



## **In situ observations of charged particles in the polar winter mesosphere: first results**

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In 1980, Hunten et al. suggested that meteor ablation products in the upper mesosphere should recondense and form so called meteoric dust particles with typical radii of just a few nanometers. Since then, it has been argued that these particles play an important role for example for the nucleation of noctilucent clouds and for the chemistry of meteoric metals. Only recently it has also been hypothesized that their presence could significantly change the water vapour budget at altitudes around  $\sim 70$  km through heterogeneous reactions between hydrogen and oxygen on their surface. Despite their obvious significance, attempts to directly measure these particles and prove their existence have turned out to be extremely challenging, mainly because of their tiny dimensions. In the current paper we report initial results from a recent sounding rocket campaign that took place in October 2004 from the Swedish rocket launch site ESRANGE. During this campaign, one scientific payload was launched carrying the prototype of a newly developed particle detector to measure meteoric dust particles, several fixed biased Langmuir probes to measure relative profiles of positive ion and electron concentrations, and a 3-frequency Faraday rotation experiment to measure absolute electron number densities. In addition, ground based lidar observations provided information on the background temperature and density profile. At altitudes between 80 and 90 km, the particle detector provided clear evidence for positively charged particles with charge number densities of several hundred elementary charges per  $\text{cm}^3$ . In the same altitude range, the comparison of positive ion and electron num-

ber densities suggested the presence of negative ions. These findings will be discussed on the basis of a particle charging model in combination with a detailed model of the positive and negative ion chemistry. In addition, we will report on our plans to continue such measurements in the future in the scope of the recently funded sounding rocket project ECOMA (= Existence and Charge state Of Meteoric dust particles in the middle Atmosphere).