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Original

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Ecological structure and mapping of *Posidonia oceanica* meadows in the island of Pantelleria (South Tyrrhenian): a selected site to detect sea wave energy

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During the summer 2015, we have investigated the ecological structure of *Posidonia oceanica* (L) Delile meadows located along the northern coast of Pantelleria Island, a zone interested to a possible impacts of sea wave renewable energy production. This small Island is situated at 110 km southwest of Sicilia island, Italy (36°47'27"N 11°59'38"E).

In this work we describe, for the first time, the ecological scenario of the *P. oceanica* ecosystem and its change after the impact arising from the installation of offshore devices for exploitation of the Inertial Sea Wave Energy Converter (ISWEC). This innovative prototype has been developed by the Polytechnic of Turin: it is characterized by high conversion efficiency, resulting from its adaptability to different wave conditions, and by a limited environmental impact due to its mooring innovative method which does not make use of fixed anchors to the seabed. In order to allow a suitable sea energy harvesting, ISWEC has been installed at 30 meters bathymetry depth, 800 m offshore of coastal zone: a strategic site near the important *P. oceanica* meadows. Genetic, morphological and physiological data of the collected *P. oceanica* plants were analyzed. Then, data were processed and integrated for providing a suitable point calibration to the subsequent spectral clustering methods on purpose implemented for monitoring and mapping the meadows in the coastal zone of interest using satellite remote sensing techniques.

The preliminary results showed that the environmental parameters are linked to energy production (such as the sea currents) and the distribution patterns of these different sea energy contributions can be considered useful indicators for the identification of possible natural and anthropogenic impacts on the ecosystem.

The exploitation of marine renewable energy can play a key role in providing electrical power to Italian small islands contributing to climate change mitigation. Such research represents an innovative solution for supporting alternative green energy production and, at the same time, for monitoring activities for coastal environments, including water quality and vulnerable marine ecosystems.

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