

Investigation of the HDO/H₂O ratio in the Venus atmosphere from comparison with SOIR on board Venus Express

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By using the IRTF 3 m telescope in Hawaii in 2010, we obtained a disk-averaged HDO mixing ratio of 0.22 +/- 0.03 ppm for a representative height of 62-67 km. Based on previous H₂O measurements, the HDO/H₂O ratio there is found to be 140 +/- 20 times larger than the telluric ratio. This lies in between the ratios of 120 +/- 40 and 240 +/- 25, respectively, reported for the 30-40 km region (de Bergh et al. 1991) by ground-based night-side spectroscopy and for the 80-100 km region by solar occultation measurement on board the Venus Express (Fedorova et al. 2008). However, such a large difference between the 62-67 km and 80-100 km regions might be latitudinal not vertical origin because of localization of VEx data mostly at high latitudes. In addition, the measurement by Krasnopolsky (2010) in the evening at an altitude of 70 km shows a latitudinal structure showing an equatorial minimum. This is inconsistent to our measurements.

By examining measurements by SOIR on board Venus Express at the terminator, we tried to check the consistency with our data set, and succeeded to confirm larger D/H ratio at higher altitude with little latitudinal gradient although the D/H ratio seems to be very variable.

Fedorova A. et al. JGR 113 E00B22 2008
 Krasnopolsky A. Icarus 209 314-322 2010
 de Bergh et al. Science 251 547-549 1991

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