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Improving the skill of sub-seasonal forecasts of wind speed and surface temperature using information from large-scale fields: a proof of concept

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With the continuously increasing share of renewables in the electricity mix, the sub-seasonal predictions of 100 m wind speed and surface temperature, if skillful, can provide significant socio-economic value to the energy sector. In this study, we develop a novel hybrid statistical-dynamical probabilistic prediction model to improve the skill of sub-seasonal predictions of 100 m wind speed (U100) and 2 m temperature (T2m). For the statistical part, multivariate statistical analysis is carried out between the observed gridded large-scale fields such as the geopotential height at 500 hPa (Z500) and the gridded predictand (U100 or T2m) over Europe to obtain weather regimes conditioned on the targeted predictand. The relationship between the predictor and the predictand is then used to 'reconstruct' sub-seasonal predictions of U100 and T2m based on the predictions of Z500, which are more skillful than the surface variables. This is applied on sub-seasonal predictions from the European Centre for Medium-Range Weather Forecasts. The new 50 ensemble members of 'reconstructed' surface fields are combined with the original 50 members of dynamical/direct predictions. The resulting hybrid prediction ensemble is found to be generally more skillful than the dynamical predictions on sub-seasonal timescales.