



Measuring vegetation water content by looking at trees blowing in the wind

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Satellite-based soil moisture measurements have shown a diurnal variation in soil water content in Ghana. Most likely this diurnal variation is due to variation of moisture content in vegetation, as was measured by Friesen et al. Understanding the specifics of this cycle and its relation with radar backscatter would help improve the estimation of soil moisture from satellites as well as provide a new source of information: vegetation water content (ie. plant water stress) from satellites.

To this end, a non-intrusive method is needed to measure the change in time of the water content of vegetation. In this research, we have measured the Eigen-frequency of trees using an accelerometer bolted in the tree trunk. The change in Eigen-frequency over time is related to the change in mass and stiffness which are depended on the water content of the tree. We looked at two driving forces for the tree-mass-spring system. Firstly, trees were pulled back and suddenly released. Eigen-frequencies were easily identified from the oscillation observed. Secondly, the wind was used as a driving force and Eigen-frequencies were estimated in the frequency domain.