Refinement of the DROPPS polar summer mesosphere particle data

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The two Black Brant payloads flown during the DROPPS (Distribution and Role of Particles in the Polar Summer Mesosphere) rocket program were launched during early July, 1999 from Andøya Rocket Range (ARR), Norway. The purpose was to investigate the polar summer mesosphere, particularly polar mesospheric summer echoes (PMSE). Both DROPPS payloads included front mounted side by side Particle Impact Detector (PID) charge and mass telescopes. Computer simulations have shown that the PID telescopes have the potential to detect atmospheric ice particles within the mesosphere having dimensions of a few nanometers. Ice particles of nanometer size are believed to be responsible for PMSEs through the process of scavenging. Evidence for this process is suggested by the presence of an electron "biteout" observed in the same region as the observation of nanometer size particles at an altitude of $\sim$82-87 km over Andøya during the first DROPPS launch sequence. Evidence for this dusty plasma was observed independently by several instruments aboard the DROPPS payload.

By comparing PID observations with the computer simulations we can obtain information concerning the properties of the PMSE particles, including their "rocky" core size, ice mantle thickness and distribution. We have previously presented results from an analysis of the two detectors that suggested on the first flight particles with radius of approximately 2 nm were present in the PMSE layer. We have recently realised that our interpretation of the PID data required further refinement. For example, we have now determined via computer simulations that atmospheric ions do not enter the PID telescopes due to the front grid's electric field and, consequently, that the current observed on the second PID grid appears to be due to Lyman alpha photo-emission. This realization has forced us to reinterpret both the mass and charge PID telescope data that we have previously presented. This talk will introduce the findings from the new analysis.