

Interactive comment on “Determination and significance of upper-tropospheric humidity” by Klaus Gierens and Kostas Eleftheratos

Anonymous Referee #3

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The paper describes a new method to retrieve upper tropospheric humidity (UTH) based on HIRS channel 12 brightness temperatures in an effort to bridge the channel's central wavelength change from $6.7\ \mu\text{m}$ to $6.5\ \mu\text{m}$ between HIRS2 and HIRS3 instruments. Built upon the work of past studies, this study retains the second order term in the linearization of the UTH formulation. The addition of the second order term and the choice of the spectroscopic constant for the retrievals are shown successfully matching the UTH between HIRS2 and HIRS3 observations. I am glad to see the resulting good match between HIRS2 and HIRS3 UTH. I think that the study falls into the scope of ACP. The paper is generally well written.

Specific Comments and edits:

Page 1, line 4: Define UTHi.

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Page 2, lines 18-19: HIRS3 instruments are flown on N15, N16, and N17. HIRS4 instruments are flown on satellites after.

Page 4, line 3: The choice of optical constant needs a lot more explanation here. How was the optical constant = 2.85 derived? How sensitive is the constant to the retrieval?

Page 8, line 23: It'd be helpful to include the values of a' and b' here so readers don't have to find them from the earlier paper.

Page 20, Figure 5: It is not clear which equation was used for the 2nd order retrieval line. It'd be helpful to include the equation in the caption, or make it clear in the text. On page 7 the text only mentions “Solving for U leads thus to the desired retrieval function”.

Page 25, last line: Change “more high” to “higher”.

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