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Activation of coated dust particles in desert environments

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Atmospheric dust particles which are coated with inorganic chemical species are known to activate to seed cloud droplets. But the role of dust activation in the modulation of the activation spectrum and the physical and chemical processes involved are not well established. In this study, air craft observations in an arid region, Saudi Arabia, and an aerosol activation model that represents the aerosol processes explicitly are used to understand: (a) how coated dust particles contribute to the concentration of activated particles, (b) the efficiency of coated dust particles compared to that of inorganic particles, (c) how different concentrations of coated dust and the composition of the coating modify the activation spectrum. The aerosol model used for this study is based on a modified version of the Modified Eulerian and Lagrangian Aerosol Model (MELAM) that represents the activation of dust via Gorbunov-Hamiltonian formalism.