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Investigation of stochastic similarities between wind and waves and their impact on offshore structures

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Offshore wind farms are increasingly gaining acceptance in the field of energy production. From an engineering point of view, such offshore structures are affected by various sources of uncertainty. The most severe one, is the impact that wave (height and period) and wind processes have, either at the fatigue, and in some cases failure of such structures, or at the efficiency of their energy production. In this work, we are focusing on the stochastic properties of the above processes and on their impacts on offshore structures. By extracting data from gauging stations at the Aegean Sea, we specifically examine the stochastic similarities among the marginal moments and the correlation function with focus on the extremes of the wind velocity and the wave height and period, and we discuss their impacts on open sea structures.