

Interactive comment on “Tomographic retrieval algorithm of OH concentration profiles using Double Spatial Heterodyne Spectrometers” by Yuan An et al.

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Hydroxyl OH is very important for humans to understand the chemical composition of the mesospheric atmosphere, which play an initial role in atmospheric photochemical reactions and initiate the entire oxidation chain in the atmosphere. Due to the limitation of spectral resolution and signal-to-noise ratio of detection technology, there are relatively few OH radical detection devices in the upper and middle atmosphere on board. In this paper, the tomographic retrieval algorithm of OH concentration profiles using Double Spatial Heterodyne Spectrometers has been studied. In order to improve the spatial accuracy of OH radical detection, a spectrometer with higher spectral resolution

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than SHIMMER has been developed. The spectrometer is also designed with double SHS and has on-orbit limb observation. In order to verify the detection ability of the hyper-resolution DSHS spectrometer for OH radical, including limb view separation, spectral resolution and other specifications, a number of simulation and Inversion experiments were designed. Firstly, DSHS Spectrometer layout and observation mode were introduced. Next, the forward model based on SCIATRAN was designed. Finally, in order to evaluate the detection ability of weak atmospheric background radiation, the experiment of inversion was carried out, and OH concentration profile data was obtained. The manuscript systematically introduces a new three-dimensional atmospheric detection technology, which is significance for the future development of middle and upper atmosphere payloads. Specific suggestion is provided below. A major issue with this targeted measurement is the increasing Rayleigh scattering for decreasing altitudes (especially in the lower stratosphere). While the manuscript shows a simulated set of interferograms in Figure 8, it does not show that the expected signal to noise ratios will allow the retrieval of OH throughout this altitude range.

[Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-485, 2020.](#)

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