



Operational forecast products and applications based on WRF/Chem

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The responsibilities of the national weather service of Austria (ZAMG) include the support of the federal states and the public in questions connected to the protection of the environment in the frame of advisory and counseling services as well as expert opinions. The ZAMG conducts daily Air-Quality forecasts using the on-line coupled model WRF/Chem. The mother domain expands over Europe, North Africa and parts of Russia. The nested domain includes the alpine region and has a horizontal resolution of 4 km. Local emissions (Austria) are used in combination with European inventories (TNO and EMEP) for the simulations.

The modeling system is presented and the results from the evaluation of the assimilation of pollutants using the 3D-VAR software GSI is shown. Currently observational data (PM₁₀ and O₃) from the Austrian Air-Quality network and from European stations (EEA) are assimilated into the model on an operational basis. In addition PM maps are produced using Aerosol Optical Thickness (AOT) observations from MODIS in combination with model data using machine learning techniques.

The modeling system is operationally evaluated with different data sets. The emphasis of the application is on the forecast of pollutants which are compared to the hourly values (PM₁₀, O₃ and NO₂) of the Austrian Air-Quality network. As the meteorological conditions are important for transport and chemical processes, some parameters like wind and precipitation are automatically evaluated (SAL diagrams, maps, ...) with other models (e.g. ECMWF, AROME, ...) and ground stations via web interface.

The prediction of the AOT is also important for operators of solar power plants. In the past Numerical Weather Prediction (NWP) models were used to predict the AOT based on cloud forecasts at the ZAMG. These models do not consider the spatial and temporal variation of the aerosol distribution in the atmosphere with a consequent impact on the accuracy of forecasts especially during clear-sky days when the influence of the aerosols can have a strong impact on the AOT. WRF/Chem forecasts of the atmospheric optical properties are used to add information on the incoming radiation during these days. The evaluation of the model with satellite data for different episodes with clear-sky conditions is presented.