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Atmospheric Measurement Techniques Discussions

Interactive comment on "Vertical level selection for temperature and trace gas profile retrievals using IASI" *by* R. A. Vincent et al.

J. Worden (Referee)

john.worden@jpl.nasa.gov

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I do not have too much to add over the (typically) thorough review by Dr. von Clarmann.

I agree with Thomas that the paper is well written and easy to understand for someone with rudimentary knowledge of atmospheric retrievals.

However, the paper needs some caveats that are currently missing.

For one, the paper states in the introduction that they choose levels based on their contribution to the information content (change in posterior / prior error) whereas the approach discussed in the paper uses contribution to the degrees-of-freedom for signal (trace of the averaging kernel) as the metric for level selection and these quantities are

related but not the same.

Furthermore, Choosing levels based on information content versus DFS needs some discussion in the introduction and conclusion. For example, adding levels near the surface could increase the DFS but reduce the information content, either calculated if using a "non-optimal" based constraint, or actual (as determined with independent data) because of increased non-linear effects from surface interferences.

Minor comments

The abstract is a bit self flagellating. One of the strengths of the approach discussed in this paper is in selecting levels where the trace gas distribution has a strong vertical gradient but the sensitivity of the estimate to the distribution is still significant. This situation occurs for methane and ozone in the UTLS, and H2O in the lower-most troposphere. While this discussion is present in the body of the paper I think it should be brought up to the abstract.

Minor updates to Thomas'es comments

Line 14 page 2595: optimal inverse of K is confusing. I would just explicitly define G inline with the sentence.

line 7 p 2595: perhaps change the description of epsilon to the combination of interferences (e.g., emissivity) and systematic errors (e.g spectroscopy)

regards John Worden

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 2591, 2015.