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Poster Title: Estimating the Relative Water Content of Single Leaves from Optical Polarization Measurements.

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AGU (Dec 12-16). The two abstracts are identical.)

Remotely sensing the water status of plants and the water content of canopies remain long term goals of remote sensing research. For monitoring canopy water status, existing approaches such as the Crop Water Stress Index and the Equivalent Water Thickness have limitations. The CWSI does not work well in humid regions, requires estimates of the vapor pressure deficit near the canopy during the remote sensing over-flight and, once stomata close, provides little information regarding the canopy water status. The EWI is based upon the physics of water-light interaction, not plant physiology. In this research, we applied optical polarization techniques to monitor the VIS/NIR light reflected from the leaf interior, R, as well as the leaf transmittance, T, as the relative water content (RWC) of corn (*Zea mays*) leaves decreased. Our results show that R and T both changed nonlinearly as each leaf dried, R increasing and T decreasing. Our results tie changes in the VIS/NIR R and T to leaf physiological changes – linking the light scattered out of the drying leaf interior to its relative water content and to changes in leaf cellular structure and pigments. Our results suggest remotely sensing the physiological water status of a single leaf – and perhaps of a plant canopy – might be possible in the future. However, using our approach to estimate the water status of a leaf does not appear possible at present, because our results display too much variability that we do not yet understand.