

## **Radio sounding of the Venus ionosphere with spacecraft orbiters – Venus Express, Akatsuki, PVO (again) and Envision**

The Venus Express Radio Science Experiment VeRa sounded the Venus ionosphere from 2006 to 2013 at two coherent downlink radio frequencies driven by an Ultrastable Oscillator (USO). The use of the dual-frequency one-way radio link at X-band and S-band allows the derivation of the true ionospheric electron density profile without contributions or perturbations by the spacecraft's residual or periodic vibrational motion. More than 900 electron density profiles from 15 occultation seasons in eight years of operation from solar minimum 2007 to solar maximum 2014 were recorded. The observations cover almost all solar zenith angles, local times and planetary latitudes. On average, the Venus ionosphere shows a large-scale two-layer structure with a well defined base at 110 km altitude, a lower layer V1 formed by photo-ionisation of solar X-ray and secondary ionisation and a main layer V2 formed by solar EUV. Peak densities and altitudes of both layers depend on the influx of solar radiation and the solar zenith angle. The transport region between the topside and the ionopause shows a variety of plasma scale heights. The ionopause is identified in most cases and their varying altitude depends on the pressure balance between the solar wind and the ionospheric plasma. The V2 peak density as a function of solar zenith angle follows the well known Chapman relation but the V2 peak altitude is constant at 140.7 km for solar zenith angles but from different phases of the solar cycle.

**Thursday, February 27th**

4:00-5:00 p.m.

725 Commonwealth Ave | Room 502

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