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Verification of near surface wind speeds simulated by a multi model ensemble with focus on coastal regions

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The knowledge of the wind climate at specific locations is of vital importance for risk assessment, engineering, and wind power assessment. Results from regional climate models (RCM) are getting more and more important to enlarge the investigation from local to regional scale.

In this study we investigate the simulated near surface wind speed by a multi model ensemble carried out in the EU funded project ENSEMBLES. The special focus is on the coastal regions of the Netherlands and Germany. The Southern North Sea and the German Bight are windward coasts, that means the winds blow onshore or parallel to the coast. The main wind direction in this area is West to Southwest.
Within the ENSEMBLES project several participating European institutions run their regional climate models (RCM) for the same European domain (including the Mediterranean and Island) with the same grid size of 0.44° and in a second simulation 0.22°. The simulations use ERA40 reanalysis as forcing data and cover at least the time period from 1961 to 2000.
To verify the near surface wind speed simulated by all participating models we compared daily mean of simulated 10m- wind speed to observation data. With the help of a change detection algorithm and together with the provided stations histories we defined two time windows where as many as possible of the measurements are less disturbed. For the Netherlands we choose observation data of 10 stations for the time periods 1971-1983 and 5 stations from 1971 to 2000, for the German coast it is 13 and 10 stations respectively.

To test the performance of 14 RCMs concerning the simulated surface wind speed in coastal regions, especially the North Sea area, we applied several measures and skill scores to analyse the RCMs performance compared to the driving field and to evaluate accuracy gain by including higher spatial resolution of the grid cell. Results for bias, RMSE, standard deviation but also for Brier Skill Score and Perkins adapted skill score don't show strong seasonal dependence. The differences can be addressed to the calm summer periods and the stormy autumn and winter month where large scale events are more important than local effects. At few stations e.g. Helgoland RCMs show an added value concerning the quantiles assessment of daily mean surface wind speed compared to the driving field.