

Review Comment on Manuscript by Cartwright et al. 2025

This manuscript by Cartwright et al. (2025) presents a study entitled "Global Optimal Estimation Retrievals of Atmospheric Carbonyl Sulfide Over Water from IASI Measurement Spectra for 2018". The manuscript describes scientific details about the IASI OCS retrieval algorithm, the comparison between IASI OCS retrievals and TOMCAT simulations, as well as NOAA surface measurements, and outlines further development and research plans. This is an important dataset for advancing satellite-based OCS measurements and is highly valuable for OCS-related studies. The manuscript is well-written, and the figures are presented clearly. I recommend the publication of this manuscript after the authors address the general and specific comments listed below.

General comments

- 1) Why the land OCS are not retrieved? I think the land OCS retrieval are quite useful.
- 2) Why the COS radiance is very smooth compared with other species (CO₂, O₃, H₂O, CO), in Figure 1?
- 3) ACE-FTS profiles are used in the algorithm as *a priori* profiles. Will other OCS satellite observations be considered to provide prior information?
- 4) The abstract includes technical details (e.g., MetOp-A/B, ULIRS) that may obscure readability for broader audiences. I recommend simplifying technical terminology and prioritizing the study's scientific significance. Specifically, emphasize the research motivation, e.g., the paucity of OCS observations (both ground-based and satellite-derived), to clarify why this work is needed.

Specific comments

Line 23: "This study demonstrates the ability of the IASI instrument to accurately measure OCS in the troposphere". Satellite instrument is never accurate.

Line 176: Table 1 missed a bottom line.

Line 213: "(OCS, CO₂, H₂O, temperature profiles and surface temperature)". CO₂, H₂O should be CO₂, H₂O.

Line 216: "i.e. in *b*, but their contributions were not adjusted." *b* should be bold ***b***.

Line 287: "and χ^2 is the cost function, ***J*** (Rodgers, 2000), referred to as the chi-squared test." χ^2 is not the cost function. Please rewrite the sentence.

Line 298: "Averaging kernels, denoted ***A*** in". "denoted ***A***" to "denoted as ***A***".

Line 313: “profile provides approximately one piece of information for the OCS column.” What does it mean of one piece of information for the OCS column?

Line 346: “where T corresponds to the final iteration of Eq. 7,” T should be \mathbf{T} .

Line 349: “As shown in Fig. 6, S_s is the major”, S_s should be \mathbf{S}_s .

Line 352: “This is also the case for S_m , the”. S_m should be \mathbf{S}_m .

Line 460: Figure 9 is generally in red color at a first glance. Can the figure be improved for a better visualization?

Line 563: “are between 18 and 38%,” 18 to 18% to avoid misunderstanding.

Line 569: “and can be linked to surface fluxes.” More specially, this is linked to the biosphere uptake, which can lead to smaller COS mixing ratios in the atmosphere.