



Saharan dust source activation: Comparing two years regional modelling results and satellite observations

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The regional-scale model COSMO-MUSCAT is used to simulate emissions and atmospheric distributions of Saharan dust aerosol in the years 2007 and 2008. The results are compared to dust source activation frequencies compiled from dust index imagery from the geostationary Meteosat Second Generation satellite. The comparison of the spatiotemporal distribution of modeled dust emission events with the satellite observations indicates strengths and weaknesses of the model. The observations show strong increase in dust emission frequencies in the year 2008 compared to 2007. The increase in dust emission between those years is less pronounced in the model. Comparison of the sub-daily dust source activation shows that the onset of dust emission is delayed in the model. Simulated dust emission events associated with nocturnal low level jets (LLJs) in mountainous regions are underestimated in the model. While it is possible that LLJs develop too weakly and the their degradation is delayed in the model due to an inappropriate boundary layer parameterization, it is also possible that the spatial model resolution is still too coarse to resolve strong gradients in the topography, such that a model grid cell with a horizontal gridsize of 28 km is represented by a high surface roughness length that leads to suppression of dust emissions in these areas. In contrast, in the northern Sahara the observations possibly underrepresent dust emissions due to the presence of clouds.