

4th workshop on assimilating satellite cloud and precipitation observations for NWP



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Cloud and Solar Power Prediction within the Helmholtz Analytics Framework

Solar photovoltaic power plants and grid operators rely on highly accurate and reliable short-term predictions of solar power and the related prognostic variables such as the surface solar irradiance. These on the other hand strongly depend on the proper forecasting of cloudiness and cloud evolution. Cloud scenarios are best observed by satellites. The use of satellite information in prognostic models, resulting in the improvement of the short-term prediction of cloud movement, is an (as yet) unresolved issue.

In operational weather forecast, ensemble forecasts of 50 members are standard. However, to better account for uncertainties resulting from small-scale processes like convection much more samples would be needed. In this project, a large ensemble forecast consisting of 512 members over the time span of 6 months (soon to be one year) and on a 20km resolution grid roughly covering Europe has been created using an ensemble version of the Weather Research and Forecasting (WRF) model. The ensemble members have been evaluated and calibrated using deep neural networks.

In the next step a particle filter will be used for the data assimilation of cloud fields using satellite observations. To overcome the problem of high dimensionality machine learning approaches will be investigated to sample new ensemble members with high probability mass.

This project is part of the Helmholtz Analytics Framework, a cooperation between data scientists and domain scientists to boost the development of domain specific Scientific Big Data Analytics methods.

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