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Interactive comment on "Estimating spatial mean root-zone soil moisture from point-scale observations" *by* A. J. Teuling et al.

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General comments,

Hereby we resubmit the revised version of our manuscript "Estimating spatial mean root-zone soil moisture from point-scale observations" (HESSD-2006-0059). We revised the manuscript based on the constructive comments of one anonymous referee. The referee's comments focused on the abstract, the objective, and the materials and methods section. Our revisions/responses are listed below. We hope these changes make our manuscript suitable for publication in HESS.

Abstract: Two minor changes were made to the abstract in line with the referee's suggestions.

Objective: We agree with the referee that the criteria for data selection would better fit

in the “Data” section. Most of this paragraph was relocated to the first paragraph of the modified “Data” section.

Materials and methods: As we mentioned in the manuscript, the choice for the depth of the root zone is partially arbitrary. In contrast to the actual rooting depth (which can, at least in principle, be derived from root density profiles), there is no clear definition of the “effective” root zone depth, i.e. the depth where plants extract most water. This depth varies both in space and time, while root water uptake decreases gradually rather than abruptly with depth. The main advantage of the depth we have chosen ($\sim$70 cm) is that it allows for a direct comparison of the results for different datasets, since they are valid for the same soil layer. For many sites at Tarrawarra, this depth was limited by the presence of bedrock (for all sites the deepest observations were at least 60 cm). We believe that by taking a depth of 70 cm, we capture most (if not all) of the effects of the soil moisture depletion in summer by root water uptake on the soil moisture variability dynamics for all sites, while preventing a too large attenuation of the volumetric soil moisture time series signal that would occur if soil moisture is averaged over a too large depth. Previous analysis of the datasets have shown that most of the temporal dynamics, also for R-5 and Louvain-la-Neuve, indeed take place in the upper, say, 50 cm of the soil (Loague, 1992, and Hupet and Vanclooster, 2002). Since measurements at larger depths have smaller temporal variability, including these measurements in our analysis will hardly affect the results. We included some of the arguments mentioned above in the revised version of our manuscript, in the first paragraph of the “Data” section. We hope this will clarify our arguments for the choice of the root zone depth.

The referee encourages us to include a table that summarizes the different strategies. We believe our Table 1 (’Summary of the observation strategies...’) does just that. It may have been overlooked by the referee (it prints directly below the references).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 1447, 2006.