Evolution of meteor trails and its dependence on altitude

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Using data collected from the Jicamarca Radio Observatory (JRO) 50 MHz radar (11° 57′ S, 76° 52′ W, ~1° dip angle) in June 2007, we look into the evolution of meteor trails, particularly with respect to altitude. The development and structure of meteor trail echoes, especially Range Spread Trail Echoes (RSTE) shows a remarkable dependence on altitude. The formation of these echoes was earlier reported to be restricted only between 95-105 km but they were later found to occur from throughout the meteor zone i.e. 80-120 km [*Malhotra et al., 2007b, Journal of Geophys. Res., doi:10.1029/2007JA012576*]. We look at the structural and hence, formation differences between these echoes throughout this (80-120 km) altitude range. On the basis of these significant differences, we report a new class of meteor trails – in addition to the well known RSTEs and classical/specular meteor echoes. A separate receiving array was constructed and operated at Carapongo [*Malhotra et al., 2007c, Geophys. Res. Letters, doi:10.1029/2007GL032104*] approximately 6 km from the main Jicamarca array. Signal was transmitted from the main 50MHz Jicamarca array and received both at independent modules of the Jicamarca array and the receive-only Carapongo array (11^0 59′ 56.51″ S, 76^0 52′ 15.09″ W). The combined common volume observations from these two systems lend a new and unique perspective in understanding not only the scattering processes associated with meteor trails, but also the development and evolution of meteor trails. The interferometric capabilities of the Jicamarca array allow us to determine the positions of these events, thus eliminating any range ambiguity.