



Observation capability of Superconducting Submillimeter-Wave Limb-Emission Sounder (SMILES) from International Space Station

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A new generation of super-sensitive submillimeter-wave receivers, employing SIS (Superconductor-Insulator-Superconductor) technology, will provide new opportunities for precise remote sensing observation of minor constituents in the atmosphere. SMILES had been launched at 11/09/2009, and installed on the Japanese Experiment Module (JEM) in the International Space Station (ISS). SMILES is a collaboration project between NICT and JAXA.

Mission objectives of SMILES are:

- i) Space demonstration of super-sensitive SIS mixer and 4-K mechanical cooler technology
- ii) Super-sensitive global observation of atmospheric minor constituents

JEM/SMILES observes the atmospheric species such as O_3 , $H^{35}Cl$, $H^{37}Cl$, ClO , HO_2 , BrO , $HOCl$, $HOBr$, HNO_3 , CH_3CN , Ozone isotope species, H_2O , and Ice Cloud with the precisions in a few to several tens percents. Theoretical observation capability was studied with error analysis. The altitude region of observation is from the upper troposphere to the mesopause. SMILES early results will be shown with global distributions (L3 data). The early comparison/validation of ozone performed with several satellite data, such as MLS, ACE, OSIRIS and Odin.SMR. The statistical analysis showed the differences were less of 5 percent between SMILES and other satellites data validated. This value was consistent with theoretical capability. This super technology may allow us to open new issues in atmospheric science.