Ultra-multichannel meteor wind observation with the MU radar andcalibration of interferometer with airplane echoes

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The MU radar meteor echo observation with 1 MW transmission power has been used to derive precise horizontal wind velocities in the MLT region (80 - 100 km). A new receiving system with a 29 digital quadrature detection installed in 2004 has been applied to develop 25 channel imaging meteor echo observation. Coherently integrated 25 channel receiving signals improved the SNR of meteor echoes significantly, and meteor echo number became as large as 50,000 per a day, which is about five times of previous meteor observations with the MU radar. The high-rate meteor echoes were utilized to detect horizontal distribution of wind velocity field of about 50 km scale. The limited area for determining wind velocity significantly changed the characteristics of wind velocity variation within the field of view (FOV) of 300 - 400 km, and enabled to detect wind perturbations due to horizontally propagating waves such as gravity waves. External receiving systems at remote sites for measuring forward scatter of meteor echoes are being built, which also will contribute to clarification of detailed horizontal/vertical structure of MLT region, as well as meteor orbits.

The 25 channel interferometric observation need a precise calibration of phase offset between the antennas/receivers. This is important for meteor observation because single Yagi antenna is used for each receiving channel rather than to use subarrays of 19 Yagis. Echoes from airplane at around 10 km altitude is used for phase calibration together with the optical observation of positions of airplane with a video camera with an image intensifier. The airplane echoes of evening hours when frequent flights are observed between Nagoya and Osaka are applied for such calibration. The details of phase calibration and its effect will be reported.