

Interactive comment on “Modeling the Zeeman effect in high altitude SSMIS channels for numerical weather prediction profiles: comparing a fast model and a line-by-line model” by R. Larsson et al.

Anonymous Referee #1

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The manuscript is much improved on the original version, the motivation for each part is clear and the separation between what can be learnt from Chs.19-20 and 21-22 much clearer. Thank you.

I have just three minor comments.

1. I did not get a feeling for the significance of the results shown in Fig. 6 which show discrepancies between 3D and 2D magnetic field treatment of up to ± 7 K in the tropics. This sounds a lot and makes me wonder if modelling from 2D is in fact useless for

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these higher channels. A question is how does this compare to variance with respect to climate in observation space at these altitudes / region? If this is less than 7 K then the observation error if processed with a 2D magnetic field is large compared to the climatology error, meaning the information content of the obs even against climatology is small. This would imply to use these data we need to use a 3D field. So its important to get a feel for this. NWP models are pushing higher and the time will come when they beat climatology by some margin. So I would like to understand the relative size of these three errors: climatology, current and potential future NWP, and observation error with 2D and 3D fields. I think such information would further enhance the usefulness of the paper.

2. Related to the above: I did not get a feel for how difficult it would be to use a 3D field in operational processing. The paper simply states its not currently available. It would be useful to have some indication where the issues lie in implementing something similar to the treatment in ARTS in RTTOV, or a fast fit to the ARTS model. Is this feasible? Is it expensive (but noting that observation processing is a small cost now in state of the art data assimilation we can afford more)? Is it technically feasible? What needs to be developed? This would be useful and inspiring information that could stimulate such a development.

3. The authors keep switching between height and pressure as vertical coordinate. I don't know about other readers but I have to go and look up how, say 10 Pa relates to, say, 80km. I don't particularly like that they make me work this hard when reading the paper. Could they choose their preferred vertical coordinate (perhaps height as this is most readily understood by the widest readership) and stick to it?

I would like to take this opportunity to thank the authors for this useful contribution to the literature on this topic.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 10179, 2015.

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