Post-doc (18 months) :
Estimation of beet yellowing severity and propagation by satellite image time series

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Duration: 18 months
Beginning: 01/09/2025
Remuneration: 2815,82 € / month
Reference:
Deadline: 01/07/2025
UMR (laboratory) : DYNAFOR, Toulouse (France)

INRAE presentation

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Work environment, missions and activities

This position is included in the BEET-SAT project (PNRI-C), located in DYNAFOR lab, in collaboration with BioSP (UR INRAE).

This post-doc in remote sensing aim to detect the beet yellowing propagation over time at parcel and intra-parcel scales with different satellite image time series (SITS). The three main steps of the work are:

- (1) to understand the spectral behavior of beet over a growing season for several years, based on spectral indices of Sentinel-2 that highlight leaf pigment content, leaf structure and water content, all of which are supposed to respond to symptoms of beet yellowing viruses. Water stress also create identical symptoms on beets and it will be important to dissociate these two causes to create a solid database.
- (2) to evaluate the impact of the spatial resolution of the SITS on the detection and differentiation of the stress and disease. In a first step, native Sentinel-2 time series will be compared to a super-resolved version at 5m based on the SISR architecture (Lac et al. 2023) and the SEN2VENµS dataset (Michel et al. 2022). This evaluation will be carried out over two years and if the results are positives, time series will be generated over the 2017-2026 period. Then, other sensors such as the PlanetScope constellation (approximately 3m) and

Pléiades NEO (30 cm) will be tested. The results will be compared to several additional acquisitions from unmanned aerial vehicle (UAV) technologies.
- (3) to study the benefit of combining satellite observations and simulation outputs that estimate evapotranspiration and water balance of the crops.

Training and skills

- PhD or equivalent in remote-sensing, data science or image processing
- Skills in conceptual mechanistic and spatial modelling are desirable, and knowledge of agronomy would also be appreciated.
- A strong experience in Python programming and a good knowledge of machine learning libraries such as scikit-learn.
- Good interpersonal skills and open to multidisciplinarity.

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