



Identifying the different spatio-temporal characteristics of offshore wind and wave energy resource for delivering a more stable power output onto the electric grid

Christina Kalogeri (1), Despoina Rizou (1), George Kallos (1,2)

(1) University of Athens, School of Physics, Division of Environmental Physics - Meteorology, Athens, Greece (kallos@mg.uoa.gr), (2) Weather & Marine Engineering Technologies P.C. (WeMET P.C.)

During the last years, there is an increasing penetration of weather-dependent renewable energy onto the electric grid. The latter poses a great challenge to the grid operators who have to deal with their variable and intermitted nature in order to keep the balance between supply and demand in the network at any given time. Spatial aggregation can be the only solution for reducing the variability of a single resource, e.g. wind power. However, when utilizing more than one resources, the variability of the final output can be reduced, either by taking advantage of the resource diversification at a specific site or by exploiting their geographical diversification. In any case the accurate knowledge of the main characteristics of the resources in terms of availability, variability, coherence and complementarity is a key determinant for selecting the optimum renewable energy mix that produces a reliable and smooth power output.

In this analysis, the combined use of offshore wind and wave energy resource have been analyzed with the use of numerical models and statistical methods. The benefits of their combined use, on the variability of the final power output, were evaluated in different timescales, for the offshore area of Europe, within a ten year period, 2001-2010. Finally, locations where the two resources reveal different characteristics were identified and examined regarding the extent on what the interconnection between them will smooth the final power output.