Evaluating the Impact of Aerosols on Numerical Weather Prediction

Saulo Freitas (1,4), Arlindo Silva (2), Angela Benedetti (3), Georg Grell (4), Wgne Members (5), and Mauricio Zarzur (1)

(1) INPE, CPTEC, Cachoeira Paulista - SP, Brazil (saulo.freitas@cptec.inpe.br), (2) NASA/Goddard Space Flight Center , USA, (3) European Centre for Medium-Range Weather Forecasts, UK, (4) Earth Systems Research Laboratory of the National Oceanic and Atmospheric Administration (NOAA), USA, (5) Working Group on Numerical Experimentation (WGNE)/World Meteorological Organization (WMO), Switzerland

The Working Group on Numerical Experimentation (WMO, http://www.wmo.int/pages/about/sec/rescrosscut/resdept_wgne.html) has organized an exercise to evaluate the impact of aerosols on NWP. This exercise will involve regional and global models currently used for weather forecast by the operational centers worldwide and aims at addressing the following questions: a) How important are aerosols for predicting the physical system (NWP, seasonal, climate) as distinct from predicting the aerosols themselves? b) How important is atmospheric model quality for air quality forecasting? c) What are the current capabilities of NWP models to simulate aerosol impacts on weather prediction?

Toward this goal we have selected 3 strong or persistent events of aerosol pollution worldwide that could be fairly represented in current NWP models and that allowed for an evaluation of the aerosol impact on weather prediction. The selected events includes a strong dust storm that blew off the coast of Libya and over the Mediterranean, an extremely severe episode of air pollution in Beijing and surrounding areas, and an extreme case of biomass burning smoke in Brazil. The experimental design calls for simulations with and without explicitly accounting for aerosol feedbacks in the cloud and radiation parameterizations.

In this presentation we will summarize the results of this study focusing on the evaluation of model performance in terms of its ability to faithfully simulate aerosol optical depth, and the assessment of the aerosol impact on the predictions of near surface wind, temperature, humidity, rainfall and the surface energy budget.