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Assimililation of MSG1 satellite data in a limited area model using a 1D-VAR algorithm

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The use of new remote observations from satellite platforms makes possible a substantial improvement in the analysed fields for both regional and global models by means of increased temporal sampling, spatial resolution and coverage. To test the impact of data from geostationary satellite in limited area models, observations from Meteosat Second Generation (MSG1) are assimilated through a 1D-VAR algorithm into Lokal Modell (LM) which ARPA-SIM runs operationally to provide weather forecast for Italy.

Firstly, the 1D-VAR approach finds the optimal model state that simultaneously minimises the distance to the observations, and the background model state. Then the retrieved temperature and water vapour profiles are processed by the model assimilation cycle through a nudging technique. Moreover, to take into account the "error of the day" two approches are used to evaluate the error covariance matrix ($\mathcal{B}$); the reference $\mathcal{B}$ matrix is determined following a standard approach where statistics of forecast minus analysis are calculated over the LM domain, while the other realisation is created from mini-ensemble forecast members generated by perturbing physical parametrisations' parameters.

Results are presented for a false alarm case forecast which occured in Friuli-Venezia-Giulia, a north east Italy region, on the 8th of July 2004. Comparisons between precipitation fields from the operational forecast and the ones obtained adding the use of 1D-VAR retrievals are estimated on the base of independent observations such as rain-gauges and radiosondes.