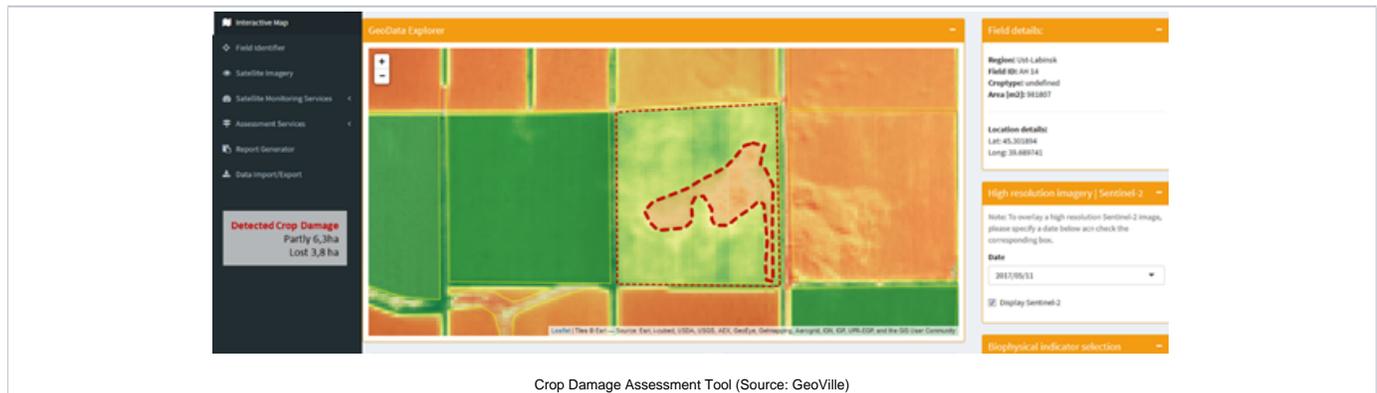


Crop Damage Zones Detection

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Category

<input checked="" type="checkbox"/> Product Development	<input type="checkbox"/> Product Sales	<input checked="" type="checkbox"/> Underwriting	<input checked="" type="checkbox"/> Loss Adjustment	<input checked="" type="checkbox"/> Claims Handling
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PRODUCT DESCRIPTION

On the one hand crop production is affected by a number of abiotic factors including soil type, its acidity and salinity, thermal and precipitation effects, application of various agricultural inputs as they affect all metabolic activities of the plant. On the other hand, crop production can also be affected by various weather events such as storm, flood, hail, drought, frost, etc.

This service will provide a mechanism for verifying crop damages through EO data at field scale and significantly contribute to efficient underwriting, loss adjustment and further claims handling. Crop damage zones details provided by the EO brings more efficiency and precision, especially for underwriting and loss adjustment purposes. Underwriters may prioritize the areas and allocation of human resources while loss adjusters may save time on crop survey and make more precise estimations of actual damage occurred at a given field.

PRODUCT SPECIFICATIONS

Main processing steps

The methodology is based on the use of time series of vegetation indices (e.g. FAPAR – Fraction of Absorbed Photosynthetically Active Radiation, NDVI – Normalized Differenced Vegetation Index or LAI – Leaf Area Index). Changes and anomalies within a defined area and over a period of time are then analysed to identify the zones where a damage has occurred using statistical thresholding.

Input data sources

Optical: Sentinel-2, VHR depending on availability (e.g., Planet, Pleiades, Worldview 3&4, RapidEye, SPOT 6&7)

Radar: Sentinel-1

Supporting data: Meteorological data (temperature, precipitation, wind, hail), field parcel information such as LPIIS

Spatial resolution and coverage

Spatial resolution: HR solution - 10m; VHR and HHR solutions (on demand) - 0,3 – 5m

Coverage: Field Level (micro)

Availability: globally available

Accuracy / constraints

Thematic accuracy: 85 %

Spatial accuracy: 1,5 -2 pixel of input data

Limitations

To identify a reason of damage and to disentangle insured damages from mismanagement practices, additional weather data is needed.

Frequency / timeliness

Frequency: various time steps starting from daily observations

Timeliness: near real-time for early damage detection

Delivery / output format

Data type: Vector; Raster; API (depending on customer needs)

File format: GeoTIFF, shapefile, others on request (depending on customer needs)

Accessibility

Commercially 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: Functionalities of plants, chemical reactions, early stress detection
- Index insurance: Parcel/Field and regional yield statistics
- Index insurance: Platform for crop health products
- Elaboration of crop profile: Field crops, vegetables, horticulture, greenhouses
- Identification of specific stresses and vegetation problems and their underlying causes
- High accuracy of crop-specific yield for smaller crop parcels
- Radar data (eliminated cloud cover effects)
- Crop growth status during the pre-winter vegetation season of winter crops
- Benchmark for anomaly indication of abnormal natural occurrence of crop growth

Underwriting

- Online platforms or easy-to-use interfaces integrating various data sources (e.g. vegetation stress, field boundary changes, comparison)
- Risk / crop zoning
- Actual crop health (vegetation)
- Procure better reinsurance terms/capacity from better insurance practice
- Identification of vegetation stages (identify most sensitive stages when crop is the most vulnerable to a risk, e.g. flowering stage)
- Crop calendar and crop practices
- Regular assessment of risk pricing and product rating

Loss Adjustment

- Workforce allocation and planning
- High accuracy of crop-specific yield for smaller crop / land parcels
- 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