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

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ABSTRACT**:** This paper presents a preliminary evaluation of the performance of a heaving point-absorbers wave energy converters deployed in Peru Basin. Offshore buoy time-series measurements from the study area were processed and analysed using long-term univariate, bivariate, and directional statistical methods. Seasonal variability of the exploitable wave power was quantified over the operational period. The device response under both regular and irregular wave conditions was systematically evaluated using two power take-off (PTO) formulations: a generic linear force model and a simplified hydraulic force representation. The effects of the mooring system were incorporated using both quasi-static and dynamic formulations, considering two commonly adopted configurations: a single-line mooring system and a three-leg mooring arrangement. Energy conversion metrics were calculated for selected years at the deployment location. Finally, a site-specific optimization of the energy conversion system was performed.