UNDERSTANDING THE NEAR-EARTH MICROMETEOR ENVIRONMENT USING RADAR MEASUREMENTS

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We discuss results of meteor head-echo observations conducted using the 430 MHz dual-beam Arecibo (AO) radar in Puerto Rico and the 50 MHz Jicamarca (JRO) radar in Peru. The seasonal behavior that is reflected in the fast component of the micrometeor velocity distribution measured at AO is explained by a micrometeor radiant distribution centered at the Earth's apex. This proposed radiant distribution is derived from meteor measurments using JRO in interferometric mode. We conclude that these and probably every other high power/large aperture radar, only detect this Apex-centered dust population. No evidence of other meteoroid sources becomes apparent from these observations. Additionally we present specular meteor trail measurements from the quasi-all-sky meteor radar system. This system was installed in 2001 to measure the horizontal wind field in the mesosphere and lower thermosphere (MLT) region. The diurnal and seasonal variability of the meteor flux observed over the South Pole indicate that most of the activity occurs during the Antarctic summer around a very concentrated region of the sky in elevation and azimuth. These results agree with previous Arctic meteor observations and suggest that most of the flux is concentrated around the ecliptic plane. This also is in agreement with the Apex-centered dust distribution detected by the HPLA radars. We also show that in order to explain the diurnal and seasonal variability of the meteor rate detected at AO and JRO an atmospheric filtering effect must exist produced by the early and higher ablation of micrometeors, which enter the atmosphere a low elevation angles. These particles probably reach high temperature at higher altitudes and deposit some or all their material before they penetrate deep into the MLT region.

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