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Cloud nowcasting based on the combined use of MSG cloud estimates and the WRF NWP model.

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Cloud nowcasting (i.e. up to 6 hours ahead) has important applications in fields as weather prediction, solar energy (both active and passive) or civil aviation. Numerical Weather Prediction (NWP) models are the most suitable to obtain these forecast, but current accuracy is far from optimal. Displacement of satellite cloud estimates, using statistical techniques provide reasonable results up to a few hours, when reliability greatly reduces. In this work, we propose and evaluate a new method for cloud nowcasting. The method uses the Weather Research and Forecasting (WRF) NWP model to advect and diffuse MSG based cloud estimates. To this end, cloud index maps retrieved using Heliosat-II algorithms are inserted in WRF model as a tracer. Then, this "tracer" forecasts are evaluate as a cloudiness forecasts. The performance of the model was tested based on the EUMETSAT Satellite Application Facility (SAF) "cloud mask" dataset. The performance of persistence and WRF models cloudiness forecasts were also tested for benchmarking purposes. The evaluation was conducted for the southern half of Spain (∼700 x 400 km), at 3-km resolution grid, for a set of 25 days containing varied sky conditions. Results probed, firstly, the skill of the proposed model against persistence be about 30%, in terms of RMSE, at one hour lead time. In addition the proposed model provide more accurate forecasts than the WRF model up to two hours leading time, when the WRF model showed a better performance.