# Modelling of aerosol optical properties with CHIMERE and OPAC and validation with Brewer and Cimel measurements at Brussels, Belgium

V. De Bock[1], A. Delcloo[1], A. Mangold[1] and H. De Backer[1]

[1]Observations Department, Royal Meteorological Institute of Belgium, Brussels, B-1180, Belgium
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Presenting author email: Veerle.DeBock@meteo.be

The current UV forecasting model of the Royal Meteorological Institute of Belgium uses climatological monthly Aerosol Optical Depth (AOD) values in order to forecast the UV index for today, tomorrow and the day after tomorrow. In order to improve the UV forecasts, it would be interesting if we were able to reliably predict the AOD for those days, instead of using climatology. Therefore we are investigating the possibility of combining a Chemical Transport Model (CTM), with the OPAC (Optical Properties of Aerosols and Clouds; Hess et al., 1998) software package to model AOD values.

The CTM we use is CHIMERE, a chemical transport model for the prediction and simulation of air quality (http://www.lmd.polytechnique.fr/chimere/, Vautard *et al.* 2001) that provides the chemical composition of aerosol particles up to a height of 5.5km, with data for Brussels going back to 1990. The model is forced by the meteorological fields of European Centre for Medium-range Weather Forecast's ERA-INTERIM reanalysis. The emissions are taken from the EMEP database (Vestreng, 2003). The chemical mechanism used is MELCHIOR (Derognat *et al*. 2003). To be able to use the CHIMERE output as input for the OPAC software package, some alterations (e.g. change of units from µg/m³ to particles/cm³, redefinition of aerosol classes) had to be made.

The OPAC software package provides optical properties in the solar and terrestrial spectral range of atmospheric particulate matter. The optical properties are calculated on the basis of the microphysical data (size distribution and spectral refractive index) under the assumption of spherical particles in case of aerosols. Data are given for up to 61 wavelengths between 0.25 and 40 µm and up to 8 values of relative humidity.

In this research, we are interested in the modeled AOD values at 300, 350 and 500nm since we can validate the modeled optical properties with measured data at those wavelengths from the Brewer spectrophotometer and the Cimel sunphotometer located in Brussels. This will also allow us to gain more knowledge on the optical properties within the UV spectral range where there are still many uncertainties concerning the behavior of aerosol optical properties. Previous research has shown that it is possible to retrieve the AOD using both the direct sun measurements (at 306, 310, 313, 316 and 320nm) as the sun scan measurements (at 340nm) of the Brewer spectrophotometer (Cheymol & De Backer, 2003; De Bock *et al*., 2010). Also the AOD measurements of the collocated Cimel sunphotometer (at 340 and 500 nm) will be used as input for the validation of the model. This poster will present the first results of the comparison of modeled and measured AOD values for Uccle, Belgium.

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