

Quantifying "exposure" with Cost Effective Wave Resource Measurements

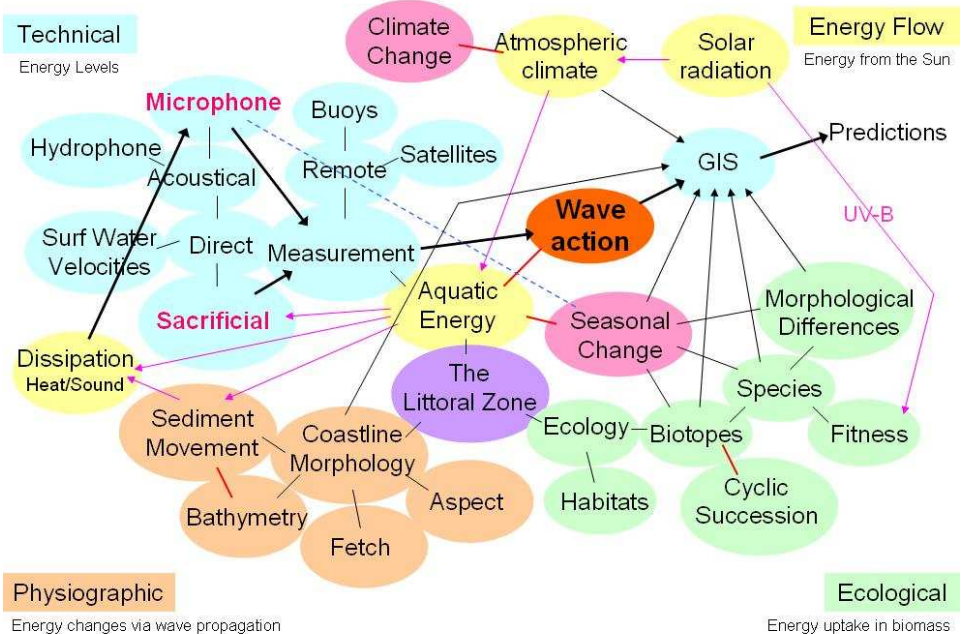
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This aim of this research is to develop new concepts and methodologies to reduce costs of environmental information gathering. This is to be achieved by identifying new measurement parameters through the development of shore based and near shore low cost devices and instrumentation, which will provide metrics for the evaluation of environmental disturbance resulting from the installation of wave energy converter arrays. A series of field studies to investigate the data acquired from the deployment of these devices against the biological communities corresponding to the habitat and biotope classification system underpinning Special Areas of Conservation (EEA, 2008) will also be undertaken.

At present there are no commercially available devices that can measure wave energy acting directly upon the coastline. This study will develop such a device/s for the accurate quantification of the environmental consequences of large scale energy extraction. Further, no studies that have attempted a quantitative measurement of "exposure" that can be understood in terms of biotope classification systems. This not only causes difficulty in developing general theories through the inability of integrating other studies, particularly for environmental impact assessments (Lindegarh and Gamfeldt, 2005), but cartographic "exposure" has actually been found to be an unsuitable method (Ruuskanen & Nappu, 2005).

Research Relationships



It is essential that where change (environmental, etc) is observed in the proximity of MEC deployments that there is confidence that such a change is as a consequence of alteration of the 'energy regime' and does not result from natural variation or any other source of disturbance (e.g. climate change). During monitoring programme planning, surveillance procedures and procedural guidelines recommended by the UK Joint Nature Conservation Committee (JNCC) will be implemented to identify normal background variations as a baseline so that any abnormal changes can be identified. The identification of such sentinels and metrics will prove invaluable to stakeholders and investors in marine renewable energy technologies.

Prototype installations – A shore trial of a second-generation prototype device is on going at Billia Croo, Orkney, the nearest shoreline location to the European Marine Energy Centre (EMEC) WEC test berths. The information from this trial will be incorporated into a series of multiple deployments at strategic locations in and around Orkney for the corroboration of wave action determination.

Environmental Survey – A monitoring programme of habitat and biotopes within the research areas related to this study to determine the natural background variation.

Remote measurements – A shore based stand-alone audio recording measurement device is being developed using PC based hardware to provide 24hr wave periodicity data.

References

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- Lindegarh, M. and Gamfeldt, L. (2005). Contrasting analyses of qualitative and quantitative ecological models: the effects of 'exposure' on rocky shore assemblages. *Ecology*. 86(5): 1346–1357
- Ruuskanen, A & Nappu, N., (2005) Morphological differences in *Fucus gardineri* between two shores with equal cartographic exposure values but different levels of wave action. *Ann. Bot. Fennici* 42: 27-33