Retrieval of the Mesosphere and Lower Thermosphere (MLT) physical and chemical properties with the proposed Superconducting Submillimeter-Wave Limb-Emission Sounder 2 (SMILES-2)

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Submillimeter-Wave Limb-Emission Sounder 2 (SMILES-2) is a satellite mission proposed in Japan to probe the middle and upper atmosphere (20–160 km) [1,2]. The main instrument is composed of 4K cooled radiometers operating near 0.7 and 2 THz. The geophysical information would be retrieved from the molecular lines contained in the spectral bands. The diurnal changes of the horizontal wind above 30 km, temperature above 20 km, ground-state atomic oxygen above 90 km, as well as abundance of about 15 chemical species, could be retrieved. In this study we discuss the sounding of the mesosphere and lower thermosphere (60–160 km). Unlike [3] that only considered the radiometer at 763 GHz, a special focus will be put on the complementarity of the 3 spectral bands for retrieving the physical parameters (wind, temperature and density) as well as the composition (O, O_3 , H_2O , NO, CO, HO_2 and OH). The presentation will also include a discussion on the retrieval of the 3 components of the geomagnetic fields using the Zeeman effect on the molecular and atomic oxygen lines at 773 GHz and 2.05 THz. The measurement performance will be discribed as the retrieval precision assessed with simulations.

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Keywords: Mesosphere and lower thermosphere, wind, temperature, composition, SMILES-2

