



Investigation of the stochastic structure of wind waves for energy production

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Ocean energy is considered a promising renewable energy resource mainly due to its massive energy potential. State of the art technologies that can harness the ocean dynamics are discussed in terms of their efficiency and cost of energy production. The ocean related process with the highest potential, but also the highest uncertainty, is the wave process generated by wind. We analyze several wind-wave timeseries mostly close to shore but also one of the largest available timeseries located in the Northern Adriatic Sea with almost 40 years of 3 hours resolution of recorded wave heights and periods. We estimate marginal seasonal properties as well as second-order dependence structures in terms of the climacogram (i.e. variance of the averaged process vs. scale) that is shown to be advantageous as compared to more traditional stochastic tools such as the autocovariance and the power spectrum. Finally, we propose a stochastic model that can adequately simulate the observed variability of timeseries in state and scale.