

A preliminary evaluation of wave energy resource in Peru Basin using offshore buoy data

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ABSTRACT: This paper presents an assessment of the wave energy potential in Peru Basin, based on the analysis of long-term time-series measurements from offshore buoys. The dataset consists of non-directional wave spectral energy derived from time-domain measurements by applying a Fast Fourier Transform and a Response Amplitude Operator. Wave climate parameters were computed from the resulting spectral data. This research is complemented by a second time series containing the mean wave direction associated with the peak-energy period, together with additional standard meteorological parameters. Both datasets span more than ten years, satisfying the minimum duration required for a reliable wave resource estimation. Pre-processing techniques, including the treatment of missing and imbalanced data, were applied prior to analysis. The processed datasets were then examined using univariate, bivariate, and directional statistical methods. Seasonal variability of the exploitable wave energy resource was quantified using theoretical offshore spectra and probability scatter tables over the study period.