

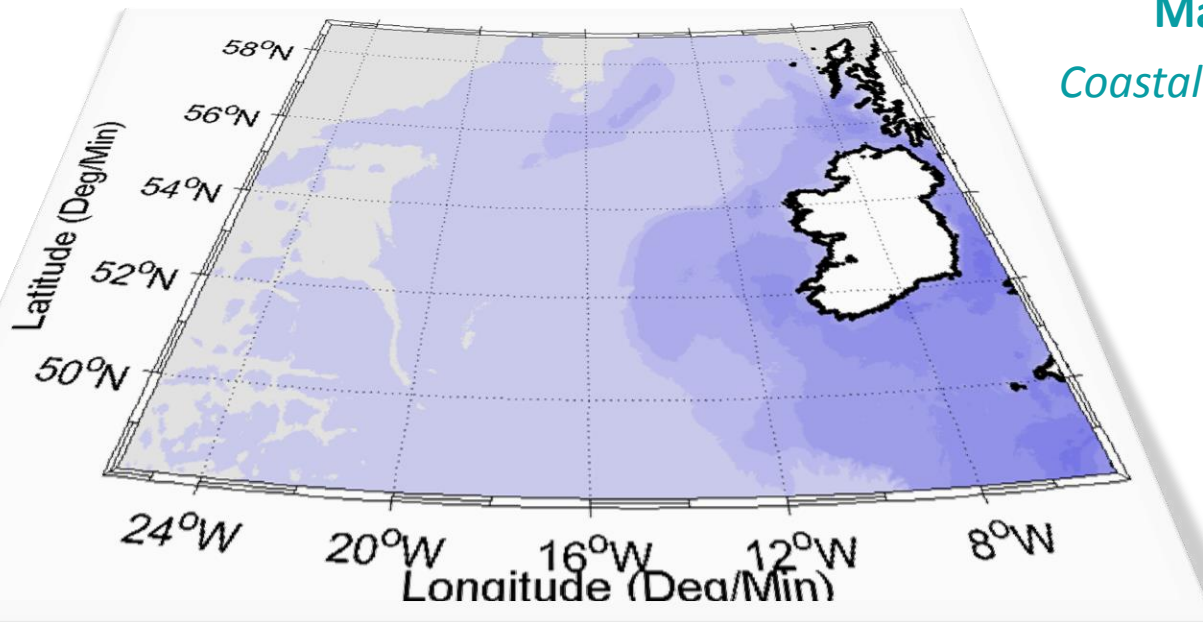
The use of Caparmor to map shipping noise in Irish waters

Thomas Folegot, Dominique Clorennec, Etienne Pardo, Serge Gulton, Lancelot Six

Quiet-Oceans, France

Mark Jessop, Gerry Sutton

Coastal Marine Research Center



Agenda

- ✓ Présentation des activités de Quiet-Oceans
- ✓ Objectifs du projet de recherche
- ✓ Difficultés de la tâche
- ✓ Caparmor: la clef
- ✓ Résultats obtenus
- ✓ Conclusion



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Généralités

- ✓ SAS créée en 2010, basée au Technopole de Brest-Iroise
- ✓ Cabinet d'études d'impacts environnementales et de conseils
- ✓ Prévission, suivi et gestion du bruit sous-marin
- ✓ 7 collaborateurs experts en
 - acoustique océanographique,
 - Modélisation & traitement du signal,
 - intégration sonar,
 - management de campagne de mesure en mer,
 - et (bien sûr!) informatique scientifique.



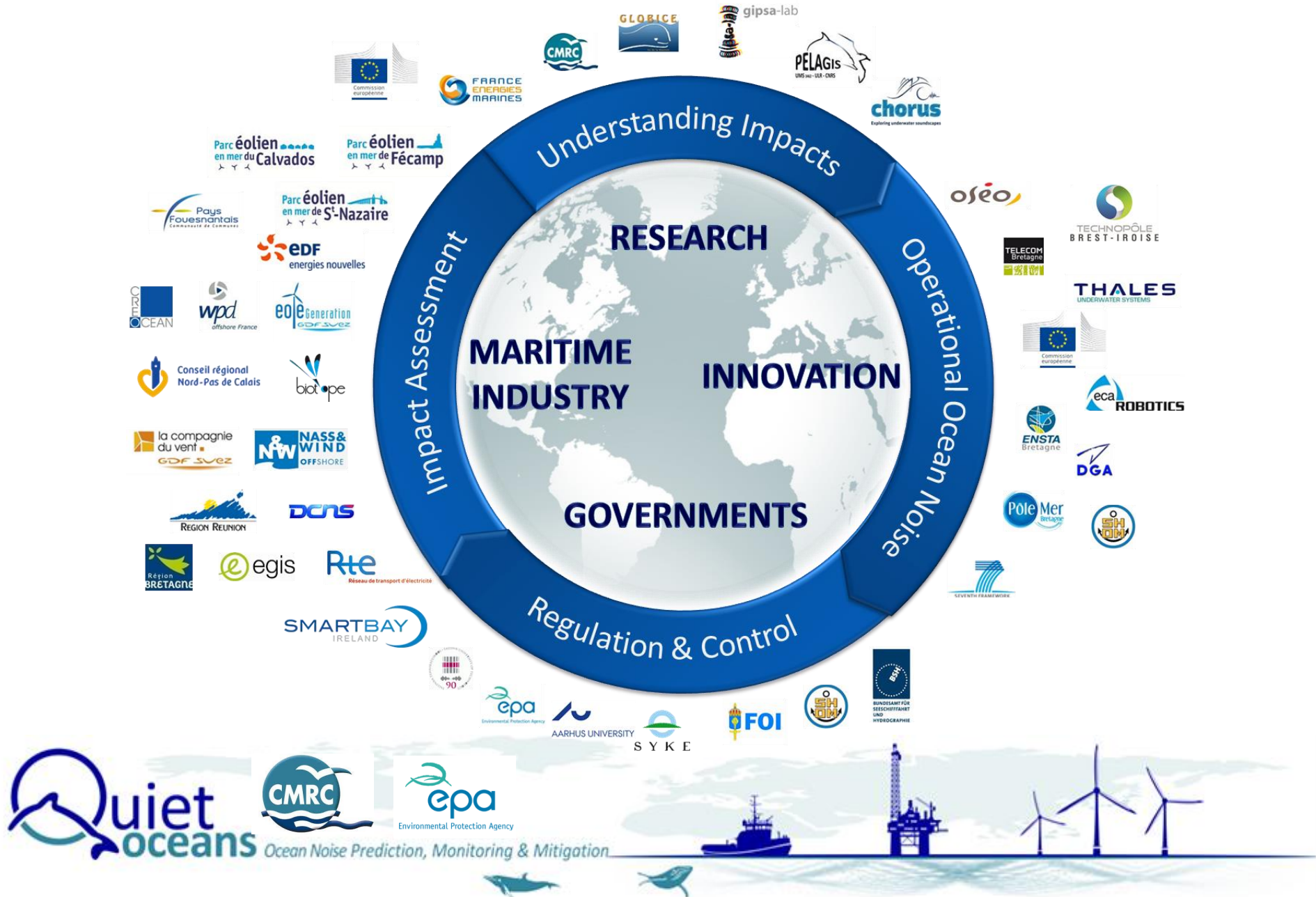
Les missions de Quiet-Oceans



Ocean Noise Prediction, Monitoring & Mitigation



Markets



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Objectives of the research project

- ✓ Produce statistical soundscapes representative of shipping noise
- ✓ Covers the entire EEZ of Ireland
- ✓ Seasonal soundscapes taking into account
 - the variability of the environment
 - the variability of the anthropogenic activities at sea
 - the uncertainties
- ✓ Provide a first assessment of noise in Irish Waters
 - to report to the European Commission
 - to help implementing the Marine Strategy Framework Directive in Ireland
 - to help defining a suitable strategy and recommendation for long term monitoring



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Issues to be addressed

✓ Environmental uncertainties

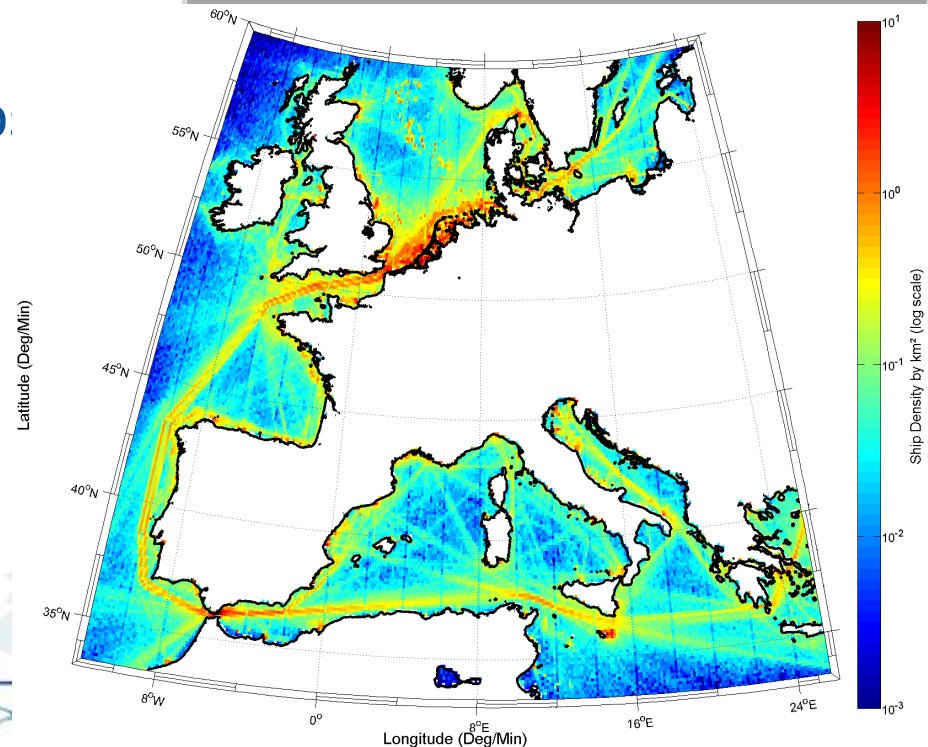
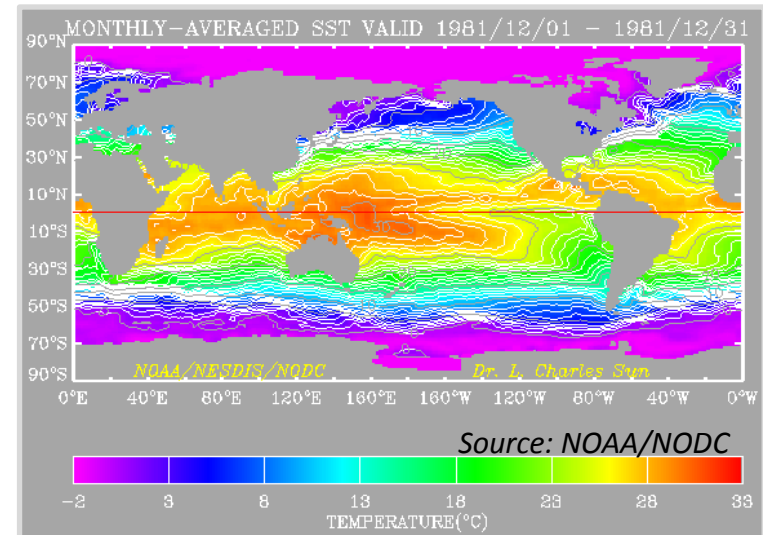
- sediment type
- sound speed profile

✓ Environmental variability

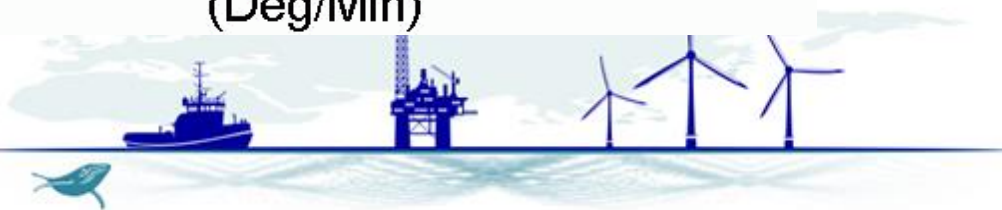
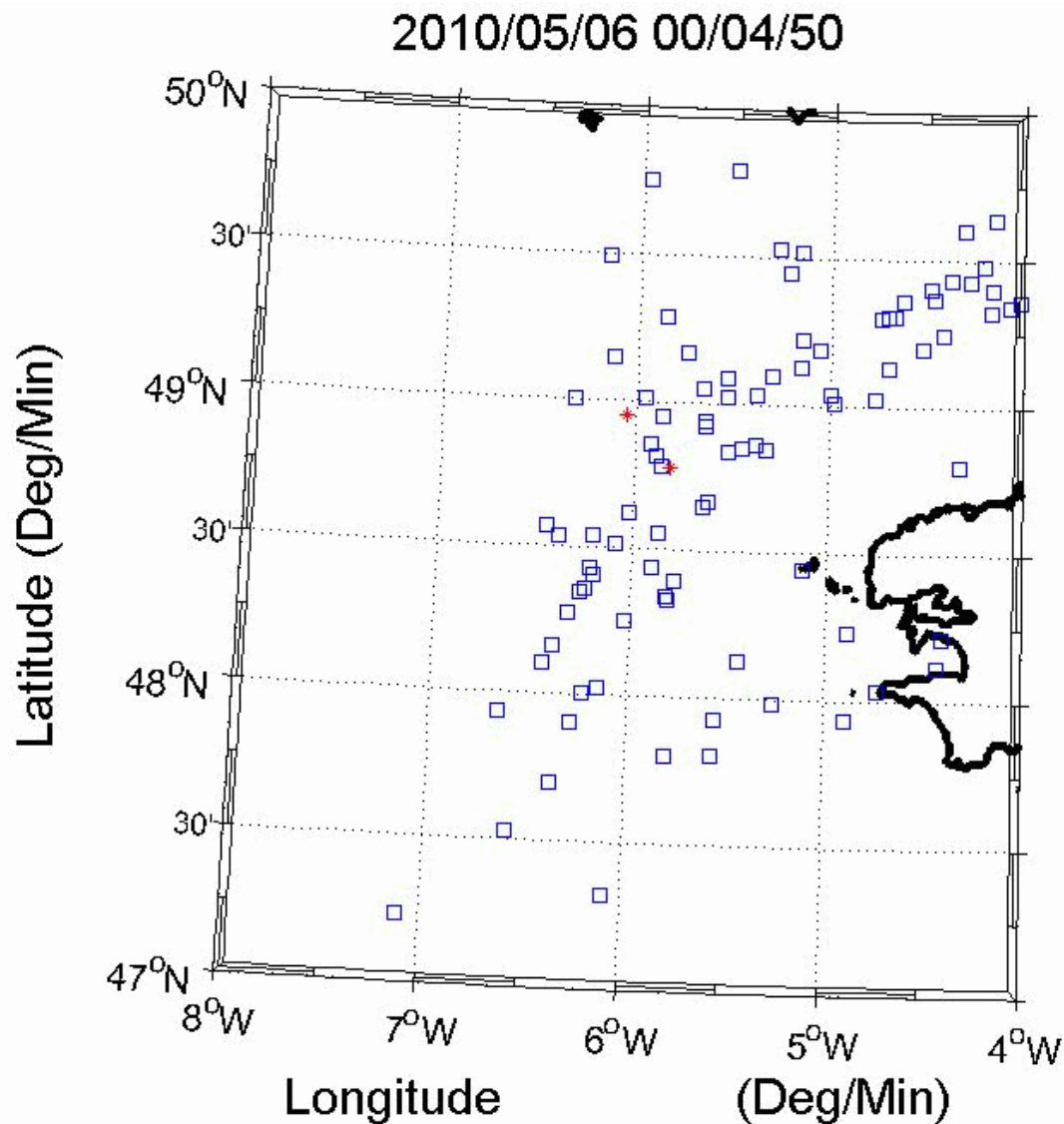
- tides
- sea state
- sound speed profile

✓ Behavioral uncertainties of ship

- unpredictability of distribution
- engine status
- source noise spectrum
- ship design
- cavitation



Space and time dependency

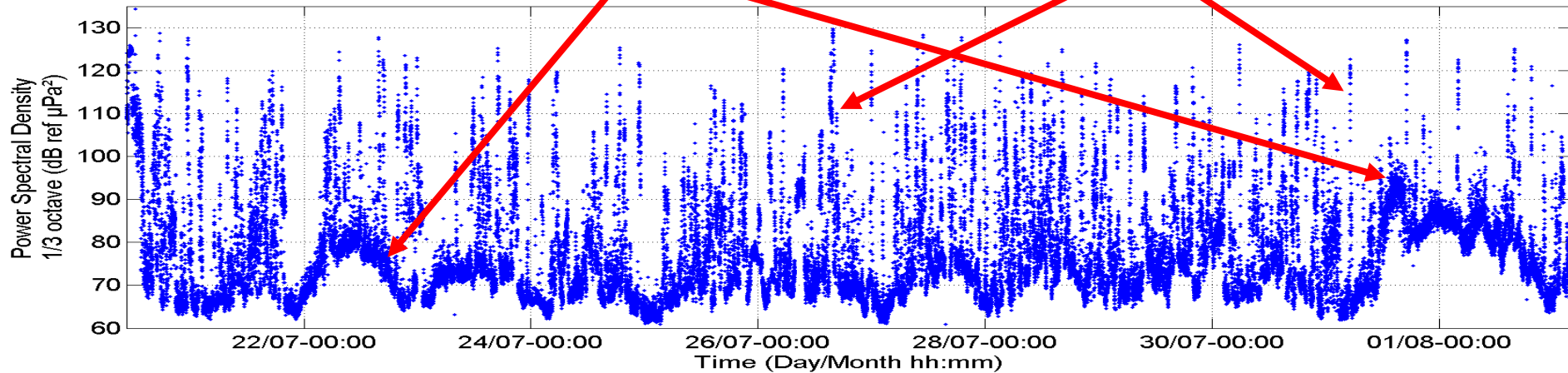


Stochasticity of the noise chorus

Biological noise
Seconds

Wind-wave noise
Hours-Days

High intensity anthropogenic events
30-60min

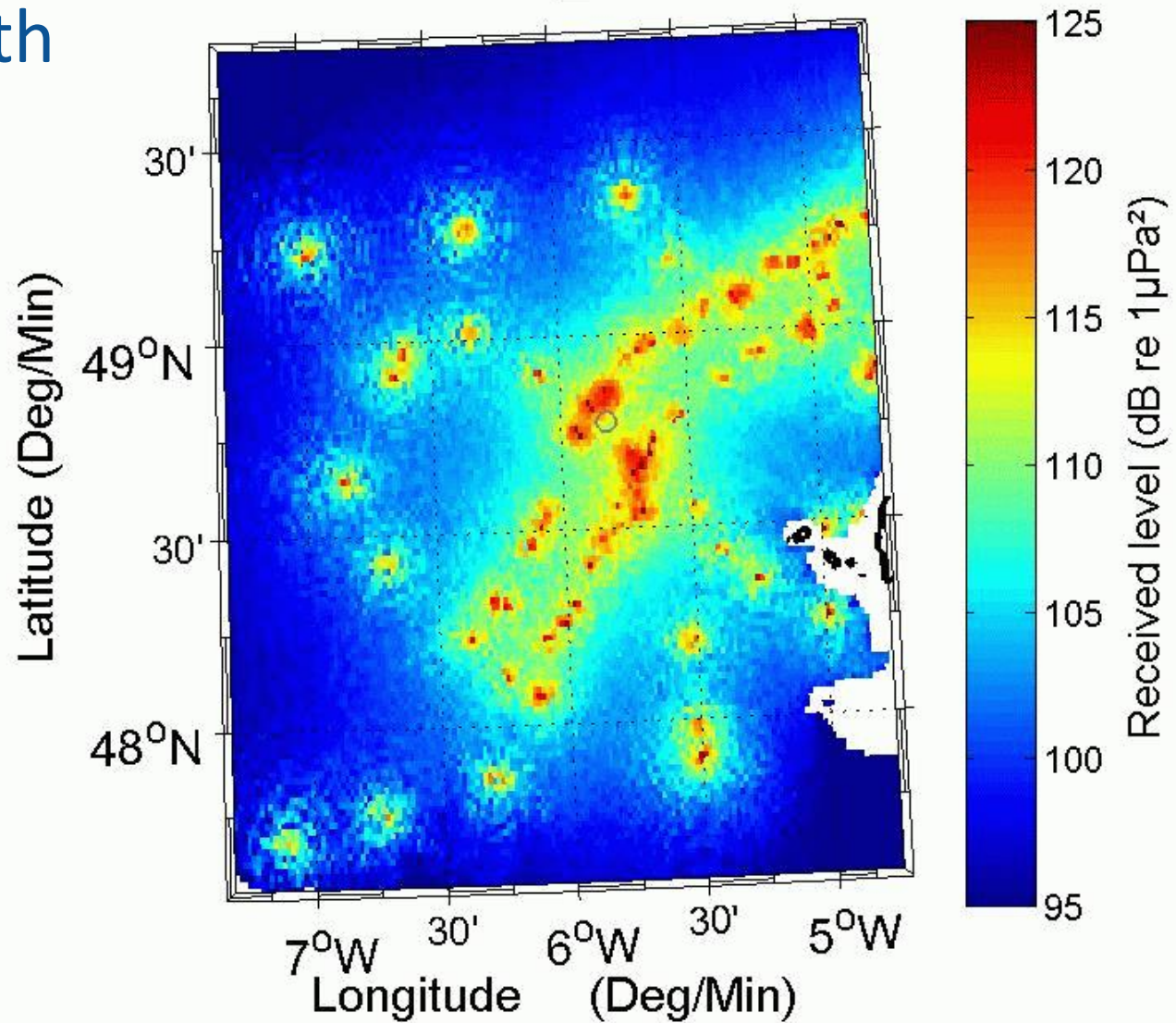


Off Cork Bay, Ireland – 125Hz 1/3 octave band



2010-05-07_06-10-59

@ 55m depth

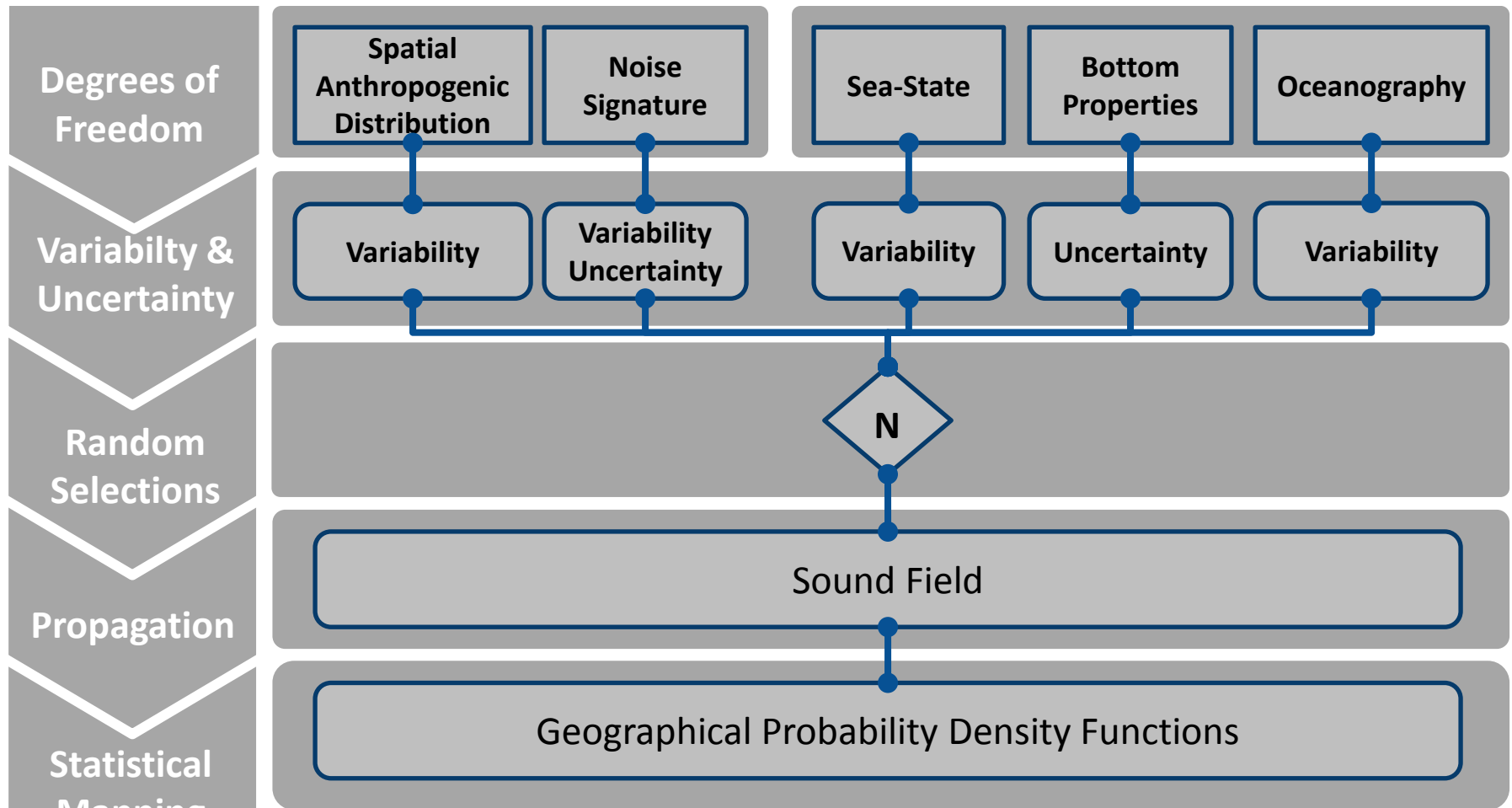


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The Monté-Carlo Approach



The issue & the solution

The area is very large
N is large (~1000)

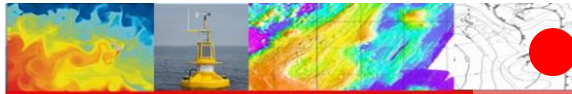
Caparmor was the only
way to tackle the issue



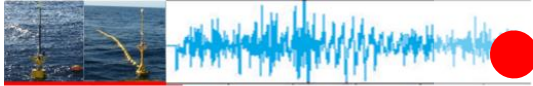
Implementing Quonops® on Caparmor



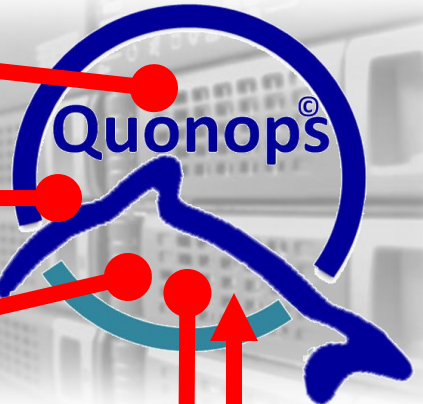
Human Activity Real-Time Data Stream



Environmental Data Stream



In-Situ Acoustic Data Stream



@ Quiet-Oceans

1 Statistical
Noise field

N Contexts



@ Caparmor



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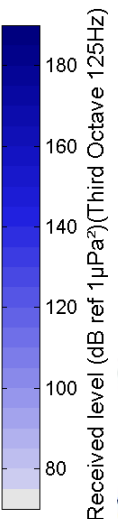
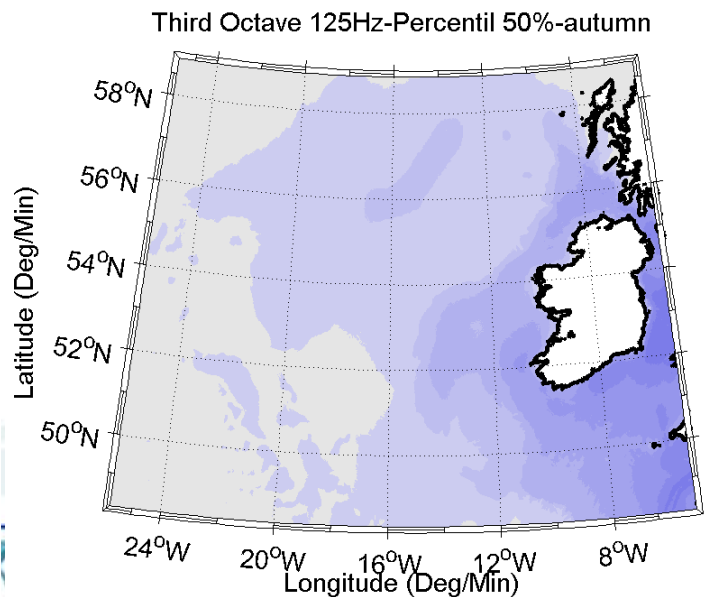
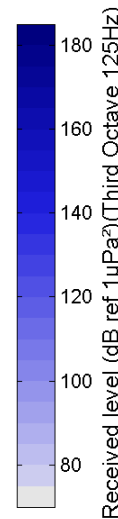
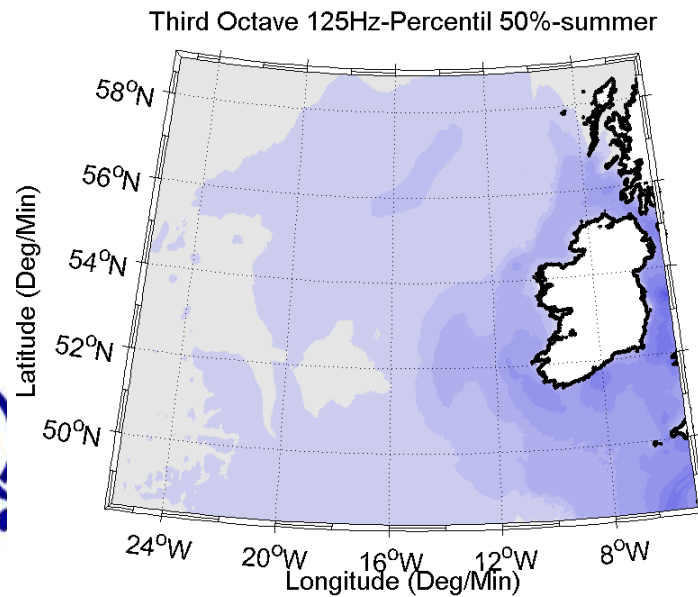
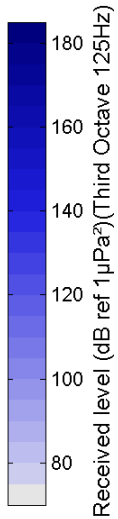
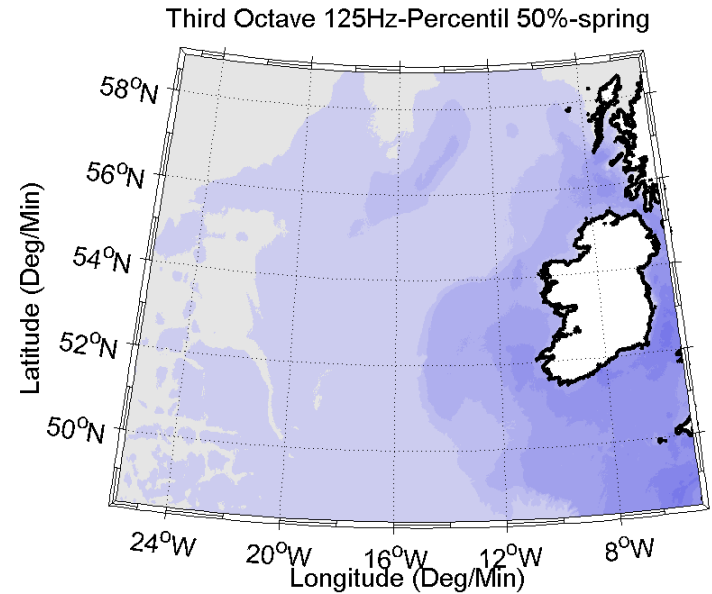
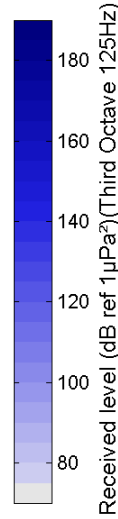
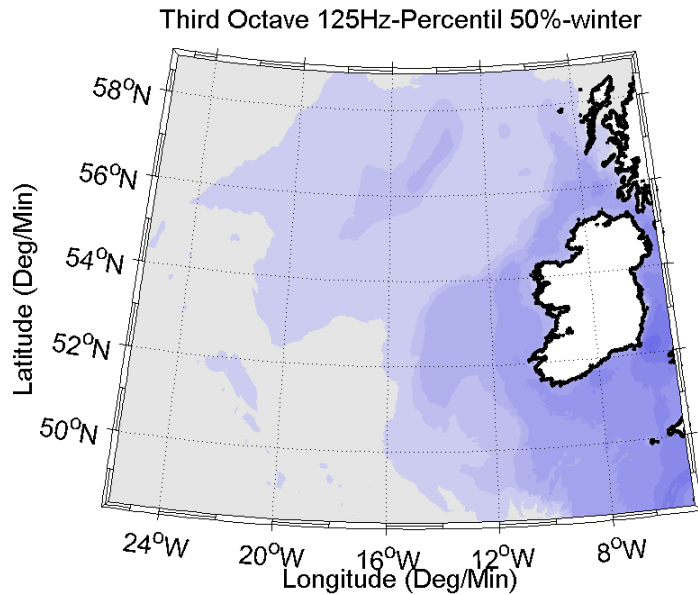


Résultats obtenus

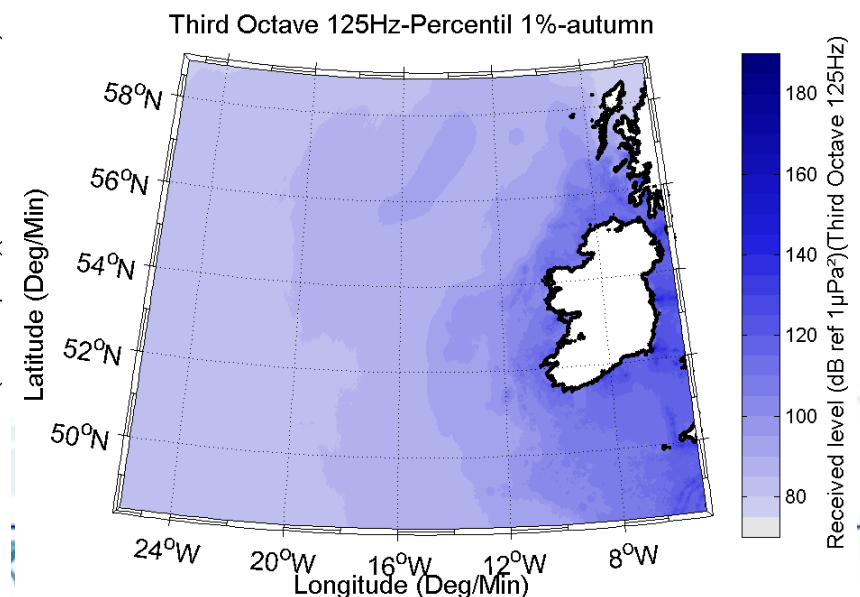
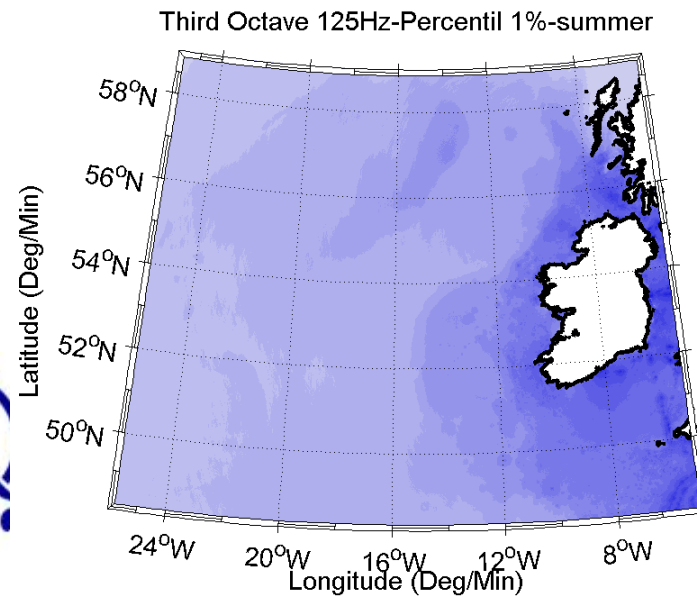
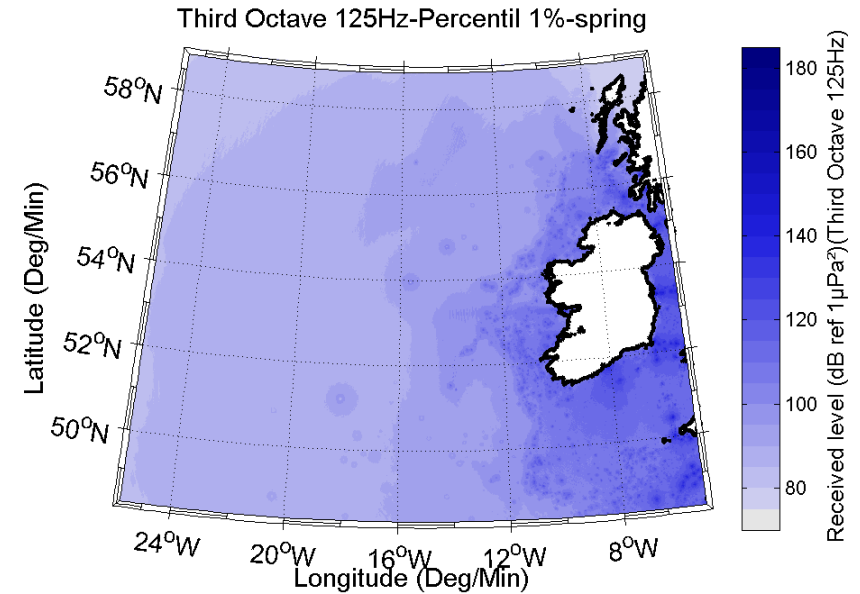
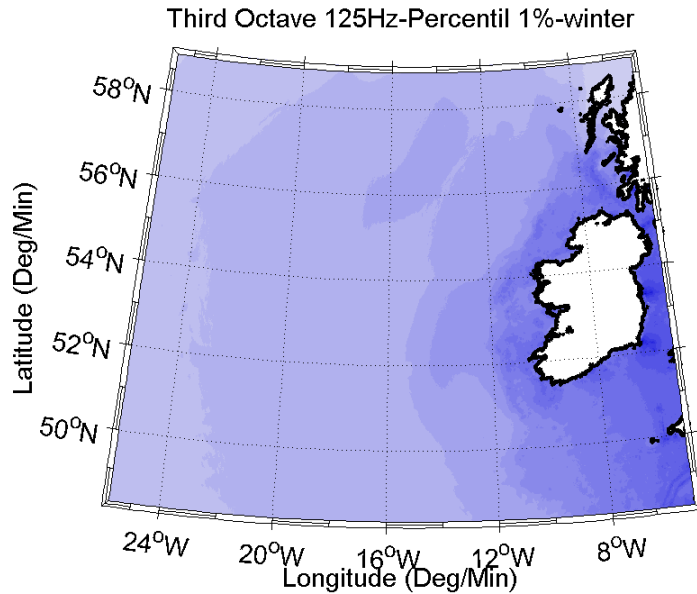
- ✓ Atlas saisonnier de bruit ambiant
- ✓ Représentations statistiques du bruit du trafic maritime
- ✓ Cartes de niveau de bruit minimum pour un niveau de probabilité donné



Noise of shipping noise @50% occurrence (median)



Noise of shipping noise @1% occurrence



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Conclusion

- ✓ Le caractère stochastique du bruit plaide pour une approche type « Monté-Carlo » ;
- ✓ Cette approche engendre un grand nombre de réalisations nécessaires pour obtenir une description statistiquement représentative des activités maritimes et des fluctuations environnementales ;
- ✓ **Caparmor** aura été une clef de succès de ce programme de recherche international coopératif.



Staring

Gerry Sutton as Project manager, *Coastal Marine Research Center*

Thomas Folegot as Chief Scientist, *Quiet-Oceans*

Dominique Clorennec as Team leader & acoustic modeling, *Quiet-Oceans*

Etienne Pardo as Computer science, *Quiet-Oceans*

Lancelot Six as Computer Science, *Quiet-Oceans*

Serge Guelton as Chief Computer Science, *Quiet-Oceans*

Mark Jessop as Geographic Information System, *Coastal Marine Research Center*

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2013





Quiet oceans

*Ocean Noise Forecasting
Monitoring & Mitigation*

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