Reply on RC2
Debora Cynthia Maan et al.

Author comment on "Dynamic root growth in response to depth-varying soil moisture availability: a rhizobox study" by Debora Cynthia Maan et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-104-AC2, 2022

Dear reviewer,

Thank you for your constructive comments.

- The reviewer comments that some models described the maximum rooting depth by a linearly increasing function with accumulated temperature.

The authors agree that temperature can be a dominant driving factor. We propose to add the following line after “In most crop ... i.e., both independently of soil moisture.”:

“Some exceptional models treat root growth more dynamically by relating root growth to soil related parameters as accumulated temperature or root zone soil moisture. Models that take the vertical profiles of soil moisture into account, however, are scarce.”

2. As I know, some crop (e.g. Spacsys and STICS) and land surface models (e.g. CLM 5.0) have implemented dynamic root growth

These models have indeed a dynamic root growth component, but do not include a dependency on the vertical variation in soil moisture.

3. The relative insensitive soil moisture should be the reason why exponential root profile is widely used in crop models and land surface models

Our data indeed suggests that roots do not only ‘follow moisture’, but the moisture also ‘finds roots’ if roots are locally not present (by diffusion), reducing the resulting error. However, the experimental setup in an enclosed box favours this process unrealistically. At a larger scale the ‘root follows moisture routine’ is expected to have a more pronounced effect on the soil moisture.