



34 – Quantification of intra-plot variability of vine water status using Sentinel-2 : case study of two Belgian vineyards

Louis DELVAL (louis.delval@uclouvain.be) – ELIE

Supervisor(s): Mathieu Javaux, François Jonard

Keywords: Vine, Sentinel-2, Water status, Intraplot variability

Climate, soil and plant material are the terroir factors that most influence the water status of the vine, and conditions can be different within the same vineyard plot, implying heterogeneous vineyard management to achieve optimal wine quality.

The objective of this study is to explore the potential of Sentinel-2 to characterize the intra-plot variability of vine water status and its evolution through time.

Four years of Sentinel-2 images of two Belgian vineyards were analyzed. Several spectral indices, based on the blue, red, NIR and SWIR bands on a 10 x 10 m² grid, were calculated and compared to quantify the evolution of the water status of the vine, as a function of the weather conditions, the grape variety and the water holding capacity (WHC). Predawn leaf water potential (Ψ_{pd}) measurements were collected in situ during dry periods, to compare them with the remote sensing indices.

We observed that spectral indices and WHC were better correlated when the water conditions were the most constraining for the vine (e.g. $R^2 = 0.72$ on 16/08/18 for NDWI/EVI). Edaphic heterogeneity is therefore better captured by spectral indices when conditions are dry for the vine. The spectral indices have a low value when the WHC is low, and vice versa. The spectral index NDWI/EVI quantifies the water status of the vine better than the NDWI, when comparing linear regressions between the two spectral indices and the Ψ_{pd} measured in the field ($R^2 = 0.67$ for NDWI/EVI; $R^2 = 0.64$ for NDWI).