Analyzing the impact of inserting soil moisture retrievals from SMAP to improve dust simulations with WRF-Chem

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Having a good simulation of the soil moisture evolution is desirable to increase the realism of dust emissions and the atmospheric dust load simulation with WRF-Chem. This is because soil moisture increases the cohesive forces of soil particles. Herein we investigate the potential of assimilating soil moisture retrievals from the Soil Moisture Active Passive (SMAP) mission in WRF-Chem. Our analysis focus over the Contiguous U.S. that has important arid regions and a good networks of ground observations. Our analysis focuses on a one year period to go beyond the more frequently examined extreme events (dust outbreaks) and we use the GOCART-AFWA dust emission parameterization. We find an overestimation of the dust load that can be largely mitigated by reducing the dust emissions to just 25% of the default configuration. Comparison of year-long simulations with/without SMAP retrievals and the reduced emissions show added value, although small, as a result of the assimilation. Improving the quality of the retrievals and several model aspects that will be highlighted during the presentation are necessary to further improve the value of soil moisture retrievals for dust simulations in WRF-Chem.