

AAS021-P21

会場:コンベンションホール

時間:5月23日 16:15-18:45

硫化カルボニルの大気中消滅反応における硫黄同位体分別 Sulfur isotope fractionations in carbonyl sulfide sink reactions in atmosphere.

服部 祥平^{1*}, ダニエラチェ セバスチアン¹, ジョンソン S マシュー², Henrik G. Kjaergaard², 上野 雄一郎³, 吉田 尚弘¹
Shohei Hattori^{1*}, Sebastian Danielache¹, Matthew S. Johnson², Henrik G. Kjaergaard², Yuichiro Ueno³, Naohiro Yoshida¹

¹ 東京工業大学総合理工学研究科, ² コペンハーゲン大学, ³ 東京工業大学理工学研究科地球惑星科学専攻
¹Tokyo Institute of Technology, ²University of Copenhagen, ³Tokyo Institute of Technology

Carbonyl sulfide (OCS), a relatively inert tropospheric sulfur compound is thought to play an important role as a source of background stratospheric sulfate aerosols (SSA). The main sink for OCS in the stratosphere is photolysis which reaches 80% of the total chemical sink at above 20 km; other sinks include reactions with O(³P) and OH. In order to investigate isotope fractionation in OCS sink reactions at present atmosphere, we undertook laboratory experiments. First, we investigated wavelength dependence of kinetic isotope effect in OCS photolysis. The absolute ultraviolet (UV) absorption cross sections of OCS isotopologues OC³²S, OC³³S, and OC³⁴S were measured using labeled samples prepared in the laboratory. The observed cross section of OC³²S is consistent with previous reported cross sections of natural abundance samples. The peak positions for labeled samples were shifted in a systematic way. Isotopologue absorptions cross sections were not only shifted in energy but in intensity. In particular, the OC³³S isotopologue had the largest cross section of the measured OCS isotopologues. This finding indicates that OCS photolysis may have a positive mass-independent effect on sulfur in the stratosphere. In addition, relative rate constants of OCS sink reaction with O(³P) and OH were investigated using photochemical chamber.

キーワード: 同位体分別, 光解離, 硫黄循環, 硫化カルボニル, 波長依存

Keywords: isotope fractionation, photolysis, sulfur cycle, carbonyl sulfide, wavelength dependence