

StatEO

5-7 May 2026 | ESA-ESRIN | Frascati (Rome), Italy

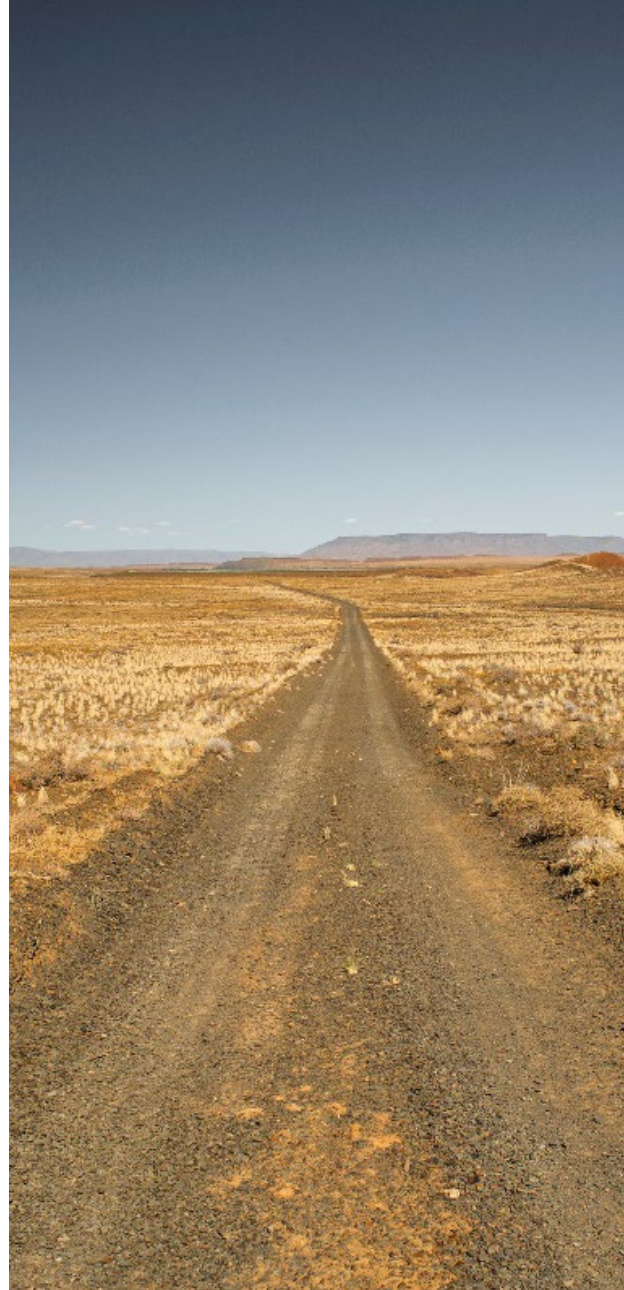


The Copernicus LCFM Service: Next-Generation Global Land Cover at 10 m Resolution

Daniele Zanaga¹, Ruben Van De Kerchove¹, Joris Coddé¹, Ioannis Kafas¹, Giorgia Milli¹, Mathilde De Vroey¹, Carolien Toté¹, Stelios Lagaras¹, Victor Verhaert¹, Dirk Daems¹, Peter Van Bouwel¹, Luc Bertels¹, Astrid Verhegghen¹, Manu Goudar¹, Francesco Perfetto¹, Myroslava Lesiv², Steffen Fritz², Antoine Masse³, Gabriel Jaffrain³, Adrien Moiret³, Andrea Lupi⁴, René Colditz⁴, Frédéric Achard⁴, Andreas Brink⁴

¹ VITO, ² IIASA, ³ IGNFI, ⁴ Joint Research Centrum (JRC)

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Land Cover Products

Enable:

- area estimation
- indicator generation
- reporting (national statistics, SDGs, environmental-economic accounting...)

Support:

- **Environmental monitoring:** deforestation, land degradation, biodiversity, habitat change
- **Climate and carbon accounting:** biomass, emissions, LULUCF reporting
- **Agriculture and food systems:** cropland extent, productivity assessments
- **Risk and planning:** urban expansion, disaster exposure, land management

A critical asset for monitoring our planet's health

Previous Generation: ESA WorldCover

First Global 10m Land Cover map from Sentinel-2 and Sentinel-1

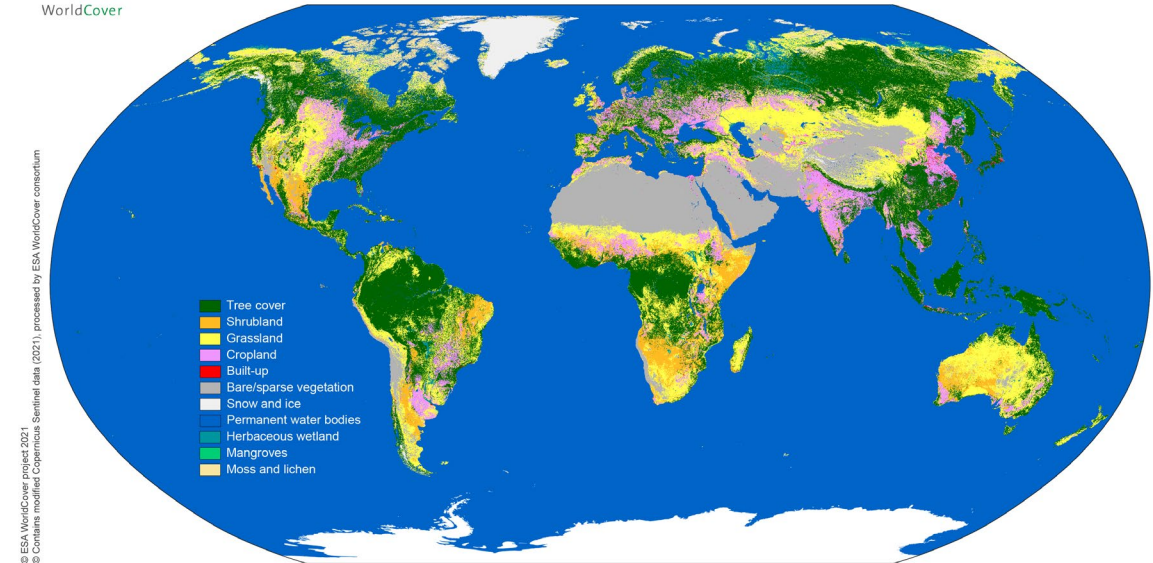


ESA WorldCover 10 m 2021



Widely adopted and used for:

- Statistical assessment and benchmarking: global validation studies, ...
- Area estimation and accounting: land cover quantification workflows at country scale, ...
- Official statistics and policy workflows: SEEA-aligned land-cover statistics by international organizations, ...



Limitations

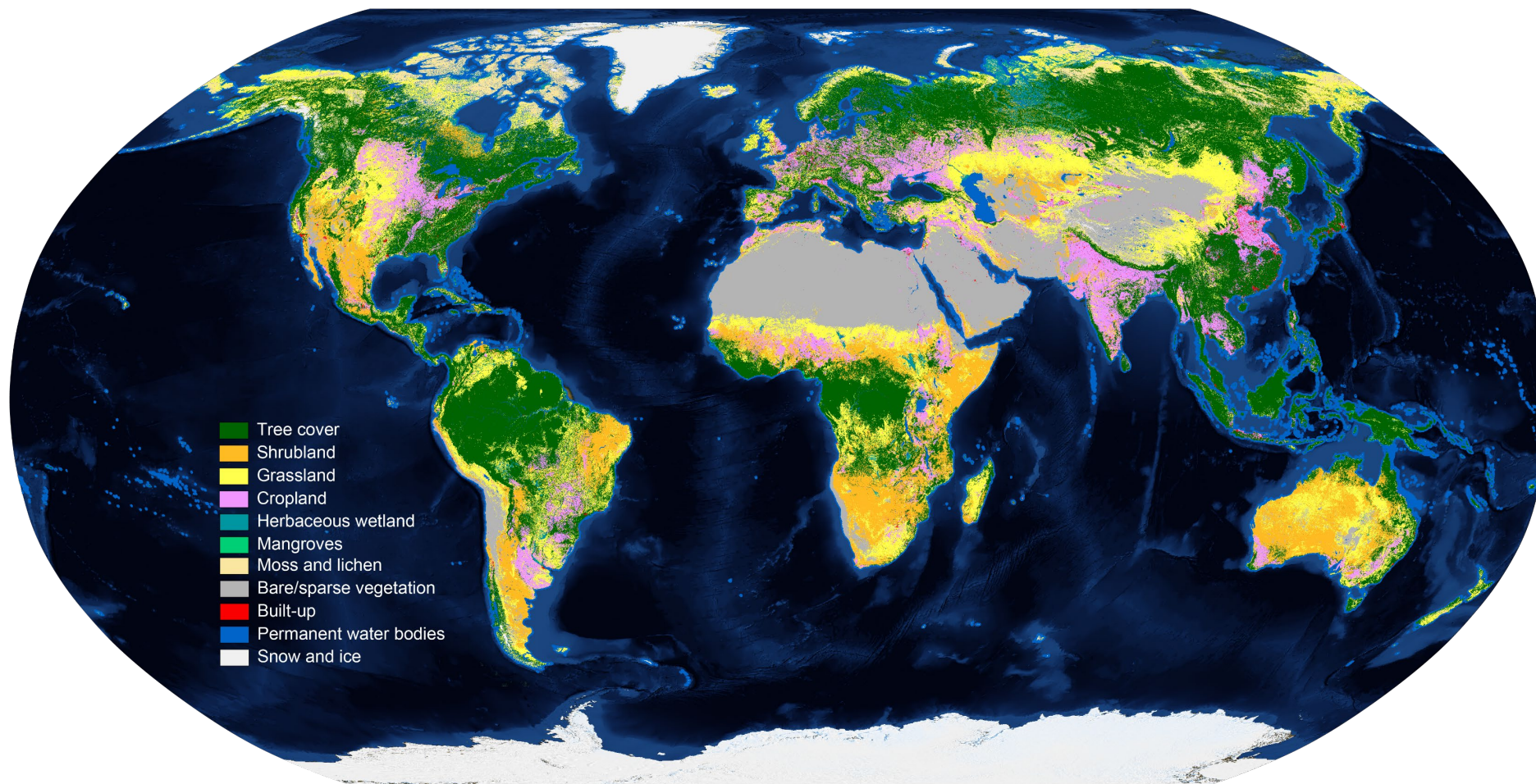
- Demonstrative project: one shot (2020-2021)
- Limited temporal consistency – updated algorithm between v100 (2020) and v200 (2021)

LCFM: Next Generation Land Cover and Forestry Products

- **Annual land cover maps at 10 m resolution for 2020-2026**
 - Consistent change mapping between years
 - Continuation of the Copernicus Global Land Cover time series
- **Innovative products**
 - 10 m Pan-tropical Tree Cover Density & Tree Cover Presence Change
 - 10 m sub-annual land cover products, monthly Land Surface Categories
- **Open-access datasets & training data**

A dynamic land cover service supporting: Enhanced global environmental monitoring and downstream applications

Global Land Cover 2020, 10 m resolution (LCM-10)



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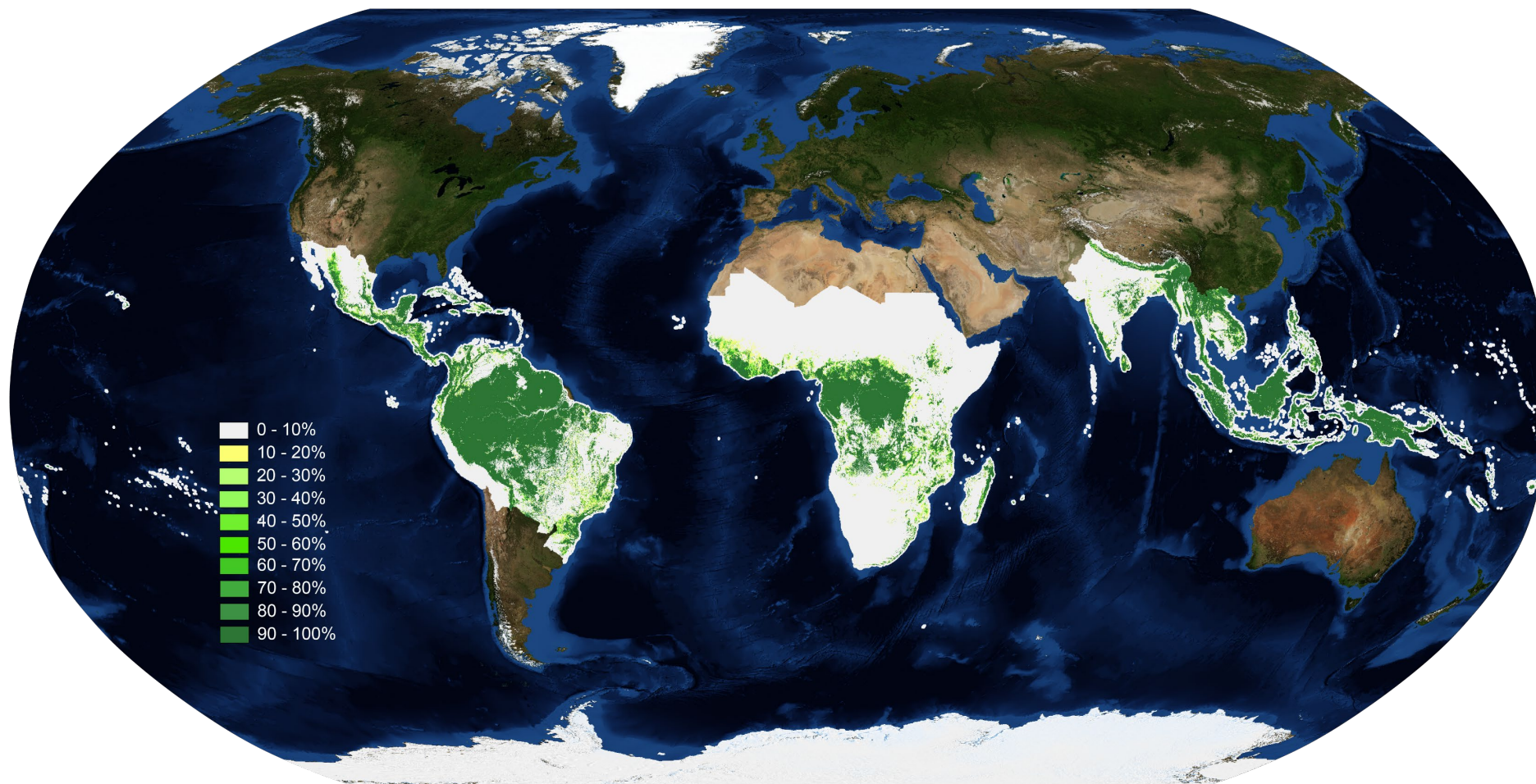
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Pan-Tropical Tree Cover Density 2020, 10 m resolution (TCD-10)



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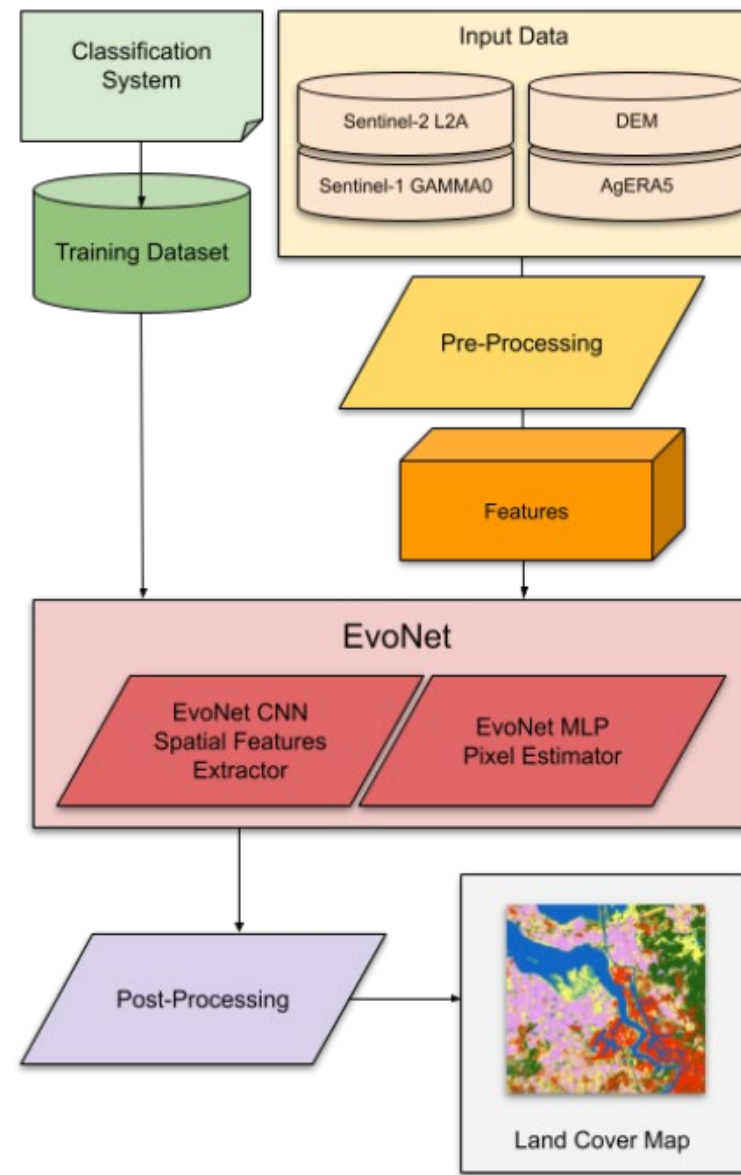
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LCM-10: Global Land Cover Map

Technical Innovations

- ESA WorldCover evolution
- Updated methodology
 - Training Dataset
 - Pre-processing
 - Classification algorithm: EvoNet
- Higher quality and accuracy



Product Accuracy

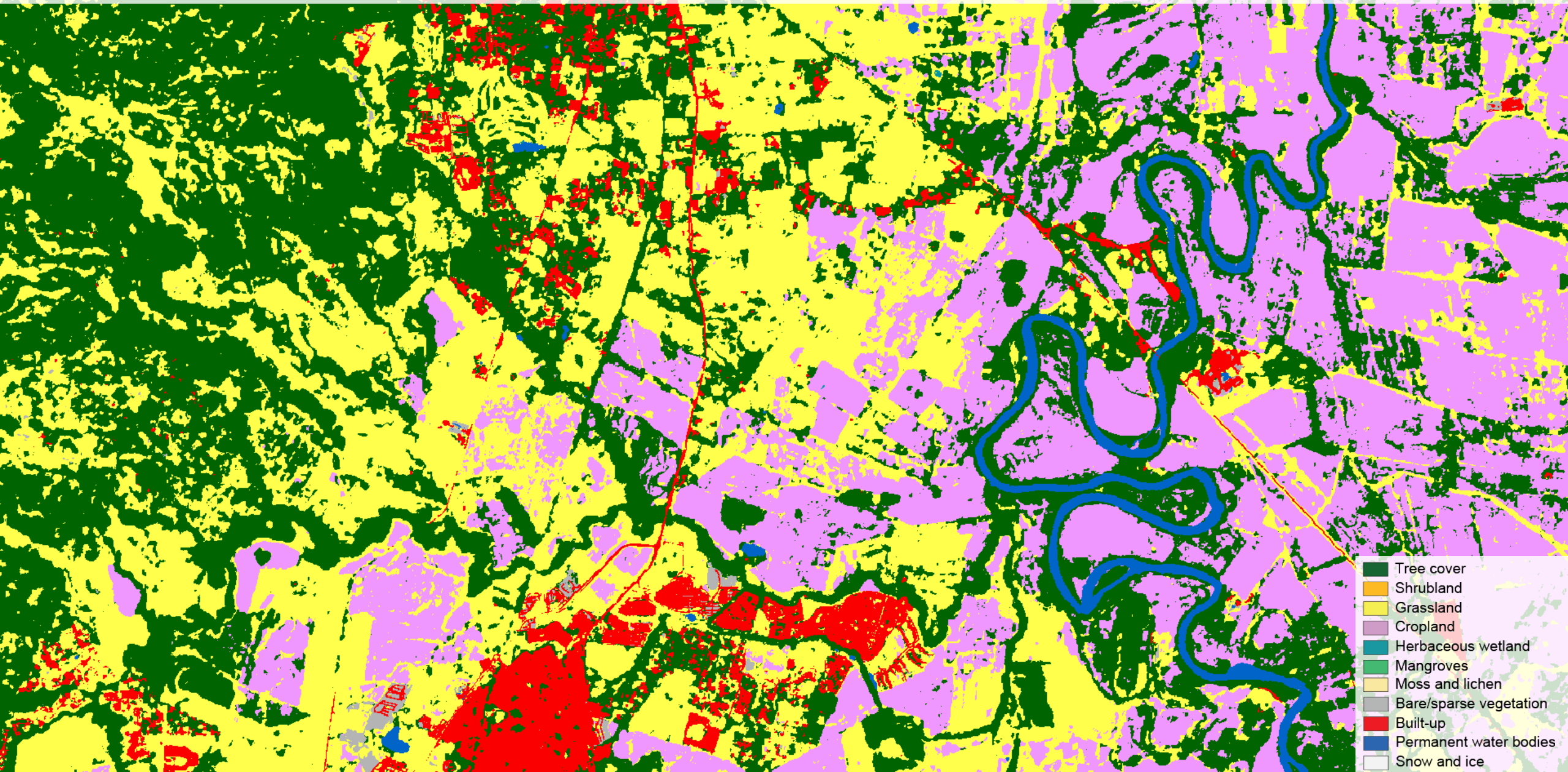
		Validation LCM-10 2020 V1 Raster product			
Code	Class	PA (%)	Δ PA (%)	UA (%)	Δ UA (%)
10	Tree cover	90.90	0.04	83.39	0.44
20	Shrubland	67.90	0.33	56.39	0.93
30	Grassland	64.53	0.14	82.44	0.46
40	Cropland	86.22	0.09	87.04	0.63
50	Herbaceous wetland	73.62	0.58	77.20	2.23
60	Mangroves	100.00	0.00	100.00	0.00
70	Moss and lichen	83.66	0.36	61.34	1.88
80	Bare /sparse vegetation	86.79	0.06	89.33	0.46
90	Built-up	77.83	0.72	59.87	2.81
100	Permanent water bodies	92.23	0.09	89.13	1.12
110	Snow and ice	99.92	0.06	85.64	1.91
254	Unclassifiable	/	/	/	/
255	No data	/	/	/	/
Overall accuracy		80.10 \pm0.20 %			

- **Independent product validation**
 - Performed by **IGNFI**, independent from the product developer (VITO)
 - Based on reference data fully independent from the training dataset
- **Blind interpretation:** reference labels assigned without access to the LCM-10 classification
- **Systematic global sampling,** ensuring representativeness across biomes
- **Improved thematic accuracy:** achieves an overall accuracy \sim 3.4 percentage points higher than ESA WorldCover

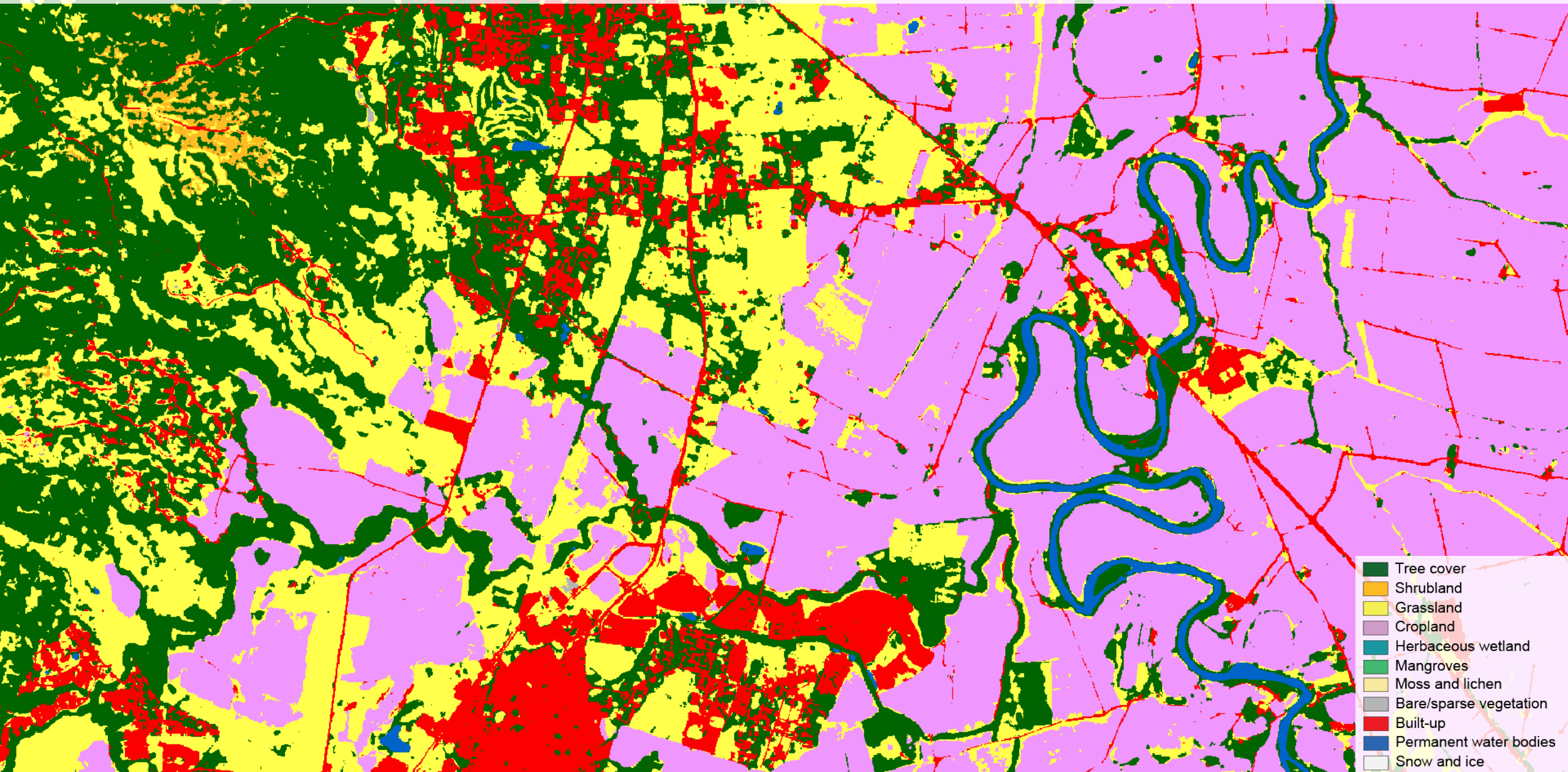
Cali (Colombia) – Sentinel-2



Cali (Colombia) – WorldCover v200



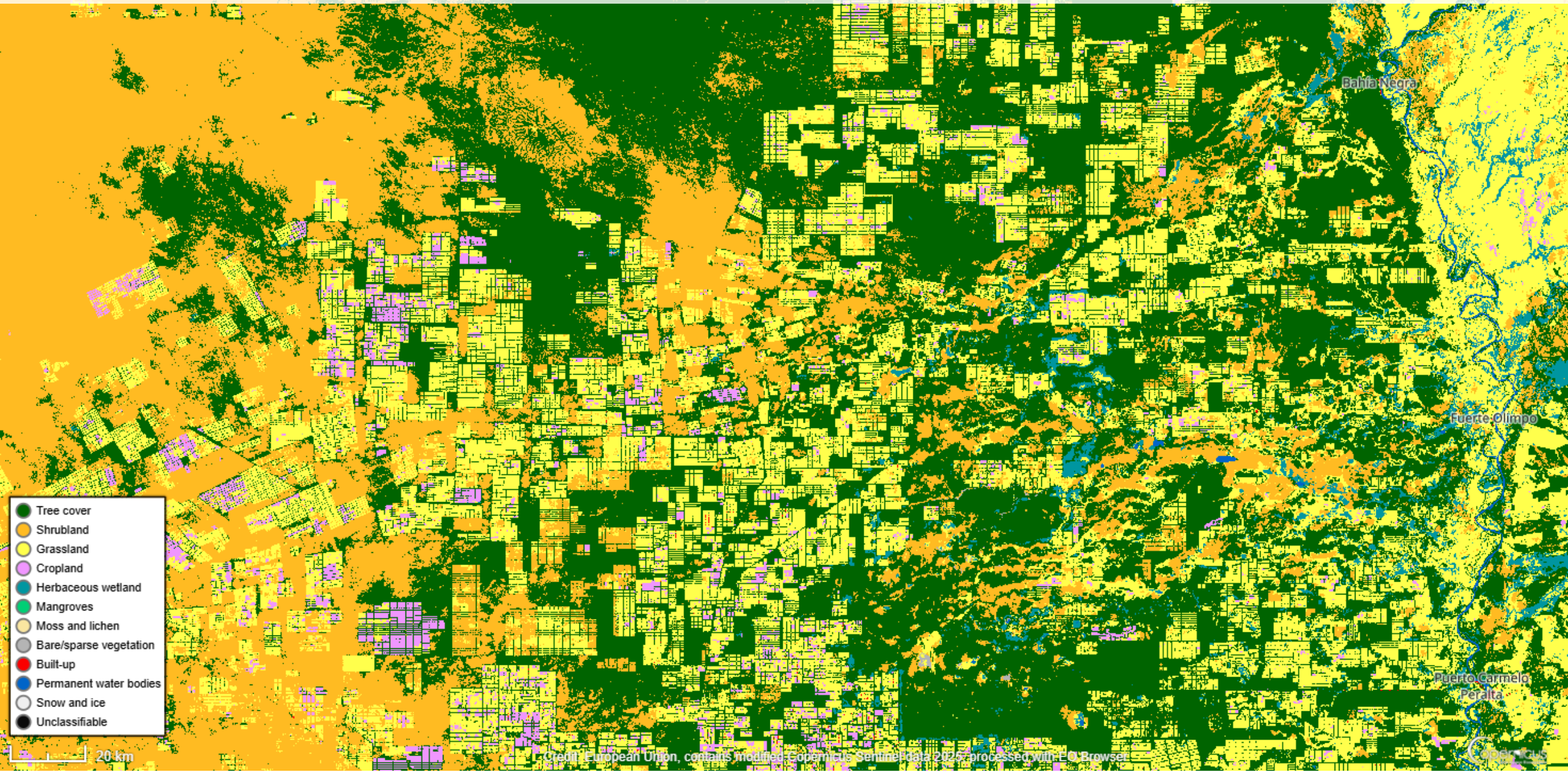
Cali (Colombia) – LCM-10



Gran Chaco (Paraguay) – Sentinel-2



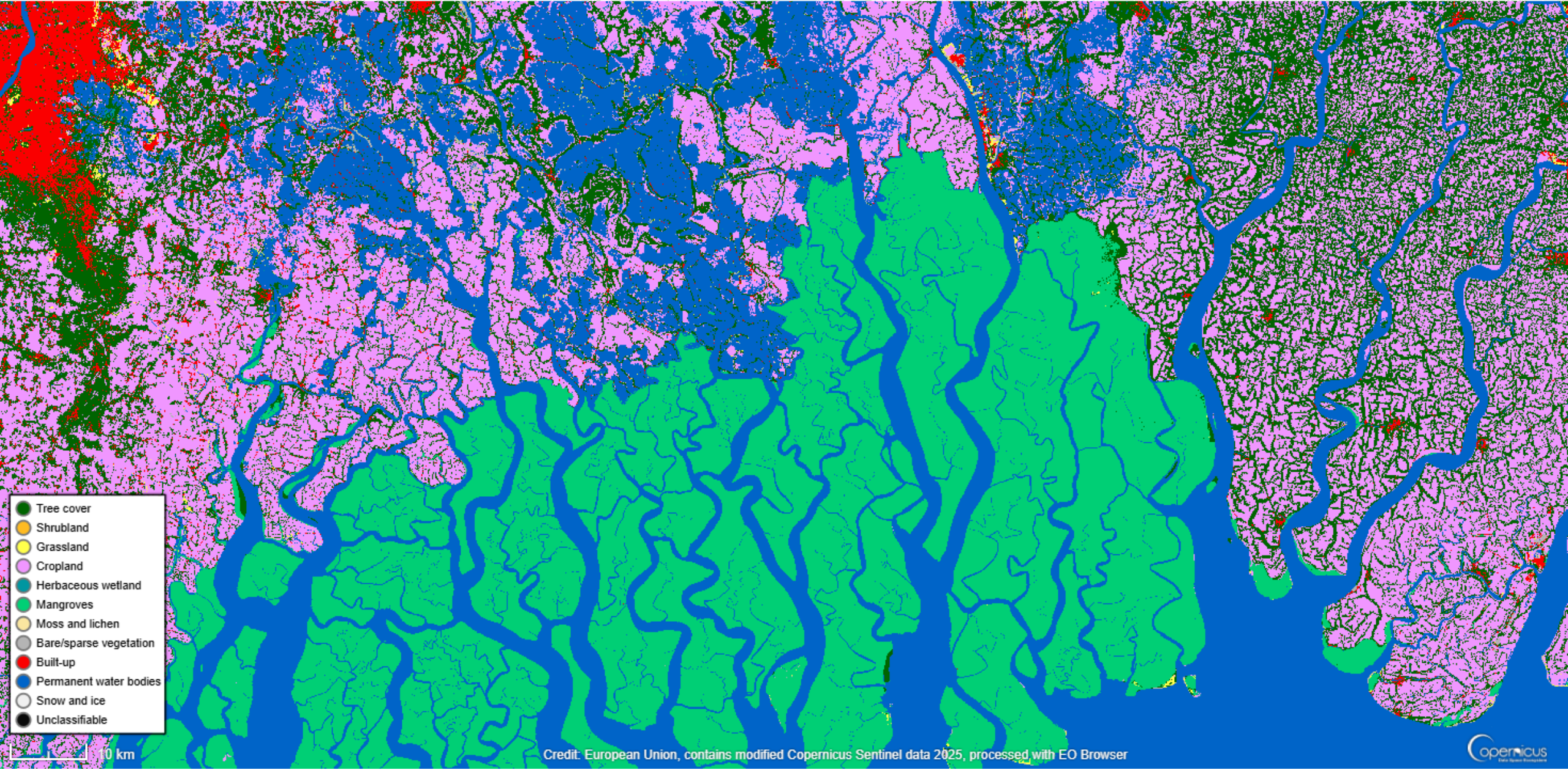
Gran Chaco (Paraguay) – LCM-10



Sundarbans (India, Bangladesh) – Sentinel-2



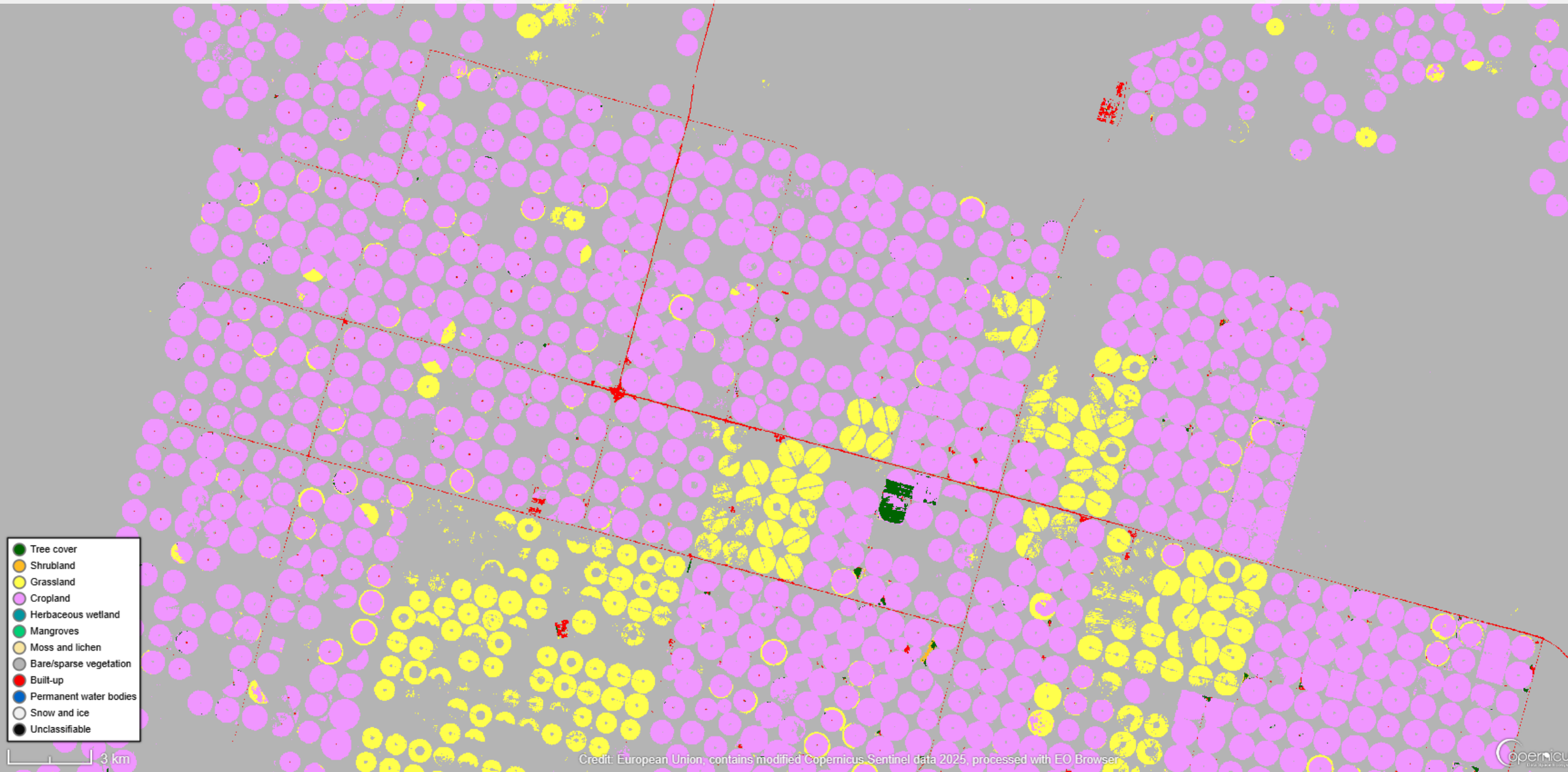
Sundarbans (India, Bangladesh) – LCM-10



Wadi As-Sirhan Basin (Saudi Arabia) – Sentinel-2

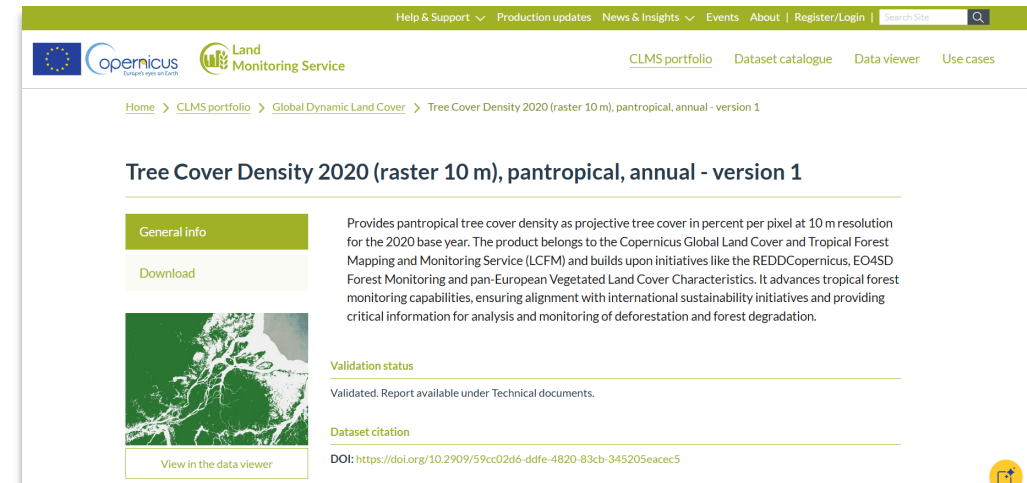
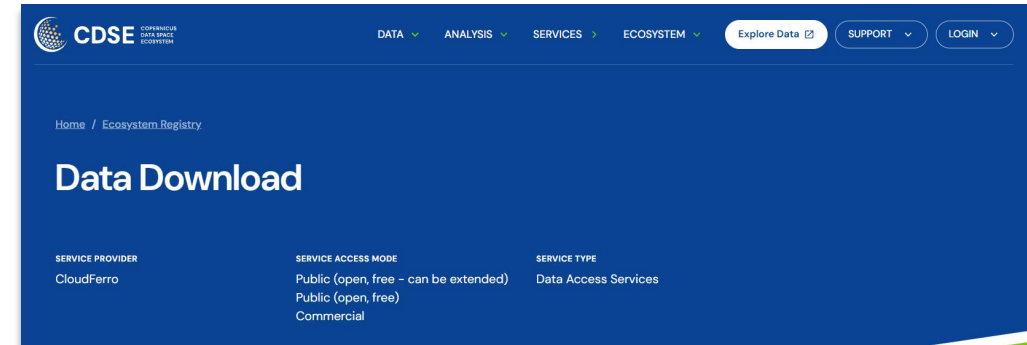
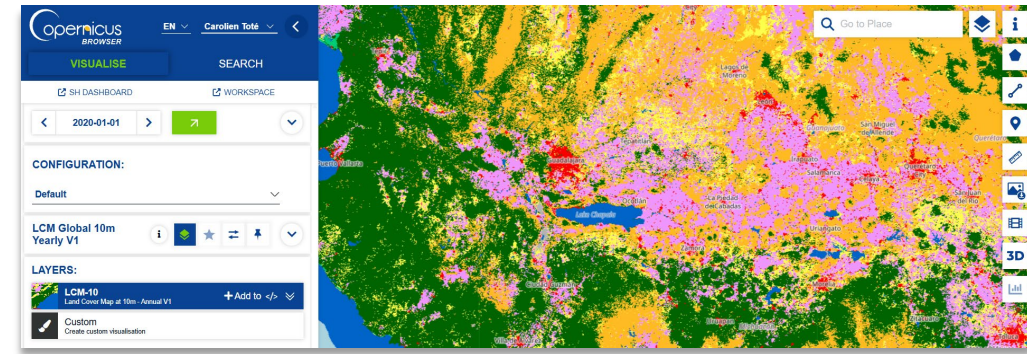


Wadi As-Sirhan Basin (Saudi Arabia) – LCM-10



Product Access

- CDSE
 - Copernicus Browser
 - S3 access for direct retrieval from the EODATA S3 bucket
 - OData API for integration into workflows
- Terrascope
 - [Viewer](#)
 - STAC collection:
<https://stac.terrascope.be/collections/lcfm-lcm-10>
 - STAC browser:
<https://stacbrowser.terrascope.be/collections/lcfm-lcm-10>
- User documentation
 - <https://land.copernicus.eu/>
 - <https://documentation.dataspace.copernicus.eu/>



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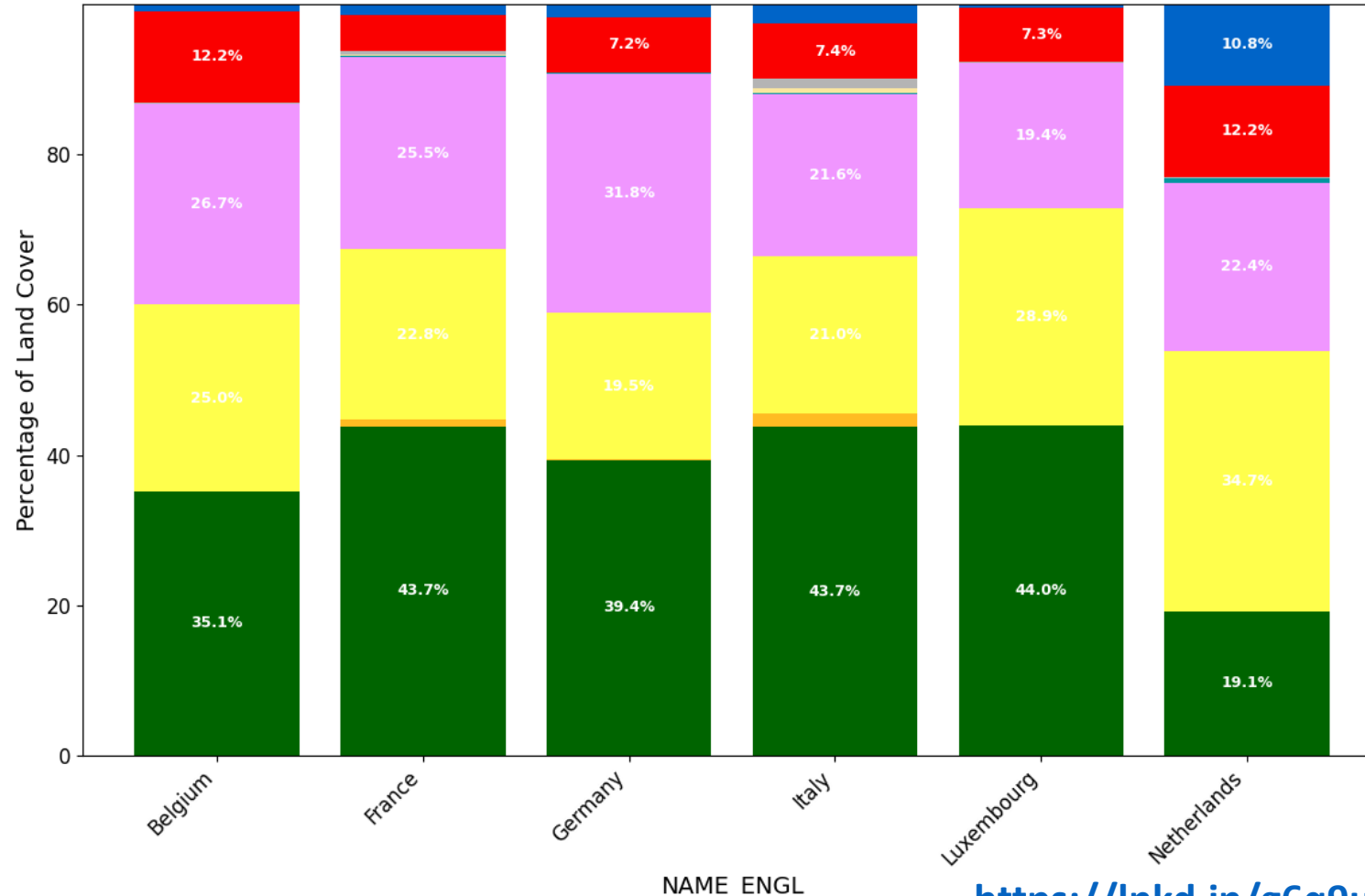


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Land Cover Statics Extraction

Land cover distribution by COUNTRIES for BE, NL, LU, DE, FR, IT (LCM-10 2020)



- Python notebook for extracting land cover statistics
- Eurostat GISCO geometries: NUTS regions (levels 0–3) or individual countries
- Processing: openEO on the Terrascope backend
- Corrects for projection bias: WGS 84 pixel area varies with latitude



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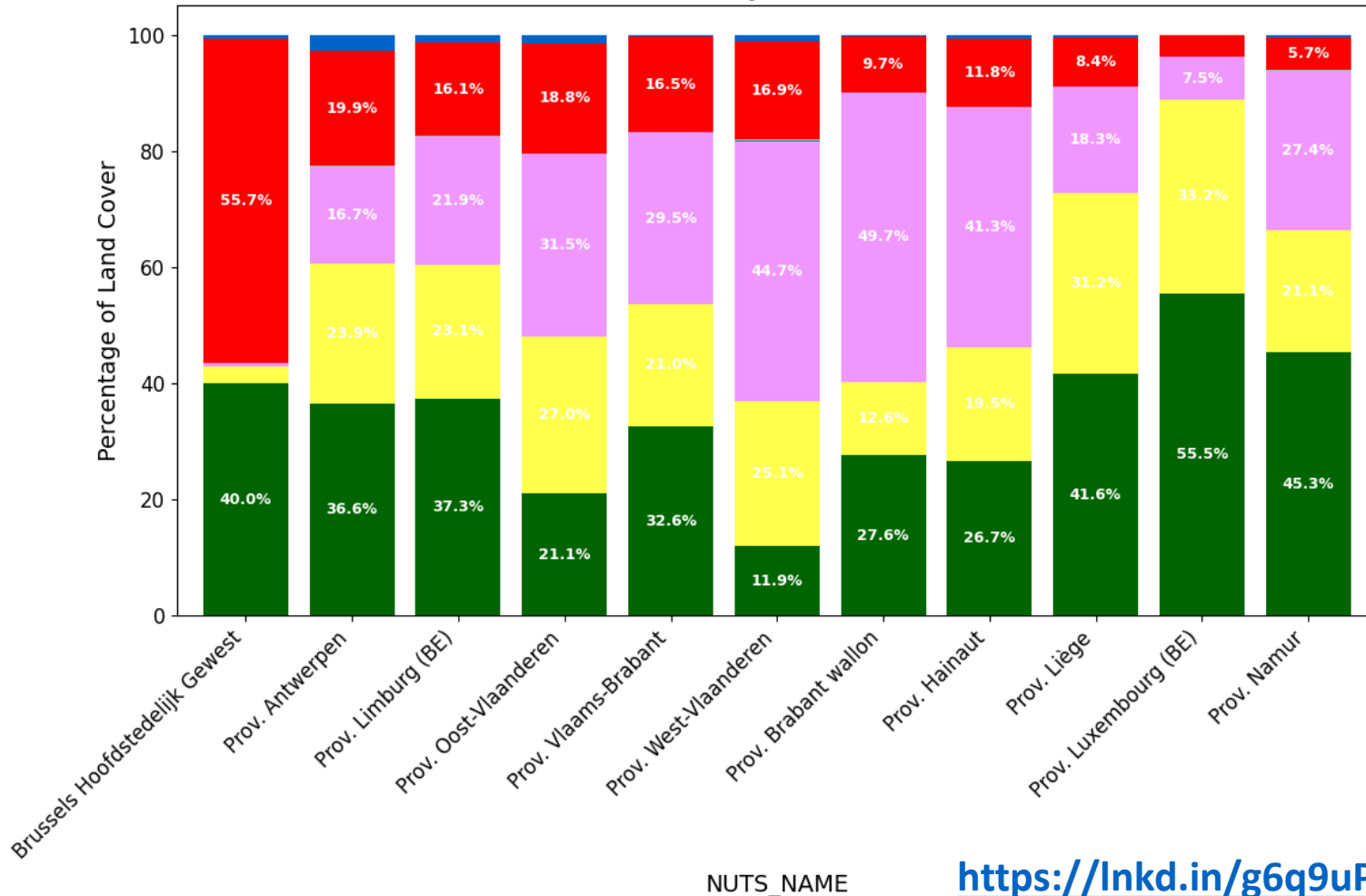


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Conclusions

- **LCFM: new baseline** for global land cover information
- **Temporally consistent** Land Cover timeseries and change products
- **Free & open** datasets and fully reproducible
- First products (2020) released last summer.
- **Full 2020-2026 timeseries planned:** 2020-2024 to be completed by end of 2025, following with 2025-2026 products in 2027



Land Monitoring

Thank you



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