

AAS020-20

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サブミリ波リムサウンダー ISS/JEM/SMILES による ClO 観測について ClO observation by 4K cooled submm limb sounder ISS/JEM/SMILES

鈴木 睦^{1*}, 光田 千紘², 高橋 千賀子², 佐野 琢己¹, 今井 弘二³, 林 寛生⁴, 西本 絵梨子⁴, 内藤 陽子⁴, 塩谷 雅人⁴
Makoto Suzuki^{1*}, Chihiro Mitsuda², Chikako Takahashi², Takuki Sano¹, Koji Imai³, Hiroo Hayashi⁴, Eriko NISHIMOTO⁴,
Yoko Naito⁴, Masato Shiotani⁴

¹ 宇宙科学研究所, ² 富士通 FIP, ³ とめ研究所, ⁴ 京都大学

¹ ISAS, ² Fujitsu FIP, ³ Tome R&D Inc., ⁴ Kyoto U.

The Superconducting Submillimeter-Wave Limb-Emission Sounder (SMILES) is one of the first instruments to use 4K mechanical cooler in space. It was successfully launched and attached to the Japanese Experiment Module (JEM) on the International Space Station (ISS) on September 25, 2009. It has been making atmospheric observations since October 12, 2009 with the 4-K cooled superconducting mixers for submillimeter limb-emission sounding in the frequency bands of 624.32-626.32 GHz and 649.12-650.32 GHz. Unfortunately, SMILES observations have been suspended since April 21, 2010 due to the failure of a critical component. On the basis of the observed spectra, the data processing has been retrieving vertical profiles for the atmospheric minor constituents and trace free radicals in the middle atmosphere, such as O₃ with isotopes, HCl, ClO, HO₂, BrO, and HNO₃.

SMILES observed ClO several times higher sensitivity compared to previous satellite programs, Aura/MLS and Odin/SMR. Validation of SMILES ClO has been carried out with Aura/MLS data, and it agreed within error bars of Aura/MLS (since MLS has lower sensitivity and larger error bar). SMILES ClO in nighttime showed small bias and histogram showed gaussian shape, and it looks SMILES ClO value is reasonable at low altitude region down to 22 km altitude. Diurnal variation of ClO was obtained from 30-45 days dataset. ClO and ClO-OC1 equilibrium is observed within arctic polar vortex in January 2009.

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Keywords: submm, ClO, stratosphere, ISS, Limb Observation