IMPACT OF THE IONOSPHERE ON GNSS RADIO OCCULTATION RETRIEVALS.

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Stratospheric retrievals using GPS radio occultation (GPSRO) are affected by raypath bending in the Earth's ionosphere. The standard approach to calibrating the ionosphere is forming a linear combination of the bending angles from the two GPS frequencies. However, due to raypath separation of the two GPS signals, not all ionospheric effects are eliminated with this combination. In addition, so-called "higher order" residual errors occur since the bending angles depend on frequency terms of higher order than the dominant inverse-quadratic form. We are analyzing ionospheric error from two perspectives: analytically to describe the higher order dependence on bending angle, and via simulation. Our simulation studies use ray-tracing calculations combined with realistic electron density profiles from the Global Assimilative Ionosphere Model (GAIM) to characterize the impact of raypath separation. GAIM has been run for solar minimum, solar maximum, geomagnetically quiet and disturbed conditions incorporating ionospheric measurements to produce realistic electron density fields. We will present our calculations of ionospheric error versus altitude under different ionospheric conditions, and describe possible mitigation strategies and algorithms to reduce the error.