

Offshore wind energy potential in the Mediterranean

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While many parts of the world are not rich in oil, gas and coal, there are huge wind resources available.

Wind power and other renewables provide economic growth, security of energy supply, employment, and technology development, which do not come at the expense of the environment. Exploitation of wind energy will therefore help to stagnate the release of dangerous waste (from other non-renewable energy sources). That sector has a mean growth rate of 30% for the last two years. The total installed wind power capacity objective for 2010 in Europe amounts to 75 GW (EWEA, 2004). The total power currently installed (mid 2004) in Europe is 42 GW. The energy production of a wind farm is closely connected to the wind climate, and accurate measurements are required when planning new sites.

Traditionally, a mast with anemometers measures wind for at least one year in order to estimate the local wind climate. Offshore measurements are costly (typically 1M $\text{\$}$ for 100 m mast) and only produce datasets for a single geographical position. Therefore it is of interest to exploit other methodologies e.g. the use of satellite data. Analysis of the wind climatology over the whole Mediterranean basin is available from two models and from satellite scatterometer data. Two sets of model data are used. One is the ECMWF data (1994-2003) at a 0,5 deg x 0.5 deg grid and the other is the so-called GeoWAsP method. Using this method, geostrophic wind speeds (1985-1997) was calculated from a sea level pressure dataset. WASP $\text{\textcircled{R}}$ was then applied to obtain the wind climate for each 0,5 deg x 0.5 deg grid cell. Quikscat data (1999 -) are resampled into half a degree grid to be comparable with the model grids. The modelled data sets and the satellite data for the mean surface wind speed are compared, and the seasonal variability in the data sets is analysed. Furthermore, the relative frequency distribution from four experimental offshore sites around Italy is analysed: 2 islands (30 years), a platform (10 years) and one buoy (1 year), and from three buoys in Greece. The preliminary results of the study indicate that the largest discrepancies are found in the coastal areas and that the satellite data does not seem to capture the seasonal variability as well as the model data set. An innovative and potentially important application of high spatial resolution Synthetic Aperture Radar (SAR) is for wind resource mapping in coastal regions worldwide. A technique is being developed for combining high resolution wind speeds from SAR with scatterometer data to obtain a map of the local mean wind speed in the coastal region with high spatial resolution (400 m x 400 m). This technique is applied on a site in the Mediterranean and the result is compared with local in situ observations.