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# Development of a dynamic dust-source map for regional dust models based on MODIS NDVI

**Stavros Solomos**[1], Christos Spyrou[1,2], Nikos Bartsotas[1,2], and Slobodan Nickovic[3]
[1]Academy of Athens, Research Center for Atmospheric Physics and Climatology, Athens, Greece
(ssolomos@academyofathens.gr)
[2]National Observatory of Athens, IAASARS, Athens GR-15236, Greece
[3]Republic Hydrometeorological Service of Serbia, 11000 Belgrade, Serbia

The proper representation of dust production in numerical weather prediction (NWP) models depends largely on the detailed mapping of the arid areas that act as natural dust sources. The extend and the strength of these sources varies throughout the year based on aridity and vegetation properties. Such changes are monitored from spaceborne platforms (e.g. MODIS NDVI index). In this work we present a methodology for including a dynamic dust source map in the state-of-the-art NMME-DREAM and WRF-Chem models. This time-varying dust source map is based on the 1000m 16-day averaged Normalized Difference Vegetation (NDVI) from the MODIS/Terra instrument. The methodology is first tested with DREAM-NMM over the Arabian Peninsula. The results indicate significant improvement in simulated AODs over AERONET stations compared to the runs driven by the standard static dust source map. The modeled AOD bias in NMME-DREAM is improved from -0.140 to 0.083 for AOD>0.25 and from -0.933 to -0.424 for dust episodes with AOD> 1. Afterwards we apply the above methodology to the Air Force Weather Agency (AFWA) dust emission module in WRF-Chem model. WRF-Chem has been selected due to its nesting capabilities that permit finer resolution simulations of local scale dust processes. Two sets of simulations have been performed covering the entire Saharan desert, the Mediterranean, Europe and part of the Arabian Peninsula, at a horizontal resolution of 12×12 Km: (1) WRF-Chem control simulations, where dust sources are defined based on the original AFWA code and (2) WRF-Chem experimental simulations where the erodibility of the selected domain is modified based on MODIS NDVI. The selected test period is April 2017 when significant Saharan dust outbreaks took place over the Mediterranean. The simulated AOD from both sets of model runs are validated against AERONET stations. First results verify the successful implementation of the dynamic dust source module in WRF-Chem. The experimental (NDVI) simulations showed an overall increase in dust loads over the entire domain and an improved performance, mostly in areas close to the Saharan desert.