

The role of clouds in the transport of aerosol particles

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Aerosol particles not only affect the formation of precipitation elements and the optical properties of the cloud, the clouds also impact the characteristics of the aerosol particles. A lot of effort has been made to clarify the role of aerosol particles in the formation of cloud and precipitation elements, and the effect of clouds on aerosol particles. Numerical models able to simulate these complex processes have been improved significantly for the last two decades. In the early version of numerical models a simple, arbitrary assumption was made about the number concentration of cloud condensation nuclei.

Our model, developed recently, is able to simulate how drops form on the aerosol particles depending on their size distribution and chemical composition. Different types of scavenging mechanisms are taken into consideration in the model. Tracking of the aerosol size distribution and calculation of the regeneration of aerosol particles allow us to simulate how the clouds affect the characteristics of the aerosol particles.

Results of our numerical model about the cloud - aerosol interaction in warm clouds will be presented:

The results show that number concentration of the water drops formed in the cloud depends not only on the number concentration of water soluble aerosol particles but also on the competition for the available vapor between the aerosol particles containing different chemical compounds.

Due to the collision – coalescence of the water drops, size distribution and chemical composition of the aerosol particles change depending on the initial concentration and chemical composition.

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