

REFRACTIVITY PROFILE OBTAINED BY ABEL INVERSION FROM A DOWN LOOKING GPS RADIO OCCULTATION EXPERIMENT AT MT. FUJI: PRELIMINARY RESULTS AND FUTURE PLAN

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Down Looking (DL) GPS radio occultation can produce an estimate of the atmospheric refractivity profile. The main observations are the bending angle as a function of the impact parameter. DL provides both negative as well as positive elevation angle measurements. Abel inversion can be operated on a profile of partial bending angle found by subtracting the positive elevation measurement from the negative one with the same impact parameter. Abel inversion requires the spherical symmetrical assumption. Basically, partial bending calculation removes the ionospheric bending and hence it is possible to use a single frequency GPS receiver.

The DL measurement experiment was performed in collaboration with JPL on the top of Mt. Fuji from July 10 to September 25, 2001. The GPS receiver, Turbo Rogue SNR-8000, and chock ring antenna were installed at an altitude of 3776m. On average, the numbers of daily occultation that included the negative elevation angle were six events. We succeeded in deriving the refractivity profile, which was consistent with the radio sonde observation, from these DL measurement data by applying Abel inversion. However, those DL measurement data were unable to provide enough height range to measure the refractivity profile within the atmospheric boundary layer, because the measurements were often stopped before the occulting GPS satellite went down below the horizon. Consequently we plan to install a high gain antenna at Mt. Fuji and carry out the experiment from July 18 to September 26, 2002.

For the future, we intend to realize DL measurements from an airplane with the aim of extending the observation range. Therefore we organize a project team, and plan to develop a new GPS receiver system optimized for DL measurements. For the airplane occultation case, more investigation is needed to include the effect of the asymmetry of the atmosphere.