



Aerosol cloud interaction in mixed phase cloud

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The talk will focus on recent modeling, field and laboratory studies concerning the interaction of aerosol and mixed phase clouds. The key and complex issue of mixed phase cloud will involve a discussion of the microphysical processes responsible for the formation of the precipitation. Recent modeling studies investigating the role of Cloud Condensation Nuclei, Ice Nuclei and secondary ice particle production processes will be presented. These will be compared to the results of recent field studies in a range of cloud types. These will include the projects CLACE (Jungfraujoch), EMERALD 2 and ACTIVE in Australia, and recent field studies performed in Cirrus and mixed phase frontal clouds over the UK using the new BAE 146 aircraft.

Results will be presented which show that in some conditions apparently mixed phase clouds actually contain neighbouring regions of predominantly ice cloud and predominantly supercooled water cloud.

It will be shown that despite the importance of secondary ice processes a key issue is the availability of heterogeneous Ice Nuclei. These play a key role in both the microphysics and dynamics of the cloud system. This is due to changes in the rate and pattern of glaciation resulting in changes to the pattern of latent heat release in the cloud.

The sensitivity of the production of precipitation to the loading of Cloud Condensation Nuclei and Ice Nuclei entering the cloud will be discussed. It will be shown that no simple relationship exists between precipitation and aerosol in these systems. This is due to the complexity of changes in the cloud microphysics and cloud dynamics in a mixed phase system. The competing physical processes controlling the precipitation production a range of different regimes will be explained.