A multi-model comparison of dust aerosols and associated processes over Northern Africa and North Atlantic Ocean

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Abstract

A number of global aerosol models are utilized to study global dust distribution and its impact on global climate and echo system, but they also find that the range of the estimated dust from different models is severely diverged, expressing low confidence in our understanding of global dust distribution and its impact. Constraining the divergence between models is challenging due to the complex physio-chemical nature in dust processes and the lack of observational data. This study investigates the source of the divergence using an inter-model comparison conducted over the Northern Africa and North Atlantic Ocean region where dust is the most dominant aerosol. Results from the five models participating the AeroCom experiment are compared using two parameter types of (1) the bulk mean parameters and (2) the normalized mean parameters. The comparison with the bulk parameter confirms previously reported diversity which is the greater than factor of a few differences between models depending on variable type, location, and season. The comparison with the normalized parameter reveals significant qualitative and quantitative differences between models which was unclear with the bulk parameters. Our result can be useful for reducing the divergence between models and for improving models in future development.