MSc Thesis

Title: **Underwater Acoustic Impact of Marine Renewable Energy Devices: Modelling Approaches**

Requirements: Physics, Fluid Mechanics, Numerical Methods, Noise&Vibrations, Linux, Python
Duration: 6-9 months
**Location:**   IST and WavEC-Offshore Renewables (www.wavec.org) (Lisbon, Portugal)
Supervisors: **XXXX (IST), Eng. Erica Cruz (WavEC), Dr. Guilherme Vaz (WavEC)**

Description

Sources of anthropogenic noise in the marine environment can be of concern to marine life that use sound for several tasks, as for example communication, navigation and hunting. The effects are dependent on individual species' responses, as well as characteristics of the noise source, including amplitude, frequency and characteristics of how the sound propagates through seawater.

The use of sound propagation models in combination with biological information can present a valuable solution on environmental impacts assessment and planning of ocean energy projects. Additionally, there is a need to understand how the scale-up of the projects could affect the acoustic environment. In order to numerically model underwater sound propagation several methods may be used with different degrees of accuracy. There are also open-source and commercial tools available for the purpose.

In this project, we propose the development of a tool/tools, or procedure for underwater propagation and impact assessment. The most suitable method for sound propagation should be identified, having in mind both accuracy and computational costs. In particular, the objectives are to perform the following studies:
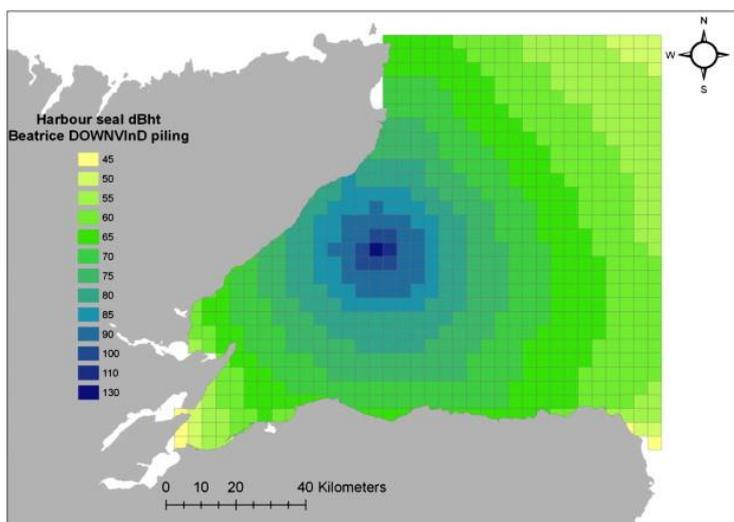
- Identification of suitable open-source methods/libraries for sound propagation (literature study);
- Implement tools.
- Perform tool verification;
- Application of the method to real scenarios using existing field measurement to validate the model;
- Application of the tool for mapping sensitive areas considering the thresholds for sensitive species.

For this work, the candidate will have access to Portuguese and European HPC super-computers. Upon good performance of the candidate the work may be presented in a conference and/or in a Journal.

Bibliography

1. Copping, A., Sather, N., Hanna, L., Whiting, J., Zydlewsk, G., Staines, G., Gill, A., Hutchison, I., O'_Hagan, A.M., Simas, T., Bald, J., Sparling, C. Wood, J., and Madsen, E. (2016). Annex IV 2016 State of the Science Report: Environmental Effect of Marine Renewable Energy Development around the World.
2. Farcas, A., (2016). Underwater Noise Modelling for Environmental Impact Assessment, in Environmental Impact Assessment Review 57, pages 114-122.
3. https://oalib-acoustics.org/