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The Structure of the Venus Ionosphere

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The radio science experiment Vera on Venus Express (VEX) sounds the ionosphere of Venus during so-called occultation seasons. In each orbit the VEX spacecraft disappears behind the planetary disk as seen from the Earth. Prior to occultation the radio signals propagate through the ionosphere and are bended according to the local state of the electron density. An Ultrastable Oscillator connected to the onboard transmitters allows the transmission of stabilized dual-frequency one-way radio signals. The one-way method makes it feasible to record the ingress and the egress from occultation as well. Half of the observations of one 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. Seventy occultations with about 140 electron density profiles have been observed.

The entire structure of the ionosphere can be observed and will be described in this presentation: from the base at 120 km, a well established double layer daytime structure V1 and V2 (main peak) at 130 km and 150 km, respectively, a potential third layer in the topside, the well established ionopause feature and the residual nighttime ionisation.