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Interactive comment on "An update on the RTTOV fast radiative transfer model (currently at version 12)" *by* Roger Saunders et al.

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This paper gives an overview of the widely-used RTTOV radiative transfer model. It is a nice description and summary of all the capabilities of the RTTOV system. From the formalism of the optical depth parameterization, to the description of the multiple scattering mechanism used in the simulation of measurements in cloudy conditions. While the paper represents a comprehensive description, it is nevertheless written in a relatively concise and very easy to follow fashion. It also gives a thorough overview of the history of the RTTOV, from inception to the latest version available on the NWP-SAF site. The paper does an excellent job reviewing the literature of existing (other) fast radiative transfer models (RTMs) and the assessment of their quality (both simulation and Jacobians). Speaking of quality, the paper covers the two aspects that are usually

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employed to validate the assessment of fast RTMs: namely the (1) comparison to line-by-line models (more accurate but too slow to be applicable in real-time applications) and (2) comparison to real data from space-based observation systems. Which shows the significant improvement achieved over the last couple years. In summary, the paper is well written, it is comprehensive in its scope and the details it covers. It is envisioned that it will be not only a scientific reference, but also a sort of manual for all users of RTTOV for the coming years.

I look forward to other comments and discussions from the community.

Technical suggestion(s) : It is shown that standard deviation (when compared to line by line) is low, but that was computed with an emissivity background of 1. It is suspected that the standard deviation will be higher if the background is lower (higher contrast with the atmosphere), such as let's say 0.5 (more realistic over ocean). Can we have that assessed?

Also, it is good to have a low standard deviation and a low bias when tuning the absorption coefficients, but this does not exclude outliers that could happen, especially if the range of temperature, or other predictors, is outside the range of the training. Can this be assessed/shown?

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