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Sulfur dioxide above Venus' clouds: sounding by orbital solar occultations in UV and IR ranges

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Sulfur dioxide (SO2) is one of key components in Venus' atmosphere. This gas participates in active photochemical life around Venus' clouds that consist of H2SO4 droplets and completely enshroud the planet. Behavior of SO2 within and above the clouds may be significant indicator of their dynamics and possible geological activity on the planet's surface. SO2 on Venus has been being explored for 40 years with mainly nadir observations. Nowadays the SPICAV/SOIR instrument onboard Venus Express orbiter is measuring content of sulfur dioxide either by nadir or by occultation soundings that provides a global SO2 monitoring above Venus' clouds. Here we present results from joint solar occultation experiment by SPICAV spectrometer in UV and SOIR spectrometer in IR. The first one gives vertical distribution of sulfur dioxide in absorption band 215 nm at altitudes 85-110 km, the second one sounds SO2 in a band around 4 μm at altitudes 65-75 km. Our equipment is not sensitive to the gas detection in-between 75-85 km because of its photochemical and absorption features in UV and IR. At Venus' clouds top (65-75 km) SO2 mixing ratio varies from 0.05 to 1 ppm depending on latitude and local time (morning or evening). Such variability is confirmed by nadir observations performed by the SPICAV in UV range [Marcq et al., 2010]. From UV occultation data the mixing ratio is also unstable: from 0.1 to 1 ppm at 85-110 km.