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Monthly Forecasting of Wind Energy

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Power generation from wind is inherently sensitive to weather conditions. Understanding and predicting this variability at a range of temporal and spatial scales is therefore important. Currently, wind forecasts are typically issued for lead times up to approximately two weeks, with 10-12 days being traditionally seen as the limit of predictability. However, recent scientific advances in sub-seasonal forecasting suggest the potential for predictability in the large scale atmospheric flow pattern over Europe in weeks 3 and 4 of the forecast, particularly during the winter season. As large scale atmospheric flow patterns have an impact upon surface conditions (both wind and temperature), there is therefore potential for wind speed predictability at these longer range timescales.

This research aims to assess whether state-of-the-art dynamical weather prediction models, such as the ECMWF VarEPS-monthly forecast, can be used to skilfully forecast wind speed (and power) properties at multi-week lead times. The forecasts are first validated against reanalysis data, and then their performance is benchmarked against a range of simpler 'statistical' weather prediction models. Initial results show that the dynamical model can produce small-to-moderate levels of correlation ($\sim$0.3) when forecasting weekly mean 10 & 100 m wind speeds averaged over the UK at lead times of 3 to 4 weeks. The dynamical model therefore appears to be outperforming simple statistical models such as persistence or climatology at this time-range. Additional work will consider the conversion of forecast skill into end user value in an energy decision making context.