Sensitivity of peak windblown dust emission to soil particle size distribution in CMAQ

Soil particle size distribution is a key factor in the calculation of windblown dust emissions. The soil size distribution directly impacts the ideal threshold friction velocity as well as the total horizontal dust flux predicted. Therefore, the objective of this work is to assess the sensitivity of CMAQ's current windblown dust modeling framework to the soil particle size distribution used. In particular, for the soil types and size distributions more common to the Great Salt Lake Desert (GSLD) and shoreline of the Great Salt Lake (GSL) in Utah. Within CMAQ 5.3.1 twelve broad soil types are defined. Each is comprised of a certain percentage of four general soil populations: Coarse sand, fine-medium sand, silt, and clay. The percentages of each soil population are adjusted in the "Clay Loam" soil type to more accurately represent the composition of the soil native to the GSLD and GSL shoreline. A sensitivity study is then conducted in which the mean mass diameter of each of the four soil populations is varied to examine the resultant effect on peak predicted windblown dust emissions for a given weather event. Additionally, the sensitivity of the ideal threshold friction velocity to particle size distribution is examined as this parameter plays a key role in determining the onset of saltation and thus windblown dust emission in the current modeling framework.

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