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Evaluation of the performances of different aerosol physical parameterisations in the chemical transport model MOCAGE

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The European continent is influenced by different types of aerosols transported from Africa, Asia, North America or by volcanic aerosols. Regional emissions are responsible for most aerosol concentrations that exceed air quality standards, but emissions and long-range transport at a global scale can lead to episodic peaks in concentrations. Our research deals with the improvement of different parameterisation schemes implemented in the chemical transport model of Météo-France MOCAGE. Such improvements are necessary to assess the importance of long-range in respect to short and medium-range transport concerning the aerosol quantities and spatial distribution and to see how episodic events of high aerosol concentrations (volcanic eruptions or desert dust outbreaks) impact the air quality over Europe. An attention is given to the importance of emissions, forcing and particularly deposition processes. Different schemes of in-cloud scavenging and below-cloud scavenging (by rain and snow) have been tested. The results indicate that the deposition processes as well as the differences between tested schemes can play an important role in defining the lifetime, extent and strength of the episodic aerosol events. In-cloud and below-cloud scavenging are not continuous processes, but they also have a local and episodic signature and their representation depends strongly on the precipitation regime in the model. Sensitive tests of these processes are performed to see how they influence and shape the strong aerosol events. Independent observations from satellites (e.g., MODIS, SEVIRI) and the ground (AERONET) have been used to evaluate performances of the tested schemes and configurations within the model. Next steps will consist of the use of data assimilation to further improve the representation of aerosol concentrations in the model.