Orchestra

ecOsystem Responses to Constant offsHorE Sound specTRA

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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)
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WP1: Literature review and metaanalysis

WP2: Laboratory studies on
(2.1) individuals
(2.2) species interactions
(2.3) ecosystem

WP3: Field studies
(3.1) German North Sea
(3.2) Adriatic Sea
(3.3) Northern North Sea

WP4: Defining the soundscapes
(4.1) Adriatic Sea
(4.2) German North Sea
(4.3) Northern North Sea

WP5: Synthesis and risk assessment
5.1 Translation of lab experiments to field experiments
5.2 Combination of the results of from the laboratory, field, and soundscapes

WP6: Stakeholder involvement

WP7: Consortium coordination & Data Management (Coordination Partners AWI)
Noisy waters can influence young-of-year lobsters’ substrate choice and their antipredatory responses

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

Sheng V. Wang, Alexa Wrede, Nelly Tremblay, Jan Beermann

Methods in Ecology and Evolution

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

Phytoplankton

Zooplankton

Planktivores

Feeding

Avoidance

Swarming

Stressors:

Responses:
- behavioural
- physiological

Translation into real world

Lab experiments WP2

Field experiments WP3

Partner 2
Zooplankton Swarming/Feeding/Antipredator behaviour

Laboratory experiments:
Aquaria with plankton wheel

Field experiments:
Zooplankton Cage

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
WindSys

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
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 (gos.quiet-oceans.com/)
Database and processing tools available
Differential gene expression analysis in *Acartia spp.* exposed to AUN

1. RNA extraction
2. De novo transcriptome reconstruction
3. RNASeq experiments on AUN vs. control species
4. Reads mapping on transcriptome
5. Differential gene expression analysis
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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