Geophysical Research Abstracts
Vol. 20, EGU2018-12385, 2018
EGU General Assembly 2018
© Author(s) 2018. CC Attribution 4.0 license.

Wildfires as a source of mineral dust – a model perspective

Robert Wagner (1), Kerstin Schepanski (1), Michael Jähn (1,2)

(1) Leibniz Institute for Tropospheric Research, Leipzig, Germany (wagnerr@tropos.de), (2) now at: Swiss Federal Laboratories for Material Science and Technology (Empa), Dübendorf, Switzerland

Wildfires, like biomass burning, are a very common phenomenon in semi-arid regions nearly all over the world. Investigations of smoke plumes originating from such wildfires found significant fractions of mineral dust and crust-related minerals within these plumes – raised by strong turbulent winds related to the fire. Since wildfires are not considered as a source of mineral dust in aerosol models so far, a better understanding of the processes, which drive fire-related dust emission, is required.

Therefore, high resolved Large-Eddy Simulations (LES) with the All Scale Atmospheric Model (ASAM) were performed to investigate the impacts of wildfires on the near-surface wind pattern. The analysis of fire-related wind pattern is crucial since the emission of mineral dust is a threshold problem, which means that an efficient mobilization of mineral dust particles requires wind velocities above a certain threshold. The influence of different fire properties (intensity, size, and shape) and different atmospheric wind regimes on the dust emission potential is investigated.

The wind fields derived from the LES fire simulations were coupled with an offline dust emission model to calculate the emission fluxes in dependency on the fire properties and the ambient atmospheric conditions. The gained results can be used to estimate typical values of the emitted amount of mineral dust during wildfires, which can be applied for the development of a parameterization of fire-driven dust emission. With that, an estimation of the importance of the process on a continental scale in relation to other types of mineral dust emissions is possible.