

How dry is Saharan dust?

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Abstract: Mineral aerosols from the Sahara desert play a significant role for the entire primary aerosol effect on the radiation budget over Europe. As these mineral-dust particles can serve as potential cloud condensation nuclei their climate impact might be even more extensive. On the other hand one would expect that air masses from deserts are rather dry.

In the years 2007 - 2010, water vapor profiles have been measured with the differential absorption lidar (DIAL) on Mt. Zugspitze. This lidar additionally yields aerosol backscatter coefficients for the reference wavelength. Saharan dust has been observed many times during that period. In most cases Saharan dust is directly advected from the south towards Mt. Zugspitze in context with the approach of a long frontal system from the North Atlantic Ocean extending to North Africa. This meteorological situation is usually accompanied by strong "Föhn". Dust from the Sahara is typically transported towards the Alps within layers reaching altitudes up to more than 5km asl. Our measurements have revealed that these layers are surprisingly humid with frequently more than 70% RH. We currently investigate the origin of the elevated water vapor which has been observed to be already rather high next to the North African coast. The outcome of this trajectory-based analysis will be presented at the meeting.