

MESOSPHERIC AEROSOL PARTICLE DETECTORS

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Two instruments have been developed to detect charged aerosol particles in the mesosphere. The first is a flat charge collecting graphite surface on the skin of the rocket that has returned data in several sounding rocket campaigns. The collection surfaces have permanent magnets behind them to provide shielding from electrons. Some of the probes also have an electrical bias to repel light positive ions. Two probes, one with and one without an electric bias have been launched in January 2005 from Esrange, Sweden, as a part of the MAGIC campaign. The probes have detected a distinct layer of aerosols at around 82 km altitude. The second instrument has been developed to detect charged, sub-visible aerosol particles in the upper atmosphere. The instrument is designed to fly on a sounding rocket and has a 30 square centimeter entrance slit. Venting ports are placed lower on the detector in order to let the air out and reduce pressure buildup inside the detector. The air sample flows between four pairs of graphite electrodes biased symmetrically with increasing bias potentials. Electrons, light ions, cluster ions and heavy charged aerosol particles of both polarities are collected mass-selectively on the electrodes that are connected to sensitive electrometers. Direct Simulation Monte Carlo (DSMC) codes have been used to optimize the supersonic airflow within and around the instrument. A laboratory prototype of the instrument has been fabricated and calibrated using low energy ion beams. The instrument is scheduled for launch in the summer of 2007 from Andoya, Norway. These in-situ measurements are planned to coincide with the Aeronomy of Ice in the Mesosphere (AIM) mission. Acknowledgement: The project is supported by NASA.

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