[ATM-02] On the Seasonal Variation of Meteor Decay Times Measured by a Meteor Radar at King Sejong Station(62°S, 58°W), Antarctica

Jeong-Han Kim[1], Chang-Sup Lee1, Yong Ha Kim[1], and Geonhwa Jee[2]
[1]*Department of Astronomy and Space Science, Chungnam National University, Daejeon*
[2]*Korea Polar Research Institute, Incheon*

A meteor radar, installed at King Sejong Station (KSS), Antarctica in February 2007, has been detecting numerous meteors more than 18,000 per day. Meteors entering the earth's atmosphere reveal much information on the atmosphere through the process of interacting with the increasingly dense air molecules, especially the altitude region between 70km and 100km. Meteor decay times measured by a meteor radar have been used to infer the atmospheric temperature and pressure under the assumption that diffusion is the only process for decay of meteor echo signals. However, meteor decay times measured over KSS decrease with decreasing altitude below 80~85 km, clearly opposite behavior to the diffusion assumption for meteor decay. The monthly averaged height profiles of meteor decay times show a maximum at 80~85km, which appears at higher altitude during southern summer season than winter. This feature was previously attributed to additional removal of meteor trail electrons by icy dust particles in the cold mesosphere. Models of meteor decay time with dust particles (Havnes and Sigernes, 2005; Younger et al., 2008) predict shorter decay times for weak echoes than strong echoes, which was supported by some of previous observations (Ballinger et al., 2008; Singer et al., 2008). However, our measured meteor decay times are generally shorter for strong echoes than for weak echoes in the altitude region of about 70~90km. In addition, height profiles of meteor echo power and SNR (signal-to-noise ratio) show steep decreases below 80~85km, indicating fast extinguishing mechanism of meteor trails even in the beginning stage at the low altitudes. These characteristics found in our data may imply fast removal of plasma/electrons other than absorption by dust particles. We will discuss about other possible mechanisms related with D-region chemistry.