

Observation of Dust in the Earth's Mesosphere

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There is substantial interest in the dusty plasma of the Earth's mesosphere at altitudes between 50 and 100 km. Two kinds of dust grains need to be considered: nanometer-size smoke particles originating from ablated meteoric material and thin mesospheric ice clouds forming at high latitudes during summer. While the ice clouds can be observed remotely by optical methods from ground and space, remote sensing of the smoke grains has so far been restricted to indirect indications from radar data. The most direct way to obtain information about both dust populations are in situ measurements by sounding rockets.

In this presentation, we review some rocket-borne measurements. Direct sampling of mesospheric smoke has recently been performed by the MAGIC project. Other recent rocket-borne studies concern the charged fraction of mesospheric dust. Both negatively and positively charged populations have been identified. In order to better understand dusty plasmas measurements in the mesosphere, we will address some basic questions: What fraction of the mesospheric dust is actually charged? How do aerodynamic effects influence rocket experiments? How do surface interactions influence the charge detection? Why is a continuum plasma approach insufficient for the dusty plasma of the mesosphere?