Tutorial 3: Online underwater noise modelling and mapping.

Abstract

Underwater noise is a human pressure on biodiversity recognized by the European Commission and the United Nations. Even if it is an issue with little regulation up until now, the first regulation being the Marine Strategy Framework Directive from the European Commission, underwater noise has been studied intensively in order to understand its physical properties and how it distributes in water.

Underwater noise modelling benefits from more than 50 years of scientific and operational development for military purposes, ranging from basic propagation modelling to more sophisticated sonar performance modelling. The military research in the field of experimental ocean acoustics has involved extensive equipment, with typically at least one ship and often an assortment of at-sea platforms equipped with sound projectors and receiving arrays. The objective of this research was to incorporate the acoustic propagation phenomena into a theoretical and numerical formalism, which gives a quantitative prediction of the sound field for arbitrary ocean environments.

Recent needs have driven the development of integrated modelling systems that allow numerical reconstructing the sound field in realistic environmental contexts. Some systems are desktop-based software that allows simulation of static scenarios (Haw-Jye and Hillson 2006), whereas more sophisticated systems are able to map the tri-dimensional noise as a function of time according to environmental data streams and human activity information and identification streams (Folegot and Clorennec 2011). These systems are now available online through friendly web-interfaces and enable local and regional mapping of natural and anthropogenic noise.

The tutorial proposed by Thomas Folegot intends to give attendees basic knowledge on the principle of underwater noise modelling and mapping. The comparison between noise mapping and noise measurement will be address, as well as techniques to ground-truth noise maps with in-situ passive acoustic measurement. A practical demonstration of Quonops Online Services, the global web-based underwater noise modelling and mapping platform will be given. Each attendee will have the opportunity to connect to the platform and to produce noise maps from shipping and from custom scenarios of their choice. The tutorial will also address how to exploit and use the noise maps in the context of impact assessment.

It is not required that the attendees have specific in-depth knowledge on underwater acoustics or on the issue of underwater noise as the tutorial is made so everyone gains understandings and skills on producing and exploit noise maps. This tutorial is intended to:

• Marine Biologists and Researchers who want to increase the scope of their research projects by including the noise spatial information, and educate their students about underwater noise.
• Governments and National Agencies who needs to monitor underwater noise in their National Waters to be compliance with regulations such as the Marine Strategy Framework Directive (MSFD).
• Agencies who are involved in licensing offshore projects.
• Developers of offshore and coastal projects who needs to evaluate the impacts of the noise generated by their projects on the marine fauna and secure their projects.
• Marine Protected Areas Managers who need to develop a sound action plan that includes underwater noise.
• Non-Governmental Organizations who want to study a specific area or communicate and inform stakeholders and the public on the noise status of an area.