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Sulfuric acid vapor and sulfur dioxide in the atmosphere of Venus as observed by VeRa

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The main Venus clouds, covering the entire planet between approx. 50 and 70 km altitude, are believed to consist mostly of liquid sulfuric acid. Below the clouds, the temperature is high enough to evaporate those droplets into gaseous sulfuric acid forming a haze layer which extends to altitudes as deep as 35 km. $H_2SO_4(g)$ is the main absorber of radio waves as was observed in Mariner, Pioneer Venus, Magellan and Venera radio occultation measurements. Radio wave absorption measurements can be used to derive the amount of H_2SO_4 as well as to estimate upper limits of SO_2 in Venus' atmosphere. The radio science experiment VeRa onboard Venus Express probed the atmosphere of Venus between 2006 and 2014 with radio signals at 13 cm (S-band) and 3.6 cm (X-band) wavelengths. Thanks to the orbit of VEX, a wide range of latitudes and local times was covered so that a global picture of the $H_2SO_4(g)$ ditribution was obtained. We present $H_2SO_4(g)$ profiles as well as upper limits of sulfur dioxide near the cloud base derived from the X-band radio signal from the entire Venus Express mission. More than 600 $H_2SO_4(g)$ profiles show the global sulfuric acid vapor distribution covering the northern and southern hemisphere on the day- and night side of the planet. A distinct latitudinal $H_2SO_4(g)$ and SO_2 variation and a southern northern symmetry are clearly visible. Observations over 8 years allow to study also long-term variations. Indications for temporal $H_2SO_4(g)$ and SO_2 variations are found, at least at northern polar latitudes. The results shall be compared with observations retrieved by other experiments onboard Venus Express. Additionally, the observed $H_2SO_4(g)$ distribution will be compared with results obtained from a mass transport model.