Ground-based IR observation of oxygen isotope ratios in the Venus atmosphere (revised)

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The oxygen isotope ratios 17O/16O and 18O/16O in the Venus atmosphere were measured simultaneously by ground-based IR spectroscopy. The CO2 absorption lines in the 2648 cm-1 (for 17O/18O) and 4582 cm-1 (for 18O/16O) regions were observed using the IRTF/CSHELL spectrometer. The deviations of the isotope fractions are found to be d17O = + 92+/-158 permil and d18O = - 42+/-85 permil as compared to the terrestrial standard (HITRAN 2012) where the uncertainties include both random and systematic errors. Such combination agrees with the Earth-Moon fractionation line within the errors. This is consistent to the fact that the proto-Venus matter was also well mixed with the proto-Earth-Moon matter.