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Influence of shallow water-tables on the spatial variation of crops evapotranspiration

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Agriculture management over large areas needs to estimate spatial variability of water balance and crop evapotranspiration (e.g. Ines *et al.*, 2002). Several spatial approaches of water balance are applied. Their main critical point is that the presence of shallow water tables is often neglected (D'Urso *et al.*, 1999).

In this work, we analyse the importance of shallow water tables on the spatial variation of crops evapotranspiration. The study takes place in the basse vallée de la Peyne, a 60 km^2 vine production area representative of the Mediterranean vineyard, under a semi-arid climate.

On a representative sample of 41 sites, water table depths were measured weekly at 41 representative sites. In parallel, measurements of the carbon isotopic composition of the grape juice, $\delta^{13}C$ were used as an estimator of the hydric stress of vine over the cultivation period (Gaudillère *et al.*, 2002). The sites were also characterized have described by observation of soil profiles in order to estimate both hydraulic properties and effective root depth. On each site, we applied a mecanistic water balance model (HYDRUS-1D - Simunek *et al.*, 1998), firstly without taking into account the water table; secondly with taking into account the temporal variation of the water table. We have then calculated the ratio between the estimated transpiration and the potential transpiration (RT / PT), to compare with the measured $\delta^{13}C$.

The results showed that taking into account water table levels significantly improves the multi-local modelling of vine water balance. If the shallow water table are not taken into account , no significant relation was obtained between $\delta^{13}C$ and the ratio RT / PT. Conversely, a significant linear relation exist between the two indicators (r^2 = 0.30, p<0,01) whenwater table depths are considered as input of the water balance

model,). Consequently, we conclude that it is really important to consider spatial variation of the shallow water tables in spatial estimation of water balance and crops evapotranspiration.

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