



Profiles of Atmospheric and Ionospheric Refractivity from Radio-Occultation Experiments at Mars with Mars Express.

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A Radio occultation experiment is the remote sensing technique of planetary atmospheres and give information on number density, pressure and temperature of the neutral atmosphere and electron density of the ionosphere.

The observables are the frequency shifts from refractive ray bending of a radio carrier signal exchanged between the spacecraft and the ground station on Earth.

With the assumption of spherical symmetry, the frequency shifts are directly connected to the bending angle, which specifies the cumulative change of the ray path in ray direction. An Abel transform of the bending angle yields vertical profiles of refractivity, which are finally translated into vertical profiles of number density, pressure and temperature by using the hydrostatic equation of state and the ideal gas law. In the ionosphere, the electron density is directly proportional to refractivity.

Refractivity profiles of the Mars atmosphere and ionosphere have been recorded by the Radio Science Experiment 'MaRS' on Mars Express almost daily during the first occultation season from March to August 2004.