

General comments:

In this manuscript, the authors present a novel methodology on channel selection from FY-3E/HIRAS-II hyperspectral IR to detect SO₂ while eliminating the impact from temperature and moisture in the atmosphere. The topic is interesting and would be beneficial for future applications on SO₂ quantitative retrievals. However, there remains some questions that are not well clarified in the manuscript. My major comment is that the title of this research is kind of misleading as it says 'quantitatively monitor'. This would, to some extent, imply the retrieval of SO₂ levels from satellite observations which never show up in this research. This research is mainly focused on channel selection, but sadly it's not reflected in the title. Therefore, I would suggest the authors revise the title of manuscript to better reflect the key contents of the research, and go through a round of revision to address the specific comments before it is published.

Specific comments:

1. Line 40, the full name of 'UV' should be given here as it appears in the manuscript for the first time.
2. Line 49, polar orbiting hyperspectral sounders observe the same area in a period no less than 12 hours, which is not enough to be described as 'continuous observations'.
3. Line 65, the last segment is recommended to be revised as 'with both,,, and,,, taken into consideration'.
4. Line 87, is that a typo of 'Radiative Transfer Model'?
5. Line 96, there's no T existing in equation (1), with only a T_{sun} which is not 'true atmospheric temperature'.
6. Line 161, ERA5 has 37 fixed pressure levels vertically, and 137 model levels distributed using hybrid sigma-pressure coordinate system. It seems like you're using the model levels. It is recommended to point this out explicitly in the manuscript.
7. Figure 4, on the figure it seems like the selection of water vapor channels only depends on cross-comparison with temperature channels. According to lines 219 to 220, with the selected SO₂ channels being a subset that aligns with the water vapor channels (purple links), there should also be a cyan link between water vapor channels and SO₂ channels which points to water vapor selections. Or as illustrated in the figure, the relevant contents should be like 'the water vapor Jacobian of SO₂ channels must match those of the water vapor channel, while the temperature Jacobian of water vapor channels must match those of the SO₂ channels.'
8. Line 232, it seems like the additional SO₂ signal is around 1125 cm⁻¹ rather than 1225 cm⁻¹ from Figure 5.

9. There should be another set of figures between Figure 6 and 7 showing the temperature Jacobian functions of the channels within SO₂ absorption region.
10. Similar to comment #8, it seems like the left circle in Figure 5 is not around 1225 cm⁻¹, and not included in Figure 8.
11. Line 307, there should be a more detailed explanation on how a higher BT simulated with positive TD would indicate better SO₂ detection. Isn't it the variation of Jacobian that represent the detection ability better?
12. Line 348, the red box is on Figure 13(c) rather than 12(c).