

Inferring the effects of surface canopy water on VOD estimation from L-band backscatter

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❖ Research objectives

1- Presenting new technique to estimate VOD from single-incidence angle backscatter data

2- Quantifying the effect of surface canopy water (SCW) on:

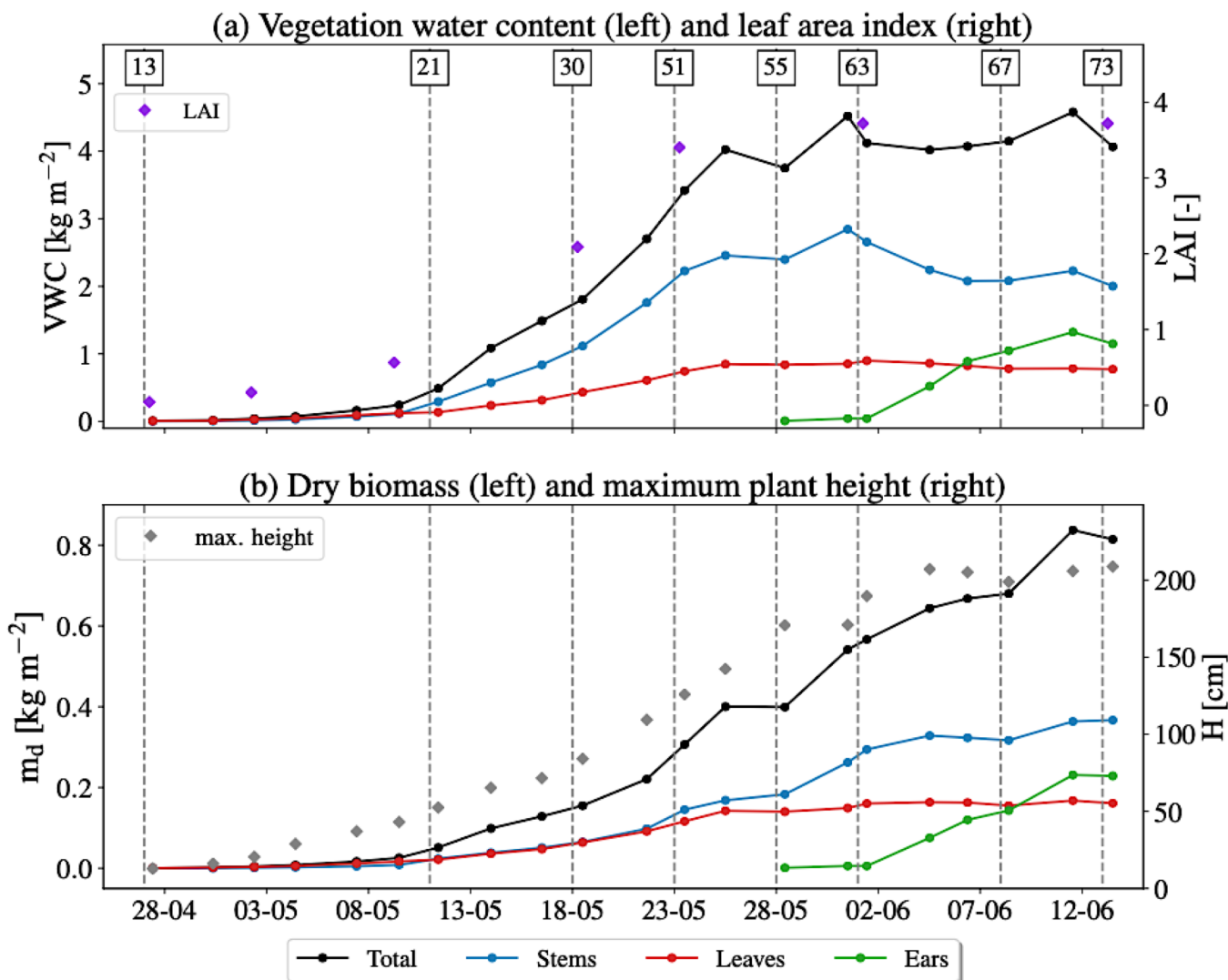
- Estimated Vegetation Optical Depth (VOD)
- Relationship between VOD and internal vegetation water content



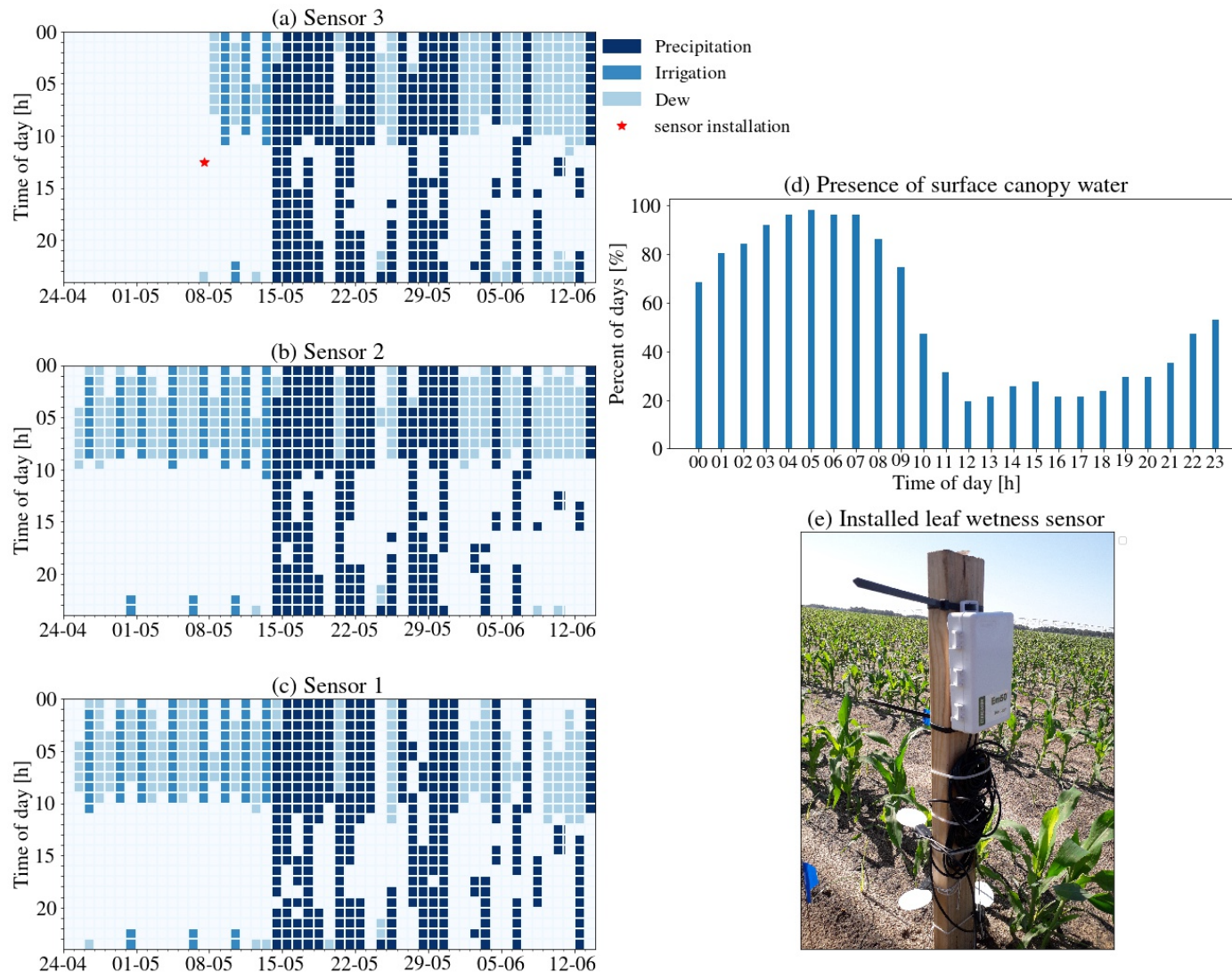
❖ Field Experiment



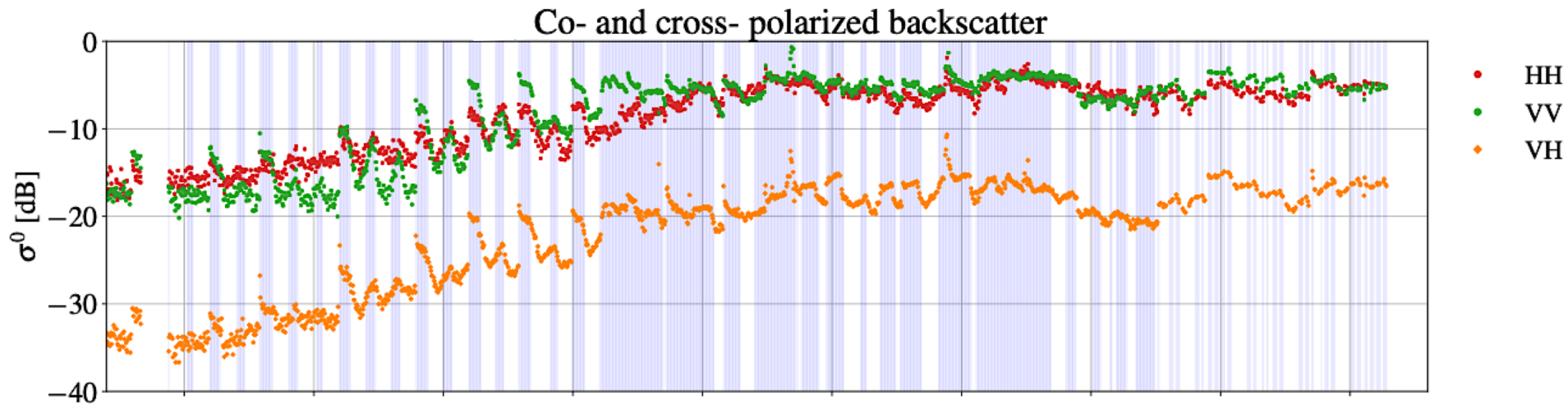
❖ Time series of biophysical variables



❖ Surface Canopy Water

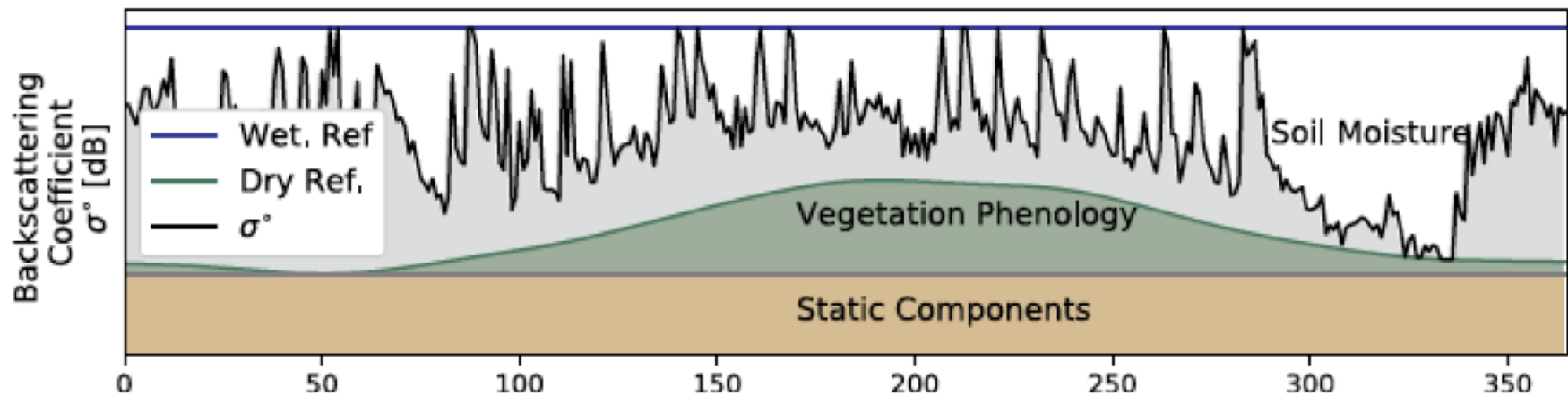


❖ Time series of L-band observables



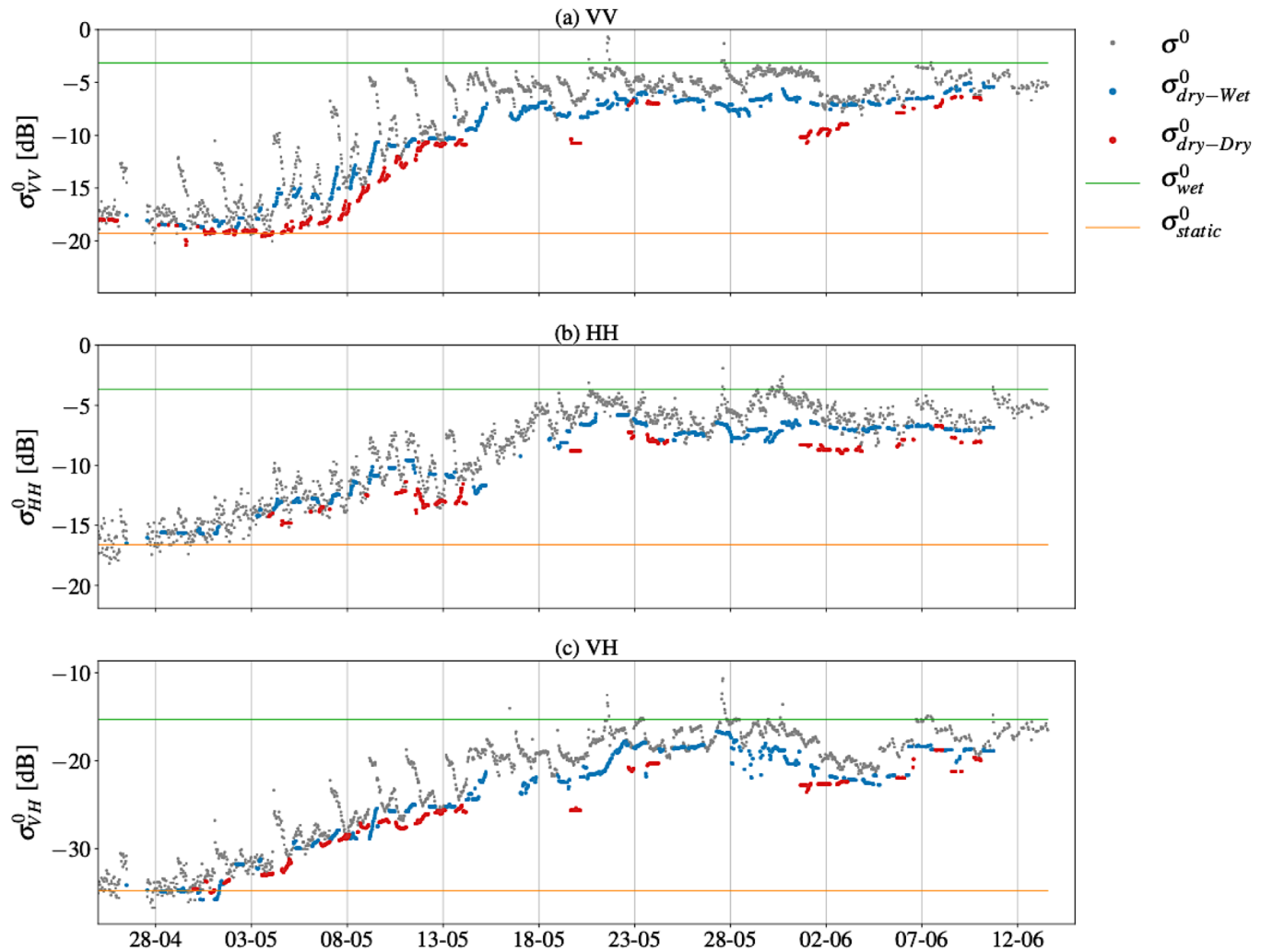
❖ Modified VOD Estimation Method

- **Dry reference:** defined as radar backscatter from driest soil under canopy cover at each radar acquisition time.
- **Wet reference:** defined as the backscatter for the saturated soil
- **Static component:** defined as lowest value of dry reference after the plant emergence.



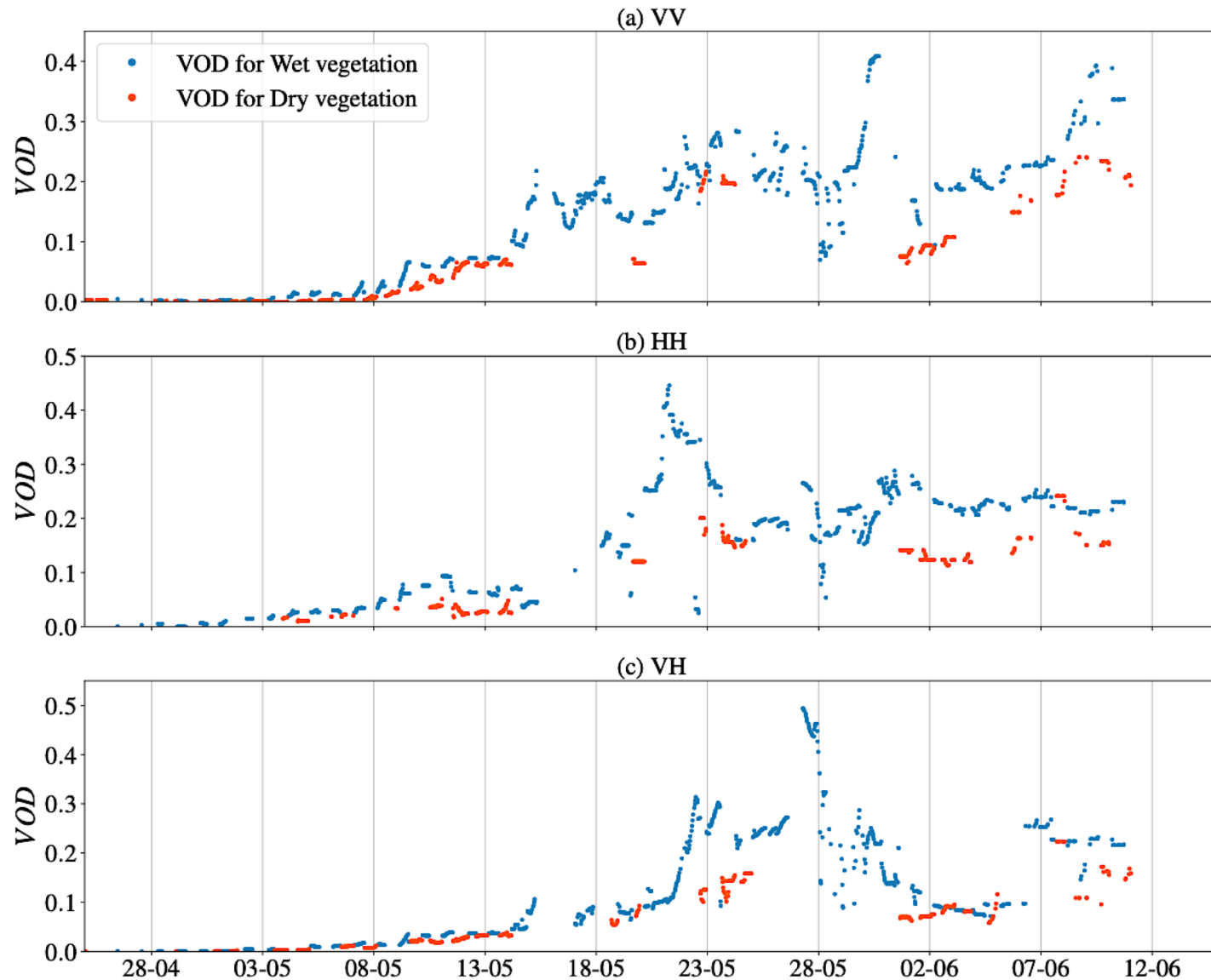
Three component of TU Wien Soil moisture retrieval method, dry reference, wet reference and static component along with radar backscatter coefficient (Steele-Dunneet al., 2019)

❖ Time series of Dry Reference

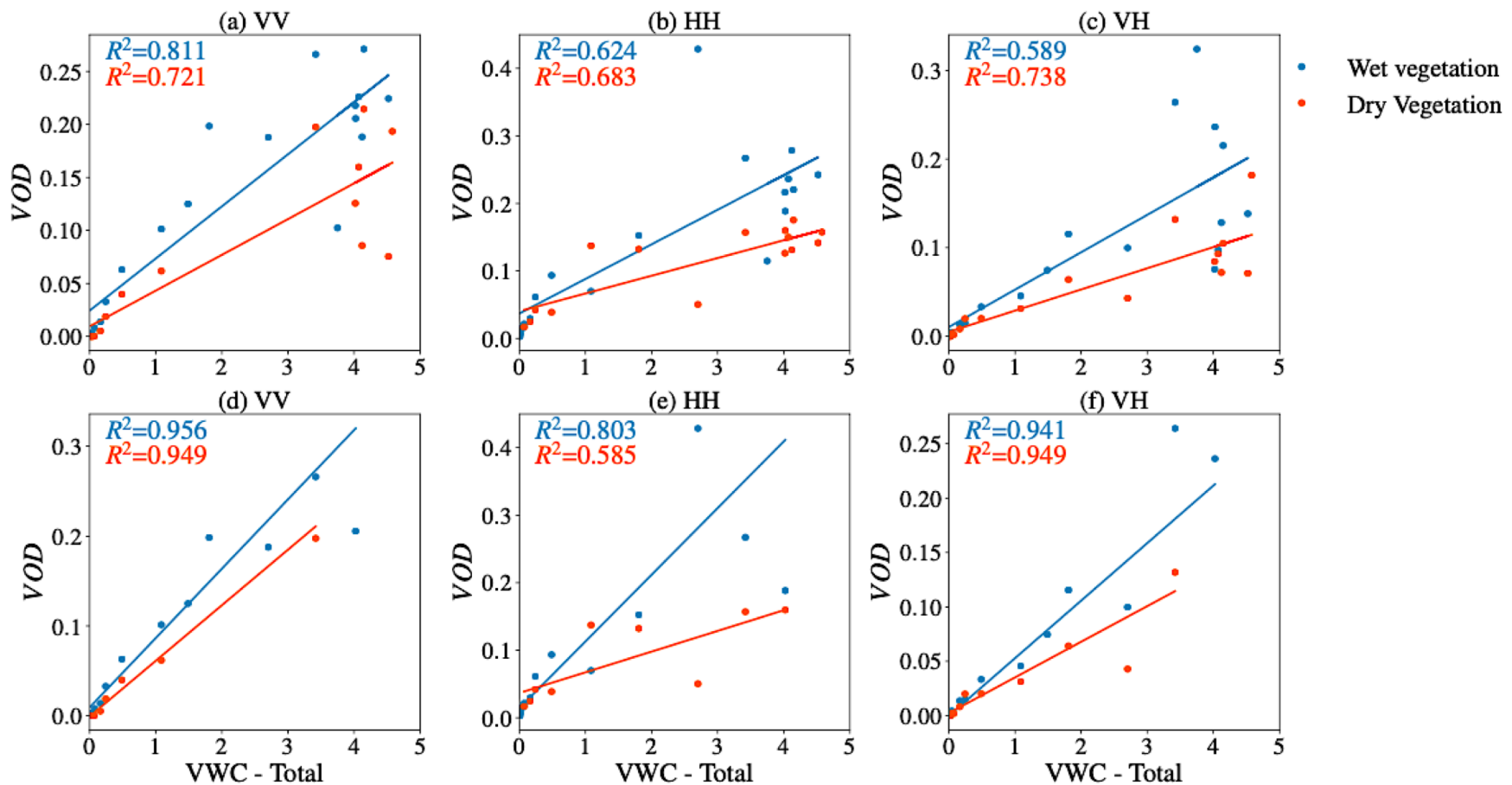


$$VOD(t) = \frac{-\cos\theta}{2} \ln\left(\frac{\sigma^0_{wet} - \sigma^0_{dry}(t)}{\sigma^0_{wet} - \sigma^0_{static}}\right)$$

❖ Estimated Vegetation Optical Depth (VOD)



❖ Relationship between VOD and internal VWC



❖ Conclusion

- Using the new technique, the VOD can be estimated from active microwave data by having surface soil moisture
- The estimated VOD from wet vegetation were generally higher than those from dry vegetation.
- The slope (b) values in the linear fit between VOD and VWC is different for dry and wet vegetation
- Choice of overpass time affects the probability of dew, and the presence of SCW led to a systematic bias in backscatter which should be considered in any vegetation applications when using data from both ascending and descending overpasses.