

Dear Author,

Dear Editor,

First of all I would like to apologize for the delay in reviewing the manuscript. Generally I try to do it as fast as possible but the last few months have just been too busy...

I find the manuscript well written. It offers a compact and valuable description of a method for assessing the utility of collocated reference measurements when validating hyperspectral infrared retrievals.

My major comment is on Section 3.2 ("Atmospheric profile errors"). In addition I think that the manuscript would further gain in clarity if the importance of using correct radiative transfer modelling is mentioned throughout the paper:

(1) Section 3.2:

Second paragraph (starting with line 10): I find it a bit unclear why you need to smooth the difference between observed and calculated radiances.

Why can't you just apply the differences as depicted in Figs. 3-6 when making the calculation according to Equation (6)?

Maybe the reason for smoothing is that you want to separate the "noise" in the measured radiances from the actually interesting errors in the radiance space? Maybe this could be a bit clearer explained.

Smoothing the square of the difference between observed minus calculated radiances: I am a bit confused, because by calculating the squares you produce only positive difference/errors, whereas originally the differences/errors have been positive and negative. To my understanding these error covariances are important. Doesn't an artificial limitation to fully correlated errors (positive radiance errors) significantly affect your calculations according to Equations (6)?

(2) Mention importance of using correct radiative transfer modelling:

Page 5594/line 15: Maybe say: "Another strategy is to assess that the combination of the global measurement, collocation, and RADIATIVE TRANSFER MODELLING errors are small enough ..."

Similarly page 5598/line 5: "This effectively means that the measured atmospheric profile, RADIATIVE TRANSFER MODEL, and the IASI radiances are consistent ..."

Page 5599/line 11,12: problem of RTM?

Page 5599/line 23: Maybe better say: "... it can be concluded that OUR RADIATIVE TRANSFER CALCULATIONS APPLIED TO two of the temperature and humidity ..."

Page 5603/line 22: Maybe better: "In other words, this assessment checks whether the measured atmospheric profiles TOGETHER WITH THE USED RADIATIVE TRANSFER MODEL and the hyperspectral instrument measurements ..."

(3) Further comments/questions:

Page 5595/line 5: Maybe also mention in parenthesis that the apodised effective resolution is 0.5 cm^{-1} .

Page 5597/line 4: Does the retrieval work with some kind of bias correction? Bias correction with respect to ECMWF? If yes, how is this done in the retrieval?

Page 5598/line 15: I suggest removing: "The assessment of the latter is what would be done if the calculated radiances are obtained" and instead write: "Using data obtained from IASI radiances would artificially increase the agreement between the calculated and measured radiances thus affecting our assessment method. In the most extreme case, by ...".

Best regards,

Matthias Schneider