

# ***Interactive comment on “All-sky Information Content Analysis for Novel Passive Microwave Instruments in the Range from 23.8 GHz up to 874.4 GHz” by Verena Grützun et al.***

## **Anonymous Referee #2**

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This is a comprehensive study on the idealized information content from microwave/sub-millimeter microwave channels that are relevant to the current instruments deployed in field and space missions. I have three major comments: 1. I agree with the author that it is highly important to have consistent micro-physical parameterisations in the RTM and atmospheric model and appreciate the careful discussions on the comparisons between Seifer and Beheng 2006 and McFarquhar and Heymsfield (1997) schemes. However, the McFarquhar and Heymsfield (1997) parameterization is developed for tropical cirrus cloud using field campaign data collected during CEPEX, which may not be proper to apply to a midlatitude frontal cloud system. Besides, I don't see why it is necessary to have such long discussions in this article if two-moment

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scheme is used in both ICON and ARTS. 2. In the calculation of Jacobians, the channel response function is not used and instead monochromatic radiative transfer simulations for the center frequencies of the side bands are carried out. For channels in the window region and sounding channels far from the absorption line center, the sensitivities or information content are sensitive to the width of the channel. And these channels are used to retrieve the hydrometeors. 3. P10. Line 8: please explain in more detail: “the scattering solver for the perturbations gets the reference result as a first guess”. Scattering is important since the focus of this study is to understand the information content in these channels to the different combination and types of hydrometers.

Minor comments: 1. In the abstract, Line 14: “however the information content is robust”, this is right after the discussion on the little information on the profiles and microphysics. “robust” with respect to what? 2. P2, Line 34: suggests to change to “low level clouds have only little effect on the . . .” 3. P3. Line 25: remove comma in 183GHz. 4. P3. Line 34: add “in” before “Sect.2”. 5. P4. Line 24: Suggest to remove the first sentence in this paragraph, and state what kind of assumptions are made for surface emissivity and surface type. 6. P7, Line 4: “smaller smaller” 7. P12, Line 19: “to choose them”. Also, should it be “for each hydrometeor type”? Line 18: “amongst the extremes”: does this mean extreme profiles are selected? If so, it is contradict with following statement that outliers are excluded. Please clarify. 8. P24, Line 8: “has to be paid”

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