

Interactive comment on “Detection of land surface induced atmospheric water vapor patterns” by Tobias Marke et al.

Wayne Angevine (Referee)

wayne.m.angevine@noaa.gov

Received and published: 20 May 2019

The discussion paper describes analysis of scanning radiometer measurements, finding persistent patterns in several years of data, and attempting to attribute those patterns to land use. It is an interesting dataset and interpretation, and should be published after some clarifications.

General comments: 1. The sort of patterns described here are, according to the literature, strongly wind-speed dependent. As far as I can tell, the wind speeds are not shown here. Does the strength of the patterns depend on the wind speed? There should be plenty of samples to support some binning of the data. See (and reference) the literature on "blending height."

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2. A related point: Mesoscale circulations are mentioned in the introduction. They turn out to be rare in real data, mostly because of the wind speed dependence mentioned above. This comes up again in the discussion of fig.6, see specific comment below. Please consider how to make this point more carefully.

3. The information content of radiometer measurements is usually rather small (at most a few pieces of information in a beam). When the humidity profile is "integrated up to a scaling height of 2.5 km," (p.7 line 2), how many pieces of information are actually included in the integral? How do you know where the height of 2.5 km is in the slant path profile?

4. Why were the changed land use types chosen in the ICON2 simulation? It is not clear to me that the simulation with these choices really clarifies the issues in question. For example, if the hypothesis is that the mined areas emit more water vapor than other land use types, changing them to water bodies is not necessarily the best way to test that. Bare water doesn't emit water vapor very efficiently compared to some crops, for example. Can you explain or justify better why you made these particular choices?

Specific comments: 1. p.1 line 15: "Compartments" is maybe not the best word here. "Interactions between the land surface and the atmospheric boundary layer..." would be better.

2. p.13 line 4-5: I am not confident that there is really a secondary circulation here, or a roll structure. The quasi-linear features are present in both simulations, just a bit more clear in ICON2. If there is a roll structure, it's not necessarily related to the land use patches, rolls occur frequently even over homogeneous surfaces.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-322>, 2019.

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