Comparison of 3D fog models and satellite fog/very low stratus products

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Fog and low stratus have a critical impact on transport safety, air quality and within the climate system. High quality predictions and near-real time assessments of fog area are therefore of great economical and ecological relevance.

The plausibility assessment of 3D fog forecasts requires an adequate spatially coherent comparison data set. A fog and very low stratus product derived from geostationary satellite data delivers this information at a sufficiently high temporal resolution. In return, the model output can provide an estimate of satellite-based ground fog detection accuracy (vertical domain). With these aims, a comparison of 3D model fog forecasts with satellite fog classification was performed for selected cases from the COST 722 Lindenberg comparison campaign (9-12/2005). Both 3D fog forecast models run with the same fog microphysics scheme coming from PAFOG (Bott & Trautmann, 2002), but each one has its own dynamical core: LM-PAFOG is based on the "Lokal Modell" of the DWD (Steppeler et. al. 2003), while NMM-PAFOG (Müller et. al. 2005) uses NMM (Janjic et. al. 2001, Janjic 2003). The satellite product makes use of Meteosat 8 data (see Cermak & Bendix, forthcoming). Parameters available are very low stratus area and ground fog confidence level.

For the comparison, the spatial extent of the modeled fog patches was contrasted with the satellite classification on a per-pixel basis. To compensate for the different spatial scales, a bilinear interpolation of satellite cloud confidence levels was performed and compared with the modeled fog presence. Verification is done using ROC computed from different confidence level thresholds. The comparison results show good agreement between modeled and satellite-classified fog area. Further research will focus on ways to operationally incorporate model output into satellite product generation.

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