

Wave power availability in the Pacific of Mexico and Central America

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The global energy demand increases every day due to population growth and the technification of daily life. It is estimated that between 2020 and 2040 most countries will have an energy deficit. In response, many countries have increased their efforts to promote the use of renewable energy sources and clean technologies to generate electricity. Among the wide variety of renewable energy sources, marine renewable energy has received significant attention in recent decades due to the great potential it represents. It is estimated that only the energy contained in the ocean waves represents between 1 TW and 10 TW. The amount of wave energy available varies according to the geographical area and, mainly, the exposure of the places of interest to the predominant wave regime. In this work an analysis of the spatial and temporal distribution of wave power in the

Mexican and Central American Pacific is performed based on numerical wave simulations for the years 1994 to 2012.

The results show that the mean wave power is higher in the northern region of Baja California, where it reaches values of 35 kW/m. In the rest of the Mexican Pacific and Central American Pacific are observed values of 20 kW/m and less than 15 kW/m respectively. In areas close to the coast, wave power varies between 10 kW/m and 20 kW/m (Figure 1).

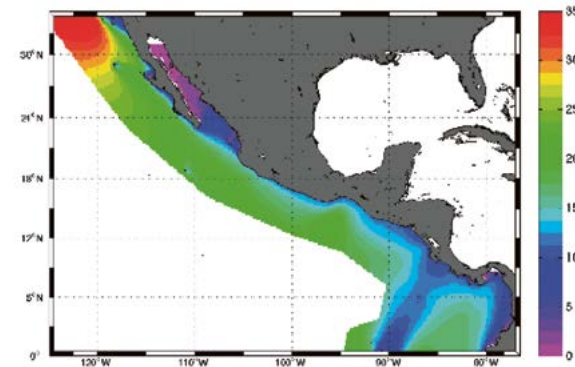


Fig. 1.- Mean wave power of the Pacific of Mexico and Central America.

In general, there is a marked seasonality of wave potential with higher values during the winter in the area of Baja California and during the summer in the rest of the Mexican and Central American Pacific (Fig. 2).

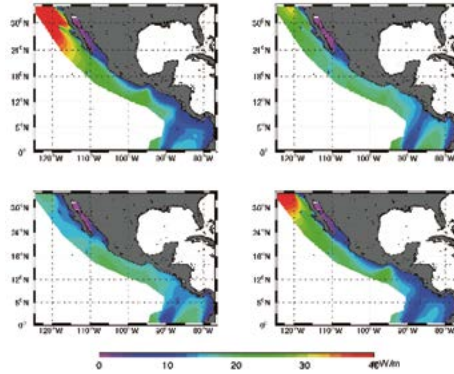


Fig. 2. Seasonal mean wave power of the Pacific of Mexico and Central America.

As part of the results, the characteristics of the prevailing waves are analysed in selected areas to estimate the feasibility of exploiting the resource with current technology (e.g. Fig. 3).

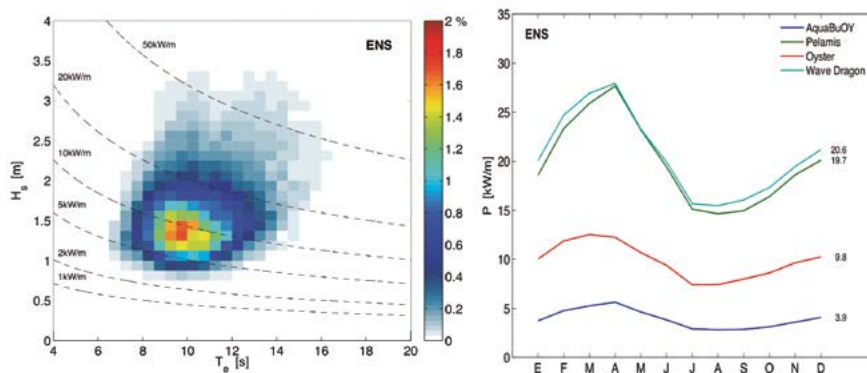


Fig. 3.- Exploitable resource in Ensenada, Baja California, México.
a) Available wave power (joint distribution of wave height and period) and b) monthly extractable wave power with different WEC technologies.

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An aerial photograph of a large body of water, likely the ocean, showing a prominent white wake from a ship moving across the surface. The water is a deep blue color, and the foam is bright white. The text is centered in the upper portion of the image.

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