Multi-Static Meteor Radar
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Meteor Radars have long been used to study upper atmospheric dynamics and the space atmosphere interaction region (SAIR). Of particular interest are winds in the mesosphere and lower thermosphere (MLT), which play an important role transporting heat and momentum from the lower atmosphere into the upper atmosphere.

The radars operate by transmitting radio waves skyward which are then reflected from the plasma trails of ablating meteors entering the Earth's atmosphere. The reflected signals are then received by an interferometric array of receiving antennas, from which various meteor properties such as angle-of-arrival, Doppler shift, and the decay coefficient are derived. Finally, neutral winds are inferred from the radial velocities of the meteor plasma trails.

Traditionally, such systems are comprised of a single transmitter co-located with an interferometric array of receivers. One drawback of this design is that the radar can only receive energy reflected from the meteor in the backscatter direction, leaving the potential to miss detections of meteors whose energy is scattered elsewhere. Another limitation is that upper atmospheric winds, which are computed as a point measurement from an ensemble of meteor detections, are necessarily assumed to be homogenous over a wide geographic range.

This work will discuss recent work in multistatic meteor radar and its role in alleviating the limitations of monostatic systems. One thrust area is the addition of multistatic receiving capability to existing meteor radars. Another thrust area is the combination of overlapping observation volumes of existing monostatic systems to achieve a diversity of viewing angles of the same volume.

Meteor radar in multistatic configuration can help increase understanding of the MLT region by increasing the spatio-temporal resolution of wind measurements, and allowing for relaxation of the spatial homogeneity assumption, working toward true vector field measurements.