Evolution of aerosol optical thickness over Europe during the August 2003 heat wave as seen from CHIMERE model simulations and POLDER data

A. Hodzic (1*), R. Vautard (1), H. Chepfer (1), P. Goloub (2), P. Chazette (3), L. Menut (1).

1. *Laboratoire de Météorologie Dynamique, Institut Pierre-Simon Laplace, Palaiseau, France.*
2. *Laboratoire d'Optique Atmosphérique, Lille, France.*
3. *Laboratoire des Sciences du Climat et de l'Environnement, Institut Pierre-Simon Laplace, Gif sur Yvette, France.*

(*) Corresponding author. Tel.: +33 1 69 33 48 01; fax: +33 1 69 33 30 05.

E-mail address:hodzic@lmd.polytechnique.fr

This study compares the aerosol optical thickness (AOT) measured at 865 nm by the Polarization and Directionality of the Earth's Reflectances (POLDER) sensor and simulated by the chemistry-transport model CHIMERE during the wide pollution episode that occurred over Europe in the first half of August 2003. The comparison demonstrates the ability of the model to reproduce the main AOT features observed in satellite data, with a general agreement within a factor 2. Although, the observed AOT values are consistently overestimated by the model (30-50%), observed and simulated data are spatially correlated. The quantitative comparison between model and satellite retrieved AOT data remains difficult due to large uncertainties in both satellite retrievals and model simulations. The simultaneous comparison with the ground-based Sun photometer Aerosol Robotic Network (AERONET) measurements suggests the underestimation of POLDER-derived aerosol levels within a factor of 2, and shows the absence of systematic biases in model simulations. The major discrepancies (factor 5) between the model and satellite occur over the Northern Europe on 05-06 August and are due to the influence of smoke particles transported from local fires in Portugal. Those particles have a strong optical signature, and are not taken into account in

model emissions. The comparison also discusses the advantages and limits of the use of satellite data for the model validation.