

Interactive comment on “Reflection tomography of time-lapse GPR data for studying dynamic unsaturated flow phenomena” by Adam R. Mangel et al.

Anonymous Referee #2

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In general, I found the paper interesting. It is well written, and you can follow the methodology of the investigators. The way the experiments were carried out, specially the automated data collection system is interesting. The numerical analysis adds value to the paper. However, there are some points that needs to be addressed and clarified. I would like the authors respond to the following questions and clearly explain their ideas and points of views:

1) In section 2.2, line 128, authors mention that 101 CMPs were collected (between $y=1\text{m}$ and $y=3\text{m}$). I think there must be a typo here. It should “COPs.” Otherwise, it does not make sense. If the transmitter and the receiver have moved 2cm each

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time, you should have 51 profiles. If each one has moved 1cm at a time, then you will have 101 profiles. Please fix and/or clarify. 2) It is mentioned that the flux is 0.125 cm/min, but the authors did not explain how uniform the irrigation was (inside the irrigation area). 3) The moisture probes were situated 0.5 m away from the line of GPR scan. Unless, the irrigation was uniform, it does not make sense to compare the results of moisture content from the GPR scans to moisture content data from the probes. I guess, we assume the sand layer was homogeneous. 4) In line 183, it is mentioned that a refraction is also observed on the CMPs. Please discuss and explain why refraction happened in this case. 5) In section 4, line 225, the error was reported for water content near the edges of the advancing plume. Please explain how the errors were calculated considering the fact that the GPR scans were collected at fixed $x=2.0$ m and the probes are 0.5 m away from the line of scan. How did you calculate the water content error for the central area versus the edges of the plume. Please explain.

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