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## Ice nucleation properties of mineral dust particles: determination of onset $RH_i$ , IN active fraction, nucleation time-lag, and the effect of active sites on contact angles

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**Abstract.** A newly developed ice nucleation experimental set up was used to investigate the heterogeneous ice nucleation properties of three Saharan and one Spanish dust particle samples. It was observed that the spread in the onset relative humidities with respect to ice ( $RH_i$ ) for Saharan dust particles varied from 104% to 110%, whereas for the Spanish dust from 106% to 110%. The elemental composition analysis shows a prominent Ca feature in the Spanish dust sample which could potentially explain the differences in nucleation threshold. Although the spread in the onset  $RH_i$  for the three Saharan dust samples were in agreement, the active fractions and nucleation time-lags calculated at various temperature and  $RH_i$  conditions were found to differ. This could be due to the subtle variation in the elemental composition of the dust samples, and surface irregularities like steps, cracks, cavities etc. A combination of classical nucleation theory and active site theory is used to understand the importance of these surface irregularities on the nucleability parameter, contact angle that is widely used in ice cloud modeling. These calculations show that the surface irregularities can reduce the contact angle by approximately 10 degrees.

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