7A.4 Use of the adapted WRF-Chem/GOCART model for regional dust transport simulation over southwest Asia.

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Mineral dust is a key contributor to global atmospheric aerosol loads. These small airborne particulates play a major role in Earth's radiative budget, weather and climate patterns, cloud microphysics, atmospheric chemistry, and ecosystem micronutrient distribution. Dust events are also notorious for creating hazardous conditions on local and regional scales. As a result, numerical dust transport model development has become a priority for the research, operational forecasting, military, and hazard mitigation communities.

Accurate dust emission flux parameterization is critical for reliable dust transport simulation, but the physical processes governing spatial and temporal dust lofting patterns are complex and difficult to model. The Weather Research and Forecasting – Chemistry (WRF-CHEM) model coupled with the Global Ozone Chemistry Aerosol Radiation and Transport (GOCART) dust model has been available to the WRF user community since 2009 and has been a popular tool for dust related forecasting and research needs; however, its algorithms were originally developed for global climate applications. An alternate GOCART emission scheme parameterization option was added to the WRF –Chem suite in 2011 (commonly referred to as Air Force Weather Agency (AFWA) GOCART) to better adapt the model for regional dust modeling.

The purpose of this study is to assess WRF-Chem/GOCART performance using a May 2009 dust case study event that occurred over Iraq, Kuwait, and the Arabian Peninsula. Simulations configured with the original and AFWA_GOCART emission schemes are compared to satellite data and in-situ observations. Recommendations for follow on research are also provided.