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The structure of the lower Venus Ionosphere

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Abstract

The radio science experiment Vera on Venus Express (VEX) sounds the ionosphere of Venus during so-called occultation seasons. An Ultrastable Oscillator connected to the onboard transmitters allows the transmission of stabilized dual-frequency one-way radio signals which makes it feasible to record the ingress and the egress from occultation as well. Half of the observations of each occultation season is at day, the other half at nighttimes. The ingress location makes a latitudinal cut through one hemisphere from equatorial to polar regions during the occultation season and back while the egress location stays at high polar latitudes of the opposite hemisphere. 120 occultations with about 240 electron density profiles have been observed, the majority on the dayside. The entire structure of the ionosphere can be observed: from the base at 115 km, a well established double layer daytime structure V1 and V2 (main peak) at 130 km and 150 km, respectively, a bulge in the topside, the well established ionopause feature. The behaviour of peak densities and peak altitudes of both V1 and V2 as a function of solar zenith angle as seen with VEX will be compared with past observations, models and conclusions. Occasionally, there are additional layers of ionisation below the base of V1 caused by the infall of meteors into the atmosphere. The occurrence of these layers corresponds mostly with the crossing of Venus through cometary orbit planes causing meteor showers in the Venus atmosphere.