

The RAL Seminar Series



NCAR

The Effects of Aerosols on Clouds and Precipitation

by

Amit Teller

National Center for Atmospheric Research
ASP / RAL

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Foothills Lab Building 2, Room 1022
3:00 p.m.*

Recent numerical cloud modeling studies and observations show that an increase of aerosol loading due to air pollution can either increase or decrease precipitation from mixed phase convective clouds depending on the environmental conditions. Currently, none of these studies provide a quantitative evaluation of the relative contribution of these factors to precipitation suppression or enhancement. Other aerosol properties that were found to have an effect on precipitation are the presence of giant Cloud Condensation Nuclei (GCCN) and the concentration of Ice Nuclei (IN).

It is essential to study the interactions of aerosol, clouds and precipitation because changes in rainfall distribution due to increased air pollution will strongly affect semi arid regions. In addition, increases or decreases in rainfall in one region could affect rainfall downwind.

The Tel Aviv University 2D single cloud model was used for studying the interaction of aerosol, clouds and precipitation. This model is a useful tool for such research because it uses a bin-microphysics approach that is able to provide a detailed description of the cloud microphysical processes while total mass of cloud particles and water vapor is conserved. In addition it can track the size and mass distributions of the cloud particles during the cloud lifetime. The simulations were initialized with different aerosol and atmospheric condition and a sensitivity analysis was carried out in order to study the effects of these factors on precipitation and other cloud properties.

A summary of this study will be presented in the seminar as well as a short discussion about the next stage of the research that will use a new bin-microphysics scheme coupled with WRF model.