Japan Geoscience Union Meeting 2013

(May 19-24 2013 at Makuhari, Chiba, Japan)

©2013. Japan Geoscience Union. All Rights Reserved.



PCG31-05

会場:301A

時間:5月23日10:00-10:15

金星雲上酸素同位体比の赤外分光測定 Quantification of oxygen isotope ratios in the Venus atmosphere by IR spectroscopy

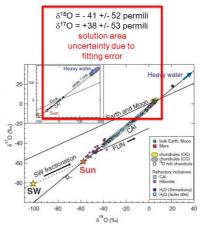
岩上 直幹 1* , はしもと じょーじ 2 Naomoto Iwagami 1* , George HASHIMOTO 2

The oxygen isotope ratios $^{17}\text{O}/^{16}\text{O}$ and $^{18}\text{O}/^{16}\text{O}$ in the solar system are known to show a clear systematic relation. And the relation differs planet by planet. For example, the $^{17}\text{O}/^{16}\text{O}$ ratio as a function of $^{18}\text{O}/^{16}\text{O}$ ratio in Mars appears to be larger than that in the Earth-Moon system by 0.05 %. This fact indicates that the proto-Earth-Mars matter was so well mixed but with a systematic difference. In such a way, the isotope ratios may provide information about the origin and evolution of the planets. However, $^{17}\text{O}/^{16}\text{O}$ ratio in Venus has never been quantified, and may provide further information about the mixing history of the early solar system if measured.

The ratios may be quantified by ground-based CO_2 IR spectroscopic measurements. By assuming a use of IRTF CSHELL spectrometer with a nominal resolution of 40000, we looked for suitable wavenumber regions to quantify the $^{17}O/^{18}O$ and $^{18}O/^{16}O$ ratios. The suitable region for the former is found at 2648 cm $^{-1}$ as shown in the figure, and the latter at 4582 cm $^{-1}$. In the figure, the top two curves show the earth and solar structures disturbing the quantification, and the middle two curves show the Venus $C^{17}O^{16}O$ and $C^{18}O^{16}O$ structures indicating a feasibility to quantify the $^{17}O/^{18}O$ ratio.



Error in HITRAN $\Delta S{\sim}2{-}5\%$ for ^{17}O $\Delta S{\sim}10{-}20\%$ for ^{18}O $\Delta S{\sim}10{-}20\%$ for ^{16}O



¹ 東京大学、2 岡山大学

¹University of Tokyo, ²Okayama University