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Monitoring Stress in Natural Vegetation combining Energy Balance and Satellite Assisted Soil Water Balance

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Water stress in crops and natural vegetation is a relevant topic in environmental studies and water management (Allen et al., 2010; Reichstein et al., 2013). The soil water balance allows monitoring the water uptake of cover at daily temporal and medium spatial resolution. Nevertheless, the stress is difficult to achieve due to the different climatic and environmental factors, particularly for the parameterization of soil for natural vegetation with a radicular system complicated to set. This problem is overcome calibrating the soil water balance using actual evapotranspiration (ETa) provided by a tower flux or energy balance model (SEB) (Campos et al., 2016). For operational purposes, a one-source energy balance model (Allen et al., 2007), applied to the natural area of las Majadas and evaluated with one year of local flux measurements, has been applied to check the instantaneous latent fluxes. The ETa obtained from SEB model, divided by the potential evapotranspiration using the reflectance-based crop coefficient approach (Kcb·ETo) provides an estimation of the water stress associated to a cover. This calibration is valid for that cover, but evaluated with the evapotranspiration measured at field shows the consistency of the model. The advantages are to extrapolate and reinforce the application of soil water balance assisted by satellite and map the stress evolution at daily scale, taking advantage of operational platforms like Sentinel in combination with traditional ones like Landsat.
Future improvements could be the disaggregation of high temporal thermal resolution data in combination with medium spatial resolution optical data providing more temporal resolution to monitor the stress in natural vegetation.

References

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