

Review for “**Ground-based Multichannel Microwave Radiometer Antenna Pattern Measurement using Solar Observations**” by Lei et al., submitted to Atmospheric Measurement Techniques

Synthesis:

This paper presents a method to determine microwave antenna patterns from solar scans instead of using an anechoic chamber. The authors apply a scan pattern a ground-based atmospheric microwave radiometer. The results prove to be reasonably accurate by comparing to laboratory measurements.

General comments:

I am missing some motivation for the study: Of course, it is always desired to characterize an instrument as well as possible. However, more motivation on why is it important to know the exact antenna patterns for ground-based microwave radiometers would be necessary to mention (e.g. temperature profiling, considering antenna patterns in radiative transfer modelling for retrieval algorithms, etc.)

The sun has been used as target for antenna pattern studies before. Please make clear what your novelty is. Would it be possible to apply your method automatically to check the pointing accuracy as well as the alignment of a radiometer that is deployed in the field?

The basics on microwave radiometry and antennas cover too much of the manuscript. Most of the information can be found in textbooks. On the other hand, the technical description of the instrument is very poor in terms of receiver technique and other components. How is elevation and azimuth scanning performed by the instrument? What are the sources of uncertainty in this regard? What is the temporal resolution of the brightness temperature measurements when performing scans?

The experimental design was not described in a reproducible way, there is a lot of practical information missing. How much time does one scan pattern take? And more in detail: When did you perform the measurements that this manuscript is based on? Did you combine several scan patterns for your results? Under which solar elevation angles were the scans performed? How did you consider the movement of the sun’s position during one scan?

What about the repeatability of the method? Did you perform several scans under different conditions and/or solar elevation angles (e.g. summer/winter, morning/noon)? What are your recommendations in that respect?

Summary

To summarize, I cannot recommend publication of this manuscript at this stage. The manuscript needs major revisions by carefully considering all the above-mentioned points.