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Supplement of

Continuous ground monitoring of vegetation optical depth and water content with GPS signals

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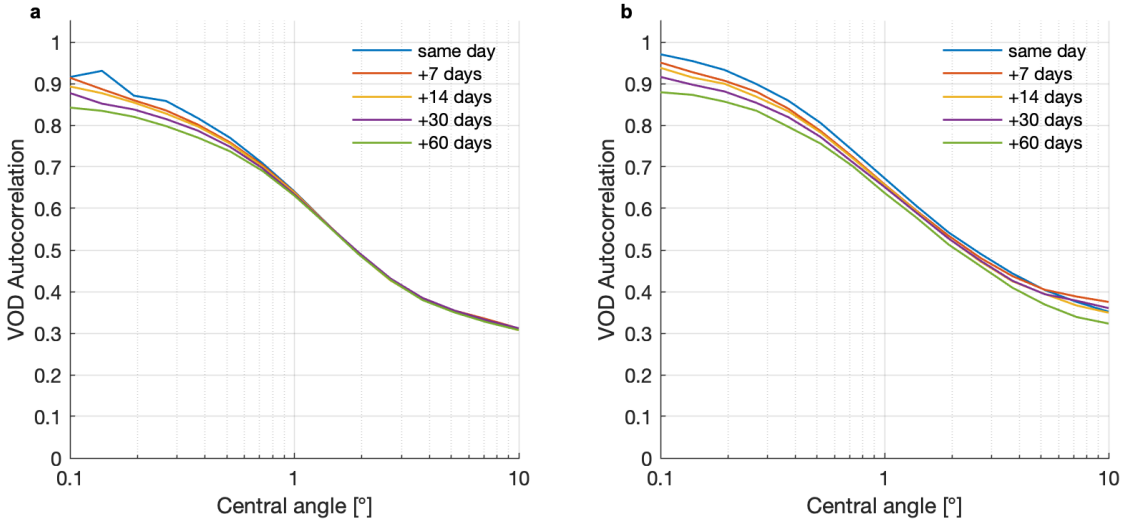
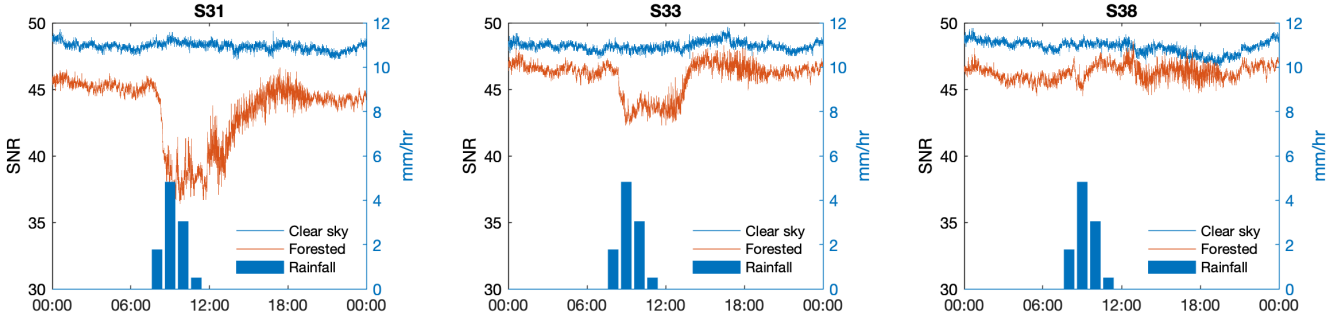
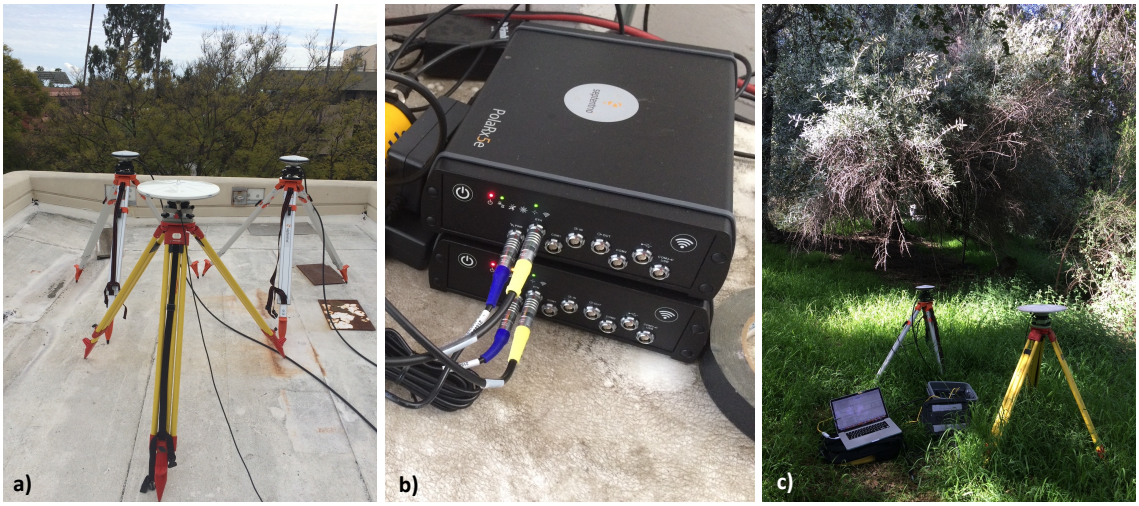


Supplementary Figure S1. Autocorrelation of individual VOD observations with respect to angular distance and taken at different temporal intervals. Based on a two-month subset of data (July 5th to September 5th) to reduce the computational time. (a) Autocorrelation based on all data. (b) Autocorrelation based only on pairs of points from the exact same satellite.



Supplementary Figure 2. Signal strengths of the three geostationary SBAS/WAAS satellites measured at the reference and the forested sites during the rainfall event on May 18, 2020. The signal strength of the reference antenna remains stable, suggesting that the potential presence of water on the antenna surface does not cause strong perturbations (for our type of antenna). Note that the signal at the forested site is attenuated differently for each satellite because of the heterogeneous canopy distribution.



Supplementary Figure S3. (a) Antennas under test at the open-sky site (the PolaNt-x MF antennas are the smaller ones at the back). (b) Receivers. (c) Deployment at the forested site. The other larger Zephyr antenna (on the yellow tripod) was tested as a backup solution but was not used in the end. Photographs by V. Humphrey.

Supplementary Table S1. Recommendations for deployment of GNSS-based VOD systems.

Critical	• Pair of identical instruments (GNSS antennas, receivers, cable types, cable lengths) • Reference station with clear view of the sky, located within 5 km • Fixed (motionless) ground stations • Good quality cables, protected from strong diurnal temperature changes
Recommended	• Receiver with multi-constellation capability • Antennas not too close to strong reflectors • Temperature measurement available at the site
Nice to have	• Receiver with multi-frequency capability • Receivers similarly exposed to weather conditions (either both outdoors, or both indoors) • Continuous ancillary measurements (e.g. weather station, eddy-covariance, sapflow, dendrometers, etc.) • Vegetation samples (e.g. leaf water potential, gravimetric moisture, LAI, dielectric measurements, biomass estimates, etc.)