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– ECHO –
Acoustic pressures related to offshore wind energy on marine mammals & ichtyofauna.

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An integrated approach to improve knowledge in a context of climate change

➢ From controlled laboratory environments to test sites at sea, with the support of numerical modelling,
➢ From underwater acoustics to behavioural studies of fish and marine mammals,
➢ From the anthropogenic underwater noise to ocean warming.

Main objectives

Scientific strategy

➢ Qualifying acoustic environment related to wind turbine activities,
➢ Assessing acoustic sensitivity & the impacts of noise pollution on the behavioural traits and physiological state of ichthyofauna,
➢ Revisiting the impacts observed under variable thermal conditions,
➢ Drawing up maps of noise effects for marine mammals and fish,
➢ Exploring inter-specific co-occurrence to assess indirect effects.

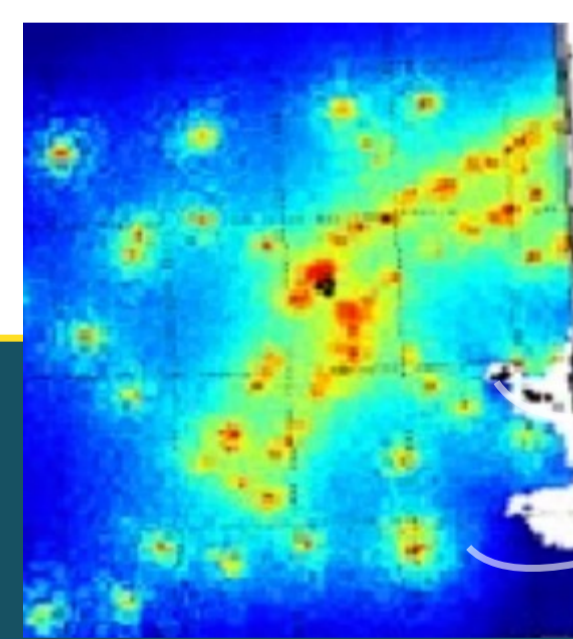**Experimental facilities on the Atlantic and Mediterranean coast**

floating wind turbine

Floatgen © Open C

Characterisation of the underwater acoustic environment

• Ambient noise before, during and after the installation of a wind turbine
• Consideration of different wind regimes

Mapping

Interactions with marine organisms

Marine mammals
From acoustic surveys :

? Behaviour
? Distribution

Correlation level of noise/presence

Fish
Through caging on studied sites :

? Health status
(growth, cell disequilibrium, …)

In laboratory controlled conditions :

? Physiological responses
(metabolism, ability to detect acoustic signals emitted by predators,..)

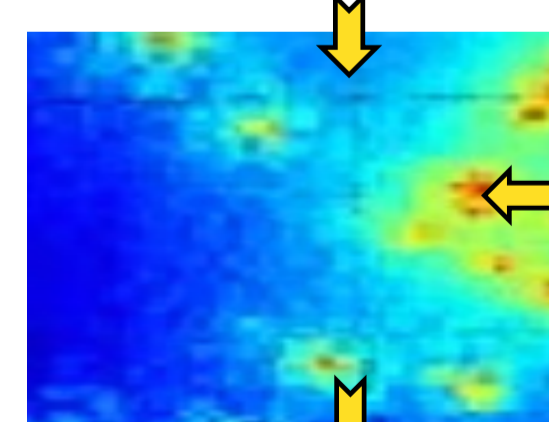**?** Behavioural changes
(avoidance, hyperactivity, immobility,....)

Estimated impact on the 2 fauna compartments considered
With modelling & SIG tools

• Identification of limiting conditions

Noise/fish layer mapping based on identified thresholds

Determination of noise thresholds triggering impacts

• Identifying common favourable habitats

Projection based on IPCC predictions

Interactions with temperature

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Main expected results

➢ Mapping sound effects for [fish] based on experimentally determined sensitivity thresholds,
➢ Assessment of the relevance of sound levels as explanatory variables in [dolphin] distribution models,
➢ Establishing interactions with temperature fratture,
➢ Issuing recommendations for increasingly integrated approaches to better assess wind turbine effects.