



# Monitoring and mitigation of noise: Mediterranean situation and Italian new prescriptions.

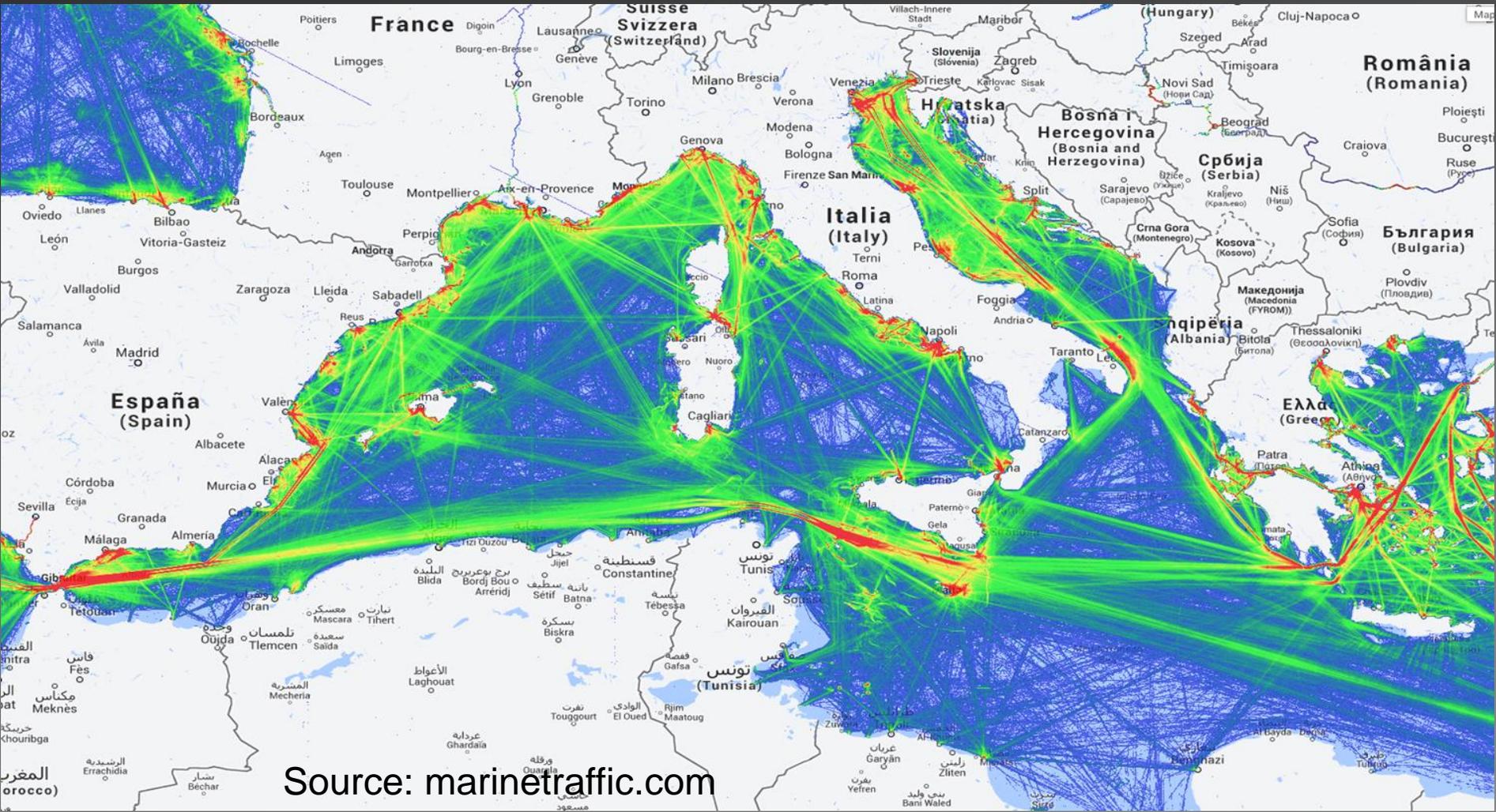
Claudio Fossati & Gianni Pavan  
CIBRA Center for Bioacoustics, Univ. of Pavia, Italy  
[claudio.fossati@unipv.it](mailto:claudio.fossati@unipv.it)

**Joint ECS/ASCOBANS/ACCOBAMS Workshop on  
Conserving Cetaceans in the Seas around Europe through  
Synergy-building between the Relevant Legislative  
Frameworks**

12 March 2016, Auditorium of the "Museu de Electricidade",  
Rua Casa da Luz, nº 2, Funchal, Madeira

*Dept. of Earth and  
Environment  
Sciences  
Pavia, Italy*

*[http://www.unipv.it/  
cibra](http://www.unipv.it/cibra)*



Source: [marinetraffic.com](http://marinetraffic.com)



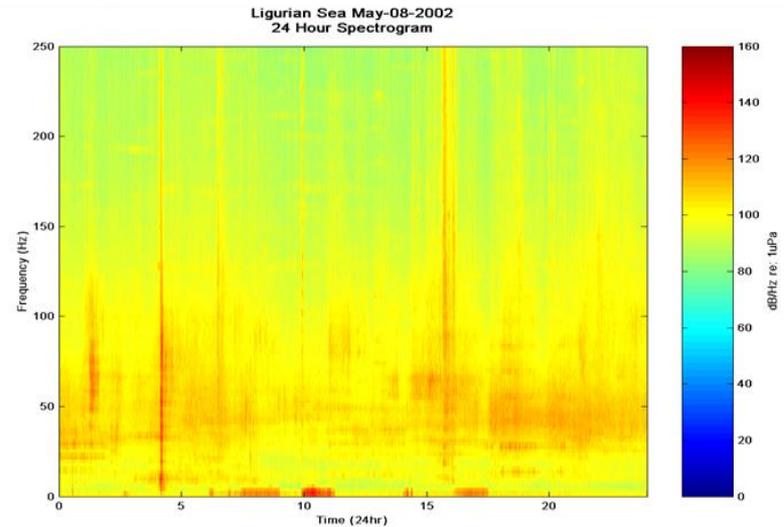
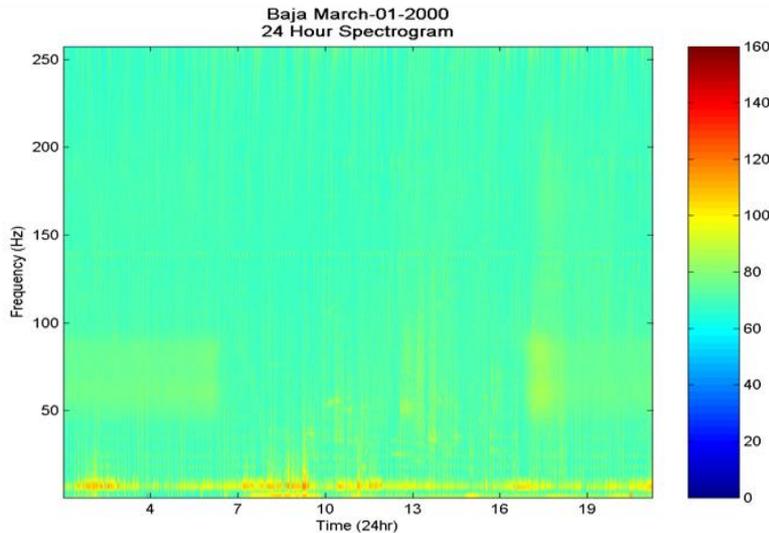
# Diffuse noise

Here the results over 24h:

Quiet ... ..... Noisy +40-50 dB

Cortez Sea, Mexico

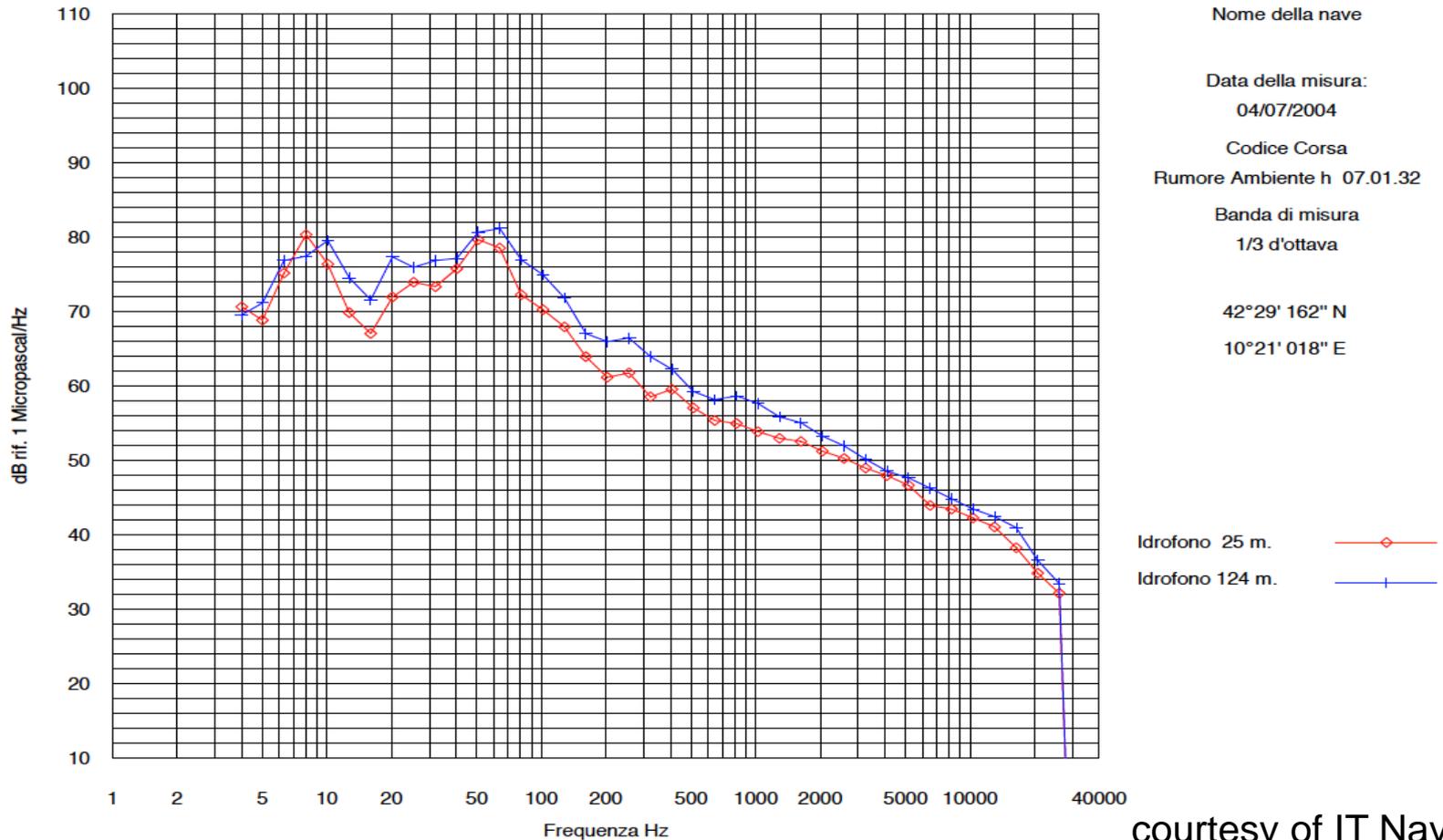
Ligurian Sea, Mediterranean Sea



The background noise may have an impact on the animals' welfare and limit their communication range (masking).



# Background noise in a quiet location/period in the Tyrrhenian Sea



courtesy of IT Navy



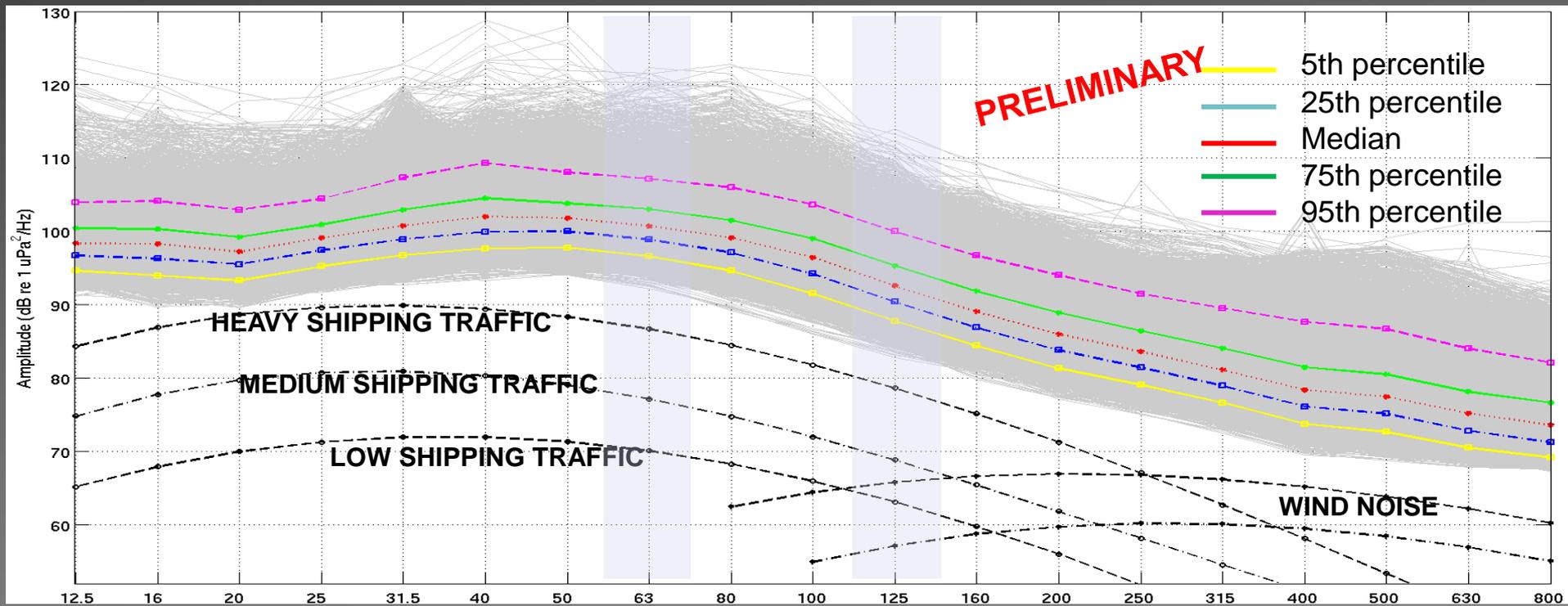
# Background Noise 25 km off the Gulf of Catania



Measures compared with the Wenz curves related to traffic noise.

(Knudsen et al., 1948; Wenz, 1962; Urick, 1983)

EMSO / SMO / Km3Net





# MONITORING

What is the Mediterranean Situation?

No standards yet, but...

## OVERVIEW OF THE NOISE HOTSPOTS IN THE ACCOBAMS AREA

### Part I – Mediterranean Sea

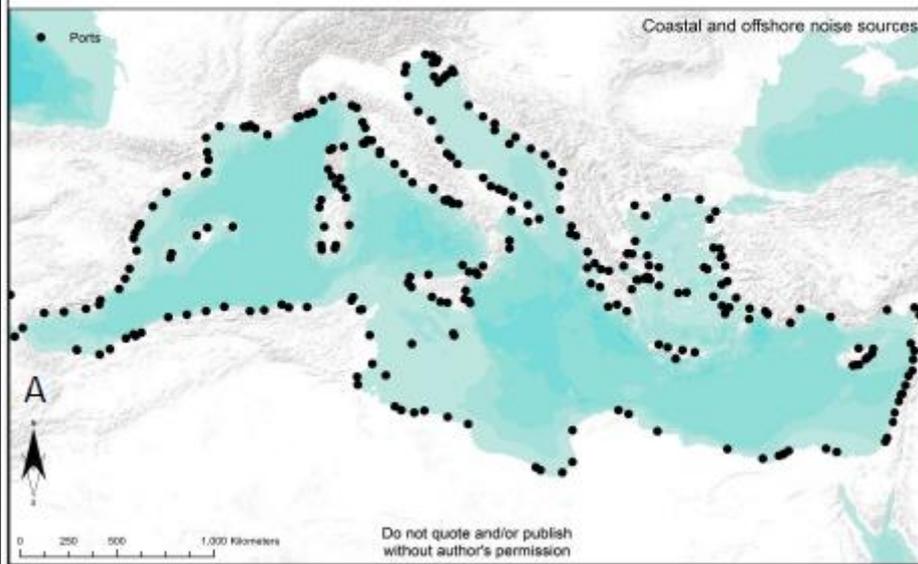
*Authors : Alessio MAGLIO<sup>1</sup>, Gianni PAVAN<sup>2</sup>, Manuel CASTELLOTE<sup>3</sup> Silvia FREY<sup>4</sup>*

*Contributors: Medjber BOUZIDI<sup>1</sup>, Bruno CLARO<sup>4</sup>, Nicolas ENTRUP<sup>4</sup>, Mahmoud FOUAD<sup>5</sup>,  
Fabrice LEROY<sup>1</sup>, Johannes MUELLER<sup>4</sup>*

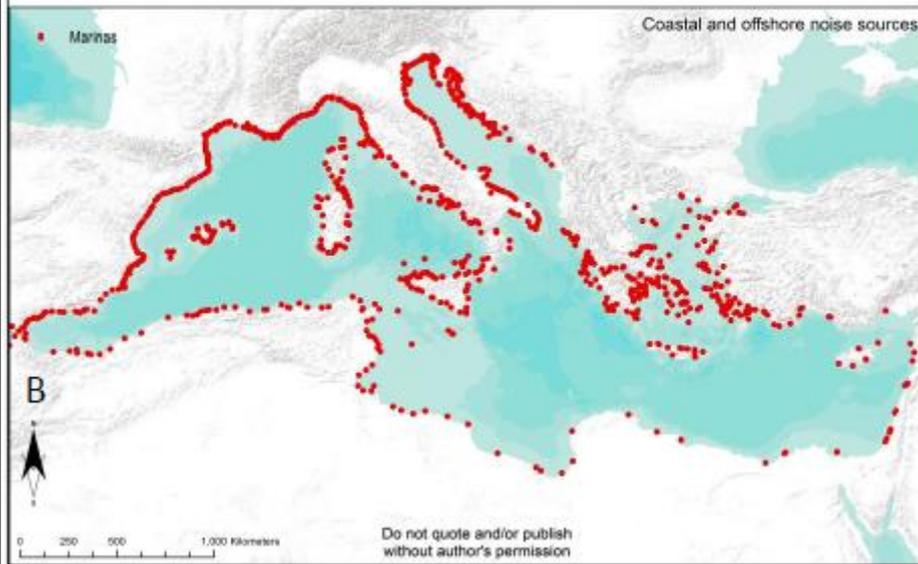
- 1) *SINAY, 117, Cours Caffarelli, 14000, Caen – FRANCE*
- 2) *CIBRA, D.S.T.A., Università di Pavia, Via Taramelli 24 – 27100 Pavia, ITALY*
- 3) *National Marine Mammal Laboratory, Alaska Fisheries Science Center/NOAA, 7600 Sand Point Way N.E. F/AKC3, Seattle, WA 98115-6349*
- 4) *OceanCare, Gerbestrasse 6, P.O. Box 372, CH- 8820 Wädenswil, SWITZERLAND*
- 5) *Marine Ecologist & Nature Conservation Consultant, EGYPT*



### Overview of the noise hotspots in the ACCOBAMS area

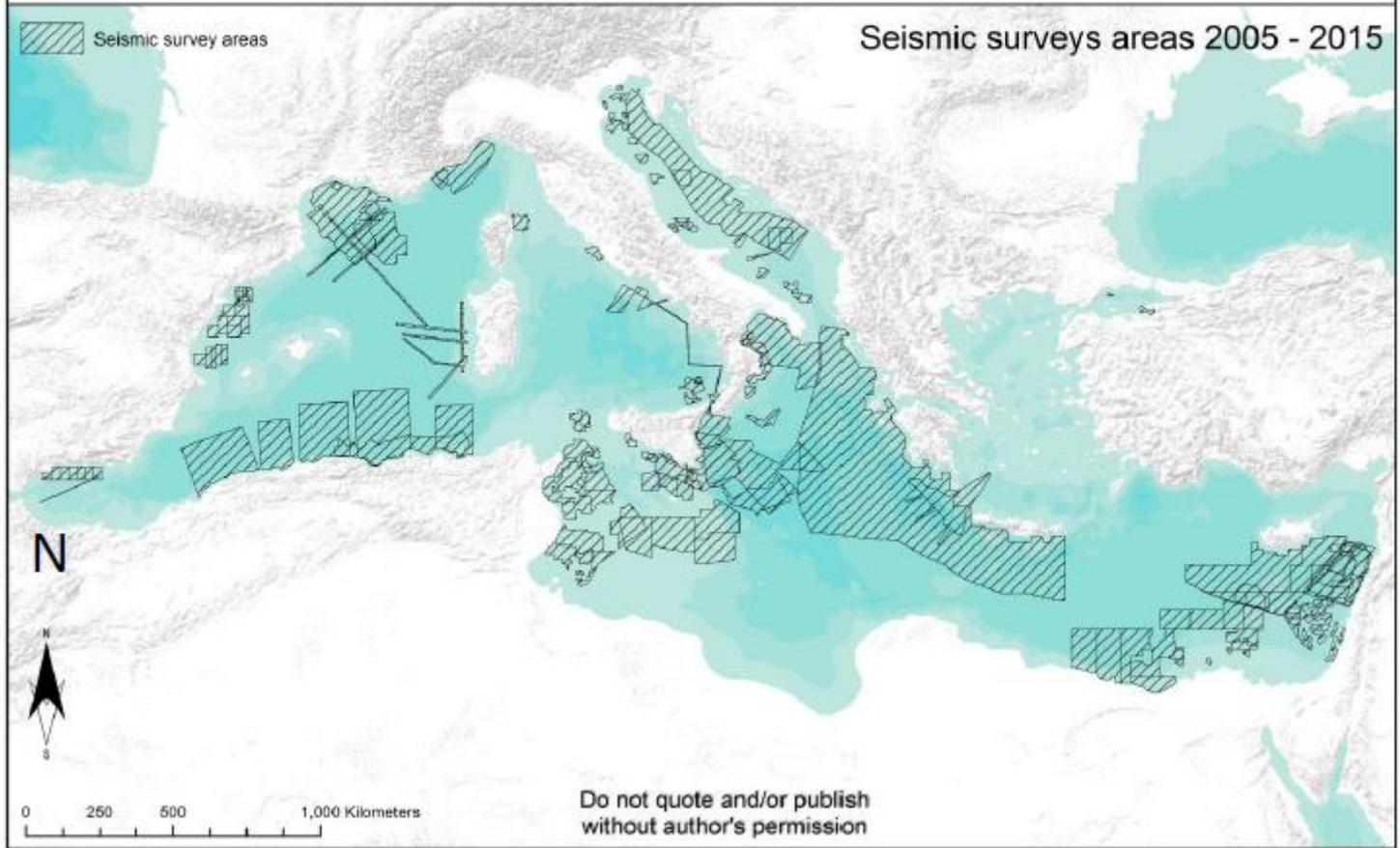


### Overview of the noise hotspots in the ACCOBAMS area





## Overview of the noise hotspots in the ACCOBAMS area





## Overview of the noise hotspots in the ACCOBAMS area

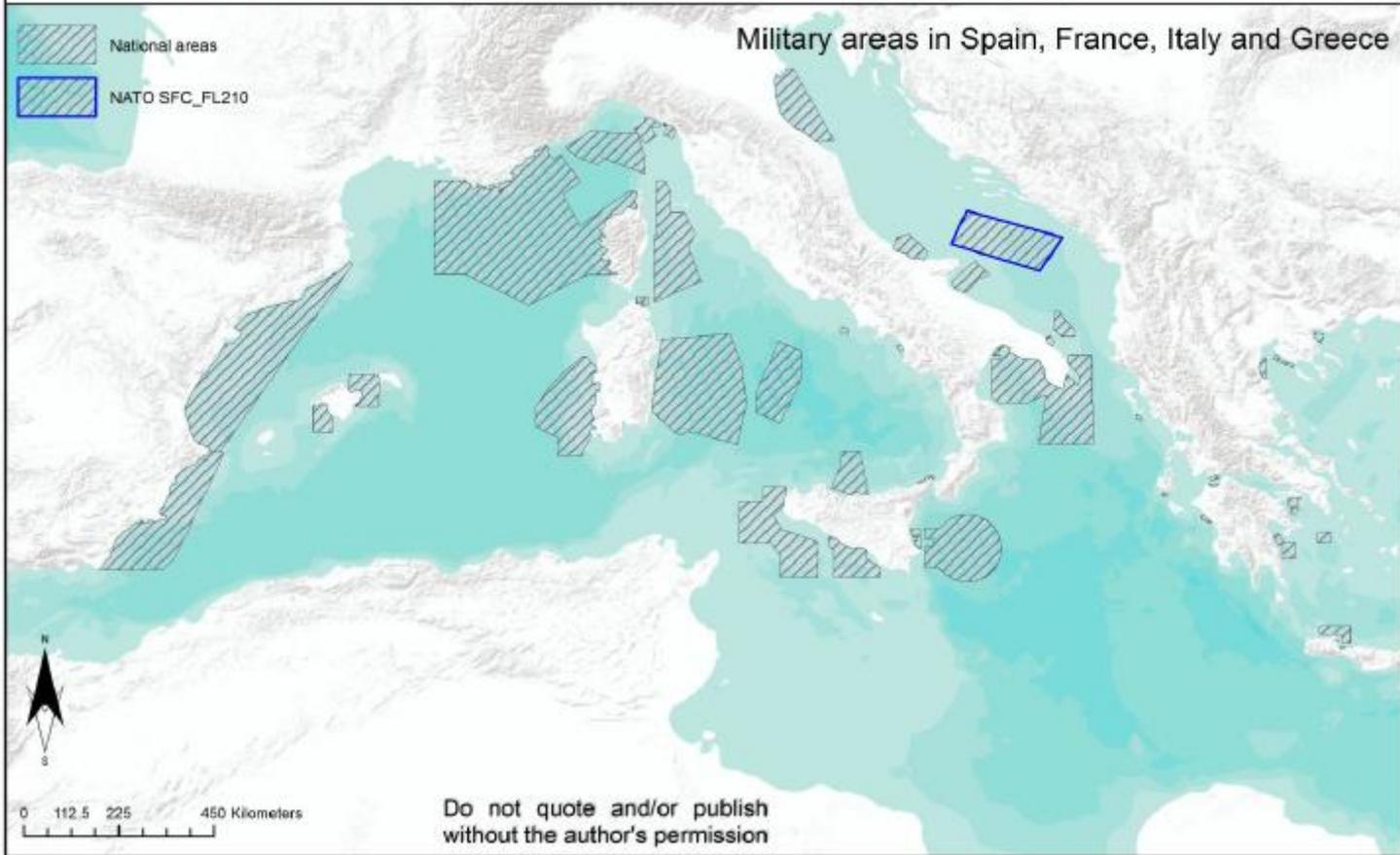
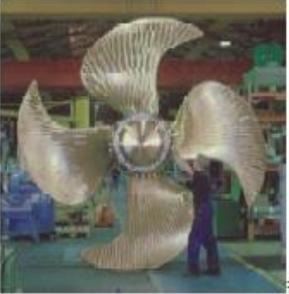
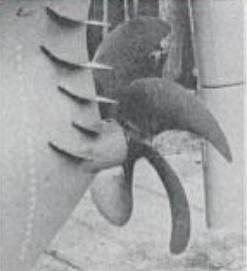




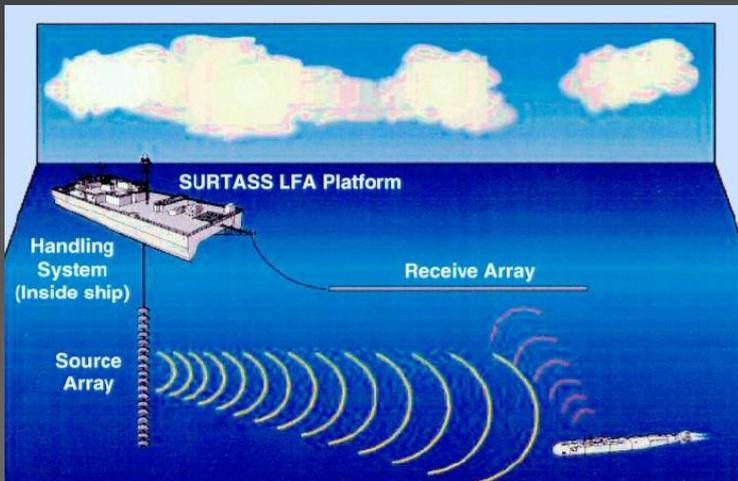
TABLE 12. MITIGATION TECHNOLOGIES FOR SHIPPING NOISE: NEW-DESIGN PROPELLERS AND APPENDAGES REDUCING CAVITATION AND DEVICES IMPROVING THE WAKE FLOW INTO THE PROPELLER. A DETAILED REVIEW OF SUCH TECHNOLOGIES IS GIVEN IN THE REPORT REDUCING UNDERWATER NOISE POLLUTION FROM LARGE COMMERCIAL VESSELS (RENILSON MARINE CONSULTING PTY LTD 2009) AS WELL AS IN LEAPER AND RENILSON 2012. WE HIGHLIGHT THAT MOST OF THESE SOLUTIONS HAS NOT BEEN TESTED IN INDEPENDENT RESEARCH.

Propellers		Appendages		Wake inflow devices	
High skew propellers		Propeller Boss Cap Fins		Schneekluth duct	
Contracted and loaded tip propellers (CLT)		Propeller Cap Turbine		Simplified compensative nozzle	
Kappel propellers		Mewis duct		Grothues spoilers	

From French Cluster Maritime – Underwater noise: economic and environment challenges in the marine environment



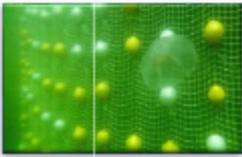
# Acute, localized noise MITIGATION





# Seismic cruises, oil platforms, wind-farms mitigation...

**TABLE 9. NOISE MITIGATION TECHNOLOGIES. SOLUTIONS CONCEIVED TO MITIGATE NOISE FROM PILE DRIVING. SOME OF THEM MAY BE APPLIED TO OTHER KIND OF MARITIME WORKS (HARBOURS, OFFSHORE PLATFORMS). ALL VALUES ARE BROADBAND SOUND LEVELS, EXCEPTED WHERE IT IS SPECIFIED 1/3 OCTAVE-BAND LEVELS. SEL = SOUND EXPOSURE LEVEL dB RE 1 $\mu$ Pa<sup>2</sup>s. SPL = SOUND PRESSURE LEVEL MEASURED AT 1 METER, dB RE 1 $\mu$ Pa @ 1 M. EFFICIENCIES OF TECHNOLOGIES PRESENTED HEREAFTER ARE NOT DIRECTLY COMPARABLE TO EACH OTHER DUE TO SIGNIFICANT DIFFERENCES BETWEEN THE TESTS THAT WERE CARRIED OUT TO MEASURE THE NOISE REDUCTION. A COMPREHENSIVE LIST OF EXISTING TECHNOLOGIES IS FOUND ON THE REPORT FROM KOSCHINSKI AND LÜDEMANN 2013 AND IN THE DOCUMENT ACCOBAMS-MOP5/2013/Doc22 (MAGLIO 2013).**

Mitigation technology	Effectiveness (noise reduction)	Development stage	Activities	
<b>Big Air Bubble Curtain.</b> A large bubble curtain consists of a hose with drilled holes, supplied with compressed air. The hose is placed on the sea bed and the air escaping from the holes forms the bubble screen.	Single bubble curtain : - 12 dB (SEL), 14 dB (peak) - 11 dB (SEL) 15 dB (peak)  Double bubble curtain : - 17 dB (SEL), 21 dB (peak)	Proven technology Potential for improvement	Pile driving Drilling Dredging Explosions	
<b>Hydro Sound Damper.</b> This technology consists of fishing nets with small balloon filled with gas and foam - tuned to resonant frequencies- fixed to it. It can be applied in different ways.	4 – 14 dB (SEL) project ESRA : (WILKE et al. 2012)  Up to 18 dB in single third-octave bands (LEE et al. 2012)	Pilote project, Applied at London Array Wind Farm	Pile driving Drilling Dredging Explosions	
<b>Cofferdam.</b> The cofferdam consists of a rigid steel tube surrounding the pile. Once the pile is stabbed into the cofferdam, the water is pumped out	Aarhus Bight : up to 23 dB (SEL) and 17 dB (SPL peak) (THOMSEN 2012)	Pilot projects but commercial use planned at HelWin ; BorWinetSylwin A	Pile driving Drilling Dredging Explosions	
<b>Noise Mitigation Screen.</b> The NMS is a double layered screen, filled with air. Between the pile and screen there is a multi level and multi size bubble injection system.	Project ESRA: 5-8 dB (SEL) (WILKE et al. 2012) 2) Project FLOW: <i>Nordsee Ost</i> : 9 dB (SEL), Ijmuiden: 11 dB (SEL) OWF <i>Riffgat</i> : 17 dB (SEL) (GERKE & BELLMANN 2012)	Pilot studies completed  First commercial use at Riffgat wind farm	Pile driving Drilling	

From French Cluster Maritime



Localized noise mitigation: no common approach (sometimes no approach!)

Mitigation is often left to Companies self policies.  
No control on operators background.

MMO&PAM operators workshop



# Mitigation: new important step in Italy

(thanks to CIBRA and Oceanomaredelphis common effort)

- Govern asks for *ante* and *post* phases
- at least 60 days each
- surface visual + acoustic survey
- mitigation according to ACCOBAMS Guidelines
- continuous acoustic monitoring (eg. bottom recorders)



# Conclusions

**Still a long way to go**

**We expect interesting results from the ante + post approach**

**We invite independent subjects (like ACCOBAMS/ASCOBANS) to contact, organize and support each state scientists to achieve common approach.**