Geophysical Research Abstracts
Vol. 20, EGU2018-7872, 2018
EGU General Assembly 2018
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# Transpiration measurement in orchard tree crops based on sap flow sensors and thermal information

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Measuring and modeling of transpiration in orchard tree crops remain a challenge. Limited water resources and the competition with other sectors of society result in the need to improve irrigation water productivity by matching irrigation supply with crop needs. It is thus essential to have a profound knowledge of crop water needs. This is especially important in orchard tree crops, which remain in the field even under drought conditions. The correct assessment of crop water requirements is essential for optimizing applied water both at the farmer's and district levels. Knowledge of crop transpiration is moving forward due to technical advances, such as the sap flow sensors. These systems provide with valuable information about crop transpiration in selected monitored trees with a high temporal frequency. Unfortunately, spatial patterns of water status distribution within the field cannot be assessed by these point measurements. High-resolution thermal remote sensing provides a valuable tool to address the issue of the spatial variability. In the case of discontinuous canopies such as orchard tree crops, high-resolution imagery is required in order to clearly identify pure vegetation pixels, avoiding crown edges and soil background effects. We used the thermal-derived Crop Water Stress Index (CWSI) and its relation to crop transpiration to monitor crop requirements in a citrus orchard field. Considering the combination of transpiration data from sap flow sensors and the thermal-derived information, our understanding of transpiration rate is improved, allowing to monitor crop transpiration at the field level.