UHF and VHF Meteor observations using the Arecibo and MU radars

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This paper reviews and updates the meteor observations made at the Arecibo observatory as well those made using the Japanese Middle and Upper (MU) atmospheric radar over the past decade. We also discuss potential scattering mechanisms associated with the Arecibo and MU observations and their potential implications.

The first Arecibo meteor results were reported by Zhou et al. (*J. Atmo. Terr. Phys.*, **57**, 421, 1995) using the time-integrated data collected for the background ionosphere. Despite that the early observations could not resolve the time-duration, it is clear that the Arecibo radar sees meteors as faint as visual magnitude +16, the faintest meteors observed by any ground based instrument. Subsequent meteor observations at Arecibo have been using the raw-data taking mode to resolve the time resolution to a milli-second and height resolution to 150 m (Mathews et al., *ICARUS*, **126**, 157, 1997; Zhou and Kelley, *J. Atmo. Terr. Phys.*, **59**, 513-521, 1997). The evolution of meteor observations and signal processing techniques was reported by Mathews et al. (*J. Atmos. Solar-Terr. Phys., submitted, 2002*). Simultaneous meteor observations have also been made of the Arecibo 430 MHz and 47MHz radars (Zhou et al., *Radio Sci.*, **33**, 1642, 1998). Janches et al. reports accurate measurements of meteor deceleration with a single feed (Janches et al., *ICARUS* **143**, 347, 2000) as well as with the more recently available dual beam (Janches et al., *J. Geophys. Res.* Submitted, 2002).

Dedicated meteor observations made by the MU radar operated by the Kyoto University reveal the existence of field-aligned irregularities (FAI) within each meteor trail (Zhou et al., *Geophys. Res. Lett.*, 2000). Because of the ubiquitous presence of FAI echoes, they potentially may affect extraction of winds and ambipolar diffusion coefficient from meteor trails. We also discuss some theoretical calculations of the aspect sensitivity of meteoric FAI echoes.