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Title: Retrieval of refractivity profiles from GPS downward-looking occultation data obtained at Mt. Fuji in 2003

Abstract:

Downward-looking (DL) GPS radio occultation can provide an estimate of the atmospheric refractivity profile with high vertical resolution below the altitude of GPS receiver. With the objective of obtaining water vapor profiles within the atmospheric boundary layer and lower troposphere, the DL experiment was performed on the top of Mt. Fuji in 2003 summer. The GPS receiver, NovAtel OEM-4, and a high gain antenna were installed at Mt. Fuji weather station located at an altitude of 3.8km. On average, the numbers of daily occultation that included the negative elevation angle were 15 events. The main observations are bending angles as a function of the impact parameters, which are derived from the observed phase of the GPS signal. The observed bending angles are grouped into a set of negative and positive elevation angles. Subtracting the bending angle of the positive elevation part from that of the negative part at the same impact parameter gives the partial bending angle. Assuming the spherical symmetry, Abel inversion can be applied to profiles of partial bending angle. We succeeded in deriving the refractivity profiles from the DL measurement data by applying Abel inversion. The retrieved refractivity profiles agree with the radiosonde observations. We discuss the accuracy of the retrieved refractivity statistically. In addition, we show temperature and water vapor profiles derived from the refractivity profiles with one-dimensional variational technique.

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