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The impact of the 3DVAR assimilation of SEVIRI radiance on the prediction of solar irradiance forecasts in Italy using WRF Solar mesoscale model

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Solar power generation is highly variable due its dependence on meteorological conditions. The integration of this fluctuating resource into the energy supply system requires reliable forecasts of the expected power production as a basis for management and operation strategies. This is one of the aims of the Solar Cloud project (funded by the Italian Ministry of Economic Development): to provide detailed forecasts of solar irradiance variables to operators and organizations operating in the solar industry. Thus, at the CNR-IMAA was implemented an operational chain that provides forecasts up to 72 hours of all the solar irradiance variables (GHI, DIR, DNI e DIF) at high temporal and horizontal resolution using the mesoscale model Weather Research and Forecasting Advanced Research (WRF ARW) Solar (Jimenez et al., 2016) version 3.8.1 released by the NCAR (National Center for Atmospheric Research) in August 2016. WRF-Solar has been developed with the aim to satisfy the needs of the solar industry, avoiding the excessive computational cost due to the explicit calculation of the modeling of aerosols. The two domains (two way nested) implemented into WRF-IMAA cover respectively the whole Mediterranean basin with 9 km spatial resolution and the whole Italian peninsula with 3 km spatial resolution. The study focuses on the evaluation of the impact on GHI forecast of the assimilation of the Spinning Enhanced Visible and Infrared Imager (SEVIRI) radiance data using the 3DVAR technique. The observational hourly comparison of the Global Horizontal Irradiance (GHI) will be performed with the ground based stations of the ARPA (Regional Agency for the Protection of the Environment). A further comparison will be done with the output from the Advanced Model for the Estimation of the Surface Solar Irradiance (AMESIS) to the aim of evaluating the bias and performances of the different approaches used to retrieve the solar irradiance.