

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

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This manuscript provides a detailed analysis of a novel approach using a lunar calibration target to investigate calibration issues with the 183 GHz channels on the NOAA-16 AMSU-B instrument. The value of an additional cold target, which is much closer to the deep space view, provides useful information that the authors use to eliminate potential issues such as nonlinearity and cold-space temperature biases as primary causes of the larger observed biases in the water vapor sounding channels near the end-of-life. The authors do a thorough job in investigating potential issues and/or limitations in using the lunar intrusions as a calibration target. The author’s conclusion that the observed calibration biases are likely due to radio frequency interference combined with a large decrease in the instrument gain, however, is less satisfying given the lack of a

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potential RFI source. If this is the case, it would seem that the most likely source would be an on-board transmitter, although it seems unlikely that it would impact all 3 183 GHz channels. RFI from the high-gain antenna for TDRS data relay on board GPM was identified prior to launch as impacting the GMI 89 and 183+/-3 GHz channels, but it was mitigated using very narrow band-reject filters for just those two channels. The dramatic changes in gain over the lifetime of the NOAA-16 AMSU-B instrument, however, do seem likely to contribute to the observed calibration changes.

Perhaps I’m not familiar enough with the previous calibration analysis on this instrument, but one issue that has impacted the calibration of several previous microwave radiometers that the authors don’t mention is an emissive reflector. Although it was a conical-scanning instrument, an emissive reflector on the DMSP F17 SSMIS instrument had a substantial impact on the calibration of the 183 GHz channels and does show a significant frequency dependence. Can that possibility be excluded based on the information provided by the lunar intrusion analysis?

Overall this is a very nice paper, and while the conclusion regarding the source of the observed calibration changes is somewhat unsatisfying, the elimination of several potential sources such as nonlinearity indicate the value of this approach for on-orbit calibration.

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