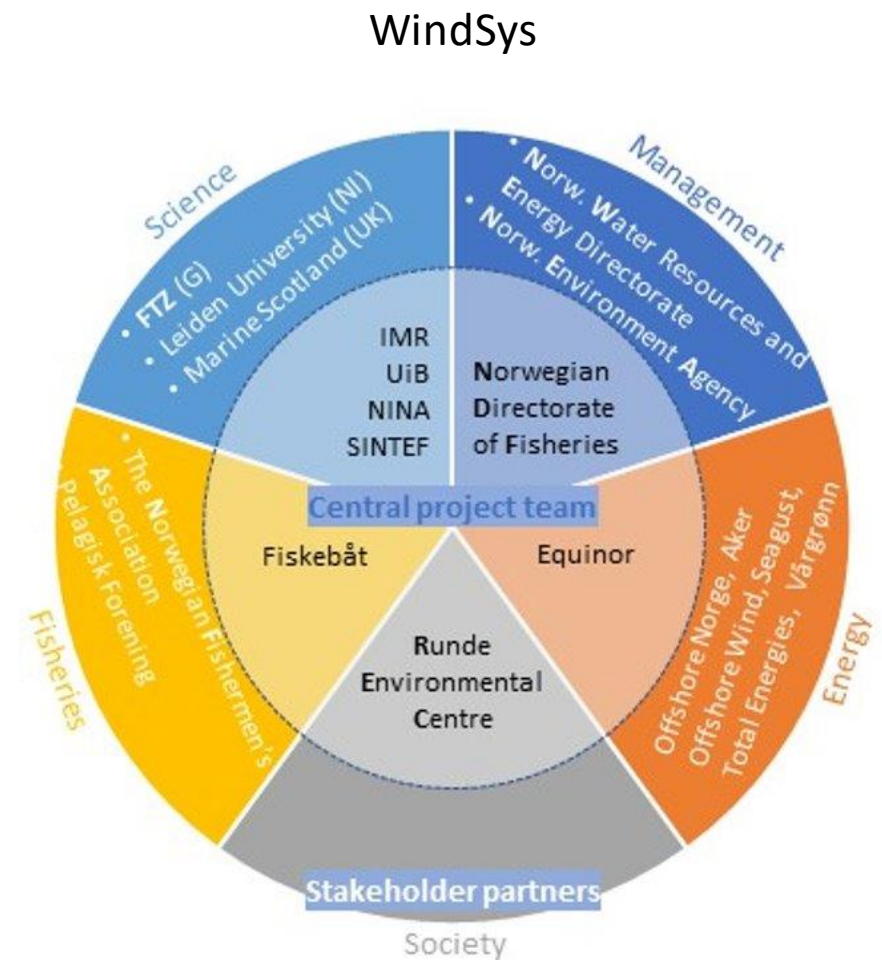
- Multi-stressor approach

Stressors:

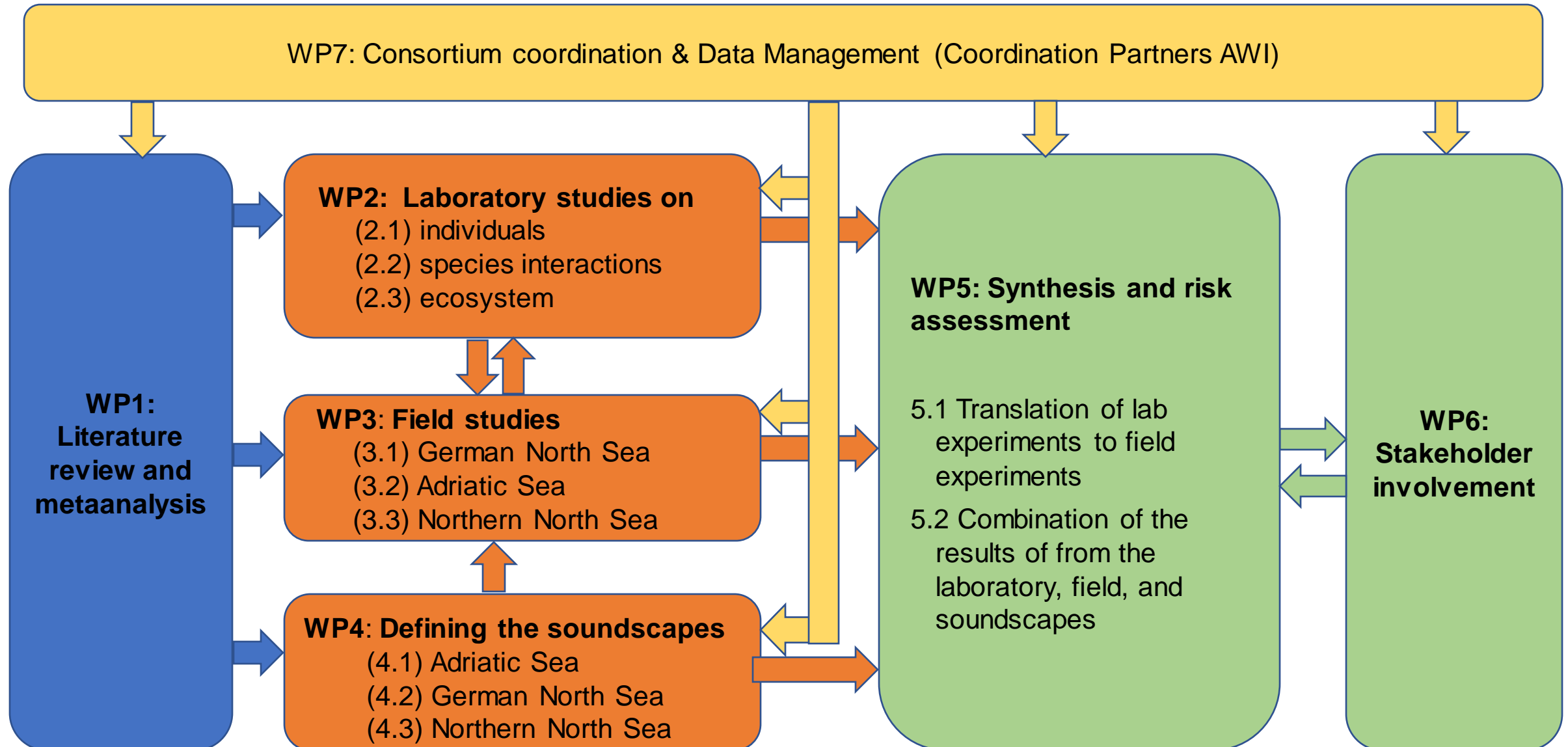


Orchestra

- Stakeholder involvement
- Teaching



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