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Investigation of the spatial correlation structure of 2-D wave fields at the Aegean Sea

Alexandra Trompouki, Sofia Efraimia Vrettou, G.-Foivos Sargentis, Panayiotis Dimitriadis, Theano Iliopoulou, and Demetris Koutsoyiannis
Water resources and environmental engineering, School of civil engineering, National Technical University of athens, Greece

The great potential of oceanic energy resources adds a new challenge in the field of off-shore engineering, that of the efficient energy extraction from sophisticated structures in the open sea. An additional challenge that the engineers have to face is the intrinsic uncertainty of the oceanic processes. In this work, we investigate the uncertainty of the wave process through the estimation of the variability in two-dimensional wave height and direction data. These are retrieved from satellite images over the Aegean Sea for a 5-year period with a 3-hour resolution. Particularly, we estimate first-order moments, considering the double seasonality of the wave events, and also the correlation structure in terms of the climacogram (i.e., variance of the averaged process vs. spatial scale). Finally, we discuss on how the spatial dependence of the wave field is affected by various weather events.