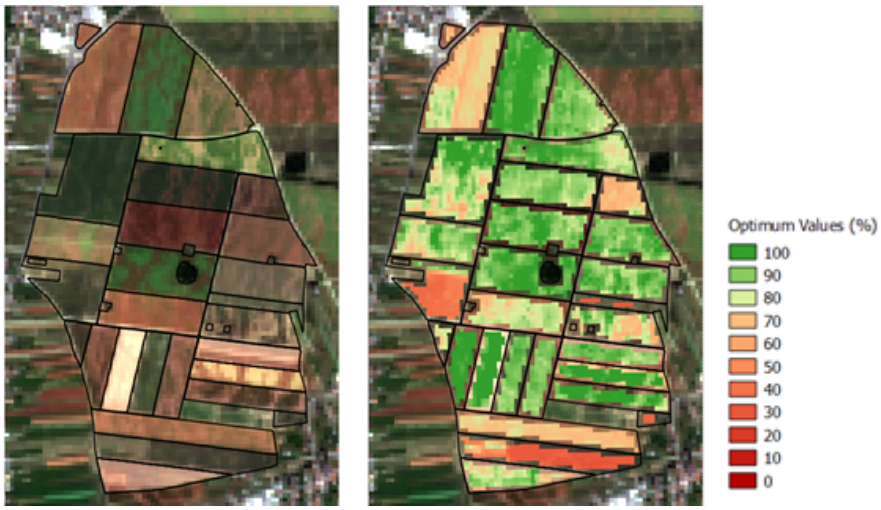
Early Vegetation Stress

Download Product Sheet



Performance of crop fields (Source: GeoVille)

Category

☐ Product Development	☐ Product Sales	☑ Underwriting	☑ Loss Adjustment	☐ Claims Handling

PRODUCT DESCRIPTION

This service provides information on vegetation stress based on the early detection of reduced photosynthesis caused by for example droughts or diseases. Typically, vegetation growth anomaly monitoring is based on long time series of optical satellite data. These type of monitoring builds upon optical indices such as the Normalized Differenced Vegetation Index (NDVI), Leaf Area Index (LAI) or Fraction of Absorbed Photosynthetically Active Radiation (FAPAR). This approach is mainly capable to detect persistent vegetation stresses that eventually affect the greenness of the vegetation. Short term stresses which can also adversely affect crop yields are however not immediately visible in the optical spectra. Additional information such as thermal data can contribute to a direct observation of crop stress under drought conditions.

For indirect early stress detection, long and consistent time series of satellite data are required to separate short term from long term vegetation stress. Additional data such as meteorological data is furthermore needed to distinguish between weather-induced short-term changes and long-term stress caused by other factors (e.g.: farm management, inputs application, soil specifics, etc.). More direct approaches use observations derived from spaceborne thermal sensors.

PRODUCT SPECIFICATIONS

Main processing steps

Processing is based on long and consistent time series of vegetation indices.

Input data sources

Optical: Sentinel-2

Radar: Sentinel-1

Supporting data: meteorological data

Spatial resolution and coverage

Spatial resolution: 10 – 300 m

Coverage: National/regional/local level

Availability: globally available

Accuracy / constraints

Thematic accuracy: > 85 %, depending on in-situ data availability

Spatial accuracy: 1.5 - 2 pixels of input data

Limitations

To disentangle actual stress from normal but e.g. delayed vegetation growth or mismanagement requires not only long time series but also information about natural conditions such as rainfall deficits.

Frequency / timeliness

Frequency: depending on satellite revisit rates

Timeliness: near real-time

Delivery / output format

Data type: Raster formats, vector formats

File format: GeoTIFF, shapefile

Accessibility

Commercially available on demand from EO service providers.

CHALLENGES ADDRESSED - USE CASE(S)

Underwriting:

- Seasonal portfolio monitoring
- Online platforms or easy-to-use interfaces integrating various data sources (e.g. vegetation stress, field boundary changes, comparison, etc.)
- Actual crop health (vegetation)
- Procure better reinsurance terms/capacity from enhanced insurance practice
- Identification of vegetation stages (identify most sensitive stages when crop is the most vulnerable to a risk, e.g. flowering stage)
- Weather forecast tool

Loss Adjustment:

- Workforce allocation and planning
- Benchmark physical field observations against yield loss detection (e.g. product calibration)
- Increase credibility of loss adjustment (e.g. show EO data/visualization to support loss adjustment communication to farmer)
- Enhance field survey (better precision with EO data support)
- Detect crop damage at field level
- Assess crop damage at field level
- Distinct field heterogeneity with crop damage
- Benchmark for anomaly indication of abnormal naturel occurrence of crop growth