An intercomparison of meteor radar measurements using two different processing systems

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A new meteor radar system was installed at the Amundsen-Scott station South Pole in 2001 to further the understanding of the dynamics of the Antarctic region. This radar system operates at a frequency of 46.3MHz and transmits a 36us Gaussian pulse every 305 ms. The antenna array consists of 4 yagis pointed along the 0, 90, 180 and 270 degree meridians and 5 dipoles arranged in a cross configuration and operating as an interferometer to provide position measurements for the detected radio meteors. The 4 yagi antennas are time division multiplexed and used for both transmitting and receiving while the 5 dipole antennas are only used for reception. All of the dipoles and the output from the yagi antenna switch are connected to a 6 channel receiver.

The current arrangement of data acquisition systems at the South Pole allows the collection of meteors in a configuration similar to the previous meteor radar system that operated at the South Pole in the mid-1990s and also using an interferometer to accurately determine the meteor positions in the sky, which enables the determination of the vertical structure of the observed waves. This has been accomplished through the use of multiple data acquisition and post-processing systems. These systems, COBRA and MEDAC, were developed independently. With two separate data acquisition systems operating in parallel we have the ability to directly compare the results and understand the inherent variability in the derived scientific results based on different system architectures and processing assumptions. Results will be presented for the determination of the meteor ranges, Doppler velocities and horizontal wind speeds. The impact of operating a system without an interferometer and the impact on the amplitudes of the observed wave components will also be considered and presented.