Effect of the terrestrial ionosphere on the radio occultation measurement of Martian ionosphere

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We are preparing for the radio occultation experiment by the NOZOMI spacecraft. NOZOMI has an Ultra Stable Oscillator to emit two coherent radio waves, S(2.3GHz) and X(8.4GHz) bands. The frequencies of radio waves are perturbed when the ray passes through the Martian atmosphere. The pressure and temperature profiles of the neutral atmosphere and the electron density profile will be derived from the frequency perturbation. The NOZOMI's radio communication system will allow us to fulfill radio occultation measurements of Martian atmosphere with vertical resolutions as high as US previous spacecrafts. We investigate the effect of the fluctuations of the plasma density in the terrestrial ionosphere on the NOZOMI's radio occultation experiment.

We are preparing for the radio occultation experiment by the NOZOMI spacecraft, which was launched last summer. NOZOMI has an Ultra Stable Oscillator to emit two coherent radio waves, S(2.3GHz) and X(8.4GHz) bands. The frequencies of radio waves are perturbed when the ray passes through the Martian atmosphere. The pressure and temperature profiles of the neutral atmosphere and the electron density profile will be derived from the frequency perturbation. The NOZOMI's radio communication system will allow us to fulfill radio occultation measurements of Martian atmosphere with vertical resolutions as high as US previous spacecrafts.

This experiment has several error sources: 1.fluctuations of the USO frequency, 2.deviation of atmospheric structure from spherical symmetry, 3.fluctuations of the plasma density in the interplanetary space, 4.fluctuations of the plasma density in the terrestrial ionosphere, 5.registration error at USUDA. Here we investigate the effect of the fluctuations of the plasma density in the terrestrial ionosphere on the NOZOMI's radio occultation experiment.

The fluctuations of the terrestrial TEC (total electron content) along the ray path from NOZOMI will be estimated from the several GPS(Global Positioning System) data. Two coherent signals from a GPS satellite can be used to estimate the TEC along the ray path from GPS spacecraft. We discuss the detection limit of the electron density of Martian ionosphere.