

**Analyse expérimentale de la réponse radar en bande C d'une oliveraie
irriguée dans une région semi-aride**

***Experimental analysis of the C-band radar response of
an irrigated olive grove in a semi-arid region***

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Abstract

This study focuses on a vegetation monitoring system based on the analysis of C-band radar response. The experiment was conducted on a quasi-continuous basis from March 2020 to December 2021 in an olive grove located near Marrakech, Morocco [1]. The setup consists of a high-altitude tower (~20m) equipped with several antennas pointed toward the olive field, as well as the entire system for data acquisition, control, and measurement transmission (Figure 1). Data collection is performed in the frequency domain using a two-port vector network analyser (VNA) over a frequency band between 5.2 and 5.8 GHz. Seven linearly polarised horns antennas, positioned horizontally or vertically, are used. Electromechanical switches enable a given pair of transmitting and receiving antennas to be configured in order to sequentially acquire VV, VH, HV and HH polarisations respectively. The measurements were taken day and night every 15 minutes for 20 months. In order to calibrate the radar response a calibration target have been used. The measurement in time domain of a trihedral corner reflector positioned 30 m from the radar in the olive grove is shown in Figure 2 and serves as a reference. The objective of these measurement campaigns was to assess the sensitivity of the C-band radar response of an olive grove depending on the water status of the vegetation.



Figure 1: Tower with the radar instrumentation illuminating the olive grove

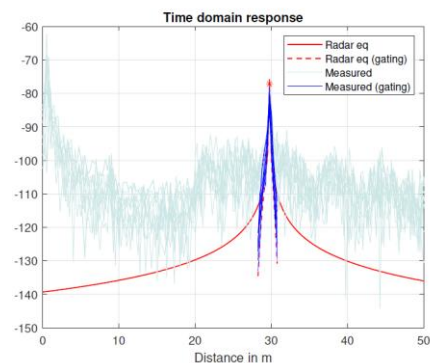


Figure 2: Calibration process of the RCS using a trihedral corner reflector in time domain

References

[1] Chakir, Adnane, et al. "Analysis of C-band radar temporal coherence over an irrigated olive orchard in a semi-arid region." *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 17 (2024): 3635-3647.