

Discussion of “Estimation of the Water Balance Using Observed Soil Water in the Nebraska Sandhills” by V. Sridhar and K. G. Hubbard

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The authors employ a modified version of the Thornthwaite-Mather TM model to estimate the water balance at four sites in the Nebraska Sandhills. They state that their “approach in this investigation is to first apply the TM model over selected sites using individual weather station data and then to estimate regional averages in comprehending the regional water balance.” However, such a generalization, i.e., the computation of regional averages, is ambiguous in the paper. It is not clear whether the authors consider the station-averaged mean annual evapotranspiration ET rate of 861 mm a site-specific or a regionally representative value. Only when one compares it with the corresponding annual precipitation rate of 420 mm may one conclude that the specified ET value cannot be a regional average because that would mean ET overall is more than double the precipitation rate the area receives. Since no major groundwater decline was reported in the Sandhills during the study period, one wonders where the additional water came from if not from within the Sandhills, which is widely recognized as a significant recharge region for the groundwater system of the High Plains aquifer (Bleed and Flowerday 1998; Szilagyi et al. 2003, 2005). Consequently, the ET rate the authors publish cannot be a regional average, it can be representative only of the interdunal valleys and areas with shallow groundwater that *locally* can evaporate more water than they receive via precipitation.

Accepting that the ET values are site specific, however, leads one to another problem. Namely, the discrepancy between them and the values obtained by the Robinson-Hubbard model the authors present in Fig. 5 of the original paper for the same sites. In the latter model the estimated ET values are nicely constrained by precipitation. Which model is correct then? Or can it be that these latter ET values are regionally representative? But how, if they are derived from the same weather station inputs? This is not explained in the study.

In summary, a mean annual ET rate more than double the corresponding precipitation rate cannot be representative of the regional water balance of the Sandhills in Nebraska. For an alternative description of the long-term mean water balance terms one is kindly referred to the studies by Szilagyi et al. (2003, 2005), which show them not only for the Sandhills but for the entire state of Nebraska.

References

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