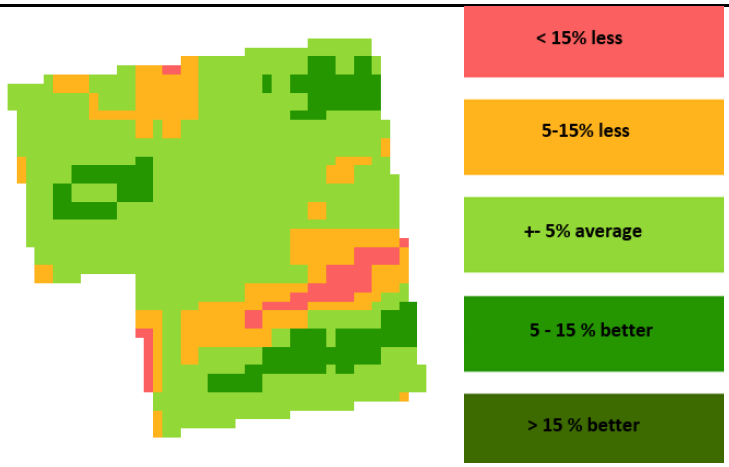
CROP GROWTH ZONE DETECTION



Historical crop growth zone detection based on 5 years of Sentinel-2 data for a parcel in Belgium (Source: VITO, watchitgrow.be)

CATEGORY

☒ Product Development ☒ Product Sales ☒ Underwriting ☒ Loss Adjustment ☒ Claims Handling

DESCRIPTION

A crop parcel is mostly uniformly treated by farmers and local weather conditions. Many fields however show a spatial variability in crop performance in the course of the growing season. Such variability is caused by a variety of natural and technology factors.

Where a multiyear recurrent variability is caused by differences in soil types, topography, weather micro-zones, crop growing technologies applied by the farmer, level of precipitation and irrigation access, while more abrupt and unexpected field variability could be caused by extreme weather events (e.g.: hail, storm, flood, drought, etc.).

Availability of crop growth zones is important for all stages of insurance product cycle, while the highest importance of such information is for agricultural underwriting and loss adjustment.

PRODUCT SPECIFICATIONS

Main processing steps	Satellite information derived from Sentinel-2 can support the evaluation of historical natural field variability as compared to the near real time detection of less/better performing zones within crop parcels.
Input data sources	Optical: Sentinel-2 Radar: n.a. Supporting data: for development: field yield samples
Spatial resolution and coverage	Spatial resolution: 10 m Coverage: crop parcel Availability: On demand
Accuracy / constraints	Thematic accuracy: The maps do not represent a physical quantity hence only a qualitative assessment is possible, e.g. by relating the maps with intra-field yield variability, detailed soil maps or crop damage maps. It is advised to perform an assessment with the service provider on a study area to evaluate the quality of the maps for a specific usage and region. Spatial accuracy: See Thematic accuracy.

Limitations	Challenging to detect the underlying processes of the intra-field variability: e.g. soil, agricultural management, crop damage. Ancillary information on weather conditions and crop type are required to interpret the detected crop growth zones.
Frequency / timeliness	Frequency: static maps or updated regularly (+- weekly) Timeliness: historical data or < 2 weeks
Delivery / output format	Data type: raster, vector File format: GeoTIFF, Shapefile
Accessibility	Available on demand from EO service providers.

CHALLENGES ADDRESSED – USE CASE(S)

Product Development:

- Index insurance: Risk / crop modelling (Correlation of EO data with in-situ data)
- Index insurance: Relation between weather and impact on crop productivity
- Index insurance: Platform for crop health products
- Elaboration of crop profile: Field crops, vegetables
- Information on forest health and production at different temporal scales (realtime monitoring, historical development)
- Radar data (eliminated cloud cover effects)
- Risk exposure (product design and customer communication)

Product Sales

- Client Outreach
- Pre-contractual Consulting (show-case risk exposure)
- Greater acceptance of index covers by farmers
- Regular market penetration review
- Risk alerts

Underwriting:

- Seasonal portfolio monitoring
- Online platforms or easy-to-use interfaces integrating various data sources (vegetation stress, field boundary changes, comparison)
- Risk / crop zoning
- Actual crop health (vegetation)
- Global/Regional production trends (e.g. monitoring specific crop acreages of surrounding regions/countries)
- Procure better reinsurance terms/capacity from enhanced insurance practice
- Crop calendar and practices
- Regular assessment of risk pricing and product rating

Loss Adjustment:

- Workforce allocation and planning
- Benchmark physical field observations against yield loss detection (e.g. product calibration)
- Risk mapping against crop's vegetation stages
- 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

Claims Handling:

- Identification of actual damage size (tons (volume) / ha (area) / price (yield value))
- Quality control assessment of claims before pay-out
- Fraud detection
- Obtaining timely, reliable and consistent data to speed-up the indemnity pay-outs