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Atmospheric Measurement Techniques Discussions

Interactive comment on "Assessment of the consistency among global microwave land surface emissivity products" *by* H. Norouzi et al.

Anonymous Referee #3

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General Comments:

This paper presents an inter-comparison of four global emissivity retrieval products. The products each use different passive microwave sensors (AMSR-E, TMI, SSM/I, and Windsat), algorithms, and ancillary data. The differences are explored in terms of global monthly mean and standard deviation, as well as sensitivity to vegetation and soil moisture. Significant differences are found, particularly over desert and snow-covered surfaces.

In section 1, the authors make a great point about the difficulty of validation in emissivity studies, and make a case for the role that inter-comparisons can play in assessment. I am not convinced that this is the best experimental setup for such a comparison,

however. The point is made throughout the paper that the instruments and retrieval techniques are very different. In comparing emissivities for different sensors using different retrieval/radiative transfer schemes and input data for each sensor, there is little to be learned, as there is no way to separate out the individual differences/sensitivities. The use of different cloud clearing algorithms, for example, could lead to large differences and it is possible that much of this comparison is a comparison of the input data, with no way to conclude which is correct in an absolute sense. It would be much more useful to apply different retrieval techniques to a single sensor, or conversely the same retrievals to multiple sensors, to get at what is behind the differences. Use of consistent surface temperature and cloud data sets could also lead to important information about differences in the retrieval schemes themselves. It is known that these products differ, and the next step is to determine why. The comparisons are a good starting point, but the work would benefit from applying this in some way, such as by offering a clear experimental plan for understanding the differences based upon what was learned through the comparison.

Specific Comments:

In the introduction, the early discussion could benefit by expanding discussion of how land surface emissivities are used in NWP and retrievals.

Physical emissivity modeling is mentioned very briefly in passing. Is there a reason that a model product has not been included in the comparison? It may be helpful to mention this.

Section 2 – Data sets: a sentence about the importance of clouds would be useful here, and clear highlighting of the different masking techniques used.

Section 3 – more specifics are needed to describe the resampling and re-projection process.

The use of monthly means and standard deviation of monthly estimates limits the scale

of this comparison. There is no ability to compare how each technique responds to large changes in soil moisture following a rain event, for example, which would be useful in diagnosing differences. This method of comparison should be justified in the text.

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