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Optimization of WRF Forecasts for Renewable Energy Applications in Italy

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The need for accurate numerical weather prediction (NWP) forecasts is rising continuously as the installed power increases. Italy currently has an installed capacity of ∼19 GW photovoltaic (PV) and ∼9 GW wind power. Respective to their high capacity of PV energy, Italy is amongst the 5 world leading countries. To maintain net stability and in order to fully exploit the solar radiation potential, high quality PV power forecasts are desired.

In this work, an adapted WRF setup is presented for renewable energy applications, with a focus on solar radiation in Italy. The quality of the irradiance forecasts is assessed by use of Meteosat Second Generation satellite data. Furthermore, the solar radiation forecasts are converted to PV power and are directly compared with PV power measurements. For validation, ground-measurement data specific to the plant-location and for post-processing methods are available. Shortcomings and possible solutions are discussed.