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

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Conserving Cetaceans in the Seas around Europe through
Synergy-building between the Relevant Legislative Frameworks
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Rua Casa da Luz, nº 2, Funchal, Madeira
Monitoring Indicator 11.1.1 on low and mid frequency impulsive sounds

- Maintain a register of all impulsive sound sources to know their distribution in time and space and model effects

Monitoring Indicator 11.2.1 on continuous diffuse low frequency sound (ambient noise).

- Monitor the 63 Hz and 125 Hz 1/3 octave frequency bands to provide long term trends

Marine Strategy requires member states to set and meet targets for "good environmental status" by 2020.

100 dB: annual average noise target originally proposed by European Commission largely exceeded by real-world measures!!

Source: 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).

Figures by Christopher Clark, Cornell University
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)

PRELIMINARY

S. Pulvirenti, Erice 2013  Erice, 18/10/2013
What is the Mediterranean Situation?
No standards yet, but…

OVERVIEW OF THE NOISE HOTSPOTS IN THE ACCOBAMS AREA

Part I – Mediterranean Sea

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Overview of the noise hotspots in the ACCOBAMS area

A. Ports

B. Manitas

Coastal and offshore noise sources

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Overview of the noise hotspots in the ACCOBAMS area

Seismic surveys areas 2005 - 2015

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Overview of the noise hotspots in the ACCOBAMS area

Military areas in Spain, France, Italy and Greece

National areas

NATO SFC_FL210

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Which approach for diffuse noise?


<table>
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<tr>
<th>Propellers</th>
<th>Appendages</th>
<th>Wake inflow devices</th>
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<tr>
<td>High skew propellers</td>
<td>Propeller Boss Cap Fins</td>
<td>Schmeckluth duct</td>
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<tr>
<td>Contracted and loaded tip propellers (CLT)</td>
<td>Propeller Cap Turbine</td>
<td>Simplified compensative nozzle</td>
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<tr>
<td>Kappel propellers</td>
<td>Mewis duct</td>
<td>Grothues spoilers</td>
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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.
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, except where it is specified 1/3 octave-band levels. SEL = Sound Exposure Level dB re 1uPa^2. SPL = Sound Pressure Level measured at 1 meter, dB re 1uPa @ 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 in the report from Koschinski and Lüdemann 2013 and in the document ACCOBAMS-MOPS/2013/Doc22 (Maglio 2013).

<table>
<thead>
<tr>
<th>Mitigation technology</th>
<th>Effectiveness (noise reduction)</th>
<th>Development stage</th>
<th>Activities</th>
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<tbody>
<tr>
<td><strong>Big Air Bubble Curtain.</strong> 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.</td>
<td>Single bubble curtain: 12 dB (SEL), 14 dB (peak) - 11 dB (SEL) 15 dB (peak) Double bubble curtain: 17 dB (SEL), 21 dB (peak)</td>
<td>Proven technology Potential for improvement</td>
<td>Pile driving Drilling Dredging Explosions</td>
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<tr>
<td><strong>Hydro Sound Damper.</strong> 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.</td>
<td>4 – 14 dB (SEL) project ESRa: (WILKE et al. 2012) Up to 18 dB in single third-octave bands (LEE et al. 2012)</td>
<td>Pilot project, Applied at London Array Wind Farm</td>
<td>Pile driving Drilling Dredging Explosions</td>
</tr>
<tr>
<td><strong>Cofferdam.</strong> The cofferdam consists of a rigid steel tube surrounding the pile. Once the pile is stabbed into the cofferdam, the water is pumped out</td>
<td>Aarhus Bight: up to 23 dB (SEL) and 17 dB (SPL peak) (THOMSEN 2012)</td>
<td>Pilot projects but commercial use planned at HelWin; BorWinE/Sylwin A</td>
<td>Pile driving Drilling Dredging Explosions</td>
</tr>
<tr>
<td><strong>Noise Mitigation Screen.</strong> 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.</td>
<td>Project ESRa: 5-8 dB (SEL) (WILKE et al. 2012) 2) Project FLOW: Nordsee Ost: 9 dB (SEL), Ihmuiden: 11 dB (SEL) OWF Riffgat: 17 dB (SEL) (GERKE &amp; BELLMANN 2012)</td>
<td>Pilot studies completed First commercial use at Riffgat wind farm</td>
<td>Pile driving Drilling</td>
</tr>
</tbody>
</table>

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.