IONOSPHERIC CONSTRAINTS AT MARS DERIVED FROM SURFACE AND ORBITING ASSETS.
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Abstract: Martian landers and rovers such as Curiosity, Perseverance, and Insight use relay radio communication at UHF frequencies to transmit data and receive commands via orbiters such as MAVEN, MRO, and TGO in pre-arranged combinations of spacecraft. As radio waves propagate from surface to space, they are attenuated by electrons in the ionized region of the Martian atmosphere. This ionized region, referred to as the ionosphere, contains variable electron abundances that can directly inform us of the dynamic atmosphere at Mars. Analysis of the difference between transmitted and received frequencies of radio signals that propagate through the ionosphere are used to derive the total electron content (TEC) along the signal propagation path between the surface and orbiting spacecraft. This presentation will describe the analysis of relay signal propagation used to derive TEC, and how a 1-D ionospheric model of Mars is used to interpret this derived value to determine the distribution of electrons with altitude.