

Refractivity profile retrieved from down-looking GPS radio occultation using Abel inversion: simulation study

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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 current paper introduces a simulation data for the case of a receiver on top of Mt. Fuji. The simulation uses model refractivity from MSIS Model as well as radiosonde data. Random noises are added to the bending profile before inversion. The result shows that it is possible to produce accurate vertical refractivity profile below the receiver altitude. The calculation of the water vapor profile is also made using temperature profile information from the MSIS Model as well as radiosonde. The errors in the retrieved vapor profile are always less than 0.1 mbar.