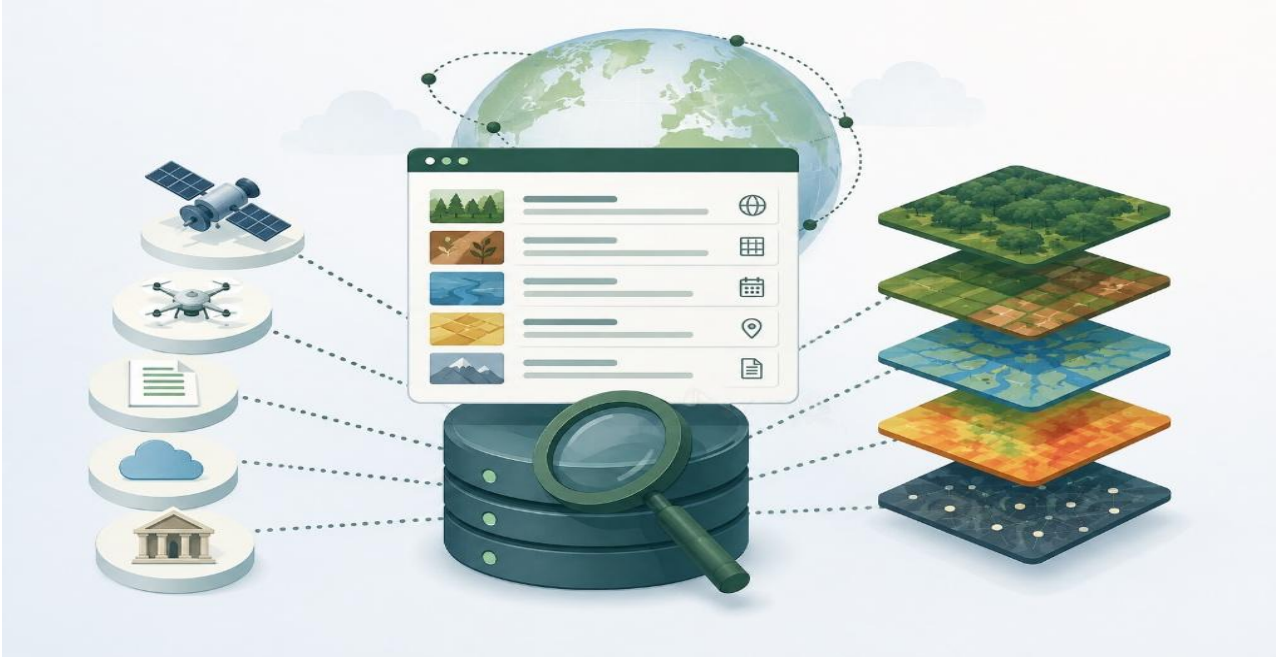
GEOS-EUDR – Technical and Policy Brief No.2

Navigating the Geodata Jungle: A Curated Metadatabase for Supporting EUDR Supply Chain Monitoring

Freitas Beyer J., Köthke M., Lippe M.



Executive Summary

The implementation of the European Union Deforestation Regulation (EUDR) (Regulation (EU) 2023/1115) has fundamentally changed compliance requirements across global supply chains. Using the cut-off date of 31 December 2020 as a reference point, **operators and national competent authorities (CAs) can leverage Earth Observation (EO) data, maps**, and other pertinent information to evaluate whether products from cattle, cocoa, coffee, oil palm, rubber, soy or wood meet the EUDR's deforestation-free requirements.

However, despite the wide availability of EO datasets and maps, operators and CAs face a **highly fragmented EO and geospatial data landscape**, characterized by differences in definitions, spatial resolutions, thematic coverage, and methodological approaches. This **fragmentation makes it difficult to select and interpret suitable datasets in a transparent manner, which poses challenges for operators** seeking to demonstrate EUDR compliance and **for CAs** verifying regulatory compliance.

This technical and policy brief introduces a curated, open-access catalogue of datasets hosted on GitHub and developed within the GEOS-EUDR project at the Thünen Institute of Forestry, Germany. Developed between May 2024 to June 2026, this metadatabase serves as a digital public infrastructure by **curating publicly available global, regional,** and **selected national geospatial datasets** relevant to the EUDR. To ensure immediate regulatory relevance, only datasets with a spatial resolution of 30 meters or finer and temporal coverage within 5 years before or after the EUDR reference year 2020 were included.

By **standardizing 28 structural, technical,** and **quality-related metadata attributes** - from explicit canopy thresholds to validation sampling sizes - the catalogue enables stakeholders to quickly find and compare spatial data. The database **serves as a knowledge resource**, **providing an overview of available EO map products** and their **potential application in relation to the EUDR**. This brief outline the contents of the metadata database and explains how it can be used. It also provides practical recommendations for using EO data and maps, taking into account the products currently available.

Background of study

Under the EUDR, operators (excluding micro and small primary operators - MSPO) must provide the geolocations of production plots, and include verifiable proof in their due diligence statements that no deforestation or forest degradation has occurred since 31 December 2020. As a consequence, monitoring complex supply chains can require a broad spectrum of data, including the extent of forest areas, information on the commodity in question, the boundaries of production areas, and relevant regional or national land cover/land use maps. Despite a previous systematic review (Freitas Beyer et al. 2025[1]) highlighting the high variability and inherent biases of global forest maps, **stakeholders still lack a centralized infrastructure and guidelines on how to evaluate EO and other geodata** and **on how to identify relevant map layers**.

Against this background, the GEOS-EUDR project has developed a framework for continuous monitoring, recording, and classification, utilizing this curated metadatabase. The **aim is to provide an overview of the wide variety of EO data and mapping products** that are currently available and could be used for EUDR purposes.

The project has **compiled an extensive repository that can serve as a digital public infrastructure**. This was achieved by querying major cloud platforms (e.g., the ESA Copernicus Data Space Ecosystem, Google Earth Engine) and repositories provided by international organisations (e.g., FAO, NASA, USGS), as well as reviewing peer-reviewed literature indexed in Scopus or Web of Science. The resulting **Metadatabase Catalogue v1.0** enables operators and CAs to assess the structural integrity, methodological transparency, and accuracy metrics of individual geospatial products prior to integrating them into due diligence workflows. The catalogue currently contains global data on forest and tree cover, and will be extended to include information on forest management,

[1]Freitas Beyer, J., Köthke, M., & Lippe, M. (2025). Assessing the Suitability of Available Global Forest Maps as Reference Tools for EUDR-Compliant Deforestation Monitoring. Remote Sensing 17, 3012. https://doi.org/10.3390/rs17173012

deforestation, tree loss, and agricultural commodities during upcoming releases, as well as datasets at regional and national scales.

Under the EUDR, operators can choose whether to use EO data, maps, or other sources of information for their deforestation risk assessment. This also includes the choice of benchmark dataset and assessment methodology. Consequently, the EU Commission has not issued a legally binding reference map, nor has provided standardised directives or mandatory guidelines on how operators and/or CAs could apply EO data and maps for compliance checks (see also: FAQ, v5, April 2026, sections 9.7 and 9.10). This policy brief does not intend to do so either.

However, given the large number of DDSs that are expected, it is reasonable to assume that operators and CAs will use EO data and maps to assess the risk of deforestation in a given production area. Therefore, using EO data, maps, and other types of geodata to monitor deforestation and forest degradation is an obvious and practical way to demonstrate due diligence. This is why we provide an overview and recommendations on **how to navigate the Geodata Jungle for supporting EUDR supply chain monitoring**.

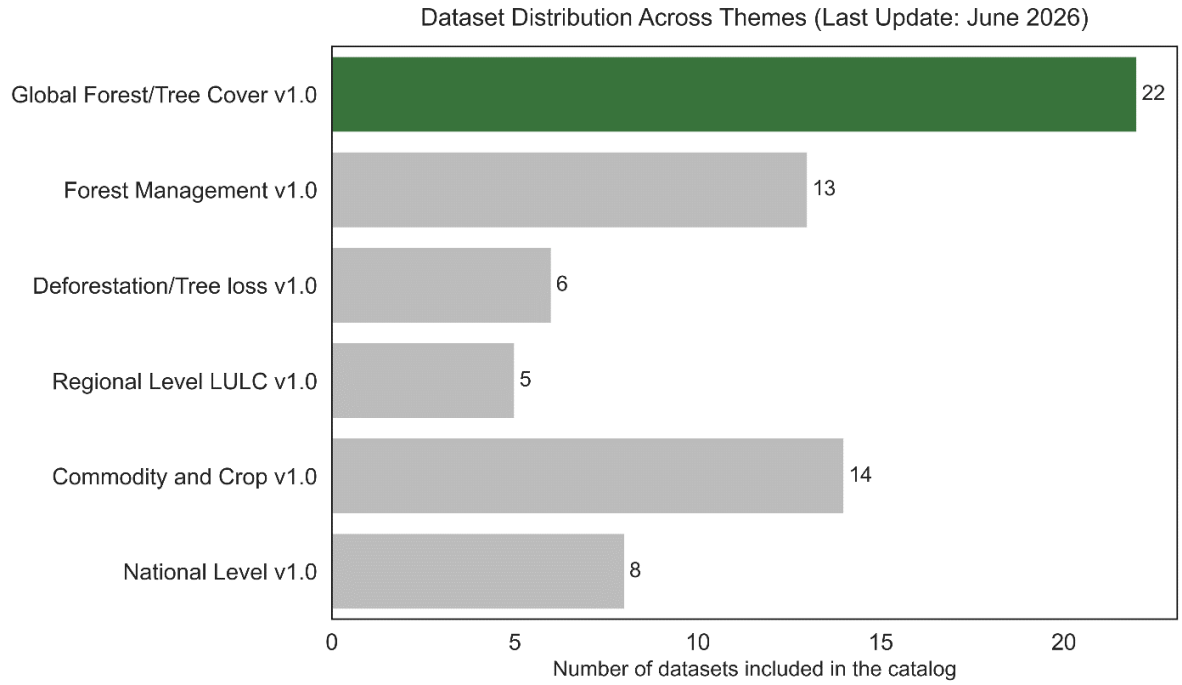


Figure 1. Number of catalogued datasets per thematic domain. Thematic domains refer to the major categories used to organize datasets according to their primary biophysical or socio-environmental focus. Note: Currently only Global Forest/Tree Cover v1.0 is publicly available (indicated by green bar), whereas other listed datasets will be published in upcoming releases (indicated by grey bars).

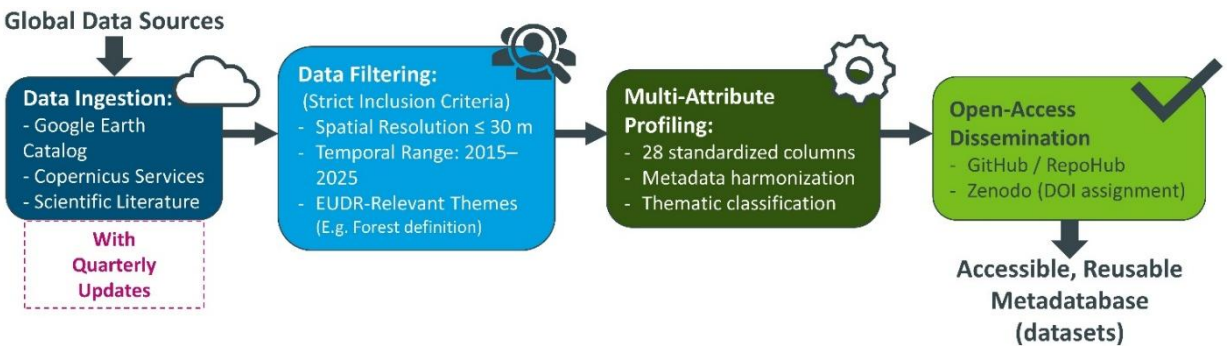


Figure 2. Schematic framework of the metadatabase pipeline.

Structural Insights

1. Multi-thematic coverage beyond simple forest mapping

Unlike single-purpose datasets, the metadatabase establishes a multi-source matrix. It catalogues EO-derived maps and geodata layers at various geographic extents and spatial scales, as well as across several key categories:

- Forest cover, degradation proxies, and tree plantations.
- Specific EUDR commodity production systems (e.g., cocoa, soy, palm oil, coffee, rubber).
- General crop extent and agricultural boundary matrices.

2. Exclusion of inappropriate data records

The metadatabase catalogue excludes lower-resolution datasets and records that fall outside the temporal scope relevant to the EUDR. By enforcing a threshold of 30 m spatial resolution and a temporal focus centred around the 2020 baseline, it ensures that listed data layers meet the minimum requirements for plot-level validation.

3. Granular profiling across 28 standardized criteria

The catalogue systematically maps metadata across a comprehensive 28-column reference guide purposely developed for this application (see for further details: Methodological Descriptions). This enables users to perform direct comparisons of:

- **Definitional Thresholds:** Explicit tracking of canopy cover, minimum area, and tree height parameters.
- **Methodological Lineage:** Documentation of EO sensors, spectral indices, and machine learning/deep learning algorithms used.
- **Data Availability:** Direct links to repositories and hosting data platforms.

4. Transparent data quality as a basis for due diligence and deforestation verification

The metadata database follows FAIR principles and reports available accuracy metrics and documented errors. Drawing on publications, technical reports, and other supporting information, it records overall accuracy (OA), producer's and user's accuracy for target classes, and validation sample sizes.

Recommendations for operators and competent authorities

1. Leverage the catalogue for cross-validation and multiple-data-sourcing

a) Operators should **not rely on a single global map layer** to verify whether a production area is deforestation-free. Instead, we recommend using the metadata database to identify overlapping, product-specific EO maps and geodata layers that cover the same production area.

b) **Using complementary datasets from different EO sensor types** (e.g., optical and radar) may improve outcomes by reducing the risk of false positives and compliance omissions. Applications such as the Forest Agreement Layer (FAL), developed in Google Earth Engine (GEE), can support such a task by generating downloadable map probability layers. If an operator or CA is not able to use applications such as GEE because of licensing or cybersecurity restrictions, the process pipeline of FAL can also be replicated in other environments such as the ESA Copernicus Data Space Ecosystem (CDSE).

2. Assess whether maps are "fit-for-purpose" under the EUDR using definitional thresholds

a) Before executing compliance checks, operators and CAs can **utilize the catalogue's specialized column fields to match a dataset's structural definitions** (canopy, height, area) **against regulatory thresholds** defined by the EUDR.

b) This **reduces the risk of misclassification**, particularly in highly dynamic land-use systems, complex agricultural-forest mosaics, and regions with sparse tree cover, where global definitions frequently conflict with local conditions or national forest definitions.

3. Prioritize "data-poor" areas using national and regional datasets

a) **Move away from purely global datasets when assessing high-risk supply chains**. Also consider regional or national maps produced by institutions with local expertise, for example. This also **requires reviewing** the available information on the **methodology**, **mapping accuracy, and reported limitations**. Ideally, this information should be documented and made available upon request to support a DDS.

b) **Particularly for smallholder landscapes** (e.g., complex coffee agroforestry systems) and agricultural-forest mosaics, **locally validated maps may offer greater spatial detail and higher accuracy** than global or regional map products. It is also worth noting that the **performance of maps may vary from region to region.**

Recommendations for policy and decision-makers

1. Fund and institutionalize open-access digital public infrastructure

a) **Support the continuous update, maintenance, and expansion of curated and standardized metadatabases** like the GEOS-EUDR Metadatabase Catalogue through public funding. Ensure that these frameworks remain open-access and integrated with version-controlled repositories such as GitHub.

b) **Standardized catalogues curated by independent institutions without any proprietary or commercial licensing interests** can lower entry barriers for operators, promote equity in global supply chains, and prevent duplication of mapping efforts across EU member states. Such catalogues could also facilitate exchanges with producer countries, recognize their geospatial efforts, and help producers and operators become EUDR-ready.

2. Enforce strict transparency and validation standards for geodata providers

a) **Independent third-party assessment and validation of EO data and maps are needed** for geodata products relevant to the EUDR. This could be undertaken as a concerted effort by independent institutions and research organizations, as well as designated government and/or EU agencies.

b) **Require commercial providers of geodata products used for EUDR purposes to disclose their validation methods, sample sizes, and accuracy metrics**. **Transparency ensures market integrity** and protect operators from unverified black-box algorithms.

3. Drive technical capacity building for national competent authorities

a) **Use the metadatabase as a foundational training directory for CAs** across EU member states. Build standardized API pipelines that connect national enforcement systems directly with the data repositories documented in the catalogue. If this is not possible because of licensing or cybersecurity restrictions (e.g., restrictions involving GEE), require independent research organizations and government and/or EU agencies to host such repositories on open-access platforms such as the ESA Copernicus Data Space Ecosystem (CDSE).

b) **Support coordinated efforts to harmonize risk assessment capabilities** across different ports of entry, ensuring that the EUDR is enforced uniformly in line with the best scientific practices.

Partner

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Contact

Dr. Melvin Lippe, **melvin.lippe@thuenen.de,**
Thünen Institute of Forestry | Hamburg | Germany
www.thuenen.de/en/geos-eudr

Repository: https://github.com/GEOS-EUDR-RepoHub/Metadatabase-Geodata-EUDR/tree/main

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THÜNEN

Federal Ministry
of Agriculture, Food
and Regional Identity

Johann Heinrich von Thünen-Institut
Bundesallee 50
38116 Braunschweig
Germany

www.thuenen.de

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