

国際宇宙ステーション搭載 SMILES で観測した成層圏・中間圏・熱圏における塩素化合物水素化合物の化学

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Chlorine and hydrogen species over the stratosphere, mesosphere and thermosphere observed by SMILES from ISS

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<https://smiles-p6.nict.go.jp/>

Diurnal variations of the atmospheric compositions were observed by the Superconducting Submillimeter-Wave Limb-Emission Sounder (SMILES) from the Exposed Module (EM) of the Japanese Experiment Module (JEM) on the International Space Station (ISS) between 12 October 2009 and 21 April 2010. The ISS has a non sun-synchronous circular orbit with an inclination angle of 51.6 to the equator, which allowed us to observe atmospheric composition at different local times. The SMILES instrument employed 4 K submillimeter-wave superconductive heterodyne receivers, and obtained spectra with unprecedented low noise, which is one order of magnitude better performance than previous microwave/sub-millimeter limb instruments in space. These unique observations gave us new opportunity of atmospheric science, such as the diurnal variation of very short-lived radical species over the stratosphere, mesosphere and thermosphere. SMILES observations provided vertical abundance profiles of O₃, H³⁵Cl, H³⁷Cl, ClO, HOCl, HO₂, H₂O₂, BrO, HNO₃, O₃ isotopologues, CH₃CN, H₂O, as well as ice clouds, winds, and temperature. The JEM/SMILES mission is a joint project of the National Institute of Information and Communications Technology (NICT) and the Japan Aerospace Exploration Agency (JAXA).