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# ACTIVITIES REPORT REGARDING THE QUIETMED PROJECT

# QUIETMED - A joint programme on noise for the implementation of the second cycle of the MSFD in the Mediterranean Sea

## PROJECT REPORT

September 2019



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# 1 INTRODUCTION AND OBJECTIVES

This report describes the structure and organisation of the project and summarises the activities carried out during the execution, including the main results and outcomes.

QUIETMED project was funded by the DG Environment of the European Commission within the call “DG ENV/MSFD Second Cycle/2016”. This call funded the 2<sup>nd</sup> phase of implementation of the MSFD, in particular to achieve regionally coherent, coordinated and consistent updates of the determinations of GES, initial assessments and sets of environmental targets by July 2018, in accordance with Article 17(2a and 2b), Article 5(2) and Article 3(5) of the Marine Strategy Framework Directive (2008/56/EC).

The project focussed on Descriptor 11 (Energy including underwater noise). It is developed by a consortium made up of 10 entities from several Mediterranean countries. ACCOBAMS was a partner of the consortium, which was coordinated by CTN, a Spanish research institution. The duration was 24 months between January 2017 and December 2018.

The aim of QUIETMED was to enhance cooperation among Member States (MS) in the Mediterranean Sea to implement the Second Cycle of the Marine Directive and in particular to assist them in the preparation of their reports to the European Commission by 2018 through the following actions:

- Promoting a common approach at Mediterranean level to update GES and Environmental targets related to Descriptor 11 in each MS marine strategies
- Developing methodological aspects for the implementation of ambient noise monitoring programs (D11C2)
- Developing a joint monitoring programme of impulsive noise (D11C1) based on a common register, including gathering and processing of available data on underwater noise

The Project had the following specific objectives:

1. Achieving a common understanding and GES assessment (MSFD, Article 9) methodology (both impulsive and continuous noise) in the Mediterranean Sea .
2. Developing a set of recommendations to the MSFD competent authorities for review of the national assessment made in 2012 (MSFD, Article 8) and the environmental targets (MSFD, Article 10) of Descriptor 11- Underwater Noise in a consistent manner taking into account the Mediterranean Sea Region approach.
3. Developing a common approach to the definition of threshold at MED level (in link with TG Noise future work and revised decision requirements) and impact indicators.
4. Coordinating with the Regional Sea Convention (the Barcelona Convention) to ensure the consistency of the project with the implementation of the EcAp process
5. Promoting and facilitate the coordination of underwater noise monitoring at the Mediterranean Sea level with third countries of the region (MSFD Article 6), in particular through building capacities of non-EU Countries and taking advantage of the ACCOBAMS-UNEP/MAP cooperation related to the implementation of the Ecosystem Approach Process (EcAp process) on underwater noise monitoring.
6. Recommending a methodology for assessments of noise indicators in the Mediterranean Sea basin taking into account the criteria and methodological standards defined for Descriptor11 (Decision 2010/477/EU, its revision and Monitoring Guidelines of TG Noise).
7. Establishing guidelines on how to perform sensor calibration and mooring to avoid or reduce any possible mistakes for monitoring ambient noise (D 11.2.1). These common recommendations should allow traceability in case the sensor give unexpected results and help to obtain high quality and comparable data.

8. Establishing guidelines on the best signal processing algorithms for the preprocessing of the data and for obtaining the ambient noise indicators (D11C2).
9. Implementing a Joint register of impulsive noise (D11C1) and hotspot map at Mediterranean Sea Region level by impulsive noise national data gathering and joint processing.
10. Enhancing collaboration among a wide network of stakeholders through the dissemination of the project results, knowledge share and networking.

The project was made up of 5 work packages and 13 activities (Figure 1).

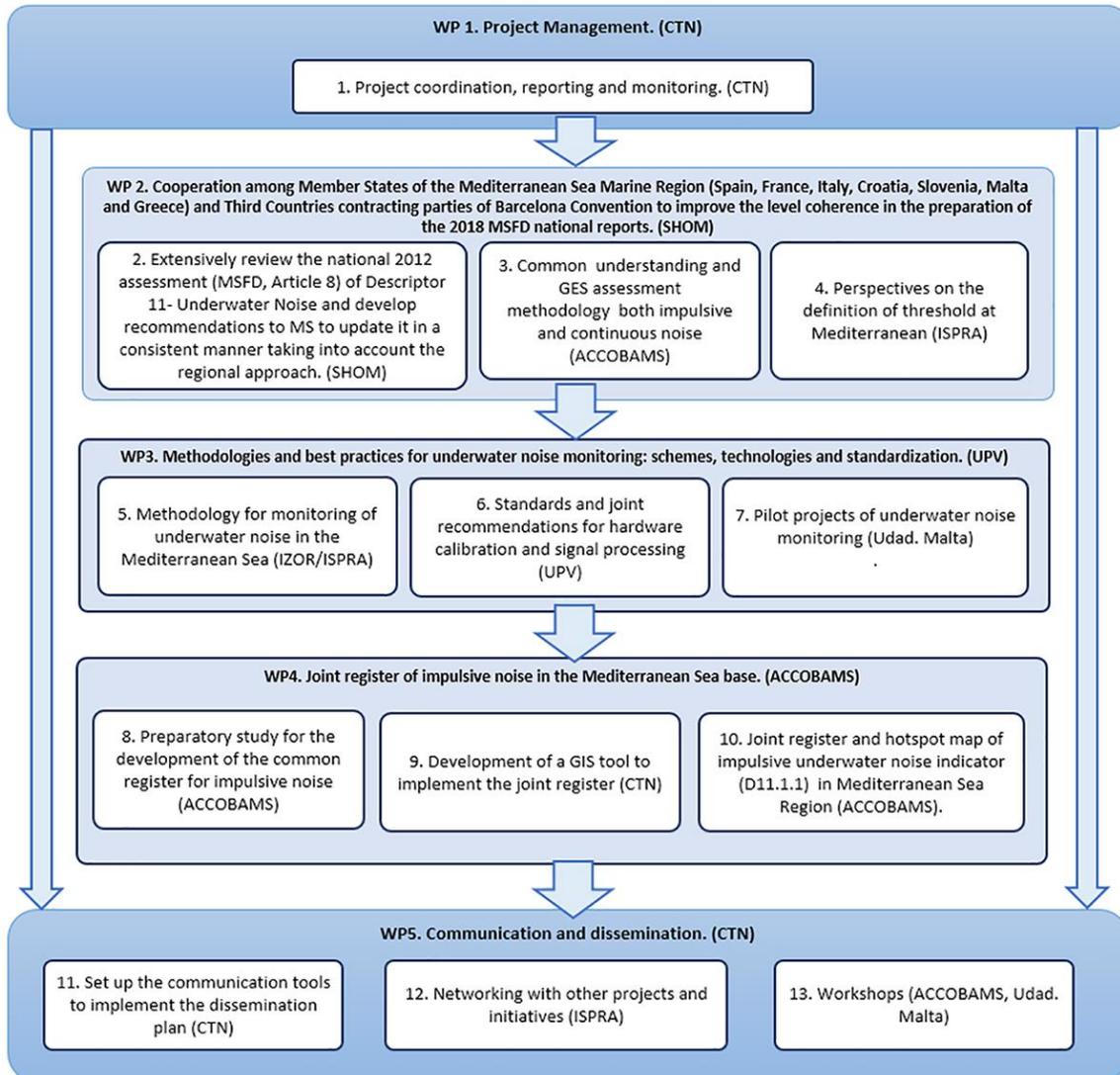


Figure 1. Work Plan Structure (in brackets responsible institutions for each activity).

The technical tasks which ACCOBAMS was responsible for were subcontracted to a team of scientists led by SINAY, a company specialist of marine environmental studies, especially in underwater acoustics and marine mammals. This team was formed by:

- Alessio Maglio (coordinator) and Achraf Drira from SINAY
- Manuel Castellote from NOAA
- Gianni Pavan from CIBRA-University of Pavia
- Silvia Frey from OceanCare

## 2 ACTIVITIES AND RESULTS

During the whole duration of the project all work packages have been developed and all 13 activities have been completed as planned.

### 2.1 DESCRIPTION OF ACTIVITIES AND ASSOCIATED ACHIEVEMENTS

The table below shows an overview of activities that were carried out as well as associated key outputs and achievements.

Table 1. Activities, achievements and associated deliverables

Activity (leader in brackets)	Achievements	Deliverable associated
1. Project coordination, reporting and monitoring (CTN)	<ul style="list-style-type: none"> <li>-Kick of meeting in Brussels 6-7/03/2017</li> <li>-38 remote coordination meetings (Skype)</li> <li>-Amendment requested and approved by EC</li> <li>-Final meeting in Brussels 12-13/12/2018</li> </ul>	D1.1., D1.2. D1.3A.,D1.3B., D1.4., D1.5
2. Extensively review the national assessment (Art.8) of D11 and recommendations to MS (SHOM)	Synthesis report on GES definition, GES assessment, operational targets, monitoring programs. Identification of disparities and recommendations to improve comparability.	D2.1
<b>3. Common understanding and GES assessment methodology (ACCOBAMS)</b>	Strategic report: consistency and coherence in GES definition and criteria assessment at the Mediterranean basin scale. Next steps for a shared and consistent understanding of targets, Approximation to an integrated assessment D11-D1	D2.3.
4. Perspectives on the definition of thresholds of Mediterranean Sea (ISPRA)	How thresholds have been integrated in the definition of GES. Criteria (framework, process) to consider for the definition of thresholds.	D2.2.
5. Methodology for monitoring underwater noise in the MED (IOF)	State of the art of the continuous underwater noise measuring methodologies. Recommendations of best practices on continuous underwater noise measurement in the Mediterranean Sea	D3.5
6. Standards and joint recommendations for hardware calibration and signal processing (UPV)	<ul style="list-style-type: none"> <li>State of the art of the different joint recommendations for hardware calibration applied to bottom mounted autonomous systems.</li> <li>Practical recommendations for the calibration of PAM devices.</li> <li>Brief review and guidelines of the different approaches on pre-processing and signal processing to extract noise indicators.</li> <li>Guidelines on the representation of noise indicators from measurements and from models</li> <li>Practical implementation of models: <b>mapping of the shipping noise around the Balearic Islands</b></li> </ul>	D3.1., D3.2., D 3.3
7. Pilot projects of underwater noise monitoring (UM)	<ul style="list-style-type: none"> <li>-Pilot project in Crete</li> <li>-Pilot project in Cabrera</li> <li>-Pilot project in Malta</li> </ul>	D3.6

<b>8. Preparatory study for the development of the common register (ACCOBAMS)</b>	Working document: Overview of regional and national register tools. General needs and requirements. Proposals for the functioning of the impulsive noise register developed during QUIETMED. Proposal for a management framework for the register after the end of QUIETMED. Conclusions and recommendations for the impulsive noise register. Considerations for national registers	N/A
9. Development of a GIS tool to implement the joint register (CTN)	Joint register of impulsive noise in the MED Region ready for use available in: <a href="http://80.73.144.60/CTN_Geoportal/home/">http://80.73.144.60/CTN_Geoportal/home/</a>	N/A
<b>10. Joint register and hotspot map of impulsive noise criterion D11C1 in the MED Region (ACCOBAMS)</b>	<p>Recommendations to Member States to set up the national registers of impulsive noise according to criterion D11C1.</p> <p>Hotspot maps and D11C1 calculation. Data provided by France (2016 and 2017).</p> <p>Compatibility with regional and national registers.</p> <p>Perspectives for the management and the future development of the impulsive noise register.</p>	D3.4, D 4.1.
11. Communication plan and tools (CTN)	<p>Communication strategy developed.</p> <p>Communication materials: web page (1.115 visits), social networks (287 followers), newsletter (4), interactive presentation.</p> <p>Presence in mass media: local TV and radio (3), local and national press (14), scientific communications (6)</p>	D 5.1., D 5.2.
12. Networking (ISPRA)	<p>21 Conferences, events and workshops attended by the consortium related to:</p> <ul style="list-style-type: none"> <li>-Development of the MSFD (6)</li> <li>-Acoustics-technical and technological aspects (8)</li> <li>-Acoustics-environmental conservation (7)</li> </ul>	N/A
<b>13. Workshops with non-EU countries (UM, ACCOBAMS)</b>	<p>Two training workshops developed in Malta from 22nd to 25th October with the participation of non-EU countries contracting parties of Barcelona Convention:</p> <ul style="list-style-type: none"> <li>-1,5 day training workshop with National Representatives of non EU countries (7 Participants from 7 different countries: Algeria, Israel, Lebanon, Libya, Morocco, Tunisia and Montenegro).</li> <li>-2,5 day training workshop with National Experts of non EU countries (11 Participants from 10 different countries: Algeria, Bosnia and Herzegovina, Libya, Israel, Lebanon, Morocco, Tunisia, Turkey, Montenegro and Malta). Cooperation with the EcAp process reinforced with the attendance of a representative of MEDPOL (Jelena Knezevic).</li> </ul>	N/A

## 2.2 ACHIEVEMENTS OF THE PROJECT AGAINST THE GENERAL AND SPECIFIC OBJECTIVES.

The following is a summary about the achievement of each project:

### **Objective 1. Achieve a common understanding and GES assessment (MSFD, Article 9) methodology (both impulsive and continuous noise) in the Mediterranean Sea.**

- Result: conclusions about GES assessment methodology available in Deliverable 2.1. Report on lessons learned from national 2012 assessment and GES definition.

### **Objective 2. Develop a set of recommendations to the MSFD competent authorities for review of the national assessment made in 2012 (MSFD, Article 8) and the environmental targets (MSFD, Article 10) of D11- Underwater Noise in a consistent manner taking into account the Mediterranean Sea Region approach.**

- Result: the review of the national assessment made in 2012 and the environmental targets and pertinent recommendations for the establishment of national environmental target have been done in Deliverable 2.1.

### **Objective 3. Develop a common approach to the definition of threshold at MED level (in link with TG Noise future work and revised decision requirements) and impact indicators.**

- Result: compilation of the criteria (framework, process) to be taken into account for the definition of thresholds based on the different approaches discussed in the framework of the TG Noise and basic principles for an approximation to the definition of thresholds at MED level are given in Deliverable 2.2.

### **Objective 4. Coordinate with the Regional Sea Convention (the Barcelona Convention) to ensure the consistency of the project with the implementation of the EcAp process.**

- Result: contracting parties to the Barcelona Convention and one representative of MEDPOL have attended the workshop training held in Malta in October 2018. Territorial scope of the Barcelona Convention has been included in the GIS tool developed in activity 9.

### **Objective 5. Promote and facilitate the coordination of underwater noise monitoring at the Mediterranean Sea level with third countries of the region (MSFD Article 6), in particular through building capacities of non-EU Countries and taking advantage of the ACCOBAMS-UNEP/MAP cooperation related to the implementation of the Ecosystem Approach Process (EcAp process) on underwater noise monitoring.**

- Result. Two training workshops developed in Malta from 22nd to 25th October with the participation of non-EU countries contracting parties of Barcelona Convention: 1,5 day training workshop with National Representatives from non EU countries (7 Participants from 7 different countries: Algeria, Israel, Lebanon, Libya, Morocco, Tunisia and Montenegro) and 2,5 day training workshop with National Experts of these countries (11 Participants from 10 different countries: Algeria, Bosnia and Herzegovina, Libya, Israel, Lebanon, Morocco, Tunisia, Turkey, Montenegro and Malta). In addition, the cooperation with the EcAp process has been reinforced with the attendance of a representative of MEDPOL (Jelena Knezevic).

### **Objective 6. Recommend a methodology for assessments of noise indicators in the Mediterranean Sea basin taking into account the criteria and methodological standards defined for Descriptor11 (Decision 2010/477/EU, its revision and Monitoring Guidelines of TG Noise).**

- Result. Recommendations for methodology to set up the national register of impulsive noise (D3.4). Recommendations for the methodology to set up monitoring of continuous underwater noise (D3.3.). Deployments of noise measuring equipment and one modelling/mapping exercise

in the Mediterranean Sea (Malta, Crete and Cabrera) (D3.2, D3.5 and 3.6). Recommendations reviewed by TG Noise.

**Objective 7. Establish guidelines on how to perform sensor calibration and mooring to avoid or reduce any possible mistakes for monitoring ambient noise (D 11.2.1).** These common recommendations should allow traceability in case the sensor give unexpected results and help to obtain high quality and comparable data.

- Result. Common approach to hardware calibration, handling sensors and deployment for underwater noise. Deliverable D.3.1. Recommendations reviewed by TG Noise.

**Objective 8. Establish guidelines on the best signal processing algorithms for the pre-processing of the data and for obtaining the ambient noise indicators (D 11.2.1).**

- Expected output and results. Recommendations for the most adequate pre-processing algorithms. Feedback or techniques to check for consistency of the noise indicators. Deliverable D.3.2. Recommendations reviewed by TG Noise.

**Objective 9. Implement a Joint register of impulsive noise (D11.1.1) and hotspot map at Mediterranean Sea Region level by impulsive noise national data gathering and joint processing.**

- Results. Joint register of impulsive noise available in: [http://80.73.144.60/CTN\\_Geoportal/home/](http://80.73.144.60/CTN_Geoportal/home/). Hotspot map of impulsive noise sources with data from France provided by SHOM.

**Objective 10. Enhance the collaboration among a wide network of stakeholders through the dissemination of the project results, knowledge share and networking.**

- Results: Communication materials developed, dissemination and networking activities performed at local, national and international level. (Deliverable 5.2).

## 2.3 DELIVERABLES.

All 18 deliverables planned in the project have been duly submitted. Public deliverables are available in the website of the QUIETMED project (<http://www.quietmed-project.eu/deliverables/>). The table below summarizes the list of deliverables produced in this project:

Code	Deliverable name	Dissemination level
D1.1.	Inception report specifying the proposed methodology for the tasks of the project	Confidential
D1.2.	First progress report.	Confidential
D1.3A.	Second progress report.	Confidential
D1.3B.	Third progress report.	Confidential
D1.4.	Final report.	Confidential
D1.5	Presentation of the main results.	Confidential
D2.1.	Report on lessons learned of national 2012 assessment and GES definition	Public

<b>D2.2.</b>	Report on common understanding and GES assessment methodology (both impulsive and continuous noise) and recommendations on the definition of threshold at MED level	Public
<b>D2.3.</b>	End Report on GES criteria assessment at basin scale with focus on the consistency and coherence of approaches at national levels (including and operational targets definition)	Public
<b>D3.1.</b>	Best practices <i>guidelines on sensor calibration and mooring</i> for underwater noise monitoring in the Mediterranean Sea.	Public
<b>D3.2.</b>	Best practices guidelines on signal processing algorithms for the preprocessing of the data and for obtaining the noise indicator	Public
<b>D 3.3.</b>	Best practice guidelines on acoustic modelling and mapping	Public
<b>D3.4</b>	Recommendations to MS to set up the national registers of impulsive noise according indicator D.11.1.1 of the Commission Decision 2010/477/EU and ACCOBAMS premises.	Public
<b>D3.5</b>	Best practice guidelines on continuous underwater noise	Public
<b>D3.6</b>	Detailed report on ambient noise measurements in Crete, Malta and Cabrera and the analysis of the measured data.	Public
<b>D 4.1.</b>	Joint register for impulsive noise available on a website with GIS and hotspot map.	Public
<b>D 5.1.</b>	Dissemination tools: Project webpage, media, and communication material.	Public
<b>D 5.2.</b>	Final report on project communication and dissemination activities.	Confidential

### 3 MAIN OUTCOMES

Main outcomes are the following :

- A proposal for a common understanding and shared view of Good Environmental Status in the Mediterranean Sea
- A common database for impulsive noise events in the Mediterranean Sea: The International Noise Register (INR-MED). The Register covers also the Black Sea despite this area was not the focus of QUIETMED
- Increased regional synergies and coordination with non-EU countries, especially thanks to training workshops where many Mediterranean countries participated from both north and south of the basin
- Common technical recommendations on noise monitoring
- Capacity Building during a 4 day workshop with National Representatives of non EU countries (1.5 days, 7 Participants from 7 different countries: Algeria, Israel, Lebanon, Libya, Morocco, Tunisia and Montenegro) and national experts (2.5 days, 11 Participants from 10 different countries: Algeria, Bosnia and Herzegovina, Libya, Israel, Lebanon, Morocco, Tunisia, Turkey, Montenegro and Malta). Cooperation with the EcAp process was reinforced thanks to the attendance of a representative of MEDPOL.

#### 3.1 FOCUS ON THE INTERNATIONAL NOISE REGISTER FOR THE MEDITERRANEAN REGION

The INR-MED is a modern web-GIS tool (Geographic Information System) available on this web page: [http://80.73.144.60/CTN\\_Geoportal/home/](http://80.73.144.60/CTN_Geoportal/home/) (Figure 2).



Figure 2. Homepage of the INR-MED

This portal has 3 main functions:

- Data exchange: upload and download
- Viewing noise event data on map
- Calculation of the indicators (Figure 3) related to impulsive noise events (Criterion 1 of Descriptor 11 of the MSFD)

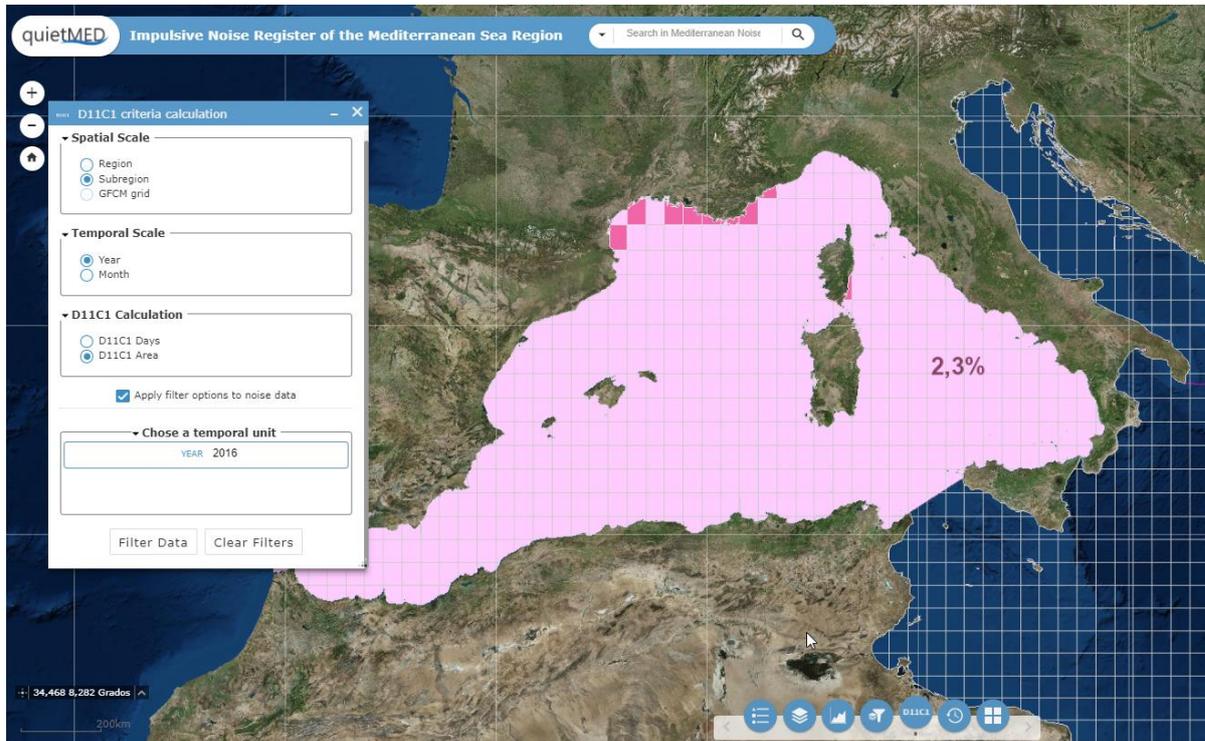


Figure 3. Example of indicator: % area with impulsive noise events in 2017 in the Western Mediterranean sub-region (sample data from France)

### 3.2 FOCUS ON TECHNICAL RECOMMENDATIONS ON NOISE MONITORING

QUIETMED project has provided:

- Recommendations on **quality control** processes of the acoustic data coming from field measures
- Recommendations for **calibration, data storing and processing**
- A **set of algorithms** for computing **continuous noise indicators**
- A **Global Picture** for the use of **noise modelling techniques**.
- One modelling exercise (Figure 4) resulting in the **first overview of continuous noise indicators** (D11C2) that might be used as baselines if considered appropriate.

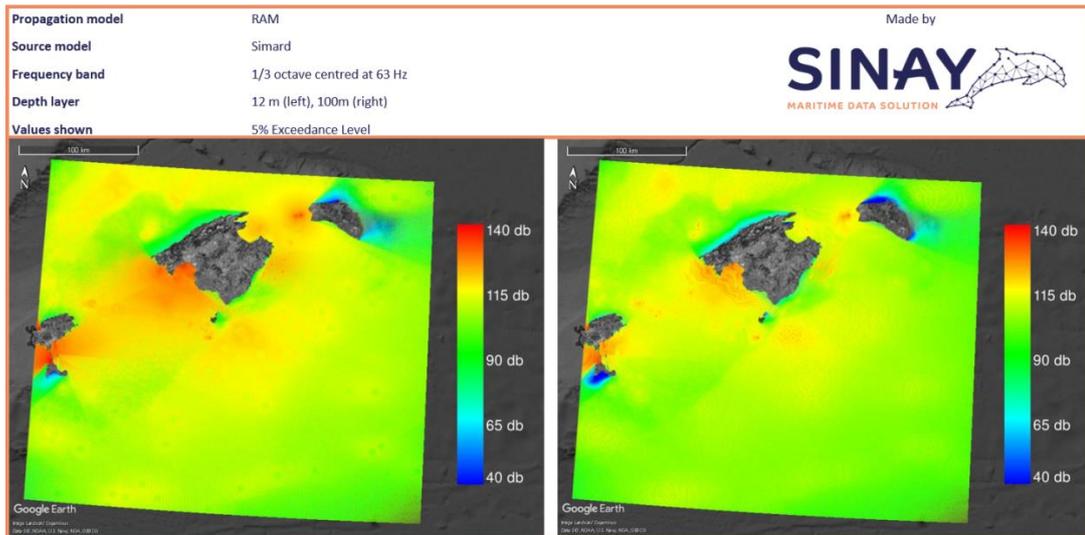
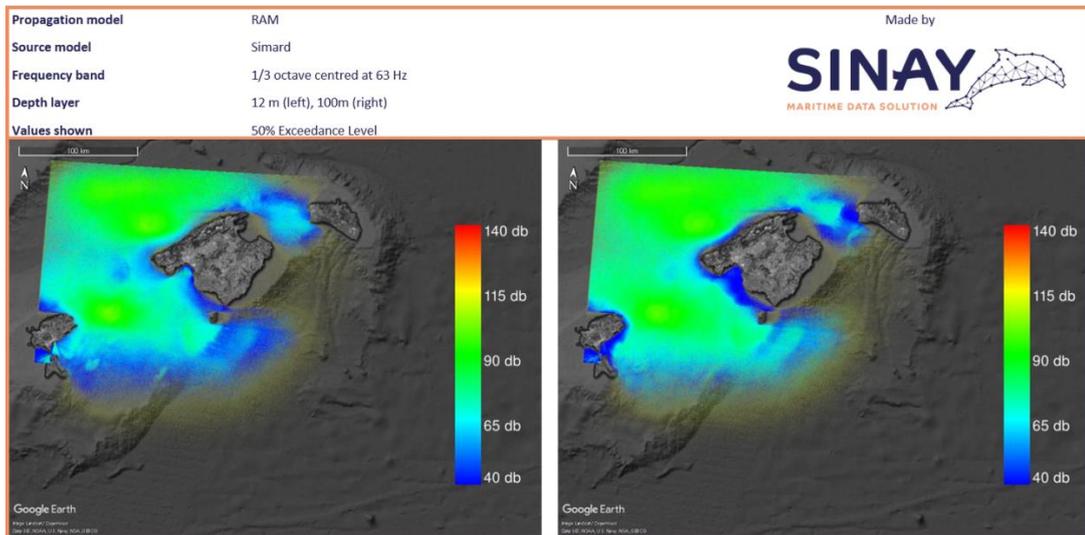
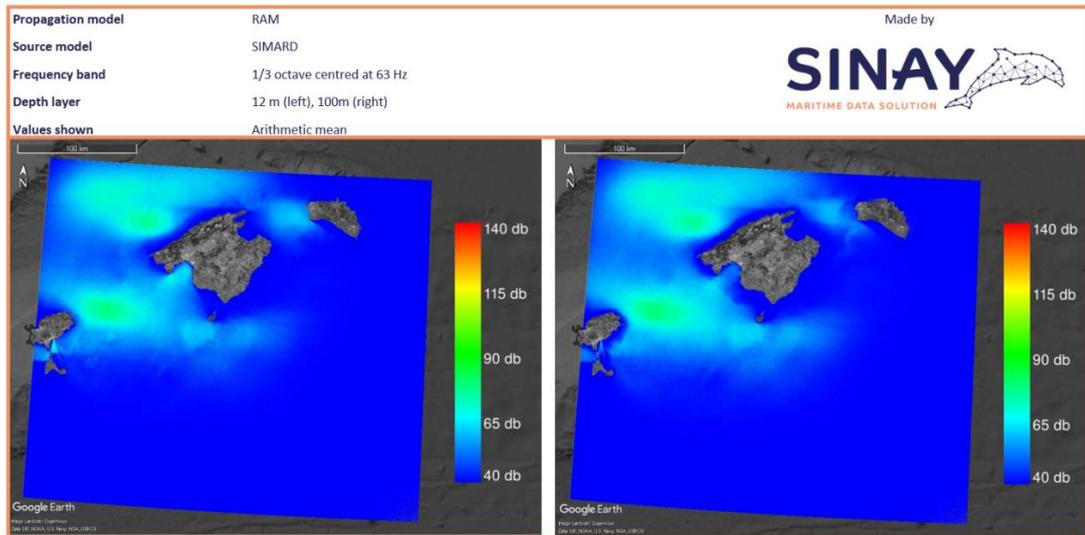


Figure 4. Example of low frequency noise maps in the Balearics, from top to bottom: average (arithmetic mean), median, and loudest noise at two depth layers.

### 3.3 FOCUS ON CAPACITY BUILDING

Two training workshops were performed in Malta from 22<sup>nd</sup> to 25<sup>th</sup> October 2018:

- 2,5 days training workshop with experts from national research institutes of non-EU countries:
  - 11 Participants from Algeria, Bosnia and Herzegovina, Libya, Israel, Lebanon, Morocco, Tunisia, Turkey, Montenegro and Malta; 1 representative from MEDPOL;
- 1,5 days training workshop with national representatives of non-EU countries involved in the EcAp process:
  - 7 participants Algeria, Israel, Lebanon, Libya, Morocco, Tunisia and Montenegro; 1 representative from MEDPOL



Figure 5. Participants of the workshops and round tables in break-out groups



## 4 CONCLUSIONS

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The execution of this project represents a major progress in the development of the implementation of the MSFD regarding Descriptor 11-underwater noise at Mediterranean level.

It is important to realize that main disparities in the status of the advancement among Member States have been identified and in consequence, recommendations and best practice guidelines have been provided in order to improve the consistency and coherency in the MSFD process.

Once these bases have been established, it is time to consider how all the results of the QUIETMED project will be used. In this sense, there is an identified need to make a significant effort to increase capacity building and training focused on representatives of Member States and technical experts. It will be essential in order to disseminate the results of the project, to ensure a real transfer of knowledge and to guarantee that the results of the project can be applied in the second cycle of the MSFD.

On the other hand, the work done can be well considered for the use and further development of MSFD by Working Groups that support this process, specially, by the EU Technical Group on Underwater Noise (EU TG-Noise) which has provided a valuable contribution to the development of this project.

Another key point in this project has been the boost of regional cooperation and links with other regional fora (MEDPOL, SPA/RAC, and other components of the Barcelona Convention) as well as with non-EU countries. These interactions have highlighted the need for close cooperation as MSFD moves forward, particularly, due to the high disparity in the current status of the implementation between MSFD and the EcAp process.

Being this project completed and having most of the technical aspects on D11 been considered, some other challenges must be addressed to get an approach beyond technological considerations such as enhancing cooperation with stakeholders, application of the results in policy making, and the articulation between state (D1/EO1) and pressure descriptors (D11/EO11).