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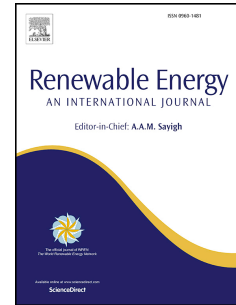
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Modelling effects of tidal currents on waves at a tidal stream energy site.

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Abstract

Whereas tidal stream energy sites may be characterised by significant wave and current interactions, numerical resource assessments routinely ignored these processes neglecting, in particular, current-induced modifications of waves. Here, these effects are investigated in locations exposed to ocean waves, evaluating performances of a phase-averaged numerical wave model to approach observed semi-diurnal modulations of wave heights, periods and directions, off and within the Fromveur Strait (western Brittany), a region with strong potential for tidal array development. The introduction of tidal forcings in the wave model is found to improve predictions by approaching the large-scale influence of current-induced refraction leading to variations of the significant wave height by nearly 30 % at the deep-water wave buoy. The model reproduces furthermore, with the inclusion of an additional dissipation term, the localised steepening and waves breaking on negative current gradients, limiting the overestimation of the significant wave height at the shallow-water wave buoy within the Fromveur Strait. Tidal currents may

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