JEM/SMILES Observations of the Upper Tropospheric and Lower Stratospheric Water Vapor

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Water vapor in the upper troposphere and lower stratosphere (UT/LS) plays a key role in determining the weather and climate on Earth. The tropospheric water vapor acts as a dominant greenhouse gas by intensively absorbing the infrared radiation from the lower atmosphere, while its long wave emissions contribute to cooling in the stratosphere. Despite its high importance, we are still behind the thorough understanding of the distribution and climatological roles of UT/LS water vapor because of insufficient observational knowledge on them.

New insight into the UT/LS water vapor can be provided by new unprecedented high sensitivity observations with the Superconducting Submillimeter-Wave Limb-Emission Sounder, SMILES: a limb emission sounder attached at the Japanese experiment module (JEM, a.k.a Kibo) onboard the International Space Station (ISS). SMILES observes the tropospheric and stratorspheric atmoshere at tangential heights from ~-35 to 100 km, and produces one global map per a day. Such a capability of low-tangential height sounding provides tropospheric observations with an improved horizontal resolution, and the non-sunsynchronous orbit of ISS makes it possible to observe diurnal variations of the UT/LS water vapor distribution. We present the retrieval analyses of UT/LS water vapor and humidity by using the SMILES research data.