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The performance of JEM/SMILES Observations

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The impact of resultant environmental change on the stratospheric molecule is available to detect clearly as it is often said "the foot print of the climate change". The sensitive observation of the stratospheric molecules is more important to detect the change of the minor molecules by climate change. A new generation of sub-millimeter-wave receivers employing sensitive SIS (Superconductor-Insulator-Superconductor) detector technology will provide new opportunities for precise remote sensing measurements of the stratospheric minor constituents on a global scale. We have been developing the SIS instruments, namely the space-station-borne JEM/SMILES instrument (Japanese Experiment Module/Sub-Millimeter Limb Emission Sounder), currently planned for launch in 2008. We have been developing the simulator named SMOCO of which retrieval algorithm is the nonlinear optimal estimation method. SMOCO is a code validated with several retrieval codes not only the forward model calculations but also the retrieval parts. We have estimated the observation capabilities of the JEM/SMILES instrument. Based on our simulations, O_3, $H^{35}Cl$, $H^{37}Cl$, ClO, HNO_3 could be retrieved from the measurements of the JEM/SMILES limb emission sounder with a precision a few percent respectively, for a daily 10± zonal means. The simultaneously observations of HOCl and HO_2 will be possible with a precision within 20 percent. This new technology should allow us to detect the sparse alteration of the stratospheric molecules.

Keywords: JEM/SMILES; SIS mixer; submillimeter-wave; SMOCO