DROUGHT INDICATORS

Germany
Soil moisture based drought monitoring

| 21 June 2018 | 1 July 2018 | 11 July 2018 | 21 July 2018 |

1 - No drought
2 - Dry conditions
3 - Moderate dry conditions
4 - Very dry conditions
5 - Extreme dry conditions
6 - Exceptional dry conditions

0   100   200   300   400   500 km

GeoVille
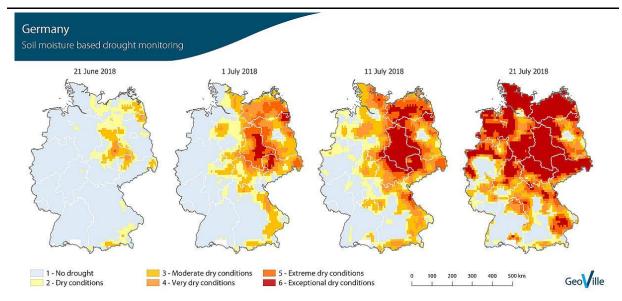
Soil moisture-based drought monitoring, June–July 2018, Germany (Source: GeoVille)

CATEGORY

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

DESCRIPTION

Droughts are prolonged periods of time when an area or region receives shortages in the water supply, whether atmospheric (below-average precipitation), surface water or ground water.

In most cases drought is referred as a large-scale (systemic) risk, as it covers larger production areas affecting all farms and crops in the region. Although the early effects of droughts are hard to identify, the longer a drought persists the greater are the effects for crops, if they are irrigated or not.

Drought indicators are variables or parameters used to describe drought conditions. Examples include precipitation, temperature, streamflow, groundwater and reservoir levels, and soil moisture.

Drought indices are typically computed numerical representations of drought severity, assessed using climatic or hydrometeorological inputs including the indicators listed above. They aim to measure the qualitative state of droughts on the landscape for a given time period. Indices are technically indicators as well.

EO data correlation with the actual drought conditions for specific crops represents the major challenge for the industry. Different crop types (and their varieties) may react differently to drought effects, showing different yield capacity decrease, which requires additional calibration of drought datasets and parameters interpretation by algorithms for the needs of a specific crop (insurance) needs.

PRODUCT SPECIFICATIONS

Main processing steps	Drought indices are amongst others based on long time series of rainfall, soil moisture and vegetation data. Anomalies compared to the long-term average highlighting areas under drought conditions.
Input data sources	Optical: Sentinel-2, Landsat-8, MODIS, Geostationary satellites (IR/visible) Radar: MetOp ASCAT, SMAP, TRMM, SSM/I Supporting data: in-situ information of drought parameters
Spatial resolution and coverage	Spatial resolution: 10 m – 25 km Coverage: National/regional/local level

	Availability: globally available
Accuracy / constraints	Thematic accuracy: depending on observed variable. Spatial accuracy: depending on observed variable.
Limitations	Depending on the drought indicator/index the limitations vary. A good overview on nearly 50 indicators/indices is provided in this WMO publication: https://www.droughtmanagement.info/literature/GWP_Handbook_of_Drought_Indicators_and_Indices_2016.pdf
Frequency / timeliness	Frequency: daily and more at regular intervals Timeliness: near real-time
Delivery / output format	Data type: Raster formats File format: GeoTIFF, NetCDF
Accessibility	Commercially available on demand from EO service providers. Publicly available data can be obtained through the Copernicus European Drought Observatory (https://www.copernicus.eu/en/european-drought-observatory).

CHALLENGES ADDRESSED – USE CASE(S)

Product Development

Index insurance:

- Index insurance: Toolbox for indices
- Index insurance: Risk / Crop modelling (Correlation of EO data with in-situ data)
- Index insurance: Relation between weather events and impact on crop productivity
- Identification of specific stresses and vegetation problems and their underlying causes
- Risk exposure (product design and customer communication)

Product Sales:

- Pre-contractual Consulting (show-case risk exposure)
- Greater acceptance of index covers by farmers
- Risk alerts

Underwriting:

- Seasonal portfolio monitoring
- Risk / crop zoning
- Identification of vegetation stages (identify most sensitive stages when crop is the most vulnerable to a risk, e.g. flowering stage)
- 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/visualizations to support loss adjustment communication to farmer)

Claims Handling

- Quality control assessment of claims before pay-out
- Fraud detection
- Timely, reliable and consistent data to speed-up the indemnity pay-outs