

→ EARTH OBSERVATION FOR SUSTAINABLE DEVELOPMENT

Climate Resilience

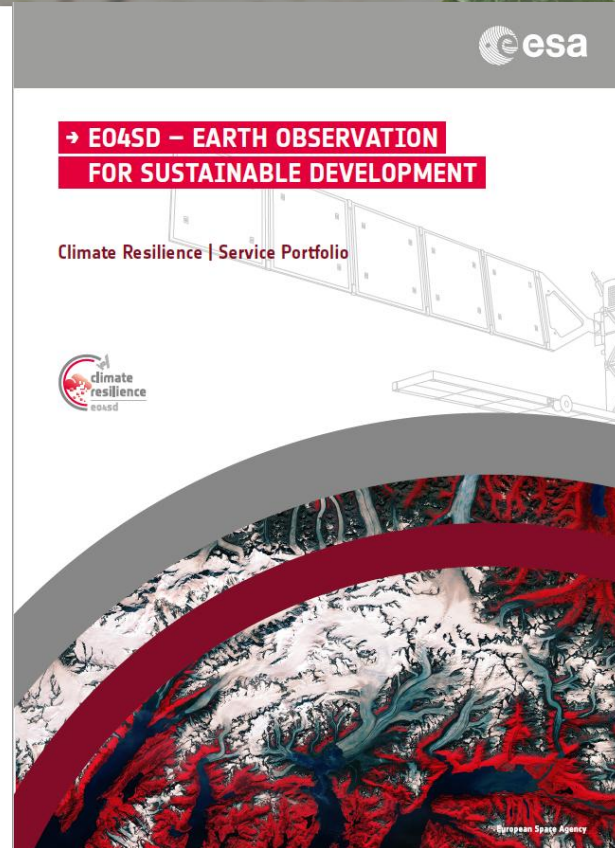


Portfolio of sectoral climate services

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The CR cluster is able to offer these services to stakeholders:

- Global EO-based services
- Customized EO services



Please always refer to the Service portfolio document:

http://prepare.gmv.com/sites/default/files/eo4sd_climate_resilience-portfolio_web_new.pdf

The global EO-based services consist of:

- Satellite datasets (e.g. Sentinel data)
- Essential Climate Variables (e.g. Temperature, Sea-surface temperature)
- Reanalysis data and
- Climate projections

Some of these are provided through the EO4SD CR platform as standard. Others can be provided on request.

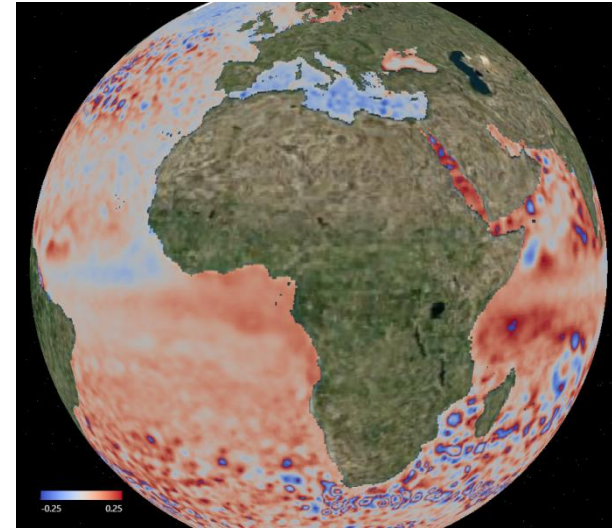
Domain	Essential Climate Variable	
Atmosphere (over land, sea and ice)	Surface	Air temperature, surface wind speed and direction , water vapour, pressure, precipitation , surface radiation budget
	Upper atmosphere	Temperature (see p. 3, top), wind speed and direction , water vapour , cloud properties , earth radiation budget , cloud properties (including solar irradiance)
	Atmospheric composition	Carbon dioxide , methane , and other greenhouse gases , ozone , aerosol properties , precursors (supporting the aerosol and ozone ECVs)
Ocean	Physical	Sea-surface temperature , subsurface salinity , sea level , sea state , sea ice , surface current, carbon dioxide partial pressure, ocean acidity, phytoplankton
	Biogeochemical	Inorganic carbon, ocean colour (for biological activity), nutrients, oxygen, transient tracers
	Biological & ecosystems	Marine habitat properties, plankton
Land	Hydrosphere	River discharge, water use, groundwater, lakes , soil moisture
	Cryosphere	Snow , glaciers , ice sheets and ice caps (see p. 3, bottom), permafrost
	Biosphere	Albedo , land cover (including vegetation type), land surface temperature , fraction of absorbed photosynthetically active radiation (FAPAR) , leaf area index (LAI) , above-ground biomass , soil carbon , fire , evaporation from land
	Anthroposphere	Anthropogenic Greenhouse gas fluxes, anthropogenic water use

Water domain example

Global EO-based services already available through the CR platform:

▪ **Precipitation:**

- **Global data from NEX-GDDP climate projections**
 - Temporal coverage: 1950 – 2100
 - Spatial resolution: 0.25°
- **Global satellite-based data from two sources:**
(Integrated Multi-satellite Retrievals for GPM (IMERG) and Hydro-Estimator (HE))
 - Temporal coverage: 2006 – present
 - Spatial resolution: 10 km (IMERG), 4.5 km (HE)
- **Sea level anomalies:**
- **Global data from the ESA Climate Change Initiative (CCI)**
 - Temporal coverage: 1993 – 2015
 - Spatial resolution: 0.25°



ESA CCI sea level anomaly data for 15/03/2015 as viewed through the EO4SD CR platform

Water domain example

Global EO-based services already available through the CR platform (continued):

▪ **Soil moisture:**

▪ **Global satellite data from SMOS**

- Temporal coverage: 2010 – present
- Spatial resolution: 30-50 km

Global EO-based services to be available through the CR platform soon:

▪ **Precipitation:**

▪ **Global data from CMIP5 climate projections, bias corrected**

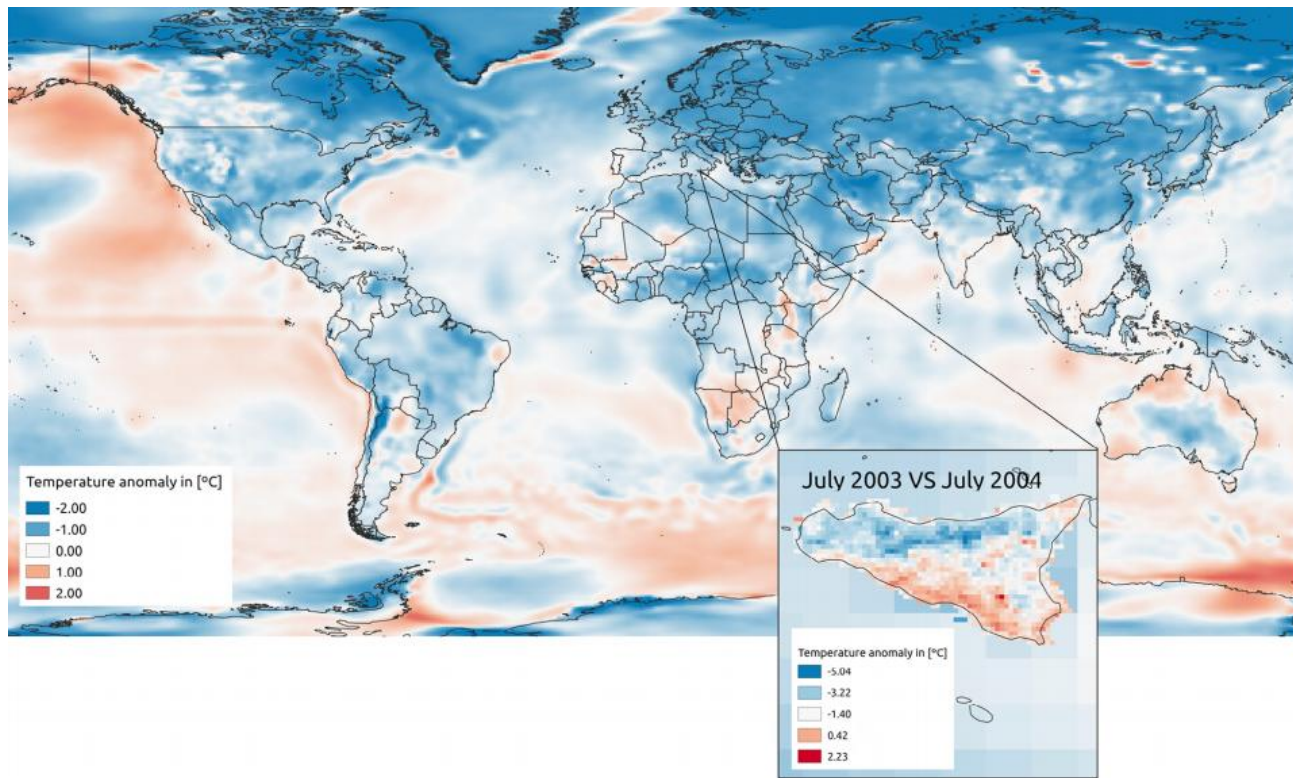
- Temporal coverage: 1978 – 2100
- Spatial resolution: 0.5°

▪ **Soil moisture:**

▪ **Global data from the ESA CCI**

- Temporal coverage: 1978 – 2016
- Spatial resolution: 0.25°

**Yearly temperature
(2m Temperature
from ERA-INTERIM
model, 0.5°
resolution) anomaly
for the period 2006
to 2008.**

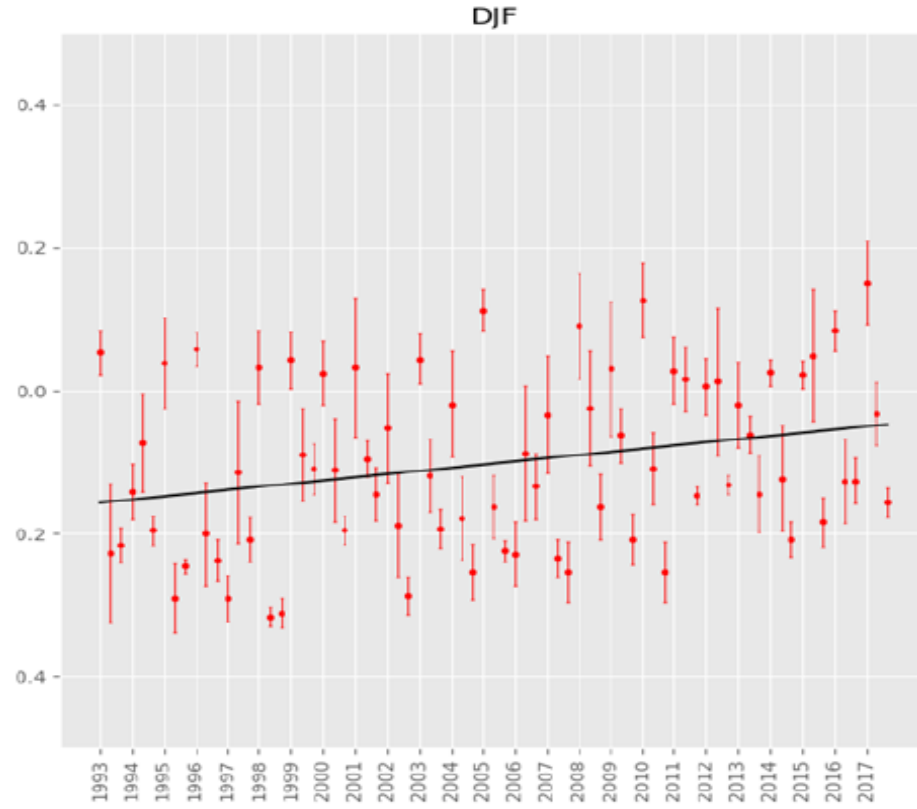


The CR cluster is able to offer these services to stakeholders:

- Global EO-based services
- Customized EO services

Sea level anomaly

Winter sea level anomaly of Bangladesh's coast from 1993-2017 showing a clear upward trend. Data from Copernicus plotted by Telespazio Vega UK.



Flood Mapping and Monitoring

Content

This EO service is dedicated to:

- The **identification, mapping** and **analyses** of flood events and flooding potential.
- It supports a **broad range of services** comprising the **continual monitoring of flooding**, the **delineation of historical flooding events**, the identification of **permanent** and **temporary** flooded areas and unflooded areas.

Relevance

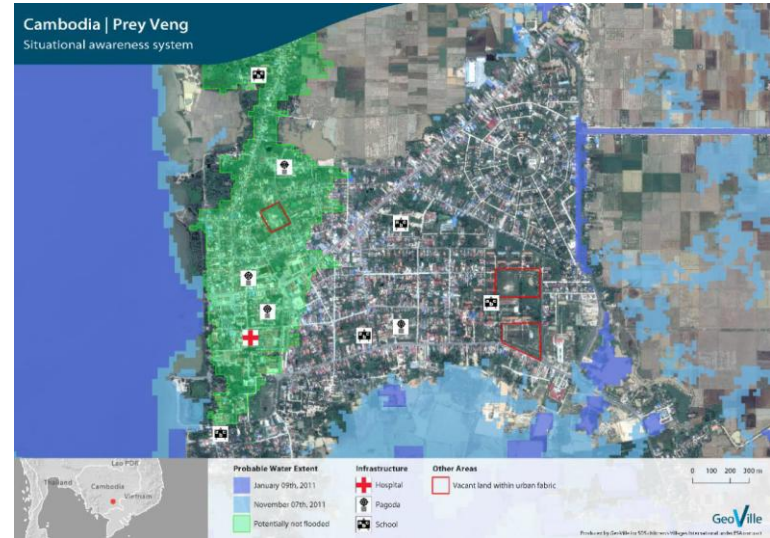
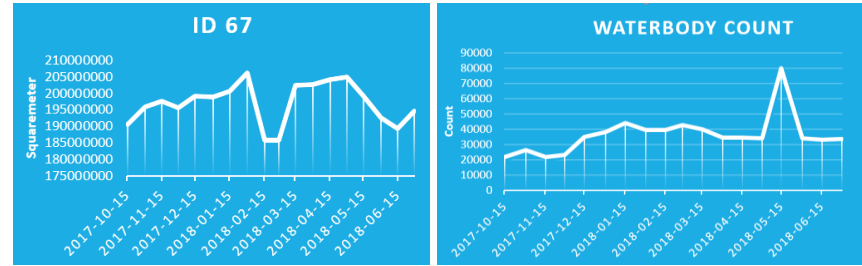
This service is relevant for:

- Hydrological modelling and river navigation
- Flood risk management
- Historical flood event analyses
- Water reservoir storage estimations
- Water management

Flood Mapping and Monitoring

Basic statistics

- Total water surface
- Water body count
- Count of Permanent, semi-permanent & ephemeral water bodies
- Rate/degree of change
- Tracking individual water body
- Seasonal analyses
- Trend analyses
- Response to precipitation or drought (in combination with meteorological data)



Flood Mapping and Monitoring

Input data and methods

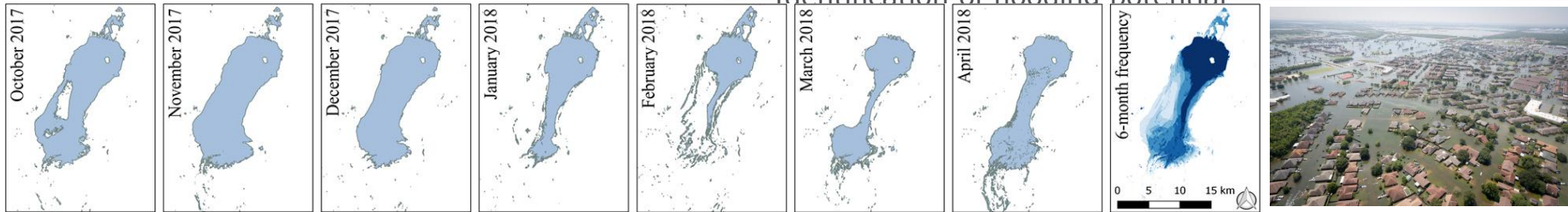
- Sentinel-1, multispectral image data from Sentinel-2, Landsat, SMOS, SMAP, MODIS
- Other in-situ and derived products e.g. precipitation data, DEM.
- Approach based on pixel-based spectral index thresholding methods fusing both optical and radar (SAR).

Technical Specifications

- SPATIAL COVERAGE: 100's of km²
- DATUM/PROJECTION: User defined
- FORMAT Data: GeoTiff, Analysis: XLSX or PDF
- SPATIAL RESOLUTION: 10m – 30m
- TEMPORAL COVERAGE: 1980's - now
- TEMPORAL RESOLUTION: Event-based, Monthly-Seasonal

POSSIBLE OUTPUTS:

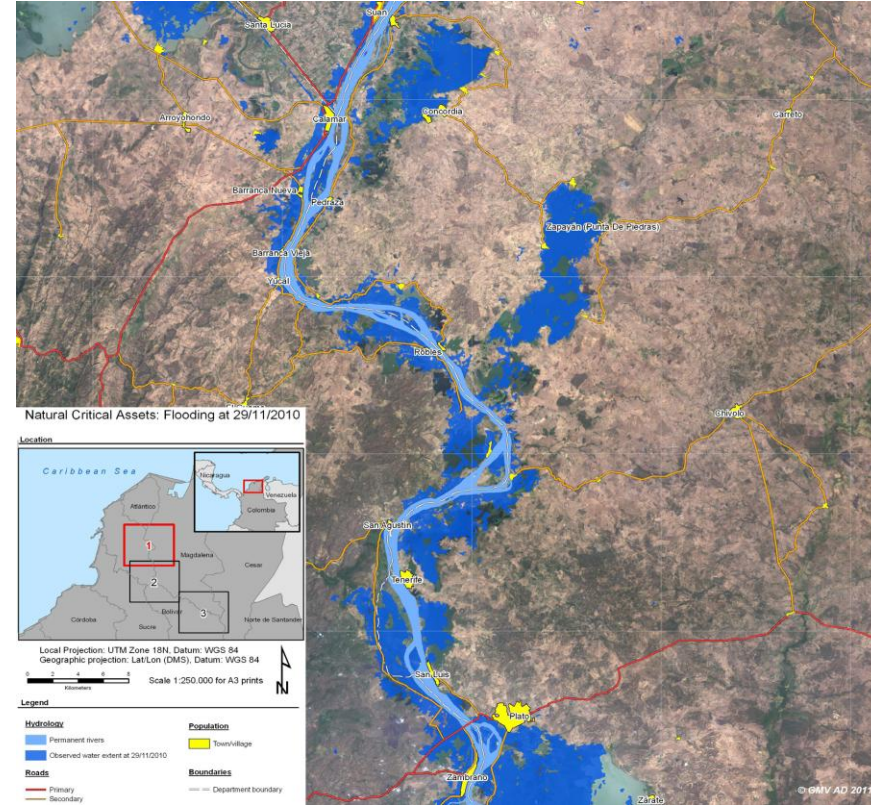
- Time series maps of surface water body extents
- Historic flood extent maps
- Identification of flooding potential



Flood Mapping and Monitoring

Flood delineation map of Northern Departments of Colombia.

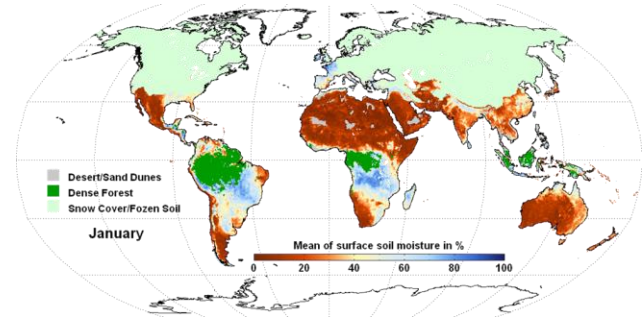
Copyright: GMV for GMES Pilot Services for Security.



Drought Mapping and Monitoring

Content

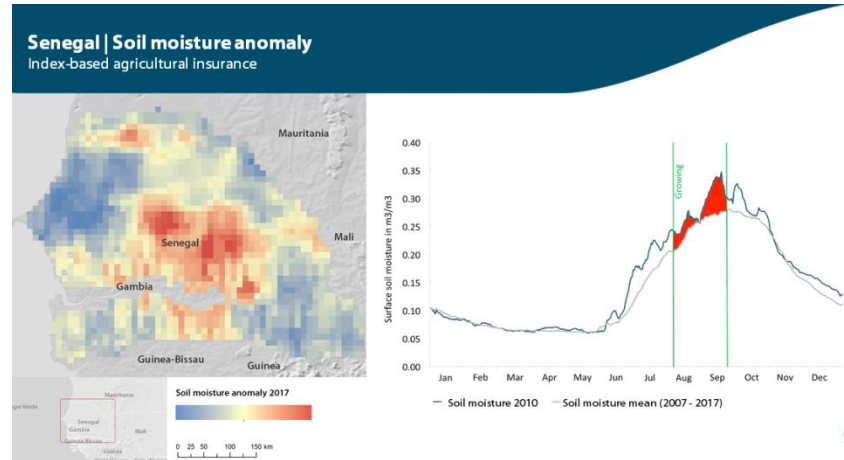
- This EO service provides **time-series** information on **soil moisture** and **soil moisture anomalies**.



Relevance

This service is relevant for

- Identifying droughts
- Relief aid management and effectiveness assessment
- Sustainable crop farming and livestock watering
- Trend analyses
- Mitigation of drought impacts (wildfires, lost agricultural production, degraded wildlife habitat)



Drought Mapping and Monitoring

Input data and methods

- Sentinel-1, multispectral image data from Sentinel-2, Landsat, MODIS, ENVISAT, SMOS SMAP,
- Other in-situ and derived products e.g. precipitation data, DEM soil moisture measurements
- Approach based on pixel-based spectral index thresholding methods fusing both optical and radar (SAR).

Technical Specifications

- SPATIAL COVERAGE: 100's of km²
- DATUM/PROJECTION: User defined
- FORMAT Data: GeoTiff, Analysis: XLSX or PDF
- SPATIAL RESOLUTION: 1km – 10km
- TEMPORAL COVERAGE: 2001 - now
- TEMPORAL RESOLUTION: Event-based, Monthly- seasonal

POSSIBLE OUTPUTS:

- Drought extent and severity maps at different scales (local to global)
- Soil moisture anomaly maps
- Statistics, trend analyses



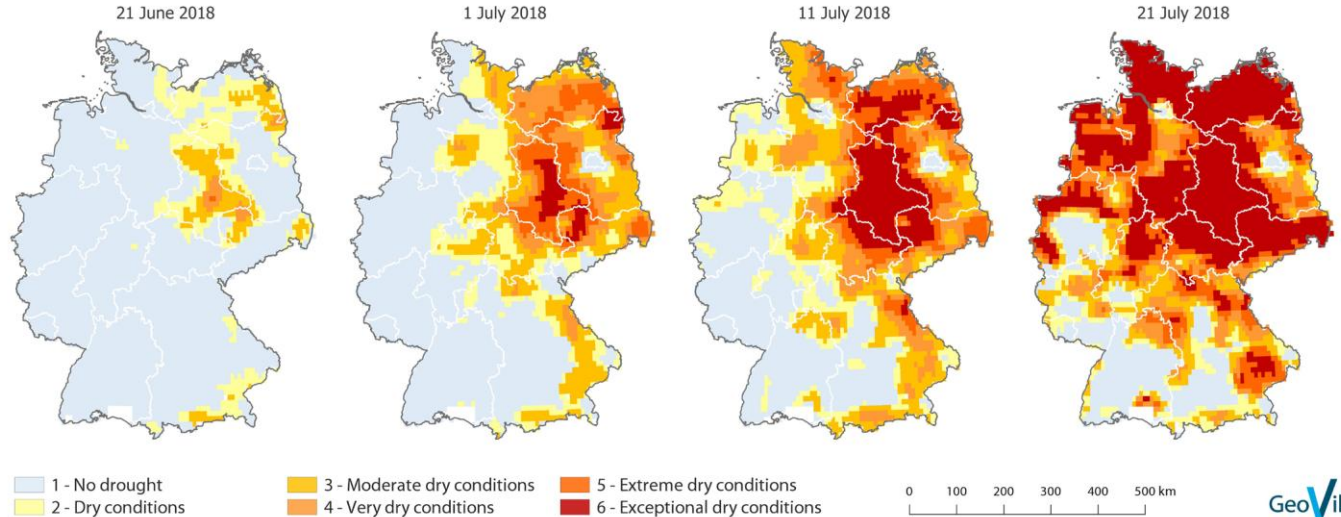
Drought Mapping and Monitoring

Germany

Soil moisture based drought monitoring

Map of Germany showing soil moisture anomalies (drought indicator) for June-July 2018. Copyright: GeoVille

Copyright: GeoVille



Wetland Monitoring Services

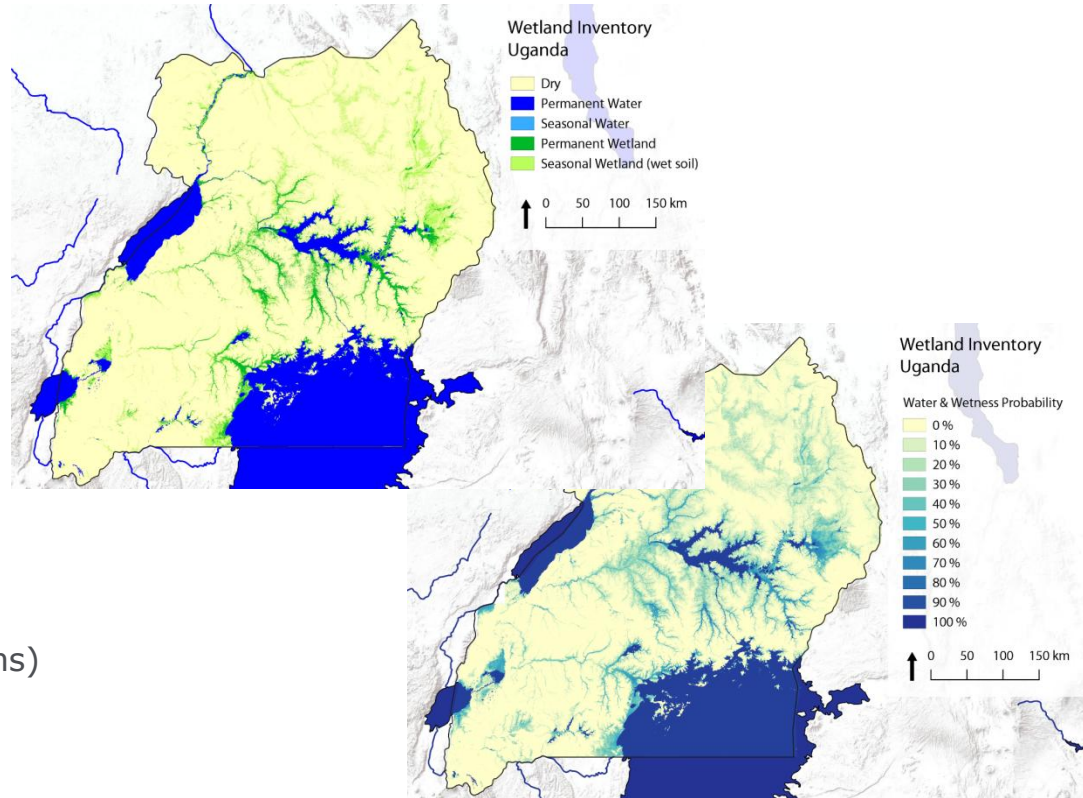
Content

- **Wetland identification** and **wetland extents**
- Identification of **seasonal changes** of wetlands and **permanent** water bodies
- Detection of **long-term developments under a changing climate** (intra- and inter-annual variation)
- Advanced statistical analyses

Relevance

This service is relevant for e.g.

- Identifying climate trends
- Water supply management
- Flood management (surface runoff estimations)
- Eco system management
- Agriculture, irrigation, livestock watering



Wetland Monitoring Services

Input data and methods

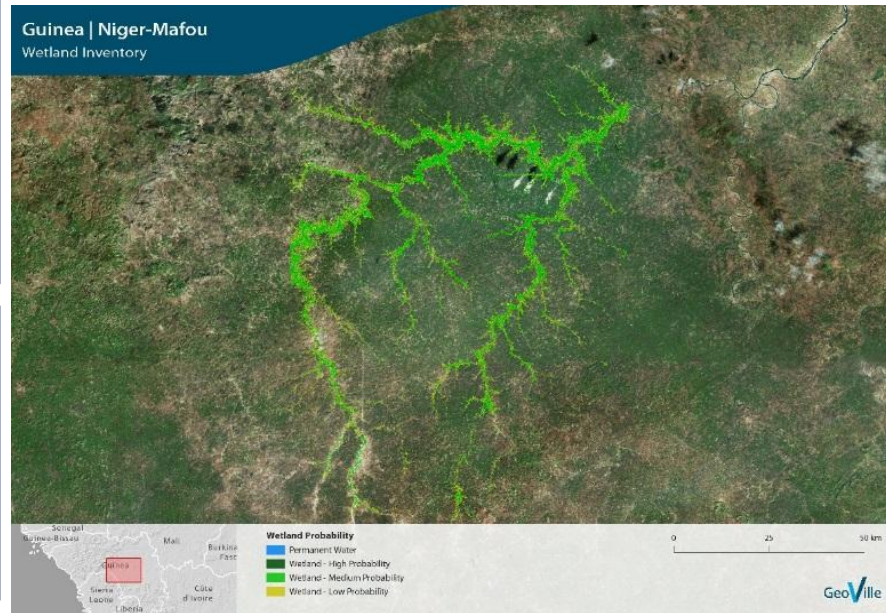
- Sentinel-1, multispectral image data from Sentinel-2, Landsat, SMOS, SMAP, MODIS
- Other in-situ and derived products e.g. precipitation data, DEM.
- Approach based on pixel-based spectral index thresholding methods fusing both optical and radar (SAR).
- Combination of soil moisture/soil water index and precipitation data for determining surface wetness

Technical Specifications

- SPATIAL COVERAGE: 100's of km²
- DATUM/PROJECTION: User defined
- FORMAT Data: GeoTiff, Analyses: XLSX or PDF
- SPATIAL RESOLUTION: 10m – 30m
- TEMPORAL COVERAGE: 2001 - now
- TEMPORAL RESOLUTION: Event-based, Monthly–Seasonal



Guinea | Niger-Mafou
Wetland Inventory



Water-based soil erosion potential mapping

Content

- Screening of areas that are prone to water-based soil erosion by their land cover, soil, terrain and climatic setting
- Extent and severity of areas with an elevated soil erosion potential
- Multiple statistical analyses possibilities

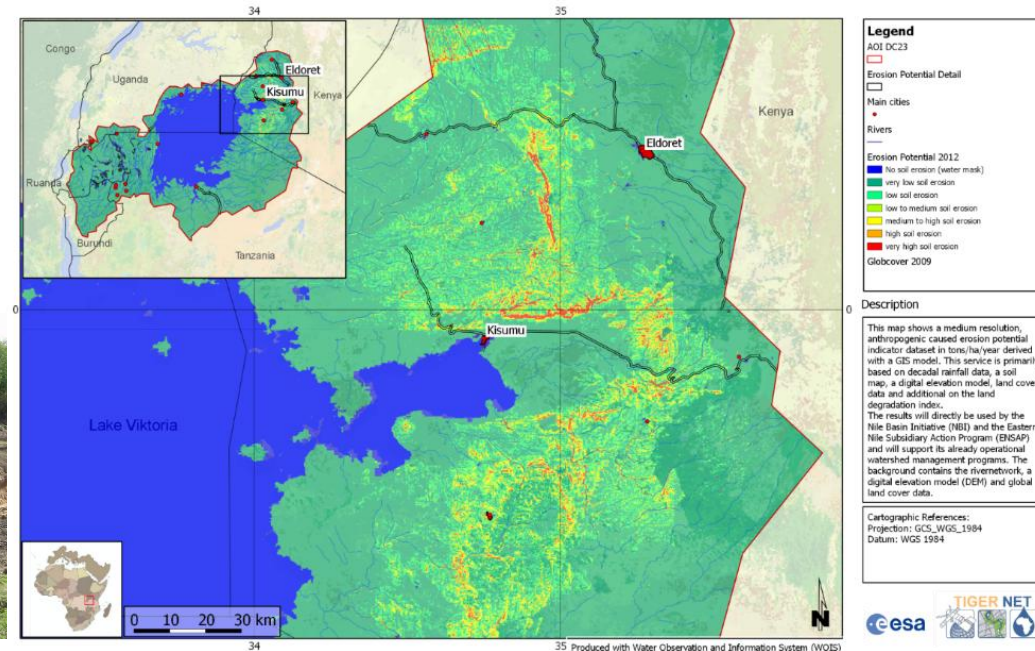
Relevance

This service is relevant for e.g.

- Monitoring soil erosion mitigation measures
- Sustainable land and water management
- Land Use Planning



Erosion Potential 2012 - Nile Basin Initiative



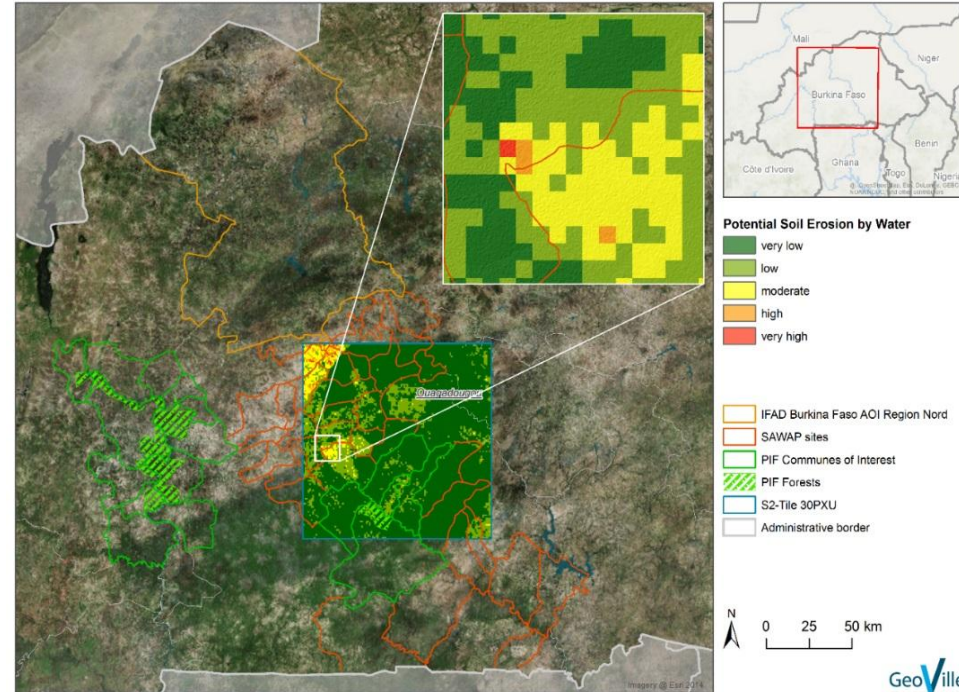
Water-based soil erosion potential mapping

Input data and methods

- Sentinel-1, multispectral image data from Sentinel-2, Landsat,
- LC/LU information, Land degradation index data
- Other in-situ and derived products e.g. TRMM precipitation data, DEM (SRTM), soil information data (Harmonised World Soil Database, HWSO)
- Approach based on pixel-based spectral analyses of EO data and DEM.

Technical Specifications

- SPATIAL COVERAGE: 100's of km²
- DATUM/PROJECTION: User defined
- FORMAT Data: GeoTiff, Analysis: XLSX or PDF
- SPATIAL RESOLUTION: 20m – 250m
- TEMPORAL COVERAGE: Present
- TEMPORAL RESOLUTION: Status



Thank you for your attention!



For more information, please contact

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