

Copernicus Land Service

Global Land Component



Land Monitoring

DG JRC – entrusted entity

Michael Cherlet

Marco Clerici

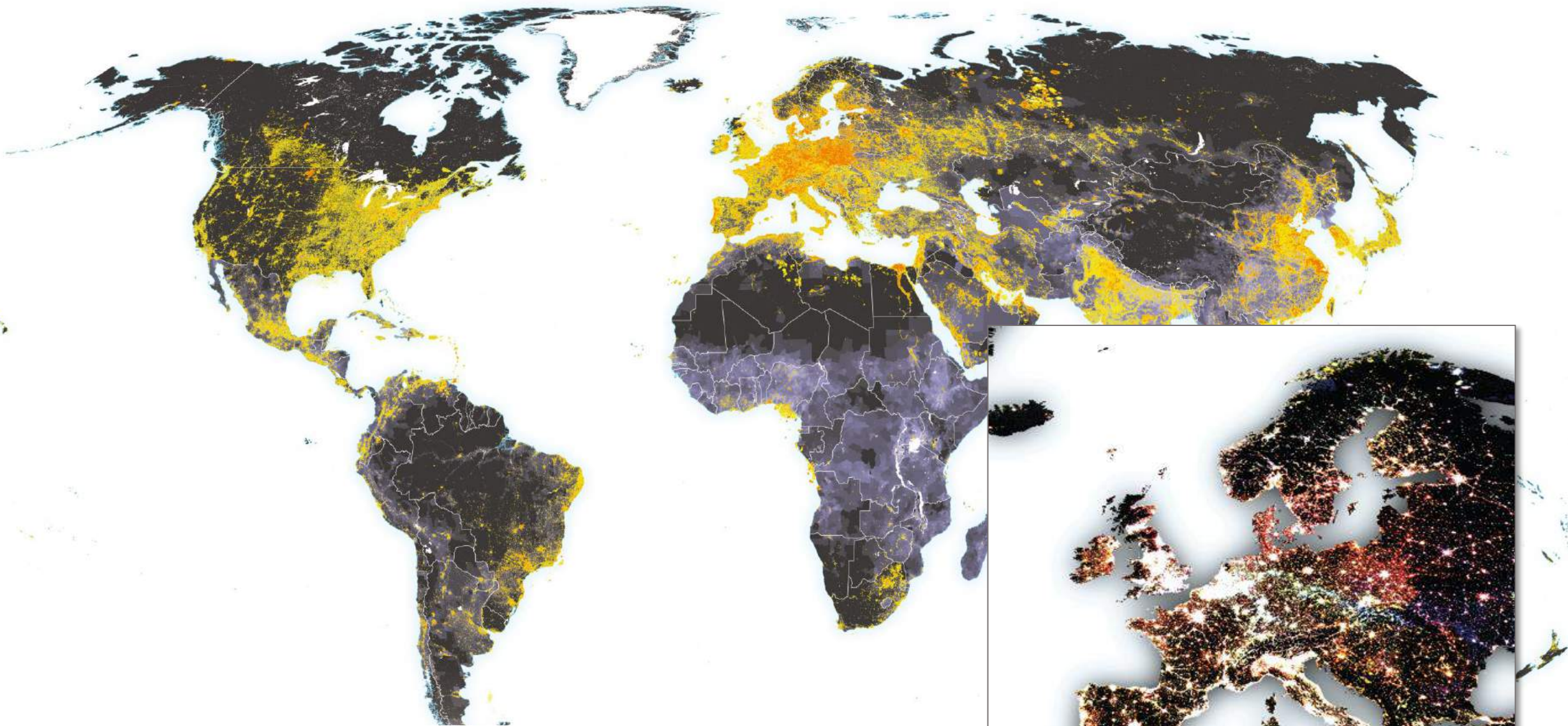
Nadine Gobron

Andreas Brink

Jean-Francois Pekel

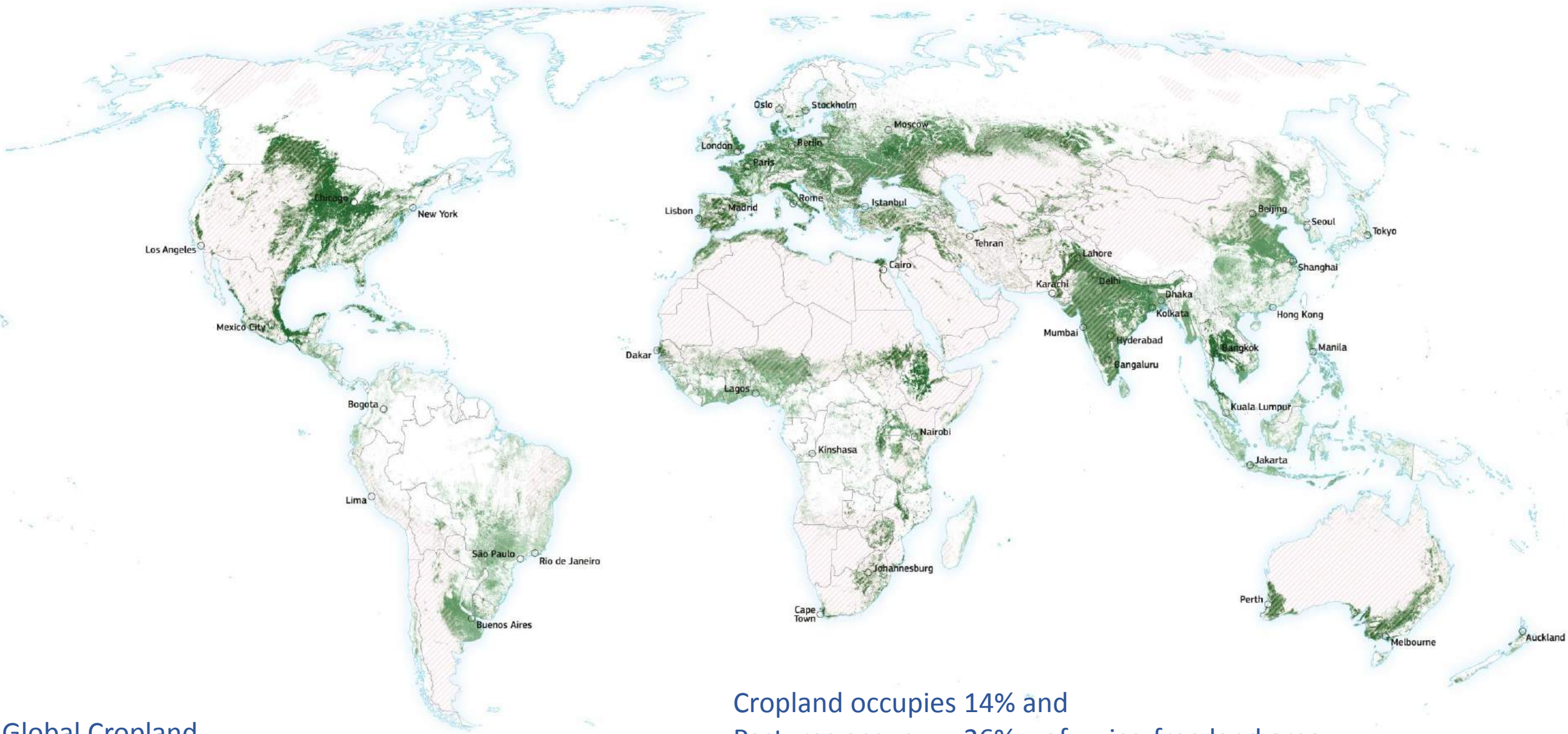
Zoltan Szantoi





Change in nightlights (2000-2010) on population density (2010)

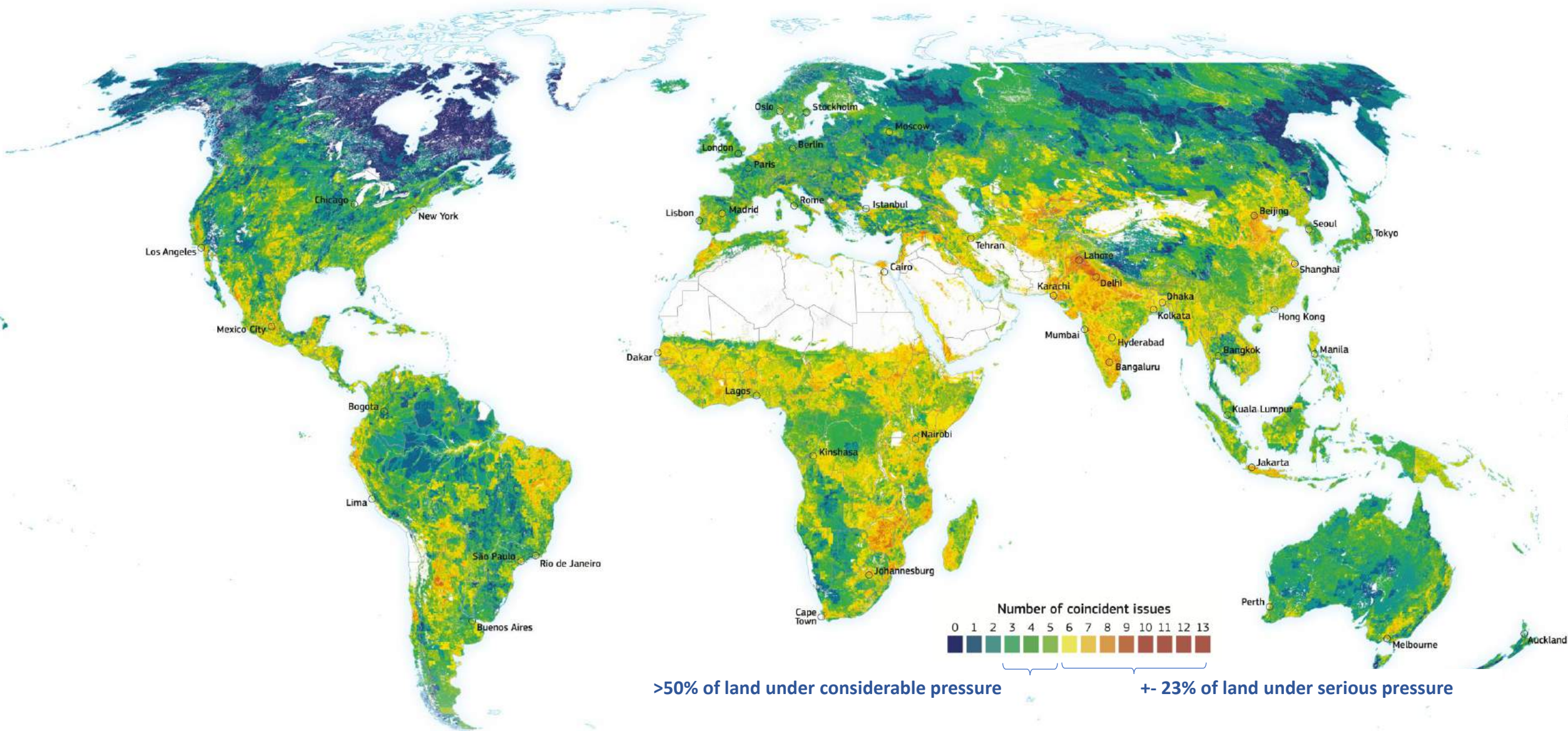
Source: NOAA-NESDIS, CIESIN



Cropland occupies 14% and
Pastures occupy 26% of ice-free land area

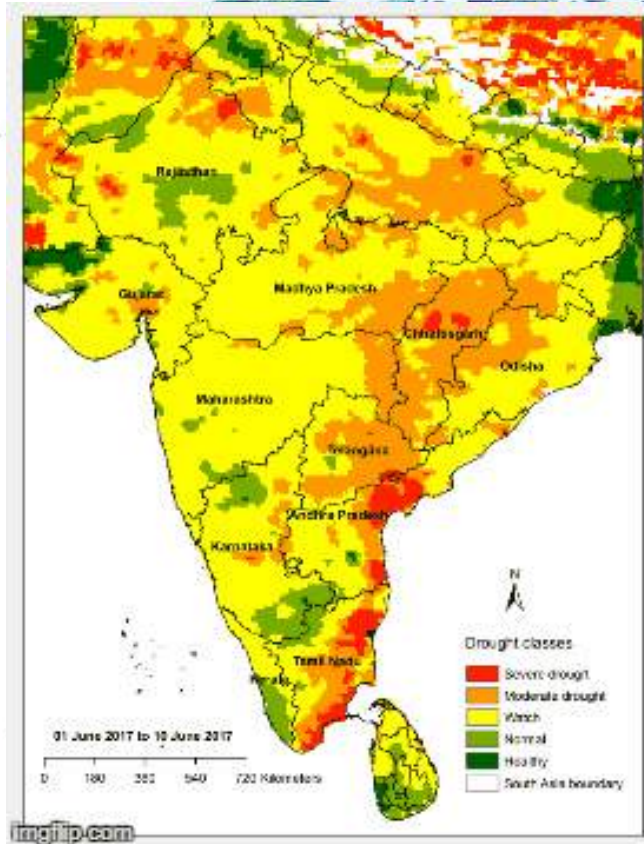
Global Cropland

(source: FAO GLCN, 2014)



- Irrigation
- Low-input agriculture
- Income level
- Population density
- Fires
- Decreasing land productivity
- Aridity
- Livestock density
- High-input agriculture
- Built-up area change
- Population change
- Tree loss
- Climate-vegetation trends
- Water stress

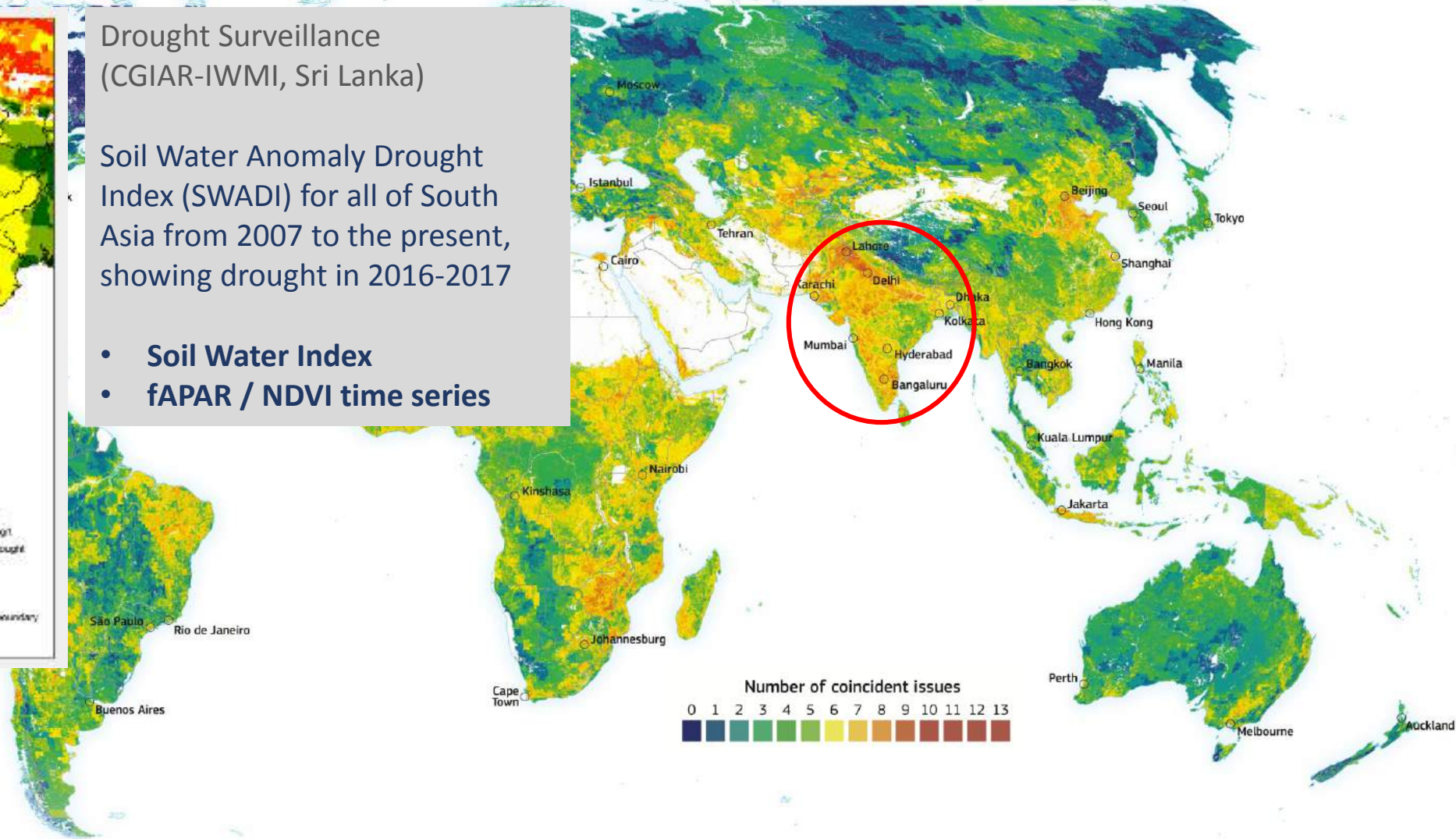
Source: World Atlas of Desertification, 2018



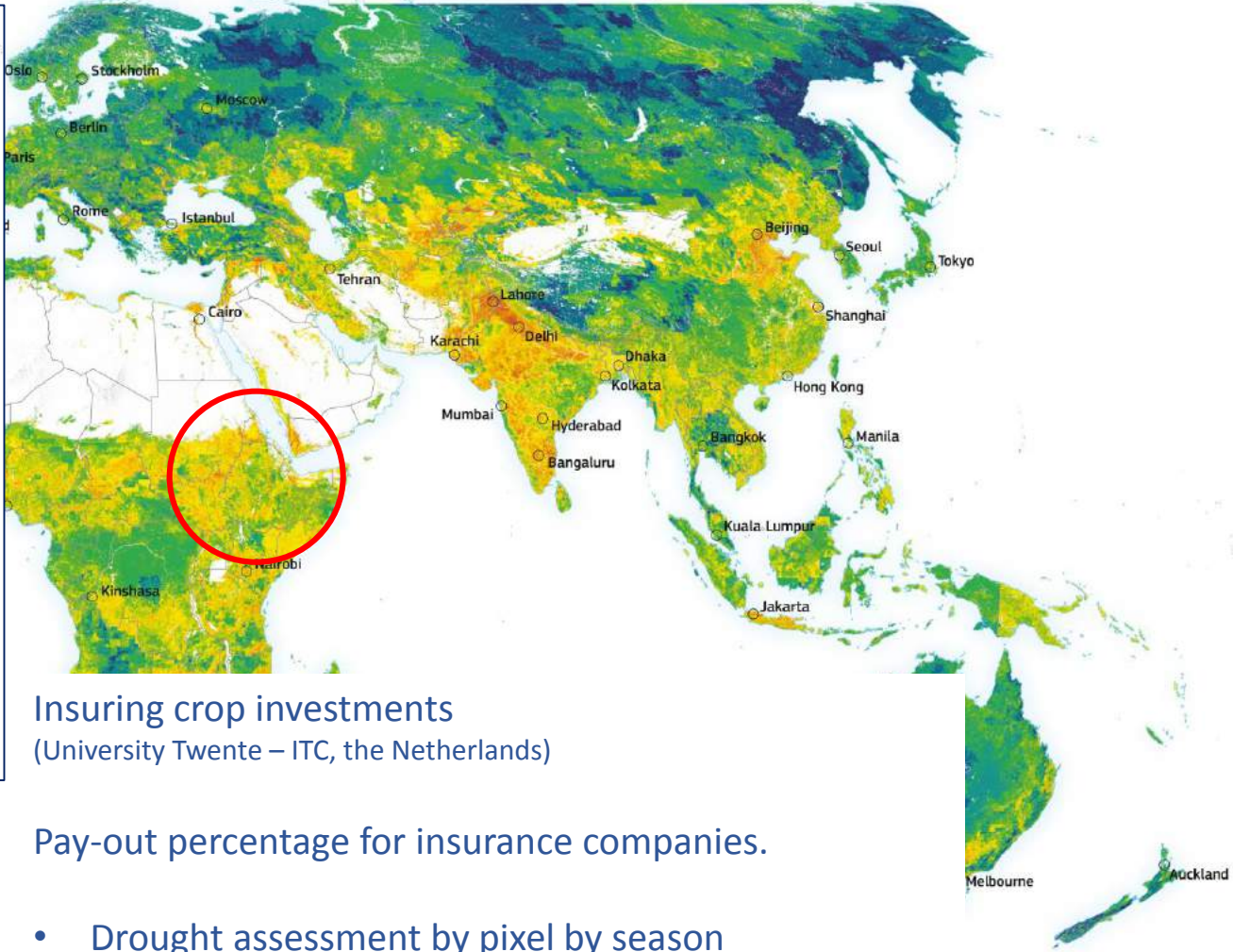
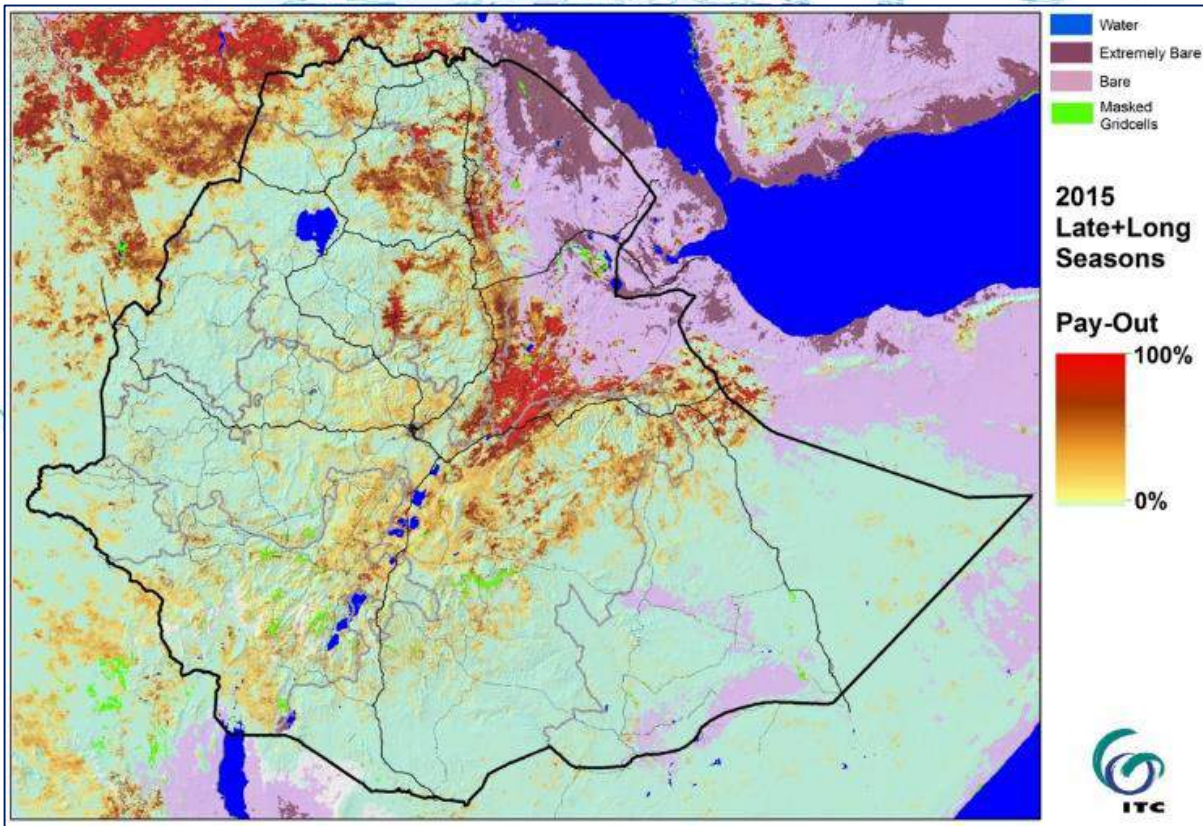
Drought Surveillance
(CGIAR-IWMI, Sri Lanka)

Soil Water Anomaly Drought Index (SWADI) for all of South Asia from 2007 to the present, showing drought in 2016-2017

- Soil Water Index
- fAPAR / NDVI time series



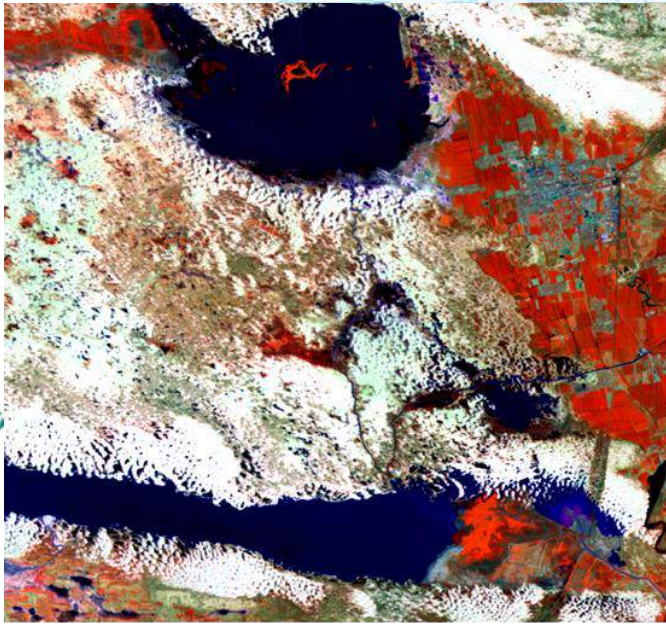
Irrigation
 Low-input agriculture
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 Water stress



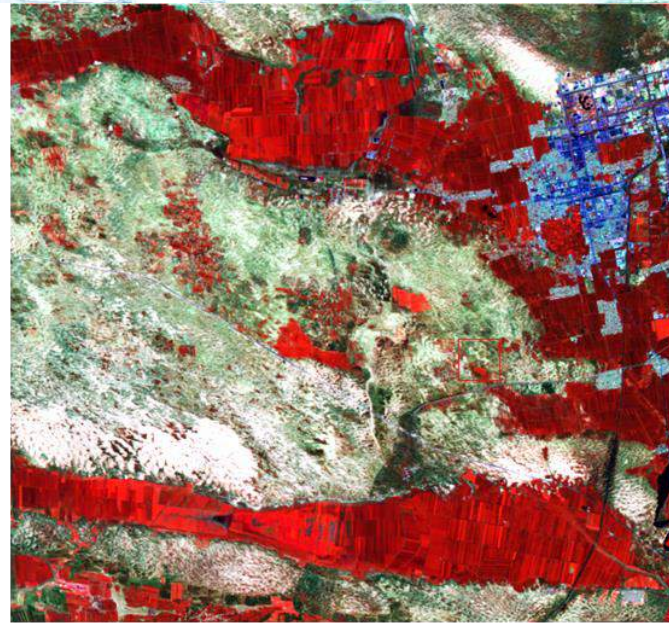
Insuring crop investments
(University Twente – ITC, the Netherlands)

Pay-out percentage for insurance companies.

- Drought assessment by pixel by season
- **Soil Water Index**
- **fAPAR / NDVI time series**
- **Dry Matter / NPP**

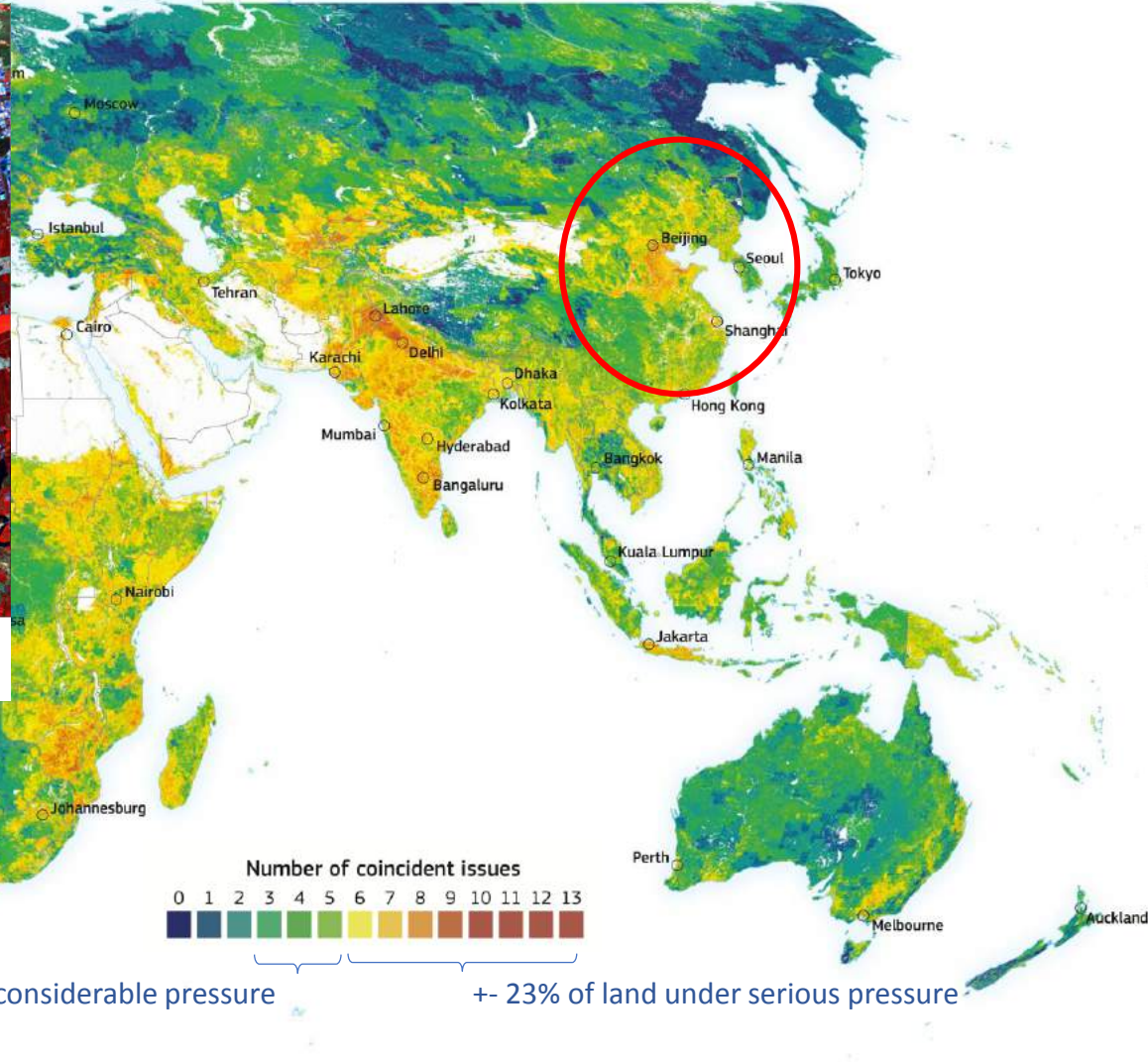
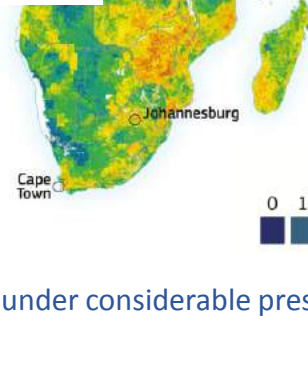
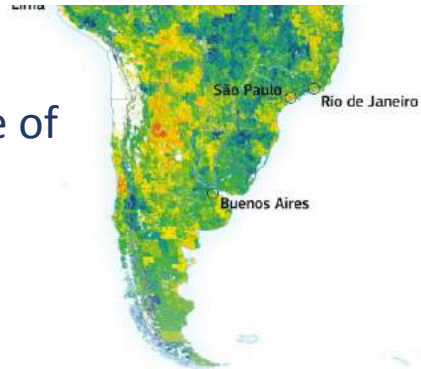


1987 08 11



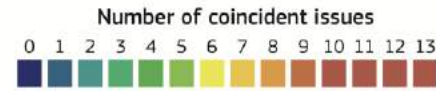
2013 09 03

Agriculture expansion
Calls for trade offs for use of
ecosystem services

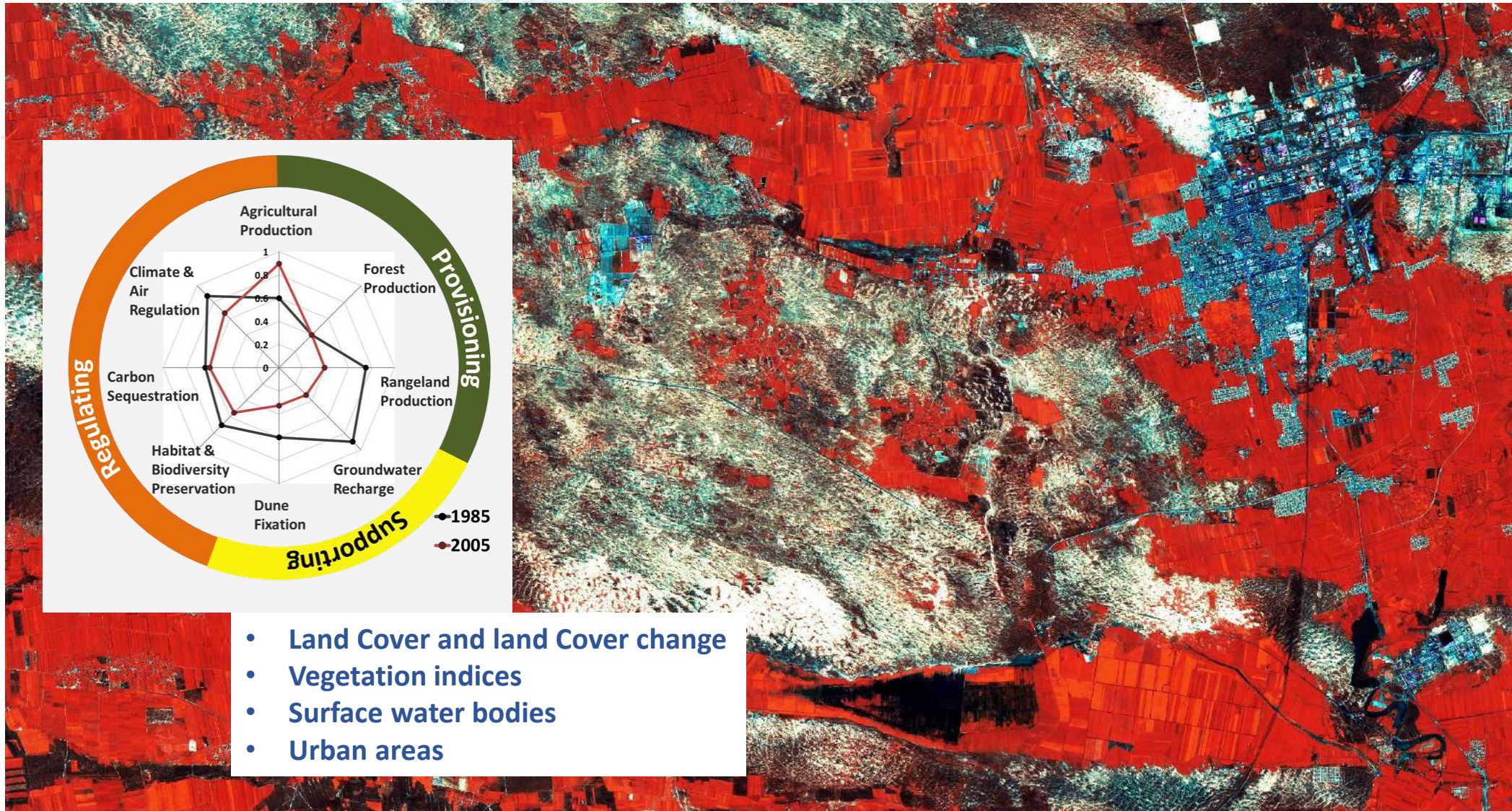


>50% of land under considerable pressure

+ 23% of land under serious pressure



- Irrigation
- Low-input agriculture
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- Aridity
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- Tree loss
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- Water stress



- Land Cover and land Cover change
- Vegetation indices
- Surface water bodies
- Urban areas

2017 (1st September, Sentinel 2)

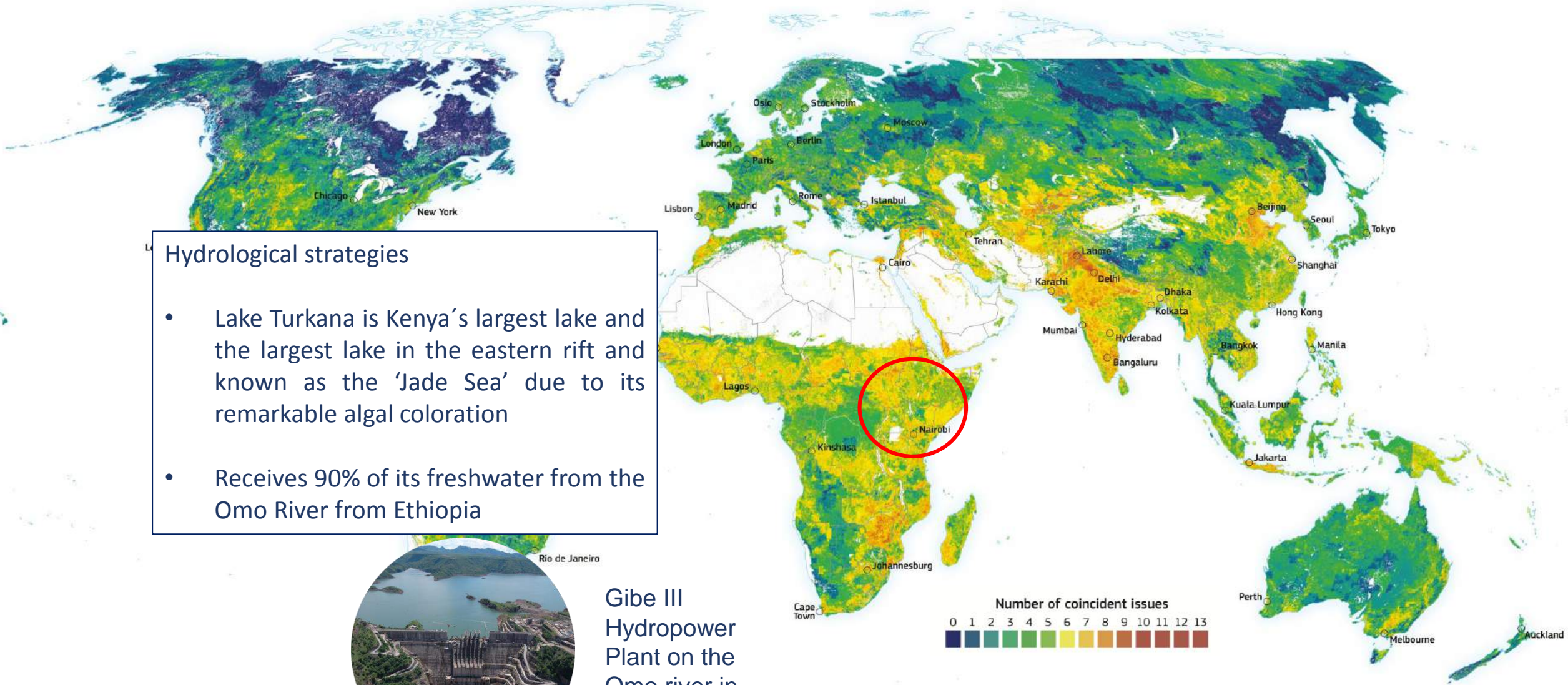
Naiman, Horqin Sandy Lands, China

Hydrological strategies

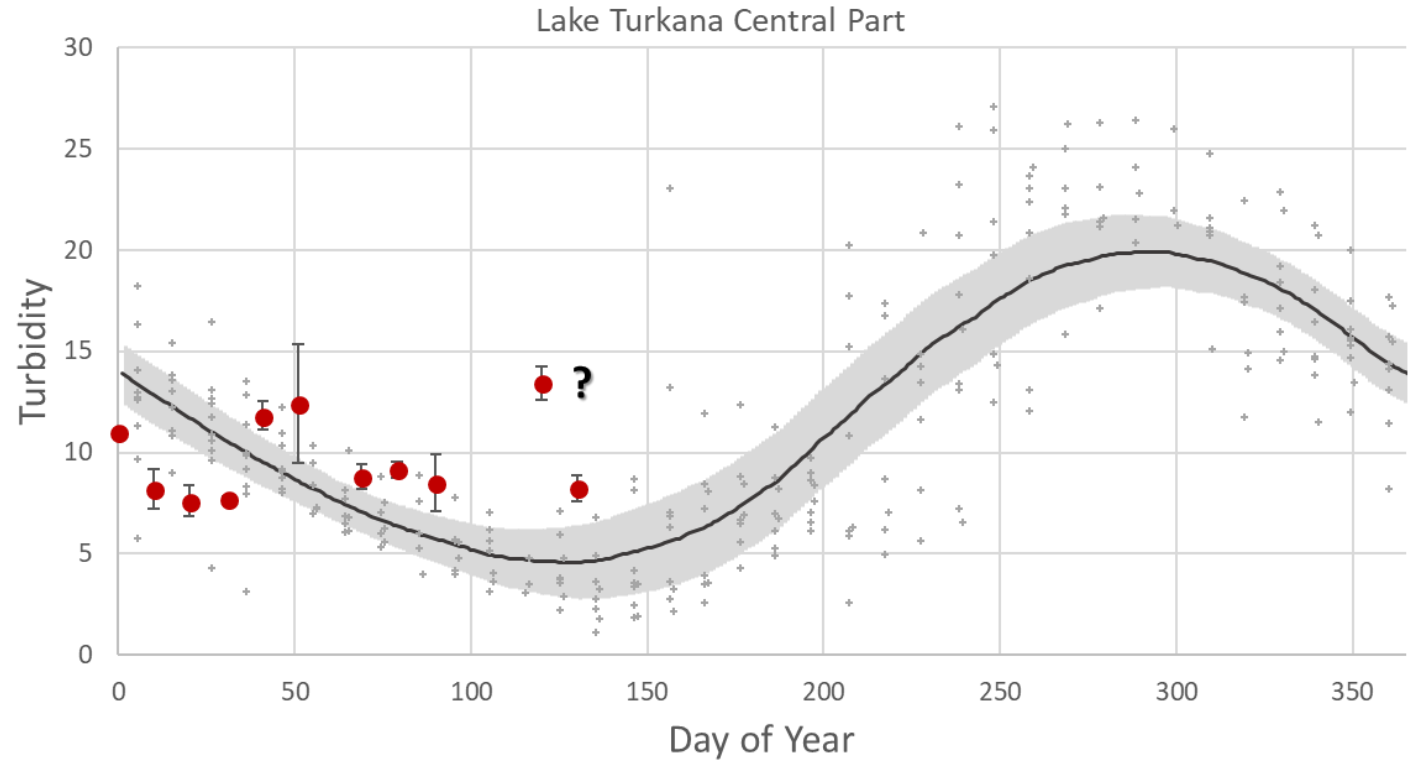
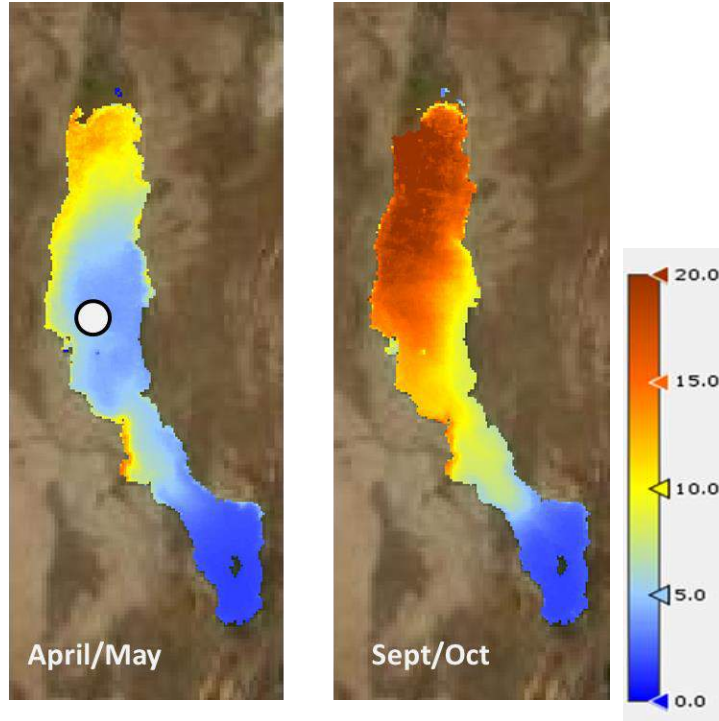
- Lake Turkana is Kenya's largest lake and the largest lake in the eastern rift and known as the 'Jade Sea' due to its remarkable algal coloration
- Receives 90% of its freshwater from the Omo River from Ethiopia



Gibe III
Hydropower
Plant on the
Omo river in
Ethiopia



Long-term average situation (CGL archive processing)



Archive Turbidity data over 10 years, seasonal trends

- **water level time series**
- **decadal turbidity times series**
- **Surface water body extent**
- **Chlorophyll and NDVI**

for monitoring the changes in spatial patterns of suspended sediment and changes of total concentration

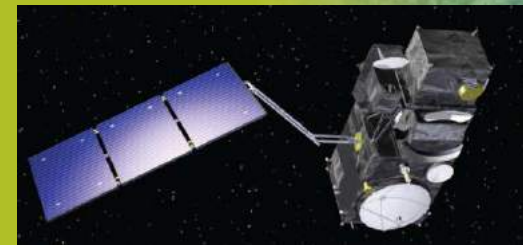


Global Land Component



Land Monitoring

- Routine production of Biophysical Variables
- Ground Based Observations for Validation
- Hot-Spot Monitoring (land cover change)
- Sentinel-2 Global Mosaics and thematic products





Land
Monitoring

Building on European expertise

50+ industry partners 300+ experts

The image displays a large collection of logos for partner organizations, arranged in a grid-like fashion. The logos include:

- SYKE** (Finnish Environment Institute)
- enveo**
- HYGEOS**
- IMDC** (International Marine & Drilling Centres)
- University of Reading**
- LEGOS**
- TU WIEN**
- GEO**
- ZAMG** (Zentralanstalt für Meteorologie und Geodynamik)
- CREAF**
- ipma**
- EUMETSAT**
- TRASY** (WE GET IT DONE)
- eodc**
- TU WIEN**
- IIASA**
- WAGENINGEN UNIVERSITY** (WAGENINGEN UR)
- JOANNEUM RESEARCH**
- IGN** (Institut National de l'Information Géographique)
- ONF International**
- RMI**
- EOLAB**
- METEO FRANCE**
- University of Leicester**
- CLS** (Collecte Localisation Satellites)
- PML** (Plymouth Marine Laboratory)
- ipma**
- CREAF**
- eodc**
- ZAMG**
- TU**
- enveo**
- SPACEBEL**
- Université de Liège**
- FINNISH METEOROLOGICAL INSTITUTE**
- vito**
- PML**
- Plymouth Marine Laboratory**
- BROCKMANN CONSULT GMBH**
- e-geos** (UNA SOCIETÀ ASI/TELESPAZIO)
- ieo**
- EXELIS** (Visual Information Solutions)
- ISPRA** (Istituto Superiore per la Protezione e la Ricerca Ambientale)
- Telespazio** (A Finmeccanica/Thales Company)



- Vegetation
- Energy
- Water
- Cryosphere
- Hot Spots

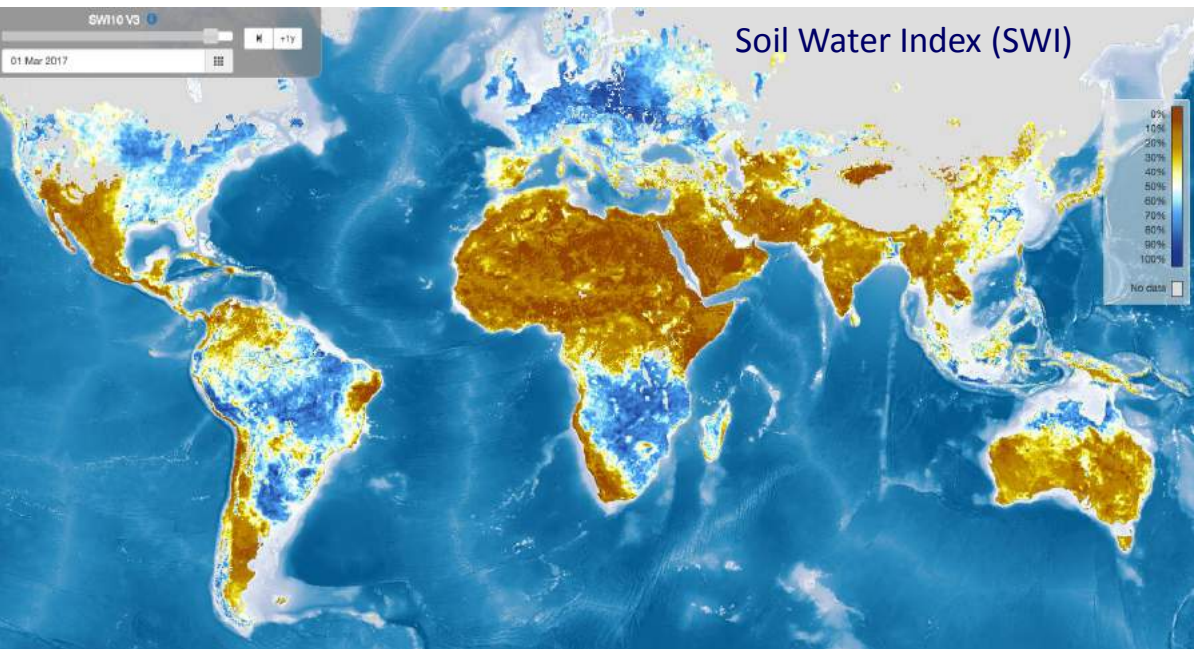
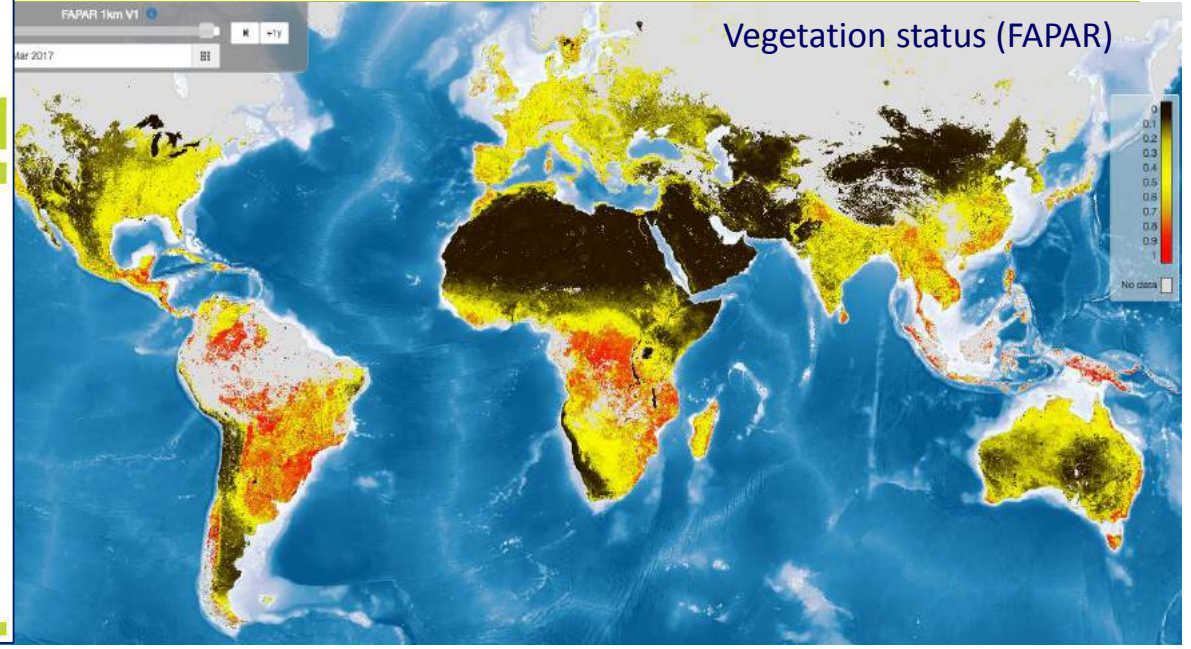
Theme	Variable	Spatial Resolution
Vegetation	Land Cover	Moderate 100m
		In production

From coarse to medium resolution

Theme	Variable	Spatial Resolution	
		Coarse >=1km	Medium 300m
Vegetation	Fraction of photosynthetically active radiation absorbed by the vegetation	In production	In production
	Fraction of green vegetation cover	In production	In production
	Leaf Area index	In production	In production
	Normalized Difference Vegetation Index	In production	In production
	Vegetation Condition Index	In production	
	Vegetation Productivity Index	In production	
	Dry Matter Productivity	In production	In production
	Burnt Area	In production	In production
	Soil Water Index	In production	
	Surface Soil Moisture	In development	
Energy	Land Surface Temperature	In production	
	Top Of Canopy Reflectance	In production	
	Surface Albedo	In production	
Water	Water Bodies	In production	In production
	Lake Surface Water Temperature	In production	
	Lake Water Quality	In production	
Cryosphere	Lake Ice Extent	In production	
	Snow Cover Extent	In production	
	Snow Water Equivalent	In production	

Non-gridded products

Theme	Variable	Rivers and Lakes
Water	Water Level	In production



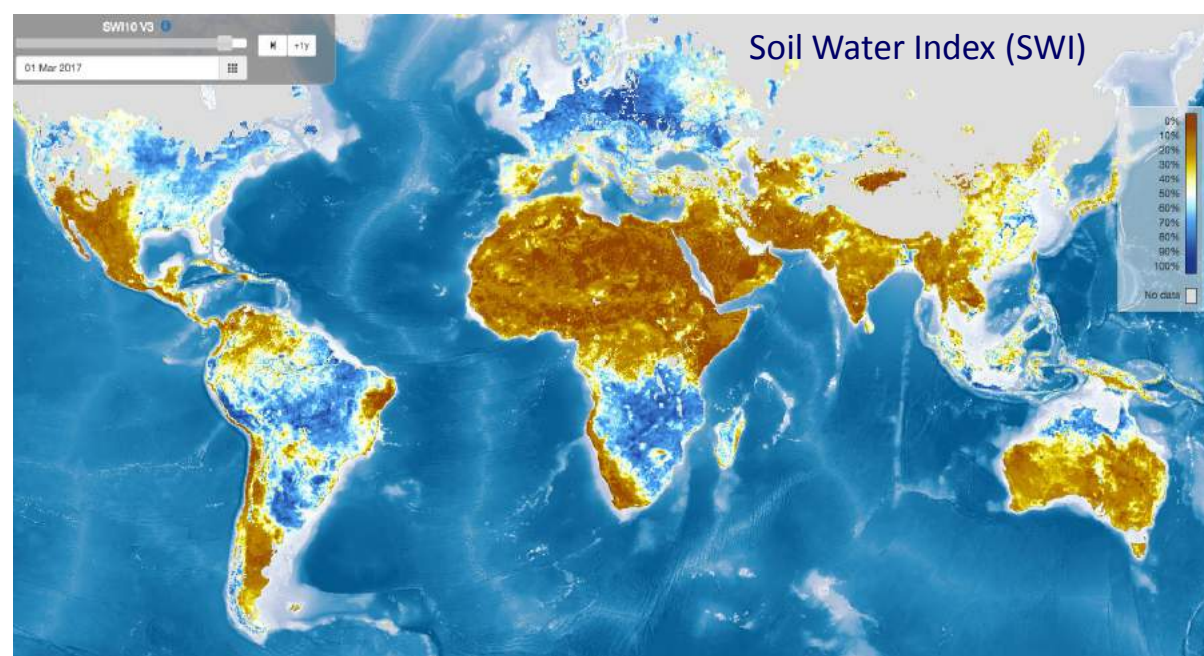
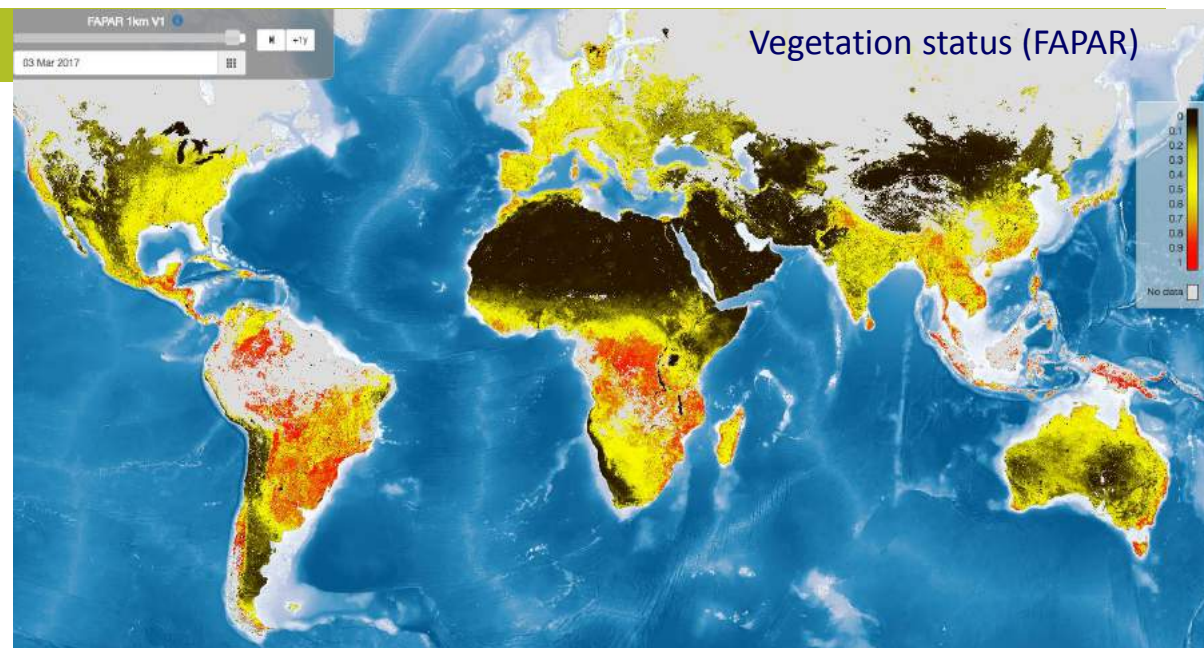
Theme	Variable	Spatial Resolution
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Non-gridded products

Theme	Variable	Rivers and Lakes
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Copernicus Global Land Service

Providing bio-geophysical products of global land surface



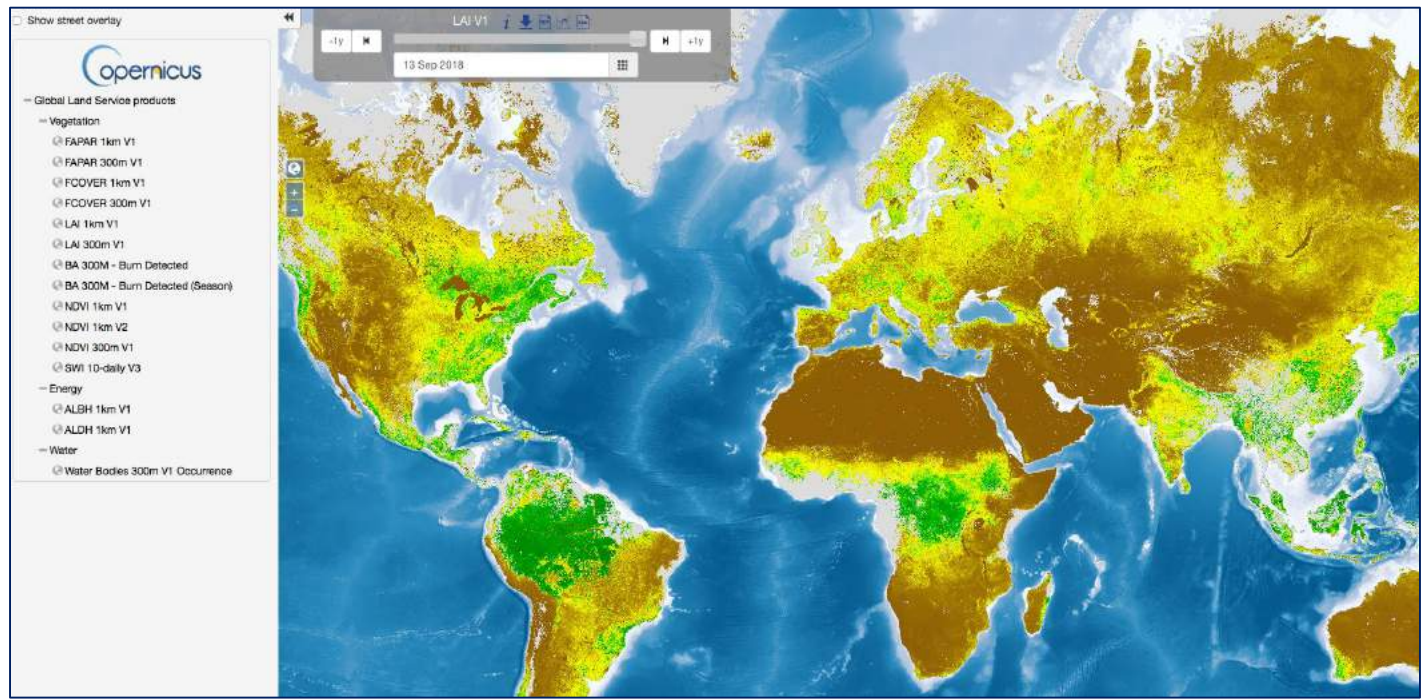
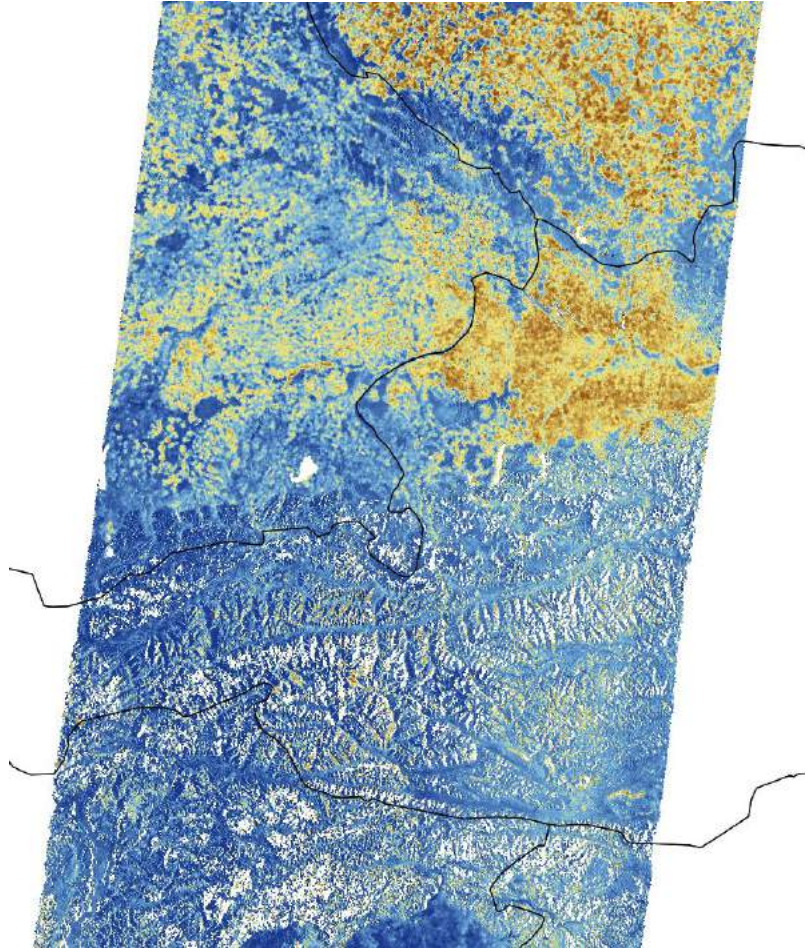
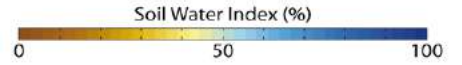
Home Products News Product Access Viewing Library



- | | |
|------------------|------------------|
| Burnt Area | Land Cover |
| Dry Matter Prod. | NDVI |
| FAPAR | Soil Water Index |
| FCOVER | VCI |
| Leaf Area Index | VPI |

- | |
|--------------------|
| Land Surface Temp. |
| Surface Albedo |
| TOC Reflectance |

Sentinel-1 SSM – Detail Central Europe (EOC – TU Wien)





biophysical variables

Copernicus Global Land Service

Providing bio-geophysical products of global land surface



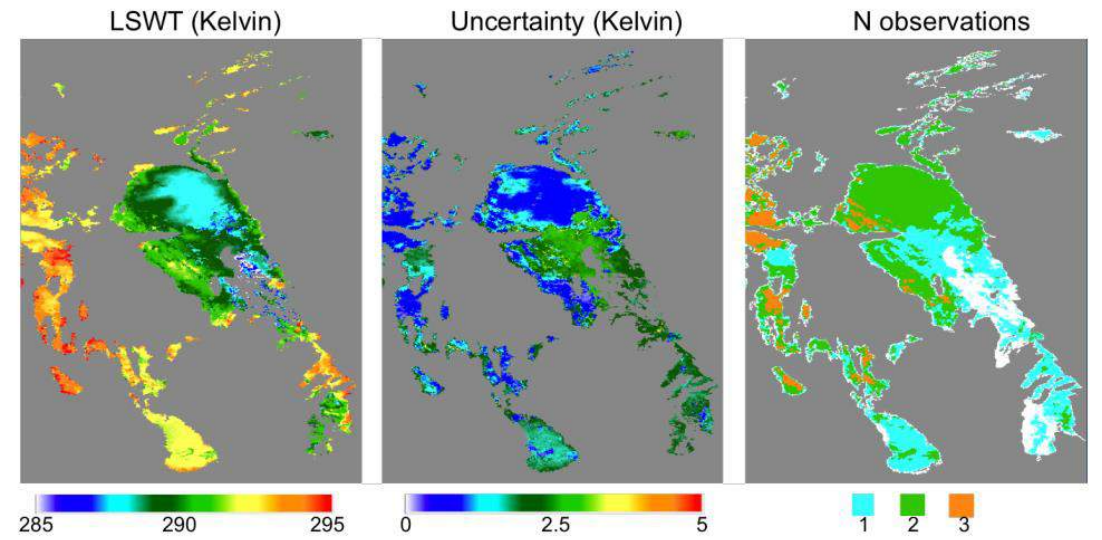
- Home
- Products
- News
- Product Access
- Viewing
- Library



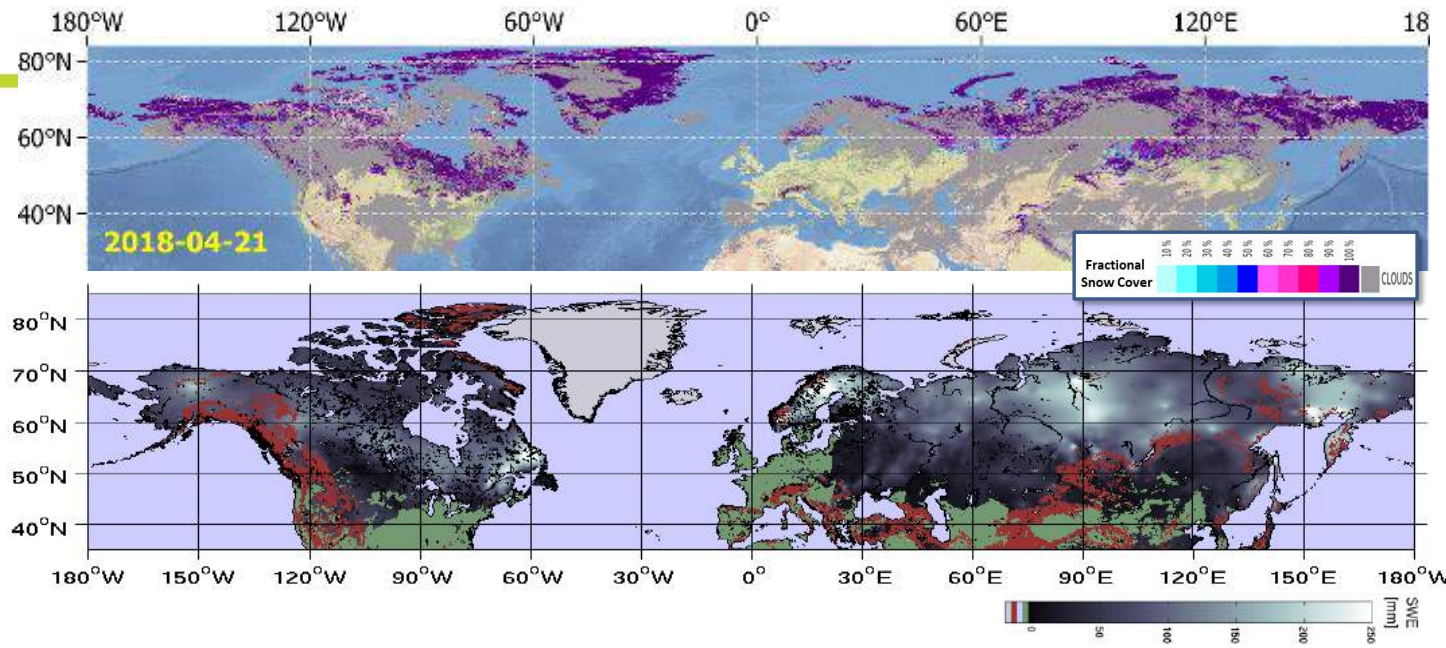
- Lake Ice Extent
- Snow Cover Extent
- Snow Water Equiv.



- Lake Surf. Water Temp.
- Lake Water Quality
- Water Bodies
- Water Level



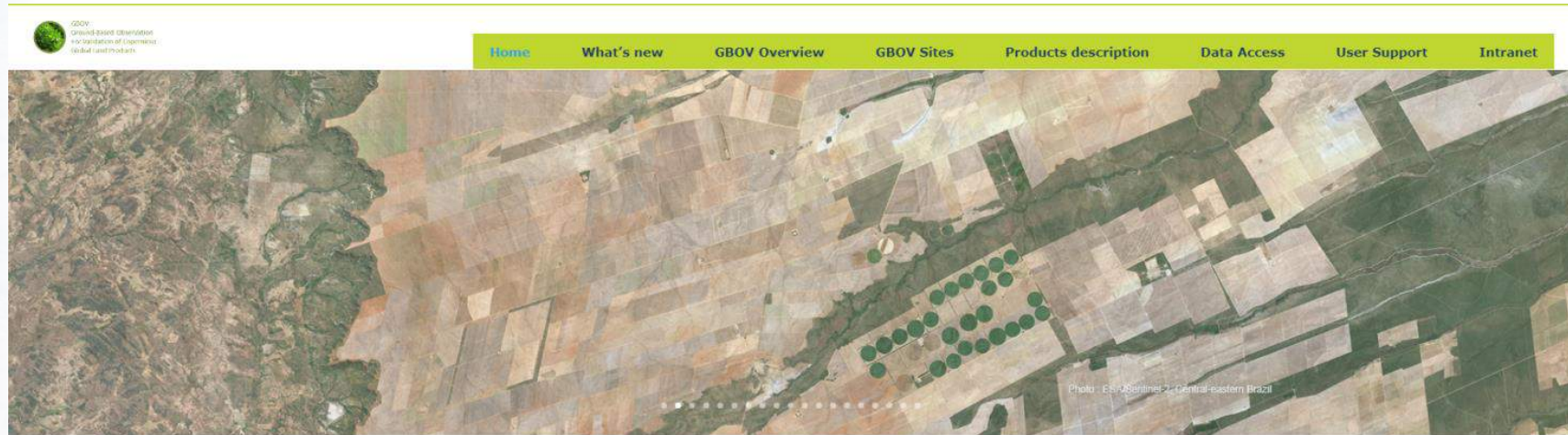
Lake water temperature





Land
Monitoring

Ground-Based Observations for Cal-Val



Ground-Based Observations for Validation (GBOV) of Copernicus Global Land Products

The GBOV service provides multiple years of high quality in-situ measurements to validate 7 core land products (Top-of-canopy reflectances, Surface albedo, fAPAR, LAI, fCover, Land Surface Temperature and Soil Moisture)

[Go to Data Access](#)

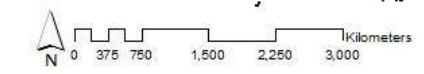
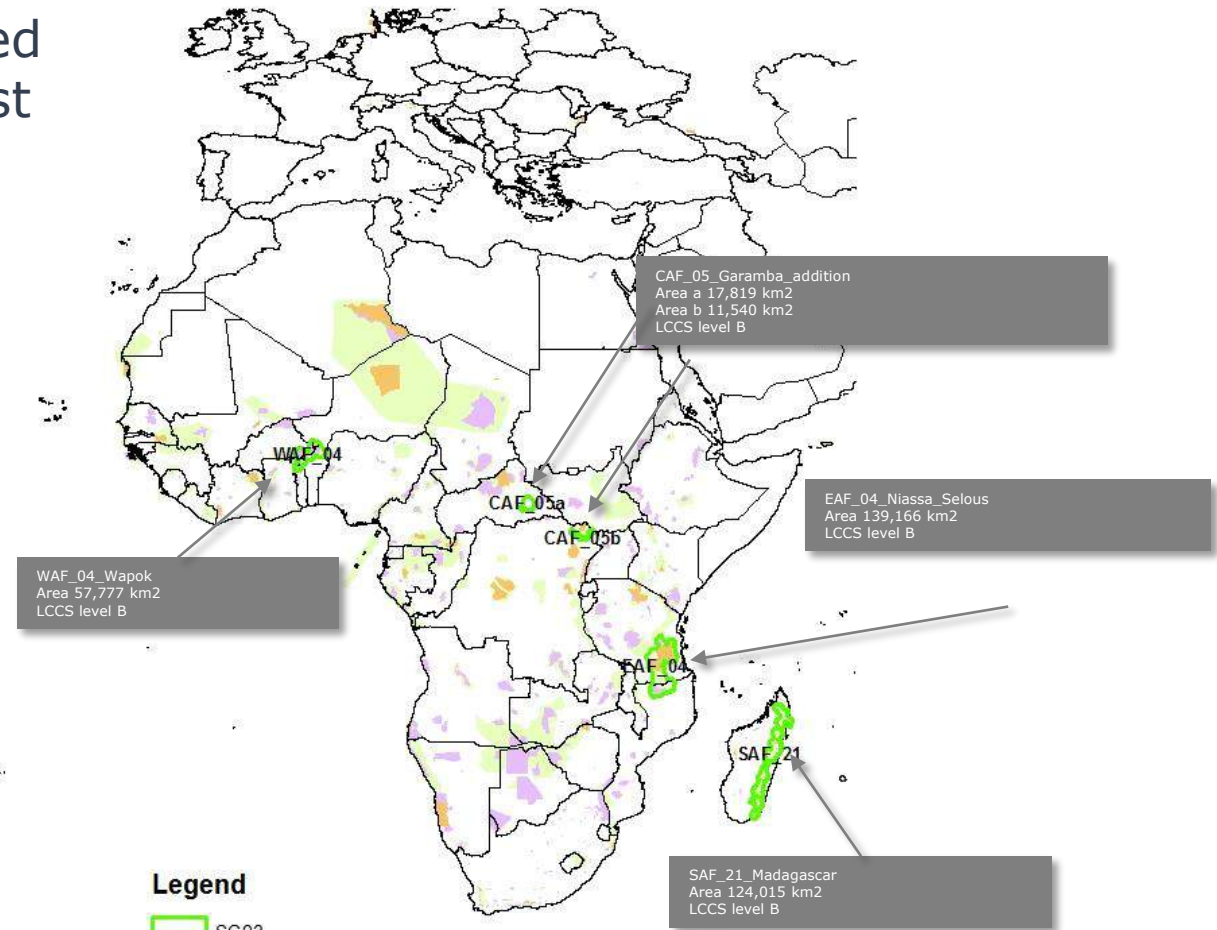


Land
Monitoring

HOT SPOT MONITORING

land cover and change maps and related indicators over specific Areas of Interest
High resolution

Complements the near real time global monitoring service at low resolution



20 Key Landscape zones
Total area: 1.273.350 km2

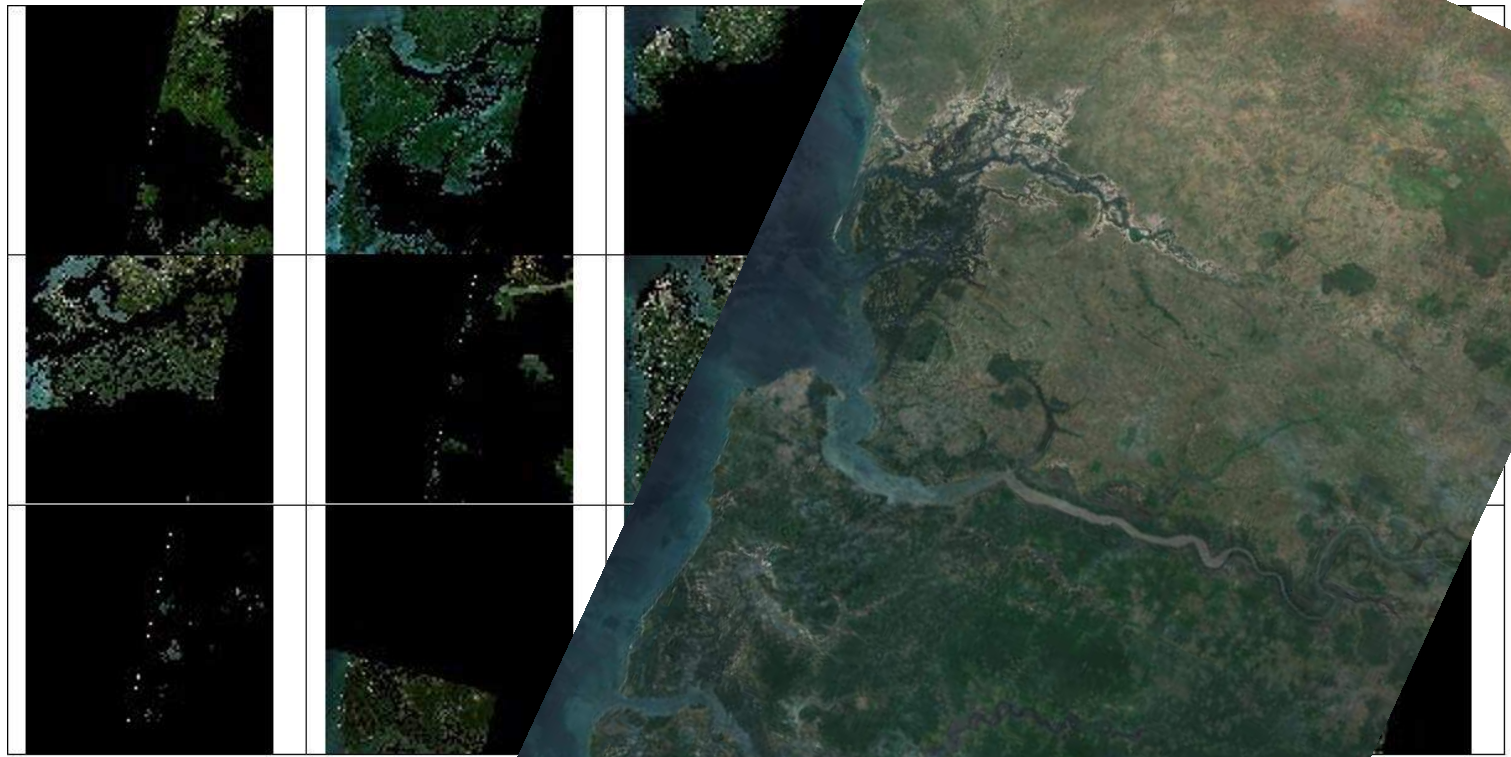


Land
Monitoring

global mosaics – sentinel 2

Preparation of Analysis Ready Data

S2 resolutions; daily, temporal
composites



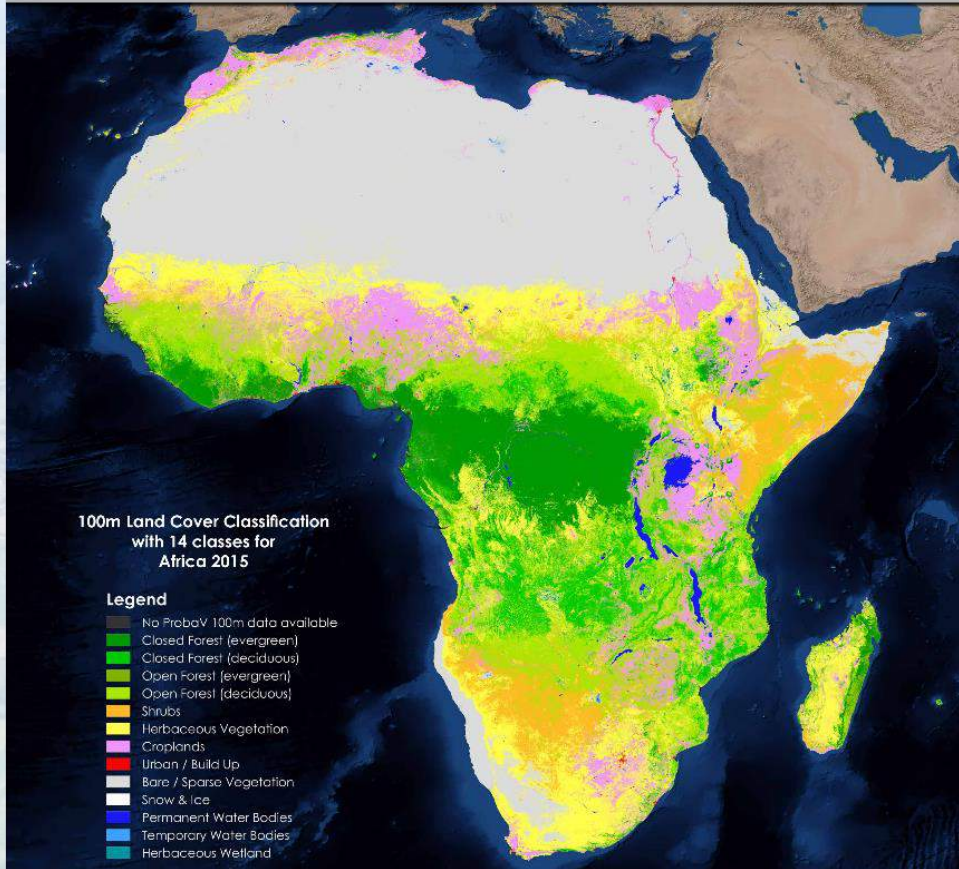
Sentinel 2B (source: ESA)



Land Monitoring



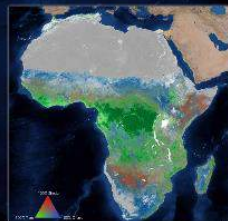
100m Global Land Cover Layer from Copernicus Global Land Service for Africa 2015



100m Land Cover Classification with 14 classes for Africa 2015

Legend

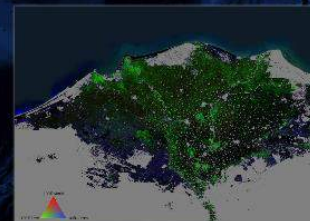
- No Proba-V 100m data available
- Closed Forest (evergreen)
- Closed Forest (deciduous)
- Open Forest (evergreen)
- Open Forest (deciduous)
- Shrubs
- Herbaceous Vegetation
- Croplands
- Urban / Build Up
- Bare / Sparse Vegetation
- Snow & Ice
- Permanent Water Bodies
- Temporary Water Bodies
- Herbaceous Wetland



Cover Fraction Layer Composite of Forest, Shrubland and Grassland.



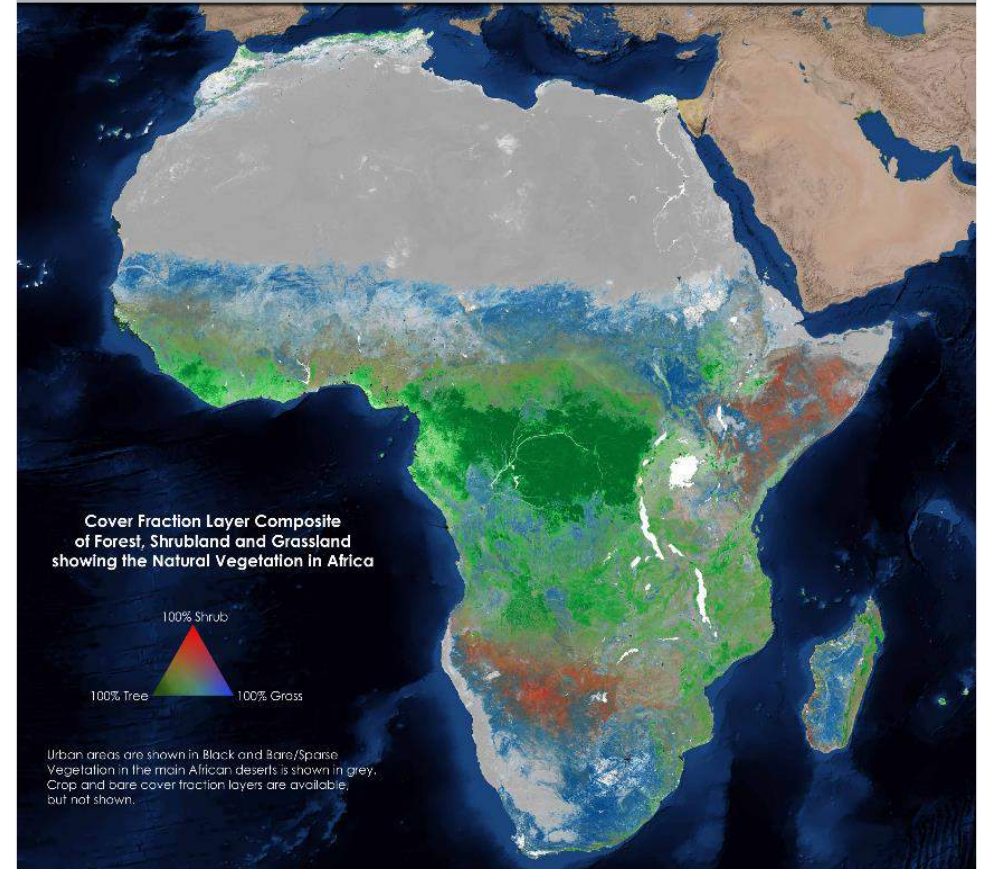
Cover Fractions for Evergreen and Deciduous Forests for Africa 2015.



Zoom in the Nile delta showing the natural mosaic for agriculture (black = 100% crops).



100m Global Land Cover Layer from Copernicus Global Land Service for Africa 2015



Cover Fraction Layer Composite of Forest, Shrubland and Grassland showing the Natural Vegetation in Africa



Urban areas are shown in Black and Bare/Sparse Vegetation in the main African deserts is shown in grey. Crop and bare cover fraction layers are available, but not shown.



100m Land Cover Classification with 14 classes for Africa 2015.



Cover Fractions for Evergreen and Deciduous Forests for Africa 2015.



Zoom in the Nile delta showing the natural mosaic for agriculture (black = 100% crops).



This map was created by VITO Remote Sensing (Belgium), IASA (Austria) and Wageningen University (the Netherlands) under assignment of the European Commission DG Joint Research Center (Italy) and in co-operation with DLR (Germany). The data used is PROBA-V 100 m for the reference year 2015. The bathymetry is derived from the Blue Marble next generation.

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This map was created by VITO Remote Sensing (Belgium), IASA (Austria) and Wageningen University (the Netherlands) under assignment of the European Commission DG Joint Research Center (Italy) and in co-operation with DLR (Germany). The data used is PROBA-V 100 m for the reference year 2015. The bathymetry is derived from the Blue Marble next generation.

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19 products available at **1km**
8 products available at **300m**

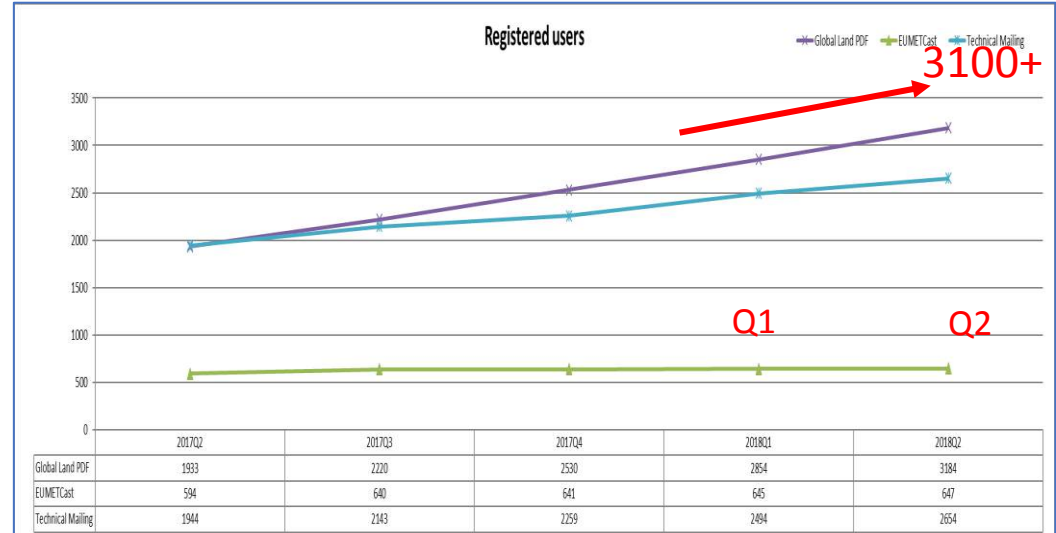
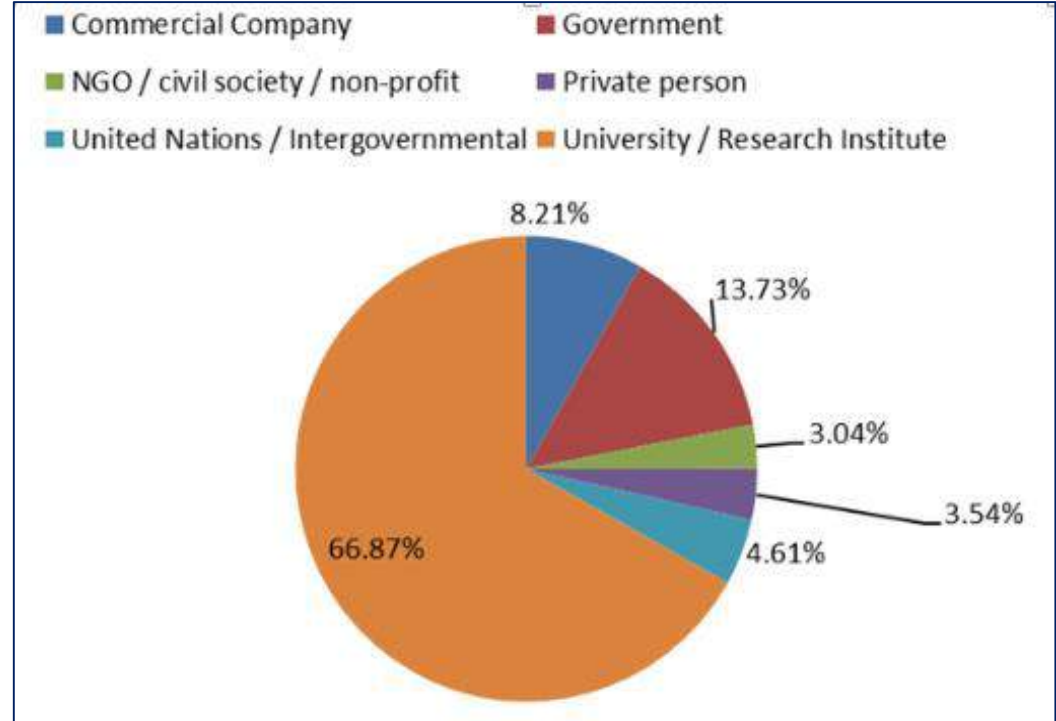
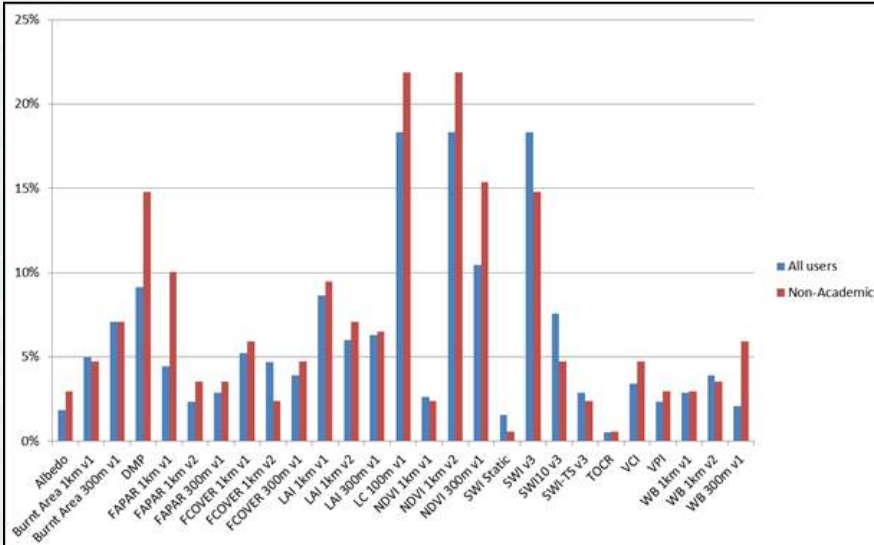
Land cover at **100m** (Africa now – Global in Q3)

20 Hotspot areas (> 1.2M km2)

Analysis ready S2 mosaics (EU – global soon)

- ✓ **Validated**
- ✓ **Documented**
- ✓ **External review**
- ✓ **Free**
- ✓ **Continuity ensured**

Updates through evolutions of 300m products. Transition to S3 to be started.





Land
Monitoring

Global Land Component

Downstream applications

Hot Spot monitoring packages

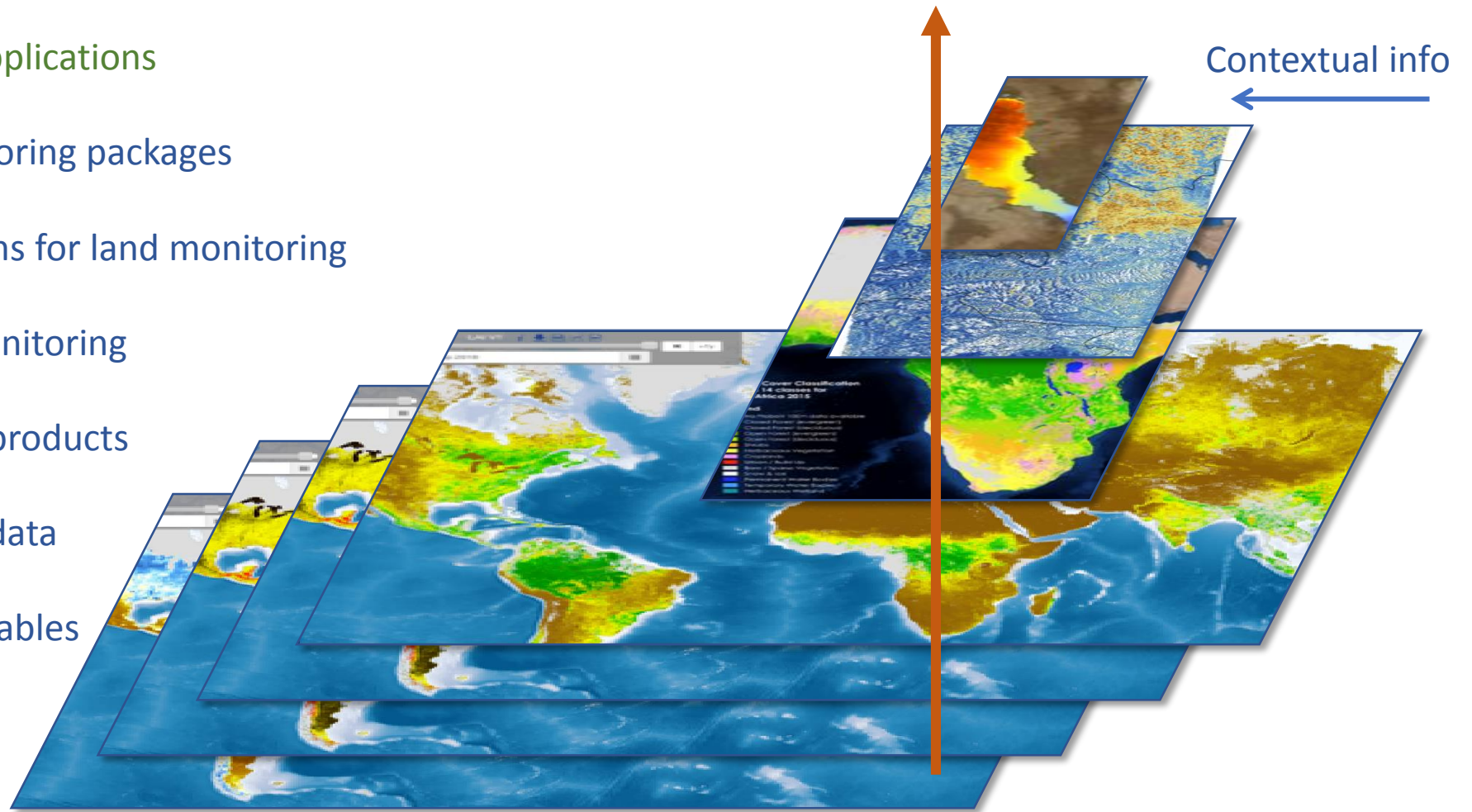
Core applications for land monitoring

Land aspect monitoring

Thematic data products

Analysis ready data

Biophysical variables





Land
Monitoring

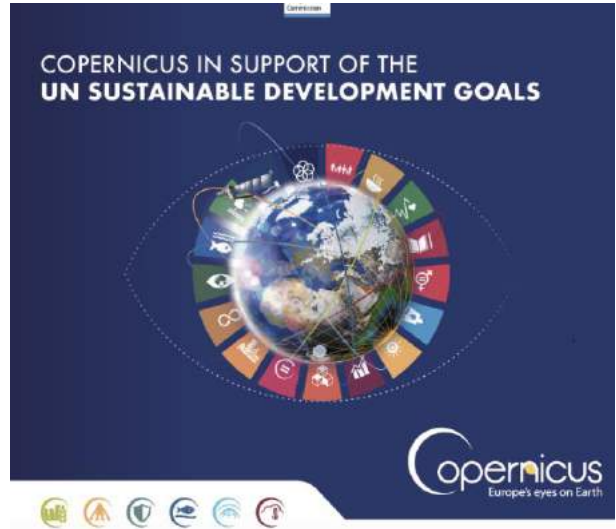
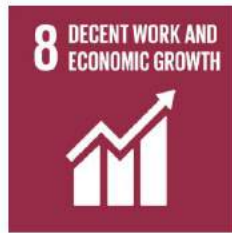




Land
Monitoring

GLOBAL LAND COMPONENT

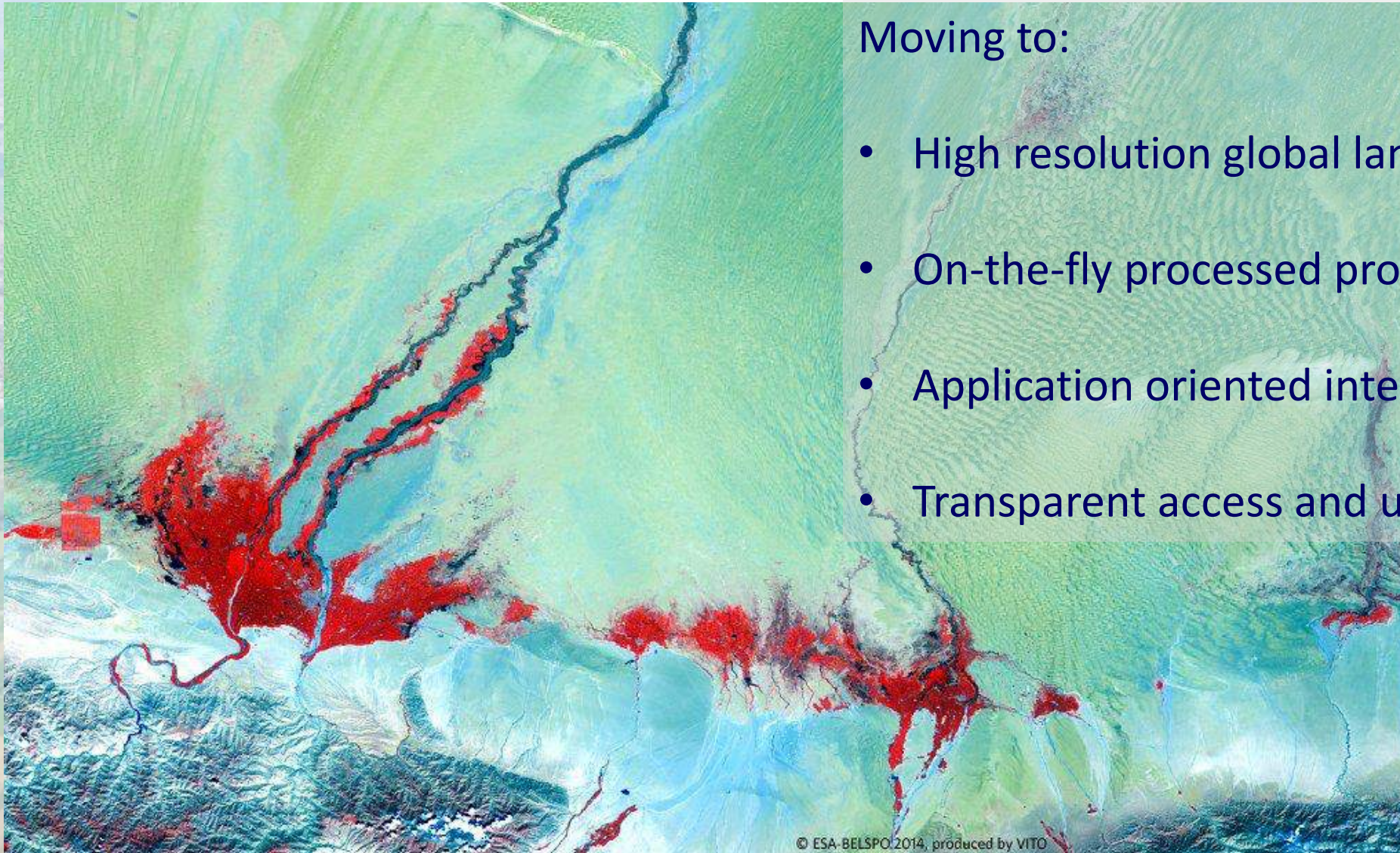
Base support for addressing Sustainable Development Goals





Land
Monitoring

GLOBAL LAND COMPONENT



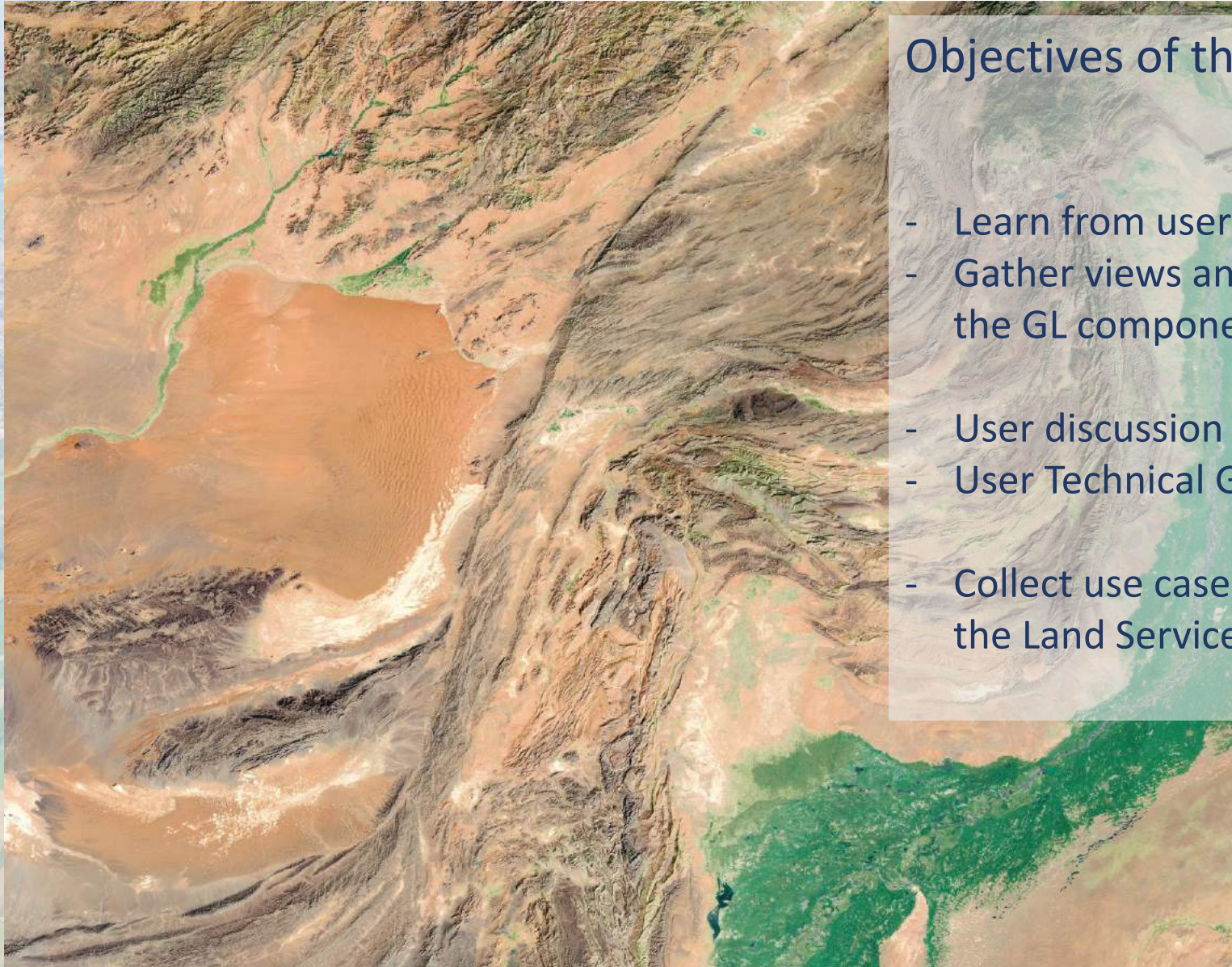
Moving to:

- High resolution global land products
- On-the-fly processed products
- Application oriented integrated products
- Transparent access and use of products



Land
Monitoring

Global Land Conference



Objectives of the Conference

- Learn from user experiences
- Gather views and recommendations to shape the GL component
- User discussion platform
- User Technical Group input
- Collect use cases to illustrate and promote the Land Service



Land
Monitoring

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Thank you!



<https://land.copernicus.eu/global/>