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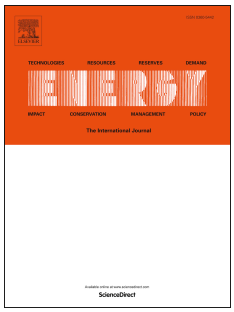

Wave energy trends over the Bay of Biscay and the consequences for wave energy converters

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Wave energy trends over the Bay of Biscay and the consequences for wave energy converters ☆

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Abstract

This is one of the pioneer and preliminary attempt to study the influence of wave energy trends on the absorbed power of wave energy converters. For that purpose, the reanalysis of the past century ERA20 has been calibrated via quantile-matching against the reanalysis ERA-Interim in their intersection period (1979-2010). The validation against four buoys in the Bay of Biscay is presented in this paper, showing a better agreement of ERA-Interim-WAM model when compared to the original ERA20. In addition, calibrated ERA20 shows a significant error reduction compared to the original ERA20. Hence, calibrated ERA20 presents an increment of the wave energy resource, more than 1 kW/m per decade, in the area of study and a general increment of the wave height and wave period throughout the analyzed decades. Finally, using the calibrated series at a given gridpoint in the bay, power absorption of a generic wave energy converter (WEC) is examined, combining the power matrix of the WEC and the two-variable (wave height and period) probability density functions (PDF) of the five do-decades of the past century. Results show important variations of the PDF, which results in significant differences, up to a 15% increase between two do-decades, in the annual mean power production.

Keywords: Wave energy trends, ERA-Interim, ERA-20C, Wave Energy Converters, Fluid Mechanics

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