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Representation of wind-solar correlations in reanalysis datasets.

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Combining wind and solar power generation has the potential to reduce the overall variability of renewable enery generation. This takes advantage of the fact that low pressure systems tend to be cloudy and windy, whereas high pressure systems usually have clear skies and lighter winds. Reanalysis data is often used to assess the viability of a location for renewable energy production. In this study, reanalysis datasets are used to investigate wind-solar correlations. Two coarse resolution global reanalyses, ERA-Interim and MERRA2, and two high resolution regional reanalysis datasets, MÉRA and a WRF-downscaled version of ERA-Interim, have been compared to correlations calculated using observed data from stations around Ireland.

Variations of these relationships have been investigated on different timescales; with reanalysis data frequently being found to overestimate the strength of the negative correlation between wind speed and shortwave radiation. Correlation values calculated using data binned by wind direction have been analysed to illustrate changes in the relationship between wind speed and shortwave radiation for different wind directions. It has been found that for winds with a northerly component, correlation values tend to be closer to zero. Spatial variability of correlation patterns have also been examined to determine geographical areas with greater suitability for combined wind and solar power generation.