Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., author comment AC1
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Reply on RC1

Wenying He et al.

Author comment on "Ground mobile observation system for measuring multisurface microwave emissivity" by Wenying He et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-165-AC1, 2021

- **RC1**: 'Comment on amt-2021-165', Yanqiu Zhu, 25 Jul 2021 reply

This study carefully designed a ground observation system to investigate the variations of microwave emissivities over water and several typical land surfaces including cement, sand, bare soil, grass. This system's design made it feasible to avoid/minimize the uncertainties in the emissivity derivation caused by LST and atmospheric effect calculation and to assess the variations of emissivities over different surface types side-by-side in a controlled experiment environment. The topic of this manuscript is important to many applications of surface-sensitive radiances.

Specific comments:

- The advantage of the ground mobile observation system is that it can provide temporal evolution of emissivity over different surface types at low costs in helping us to understand the characteristics of microwave emissivity, but in practice the usefulness of all these observations over different surface types may depend on the actual complexity of land surface in the area of observation site.

Reply□Thank you for your comments. Yes, the temporal evolution of emissivity over different surface types can be directly obtained from the ground mobile observation system at low costs, and the 5 test plots are designed to stand for certain typical surfaces. For the actual and complex land surface, it still need more real observations to find out.

- Cloud and precipitation screening. The authors didn't provide any information on how they performed cloud and precipitation screening. Was this performed automatically on RPG-XCH-DP, or the authors used the video camera records or Tb information?

Reply: Yes, the video camera can record real-time weather conditions, such as rain or snow, and there is rain sensor on RPG-XCH-DP to detect rain or no-rain observation. In this paper we mainly present the observations in October 2018 under clear sky condition.

- The major components of the system include a dual-frequency polarized ground microwave radiometer, a mobile observation platform, and auxiliary sensors to measure the surface temperature and soil temperature and moisture. The authors utilized the observations from the ground microwave radiometer and surface temperature to derive emissivity. I notice that authors haven't used soil temperature and moisture observations. As the emissivity is determined mainly by soil dielectric constant, do the authors have any plan to use these soil observations, such as to study the relationship between emissivity and soil moisture?

Reply: Thank you for your concern. Yes, adding soil moisture observations is used to further study the relationship between emissivity and soil moisture. In this paper we focus on introducing the mobile observation system for surface emissivity and some preliminary results.

- Brightness temperature Tb was referred to in many places in the manuscript. I assume authors meant the brightness temperature Tb in the ground observation mode.

Reply: Yes, in this paper Tb is the brightness temperature Tb in the ground observation mode.

- Chinese characters appeared in Fig. 4. Please translate those into English.

Reply: Thanks for your care, it was translated into English in Fig.4.

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Please also note the supplement to this comment:
https://amt.copernicus.org/preprints/amt-2021-165/amt-2021-165-AC1-supplement.pdf