



## **Local wind speed forecasting and applications to power prediction**

G. Kallos (1), G. Galanis (1, 2), P. Katsafados (1)

(1) University of Athens, Department of Physics, Atmospheric Modeling and Weather Forecasting Group, Athens, Greece

(2) Hellenic Naval Academy, Section of Mathematics, Piraeus, Greece

Wind field prediction at the level of wind farm is still a challenging problem. Different methods have been developed. Most of them are based on downscaling techniques of the wind fields predicted by Numerical Weather Prediction Models (NWPM). Downscaling techniques are necessary to be used because the present application of NWPM cannot capture the local (site) characteristics that are absolutely necessary in wind energy applications. Wind speed at a wind park level cannot be accurately downscaled by applying techniques like neural networks or other systematic error removing procedures. The main reason is that wind is the result of forcing and all these techniques cannot utilize it. A methodology based on Kalman filtering gave promising results within the framework of ANEMOS project. Despite this fact, this methodology did not perform on a satisfactory way under certain conditions, especially in cases with high variability in strength and direction. In this presentation, a new downscaling method for the elimination of systematic errors emerged in the direct outputs of atmospheric models, is presented. It is based on the combination of a classical Kalman filtering method with Kolmogorov-Zurbenko band-pass filters. The technique has been applied on NWPM at areas with different topographic characteristics and weather conditions and different wind farms of the Greek Public Regulator in Crete, Greece. The results obtained so far are promising.