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Atmospheric Measurement Techniques Discussions

Interactive comment on "Inter-channel uniformity of a microwave sounder in space" *by* Martin Burgdorf et al.

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This paper present study of using lunar radiation as reference for microwave instrument calibration error budget analysis. The topic is interesting and I have the following comments for the work: in section 2.2.1, the author checked pointing error in both cross scan and along scan direction. For ATMS 1.1 deg beam width channels, the lunar can only appear in one of the 4 FOVs at most of the time. How many cases can you find in AMSU-B and MHS lunar intrusion events that all 4 DSV been illuminated ? For cross scan pointing error assessment, if the smear effect was included in your study ? section 2.2.2. The author take the maximum fitting counts in along track direction as the lunar radiation signal. But actually for each single DSV, the receiver output counts when lunar intrusion happens are weighted sum of radiation

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from Moon's disk, cold space background radiation, earth radiation entered from side lobe, as well as the instrument noise. When calculate the rations between different channels, the impact of other radiation sources should be evaluated section 2.3. Ratio of brightness temperature should be square of of frequency ratio instead of two times of frequency ratio section 2.4. the noise level of MHS 183 channel is different, which should be considered in this study when check the calibration consistency of G band. For example, the +-1 channel has larger noise than +-7 channel. section 2.4.2. As mentioned before, the smear effect should be considered for across track pointing error assessment. The nonlinearity of Moon brightness temperature is much smaller than polar region due to the fact that after convolution with antenna pattern, the effective temperature of the moon is below 30K for 1.1 deg beam width channel. therefore it is not appropriate using lunar radiation check the nonlinearity bias. section 2.5.4, the impact of the center frequency shift is scene dependent: it is much more sensitive for earth scene than for The moon disk. I don't think the moon observations can be used to evaluate the center frequency shift. The author attribute the bias in channel 20 to RFI but provide no solid evidence. It is better to present some more details about RFI in 183 channels. For example, what is the interference source of the RFI for G band ? This may important because for RFI study, the previous research works only focused on frequencies lower than V band. If there is solid evidence to show the RFI in G band, the user should be noted. in section 3, the author concluded that "Any frequency shift of channel 20 must be smaller than 0.003 Âů 183 Ghz = 500 MHz, else channel 20 would not agree with the other sounding channels". As mentioned before, moon surface is not sensitive to center frequency shift, therefore it may not being able to identify significant center frequency shift. Table.2, The dynamic range from cold to warm counts is only 1000 counts. Please double check the raw data. Is this due to instrument gain degradation ?

Please also note the supplement to this comment:
https://www.atmos-meas-tech-discuss.net/amt-2017-405/amt-2017-405-RC1-

supplement.pdf

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