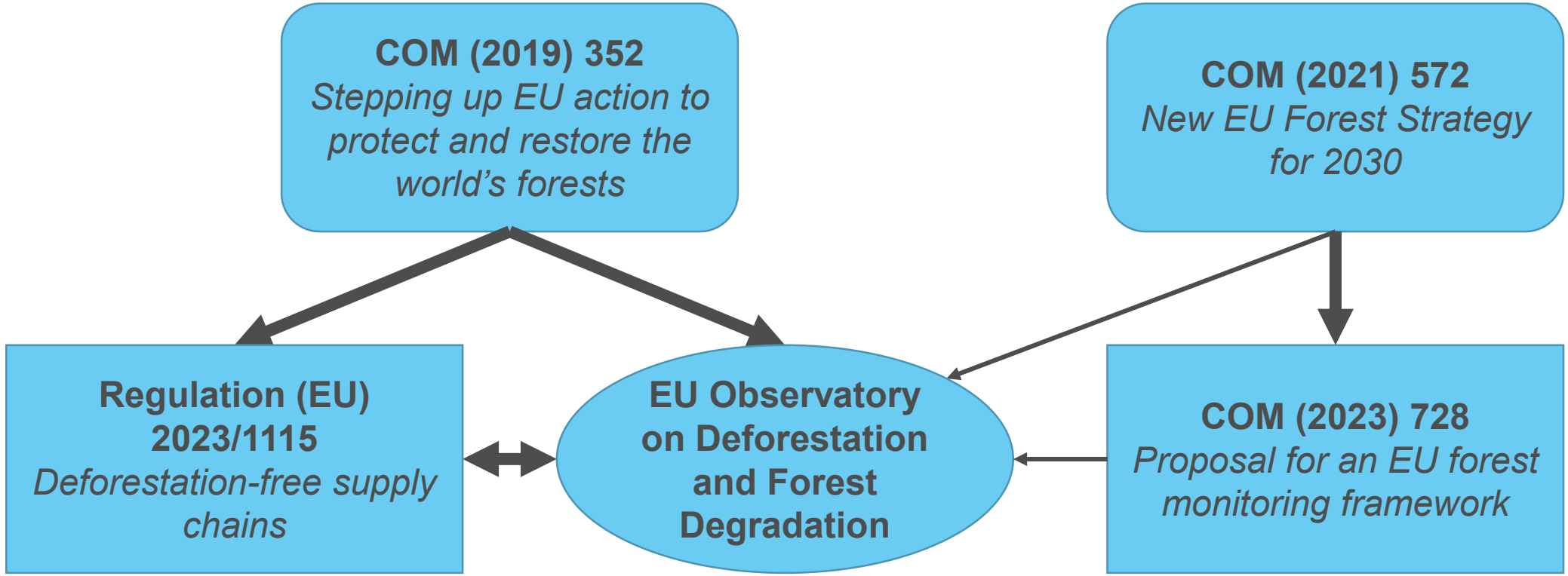
Introduction

Alessandra Zampieri, Director
Greet Janssens-Maenhout, Head of Unit

EU Observatory on Deforestation and Forest Degradation in the Policy context



European Commission

“EU Observatory on deforestation, forest degradation, changes in the world’s forest cover, and associated drivers”– Legal basis

Introduced in COM(2019) 352 final “Stepping up EU Action to Protect and Restore the World’s Forest” as action by the Commission

- *“The Commission will [...] establish an **EU Observatory on deforestation, forest degradation, changes in the world’s forest cover, and associated drivers**. The objective of this is to **facilitate access to information on supply chains** for public entities, consumers and businesses.”*

Noted in Regulation (EU) 2023/1115 on Deforestation-free supply chains:

- “The EU Observatory should **facilitate access to information on supply chains** for public entities, consumers and business, **providing easy-to-understand data and information** linking deforestation, forest degradation and changes in the world’s forest cover to Union demand for, and trade in, commodities and products. The EU Observatory should thus **support the implementation of this Regulation by providing scientific evidence** with regard to global deforestation and forest degradation and related trade.”
- The EU Observatory should:
  - Provide for land cover maps, including with time series since the cut-off date
  - Provide for a range of classes allowing landscape composition
  - Participate in the development of an early warning system combining research and monitoring capacity.
  - Cooperate with the competent authorities, relevant international organisations and bodies, research institutes, non-governmental organisations, operators, traders, third countries and other relevant stakeholders
  - Be operational as soon as possible.

“EU Observatory on deforestation, forest degradation, changes in the world’s forest cover, and associated drivers”– Legal basis

Noted in EUDR FAQ Question 61: “When will the EU Forest Observatory be operational? How is this going to help companies implement the Regulation?”

- Build on already existing monitoring tools to **support the implementation of this Regulation by providing scientific evidence, including land cover maps on the cut-off date.**
- A tool to help companies to ensure compliance the EUDR, for example to assess the deforestation risk.
- Will **cover all forests worldwide**, including European forests
- In coherence with e.g. the proposal for an EU forest monitoring framework and the Forest Information System for Europe (FISE).

Noted in COM (2021) 572 “New EU Forest Strategy for 2030”

- will **develop Earth-Observation-based monitoring tools for forests** that may be operationalized by Copernicus and taken up by FISE as part of the integrated forest monitoring system.

Noted in COM (2023) 728 “Proposal for a monitoring framework for resilient European forests”

- Link to the EU Observatory on Deforestation, Forest degradation and Associated Drivers

Implemented by the JRC

Co-legislators view on global forest monitoring

EU Council

(ST 15151 2019 INIT)

- Welcomes observatory announcement in COM(2019) 352
- Build on existing tools and mechanisms
- Consider feasibility of early alert mechanism for areas at risk of deforestation

European Parliament

(P9_TA(2020)0285)

- Welcomes observatory as announced in COM(2019) 352
- Monitoring of production and trading of commodities associated with deforestation
- Underlines role of research and monitoring programs such as Copernicus for early warning systems

Presentation of the main components of the EU Observatory on Deforestation and Forest Degradation

Frédéric Achard

Components of the EU Observatory on Deforestation and Forest Degradation

Global forest monitoring

- Global forest cover 2020
- Forest attributes
- Forest cover changes and drivers
- Tropical moist forest

Production and Trade of Commodities

- Production from FAO
- Trade flows
- 'Biotrade' tool

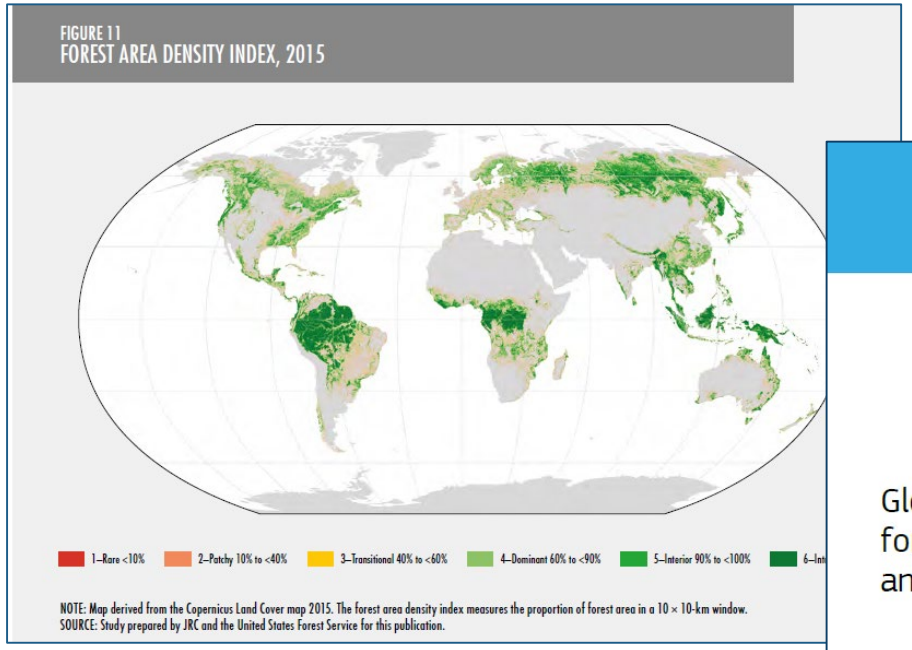
Tools for Forest Monitoring

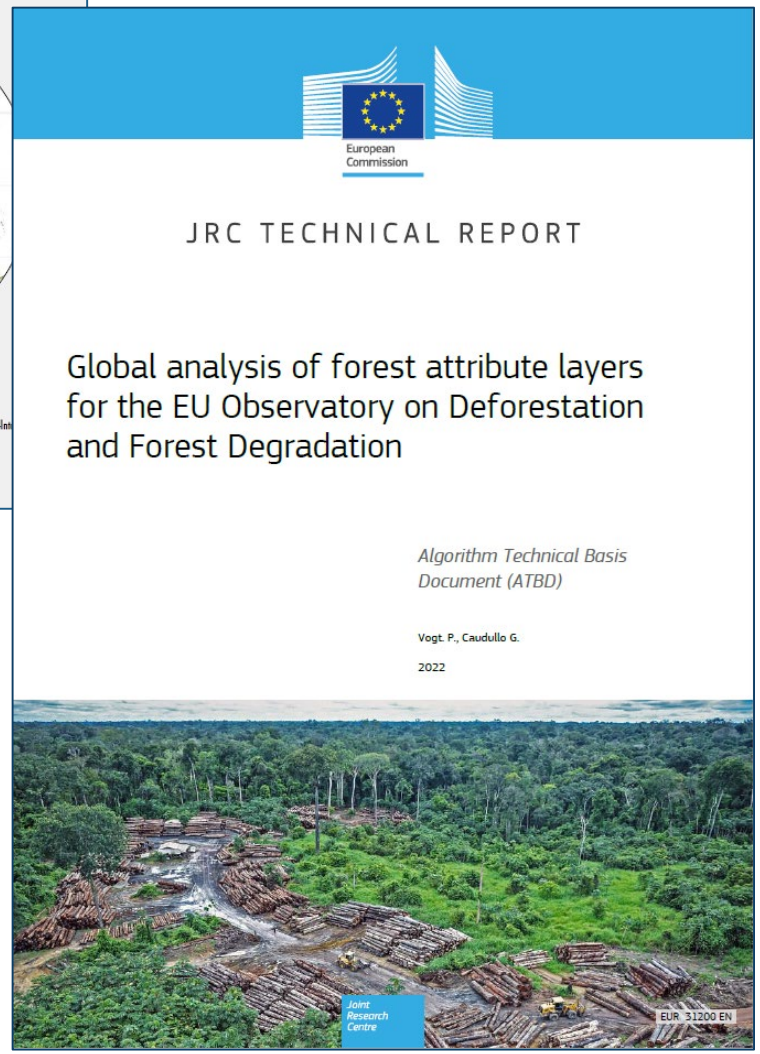
- Near real time disturbance analysis
- Landscape patterns analysis
- EU forest tree species distribution
- Spatial reference data for forest disturbances in EU
- 'IMPACT' Image processing toolbox

JRC has c. 30 years of experience in Global Land Cover mapping

European Commission

Global analysis of forest attribute layers





JRC scientific experience in global monitoring of forest cover

- Annual maps of evergreen forests over tropical biome at 30m resolution
- Identification of changes: deforestation, forest degradation and regrowth
- Characterisation of forest disturbances over time (1990-2022)
- Scientific outcome co-authored by scientists from INPE (Brazil) and CIFOR (Indonesia)

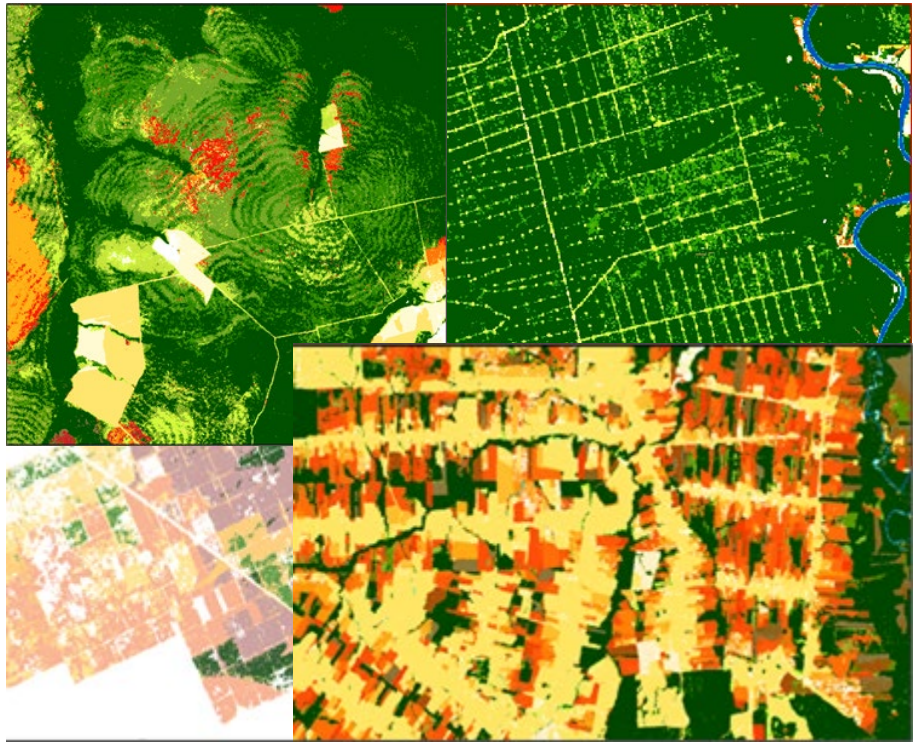
SCIENCE ADVANCES | RESEARCH ARTICLE

ENVIRONMENTAL STUDIES

Long-term (1990–2019) monitoring of forest cover changes in the humid tropics

C. Vancutsem[1]*, F. Achard[1], J.-F. Pekel[1], G. Vieilledent[1,2,3,4], S. Carboni[5], D. Simonetti[1], J. Gallego[1], L. E. O. C. Aragão[6], R. Nasi[7]

Accurate characterization of tropical moist forest changes is needed to support conservation policies and to quantify their contribution to global carbon fluxes more effectively. We document, at pantropical scale, the extent and changes (degradation, deforestation, and recovery) of these forests over the past three decades. We estimate that 17% of tropical moist forests have disappeared since 1990 with a remaining area of 1071 million hectares in 2019, from which 10% are degraded. Our study underlines the importance of the degradation process in these ecosystems, in particular, as a precursor of deforestation, and in the recent increase in tropical moist forest disturbances (natural and anthropogenic degradation or deforestation). Without a reduction of the present disturbance rates, undisturbed forests will disappear entirely in large tropical humid regions by 2050. Our study suggests that reinforcing actions are needed to prevent the initial degradation that leads to forest clearance in 45% of the cases.



Use of JRC scientific outcomes to improve the understanding of impacts of tropical forest changes on the Climate

nature geoscience

Article

https://doi.org/10.1038/s41561-023-01137-y

Comparable biophysical and biogeochemical feedbacks on warming from tropical moist forest degradation

Received: 28 April 2022

Accepted: 27 January 2023

Published online: 02 March 2023

Check for updates

Lei Zhu[1], Wei Li[1,2] ✉, Philippe Ciais[3], Jiaying He[1], Alessandro Cescatti[4], Maurizio Santoro[5], Katsumasa Tanaka[3,6], Oliver Cartus[5], Zhe Zhao[1], Yidi Xu[3], Minxuan Sun[1] & Jingmeng Wang[1]

Tropical forests have undergone extensive deforestation and degradation during the past few decades, but the area and the carbon loss due to degradation could be larger than the losses from deforestation. Degraded forests also induce biophysical feedback on climate, as they sustain less cooling from evapotranspiration. Here we estimate the biophysical and biogeochemical temperature changes caused by tropical moist forest degradation using high-resolution remote sensing data from 2010. Degraded forests, including burned, isolated, edge and other degraded forests, account for 24.1% of the total tropical moist forest area. The land surface temperature of degraded tropical moist forests is higher than that of nearby intact forests, leading to a warming effect of 0.022 ± 0.014 °C over the tropics. The cumulative carbon deficit of degraded forests reaches 6.1 ± 2.0 PgC, equivalent to a biogeochemical warming effect of 0.026 ± 0.013 °C. Forest degradation caused by anthropogenic disturbances from 1990 to 2010 induces a daytime warming effect of 0.018 ± 0.008 °C and a carbon deficit of 2.3 ± 0.8 PgC. These values are of the same order of magnitude as those due to deforestation. Our results emphasize the importance of accounting for the combined biophysical and biogeochemical effects in mitigation pledges related to reducing forest degradation and the restoration of tropical forest.

Article

The carbon sink of secondary and degraded humid tropical forests

https://doi.org/10.1038/s41586-022-05679-w

Received: 25 April 2022

Accepted: 16 December 2022

Check for u

Viola H. A. Heinrich[1,2] ✉, Christelle Vancutsem[3,4], Ricardo Dalagnol[5,6,7], Thais M. Rosan[2], Dominic Fawcett[2], Celso H. L. Silva-Junior[6,7,8], Henrique L. G. Cassol[5,9], Frédéric Achard[10], Tommaso Jucker[11], Carlos A. Silva[12], Jo House[1], Stephen Sitch[2], Tristram C. Hales[13] & Luiz E. O. C. Aragão[2,5]

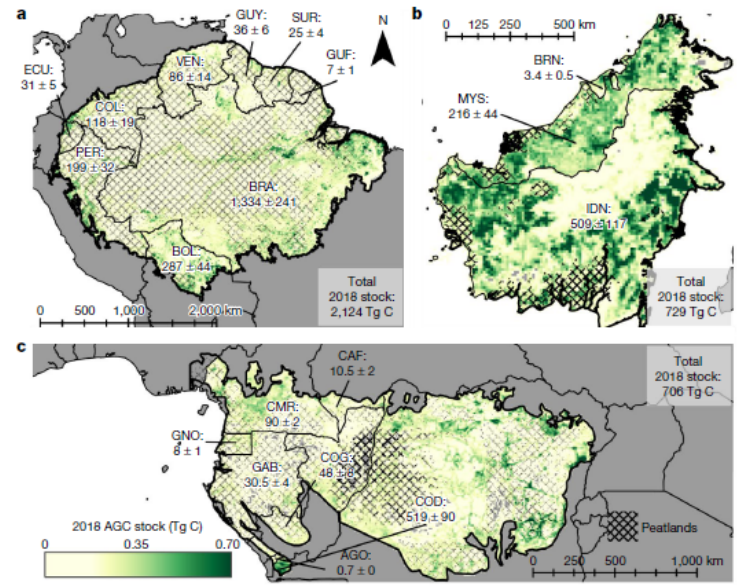
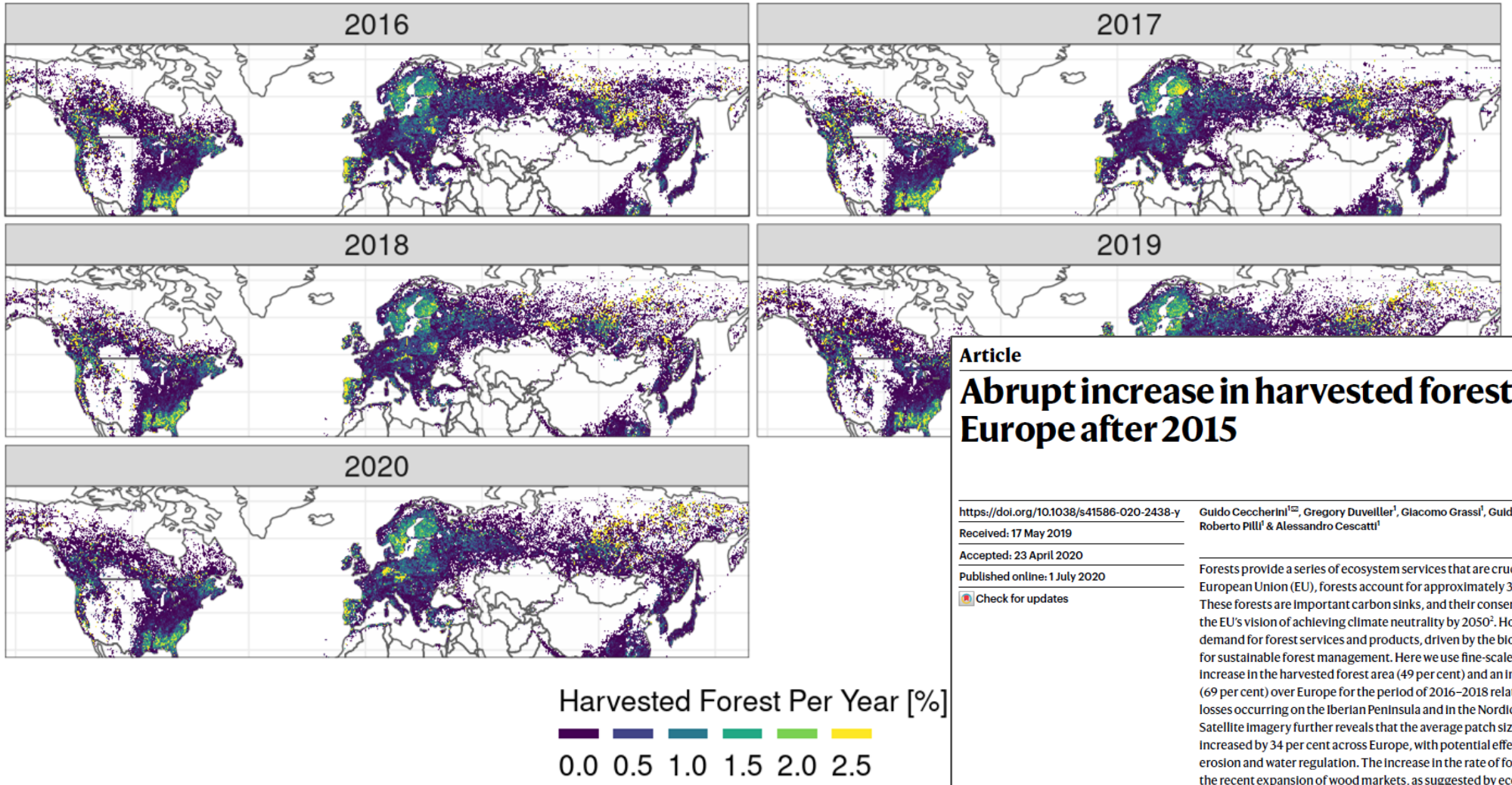


Fig. 3 | The modelled 2018 carbon stock in recovering forests (degraded and secondary forests) in the three main tropical forest regions. The carbon stock shows the total carbon that has accumulated since the last disturbance event using the region-wide regrowth models developed in this study for the Amazon (**a**), Borneo (**b**) and Central Africa (**c**). Values of the carbon stock (in Tg C) are aggregated to 0.1° grid squares and show the sum of degraded forests (Extended Data Fig. 6) and secondary forests (Extended Data Fig. 7), together representing recovering forest. Regions of peatland have been highlighted (see Methods) and are denoted by the hatching. Annotated values denote the AGC stock and associated 95% confidence interval as estimated in this study using the Monte Carlo simulations per country, expressed using the ISO3 code for each country. Map created using ESRI's ArcGIS Pro (2.6.0). AGO, Angola; BOL, Bolivia; BRA, Brazil; BRN, Brunei; CAF, Central African Republic; CMR, Cameroon; COD, Democratic Republic of the Congo; COG, Republic of the Congo; COL, Colombia; ECU, Ecuador; GAB, Gabon; GNQ, Equatorial Guinea; GUF, French Guiana; GUY, Guyana; IDN, Indonesia; MYS, Malaysia; PER, Peru; SUR, Suriname; VEN, Venezuela.

Global monitoring of harvest rate in clear-cut felling



Article

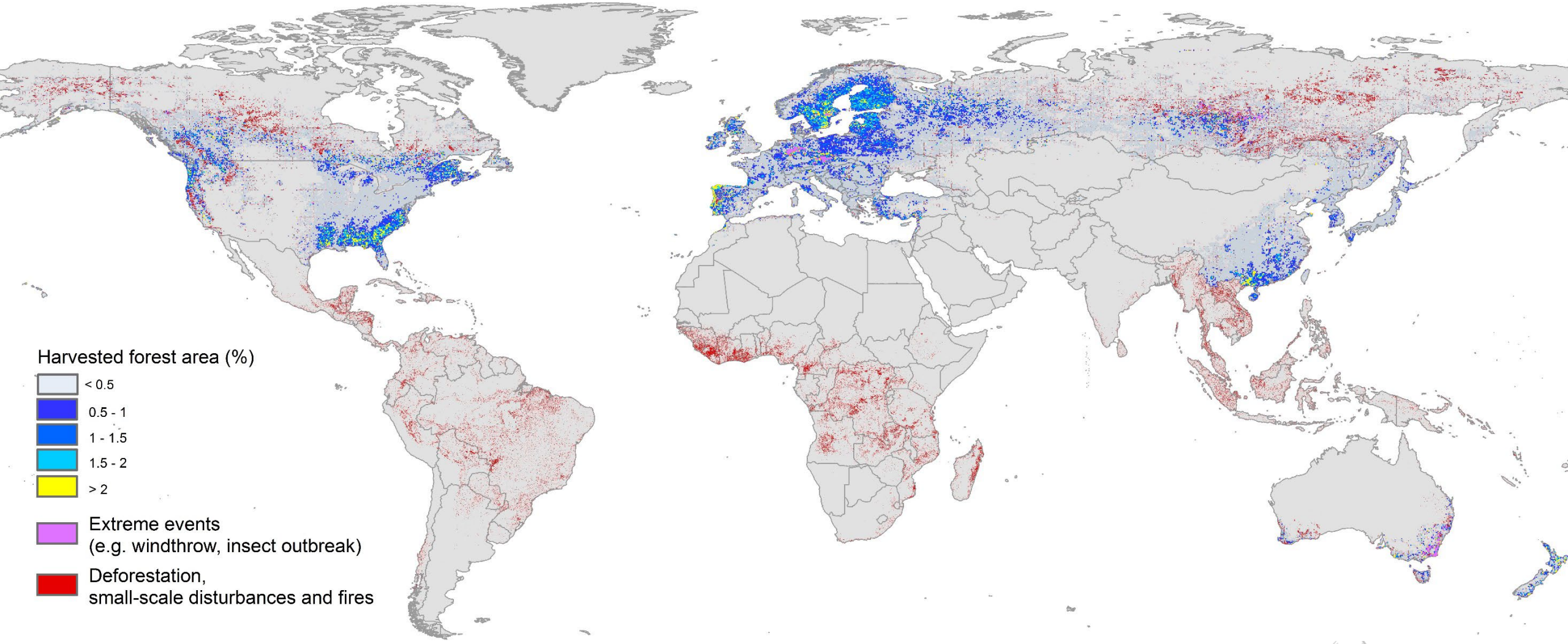
Abrupt increase in harvested forest area over Europe after 2015

https://doi.org/10.1038/s41586-020-2438-y
Received: 17 May 2019
Accepted: 23 April 2020
Published online: 1 July 2020
Check for updates

Guido Ceccherini[1✉], Gregory Duveiller[1], Giacomo Grassi[1], Guido Lemoine[2], Valerio Avitabile[1], Roberto Pilli[1] & Alessandro Cescatti[1]

Forests provide a series of ecosystem services that are crucial to our society. In the European Union (EU), forests account for approximately 38% of the total land surface[1]. These forests are important carbon sinks, and their conservation efforts are vital for the EU's vision of achieving climate neutrality by 2050[2]. However, the increasing demand for forest services and products, driven by the bioeconomy, poses challenges for sustainable forest management. Here we use fine-scale satellite data to observe an increase in the harvested forest area (49 per cent) and an increase in biomass loss (69 per cent) over Europe for the period of 2016–2018 relative to 2011–2015, with large losses occurring on the Iberian Peninsula and in the Nordic and Baltic countries. Satellite imagery further reveals that the average patch size of harvested area increased by 34 per cent across Europe, with potential effects on biodiversity, soil erosion and water regulation. The increase in the rate of forest harvest is the result of the recent expansion of wood markets, as suggested by econometric indicators on forestry, wood-based bioenergy and international trade. If such a high rate of forest harvest continues, the post-2020 EU vision of forest-based climate mitigation may be hampered, and the additional carbon losses from forests would require extra emission reductions in other sectors in order to reach climate neutrality by 2050[3].

Global map of forest harvest rates and deforestation for year 2020

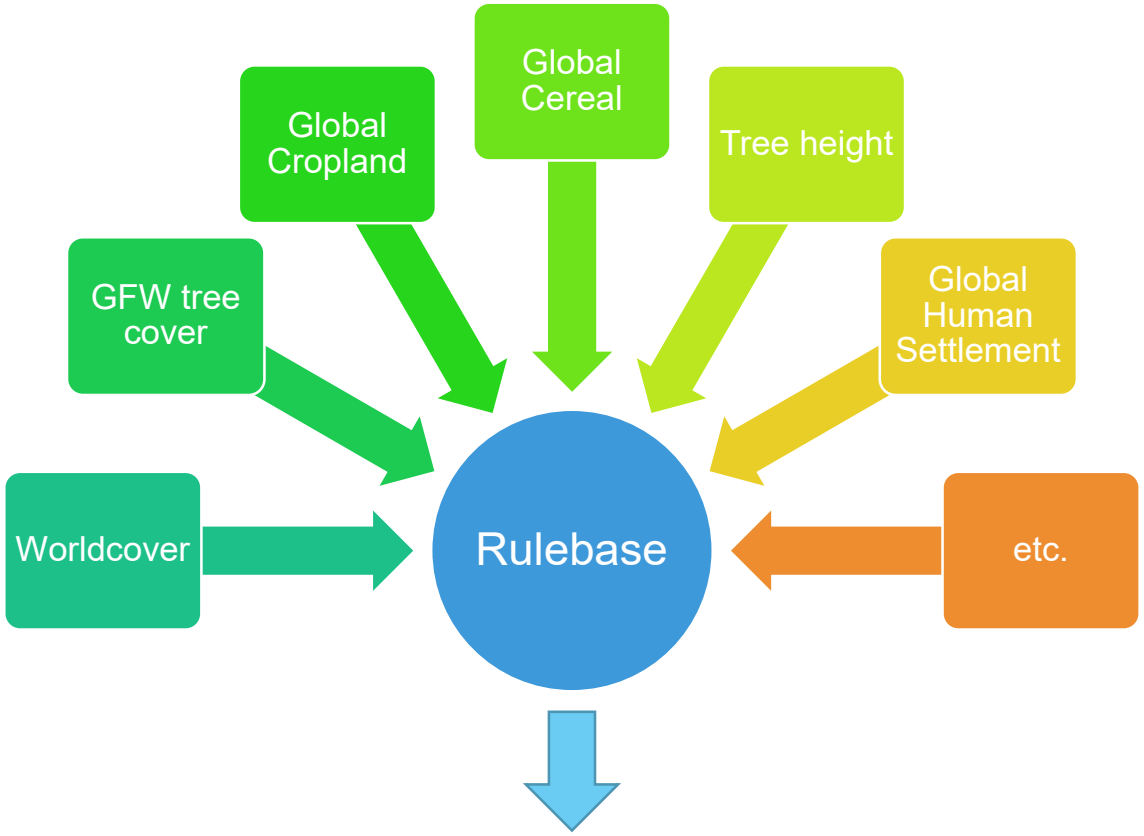


European Commission

Presentation of Global forest map 2020

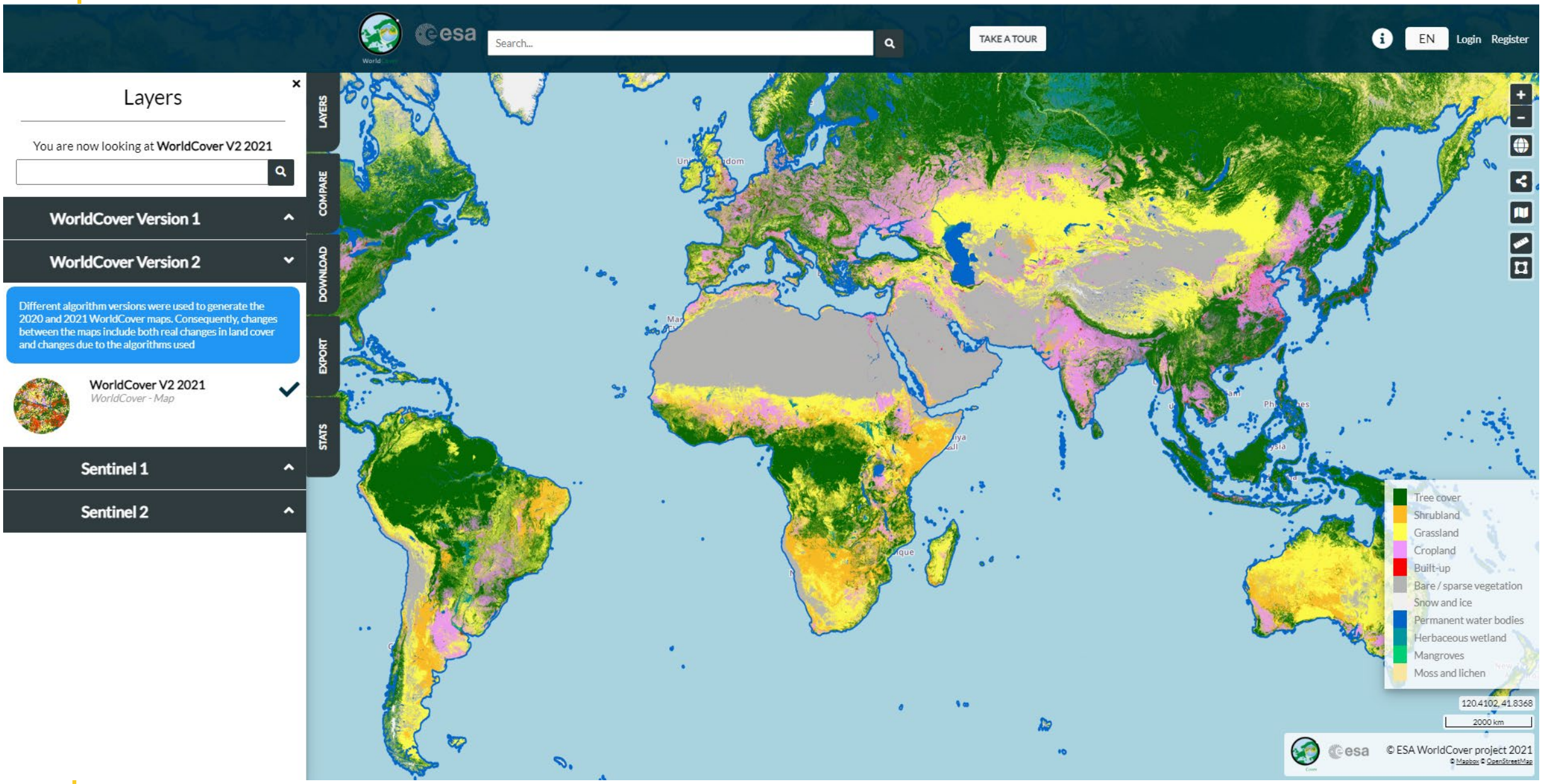
René R. Colditz

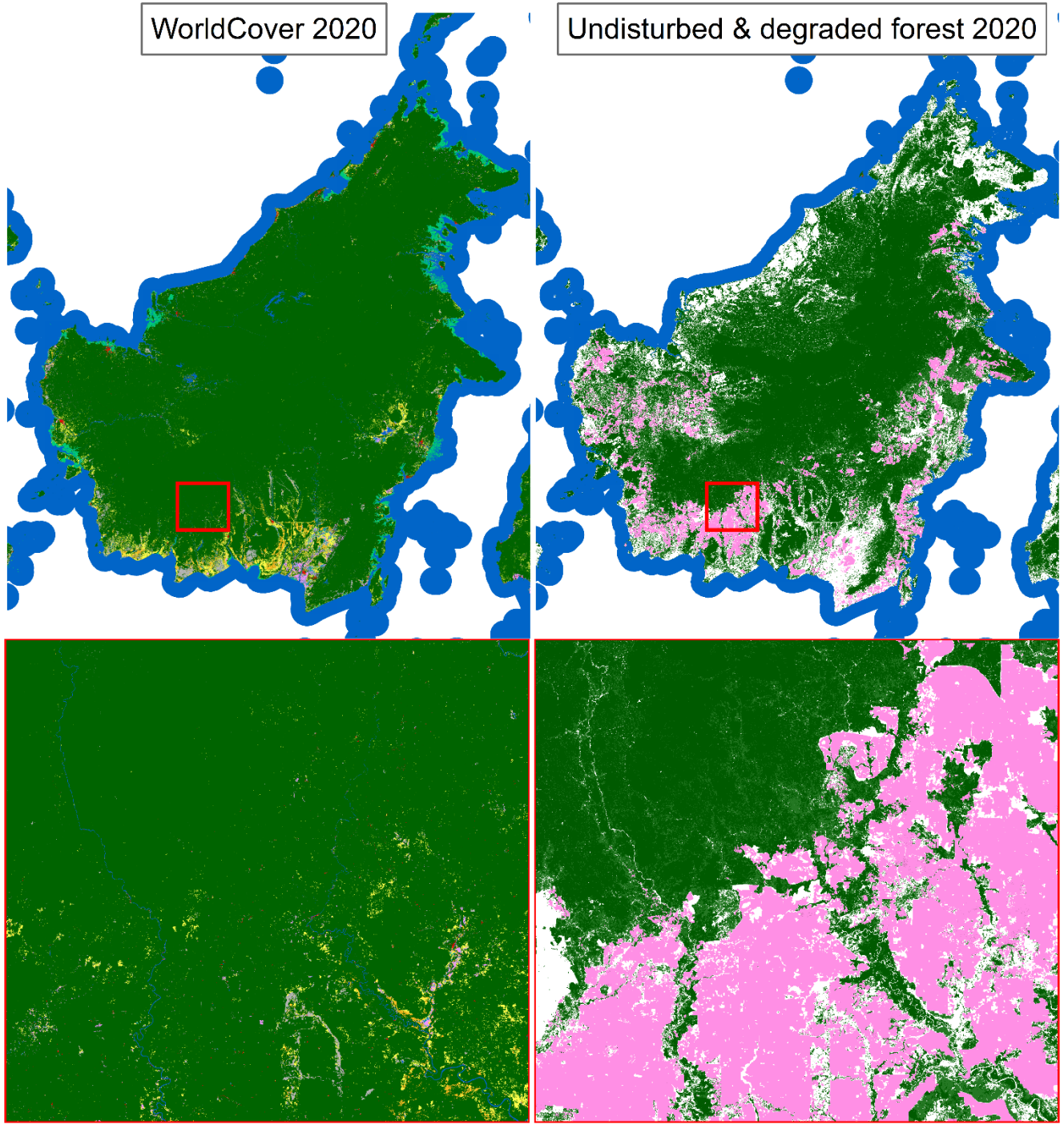
New Global forest cover map for year 2020 (version 1)



Global forest cover map of standing trees at 10m resolution for year 2020

First input layer: ESA Worldcover map for year 2020

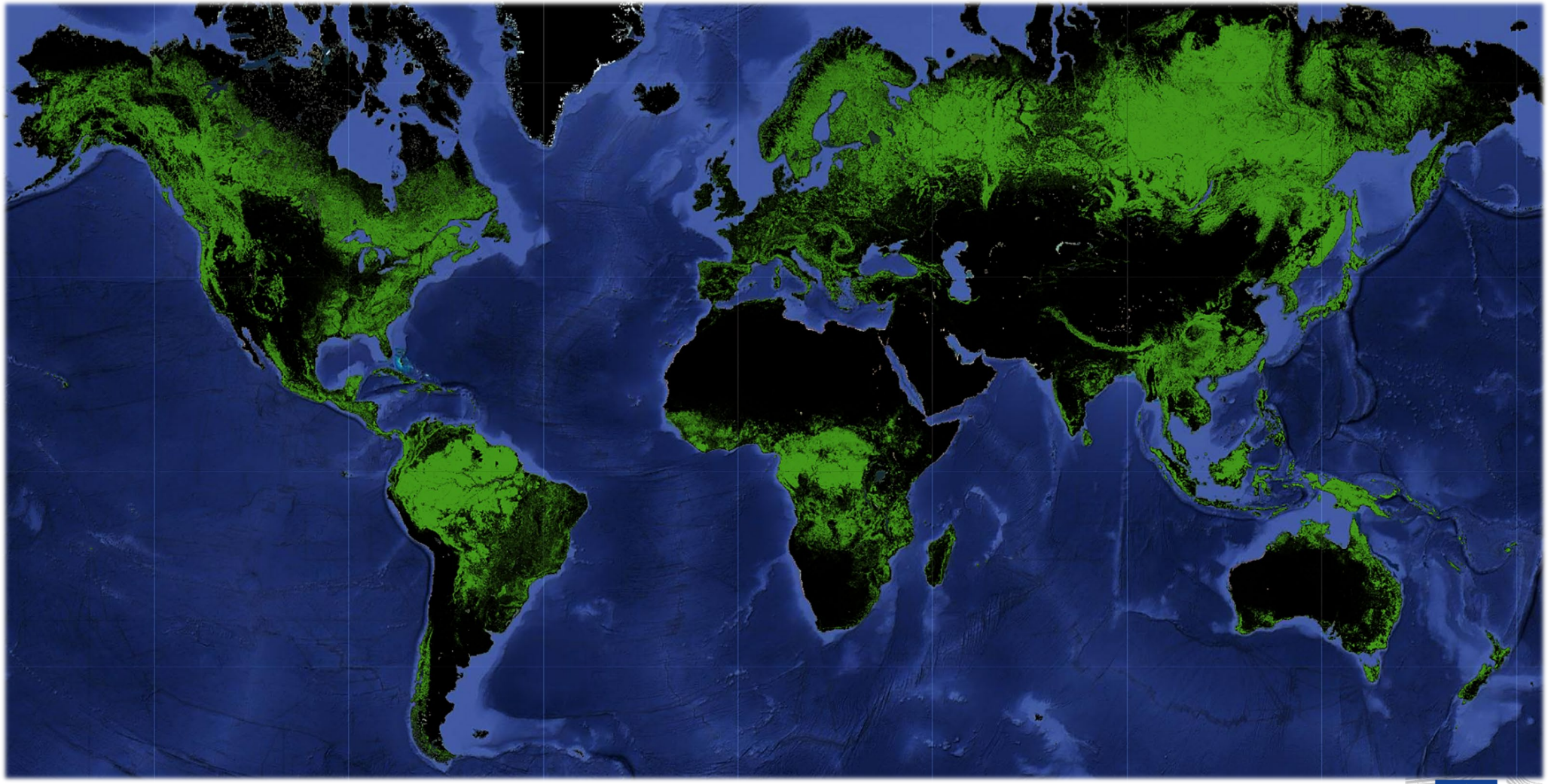




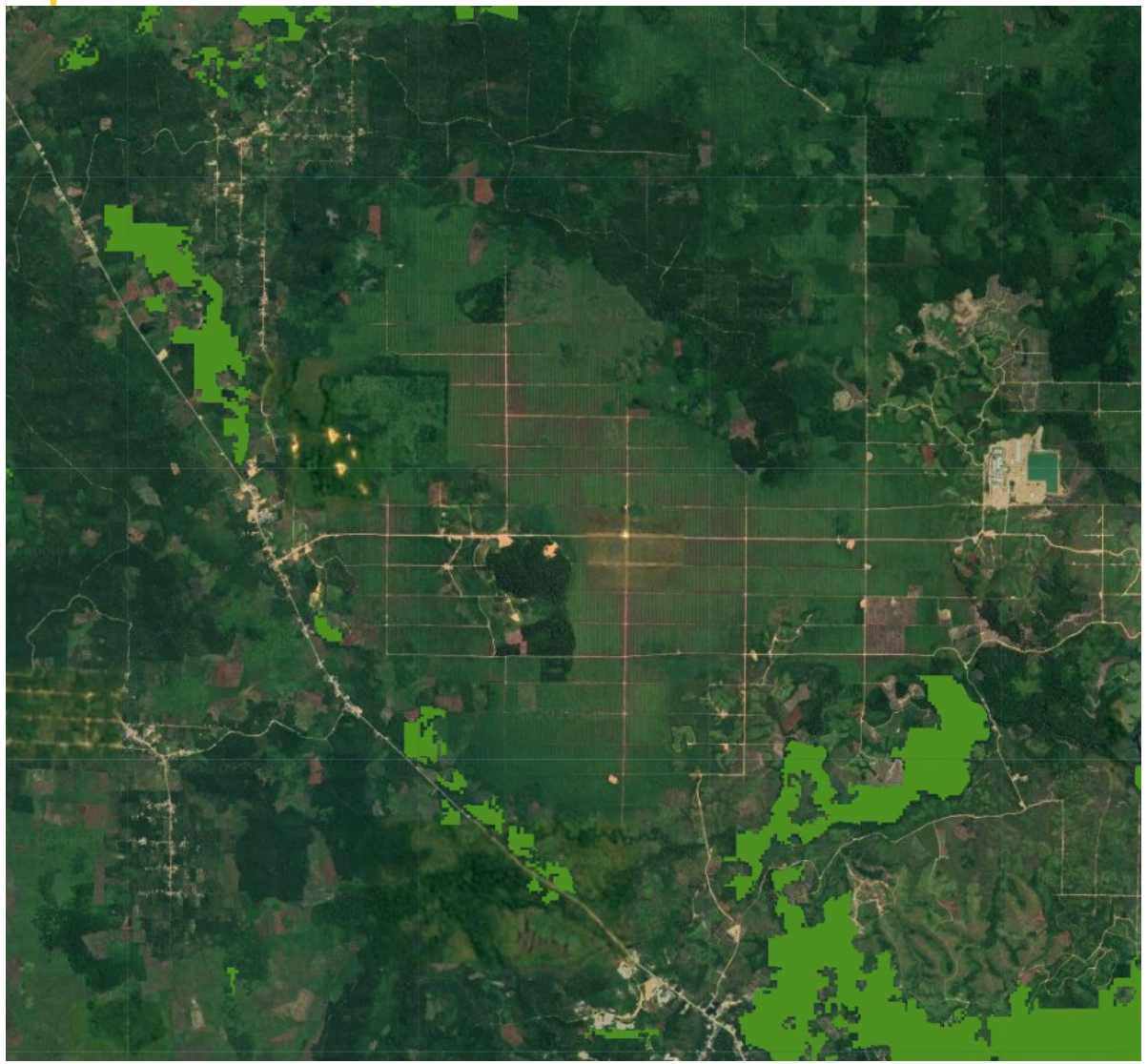
Tree Cover # Forest Cover

(4) 'forest' means land spanning more than 0,5 hectares with trees higher than 5 metres and a canopy cover of more than 10 %, or trees able to reach those thresholds in situ, excluding land that is predominantly under agricultural or urban land use;
(5) 'agricultural use' means the use of land for the purpose of agriculture, including for agricultural plantations and set- aside agricultural areas, and for rearing livestock;
(6) 'agricultural plantation' means land with tree stands in agricultural production systems, such as fruit tree plantations, oil palm plantations, olive orchards and agroforestry systems where crops are grown under tree cover; it includes all plantations of relevant commodities other than wood; agricultural plantations are excluded from the definition of 'forest';

New Global forest cover map for year 2020



Industrial oil palm plantations are excluded



Geographic coordinates: 111.593040 East; 0.242370 South

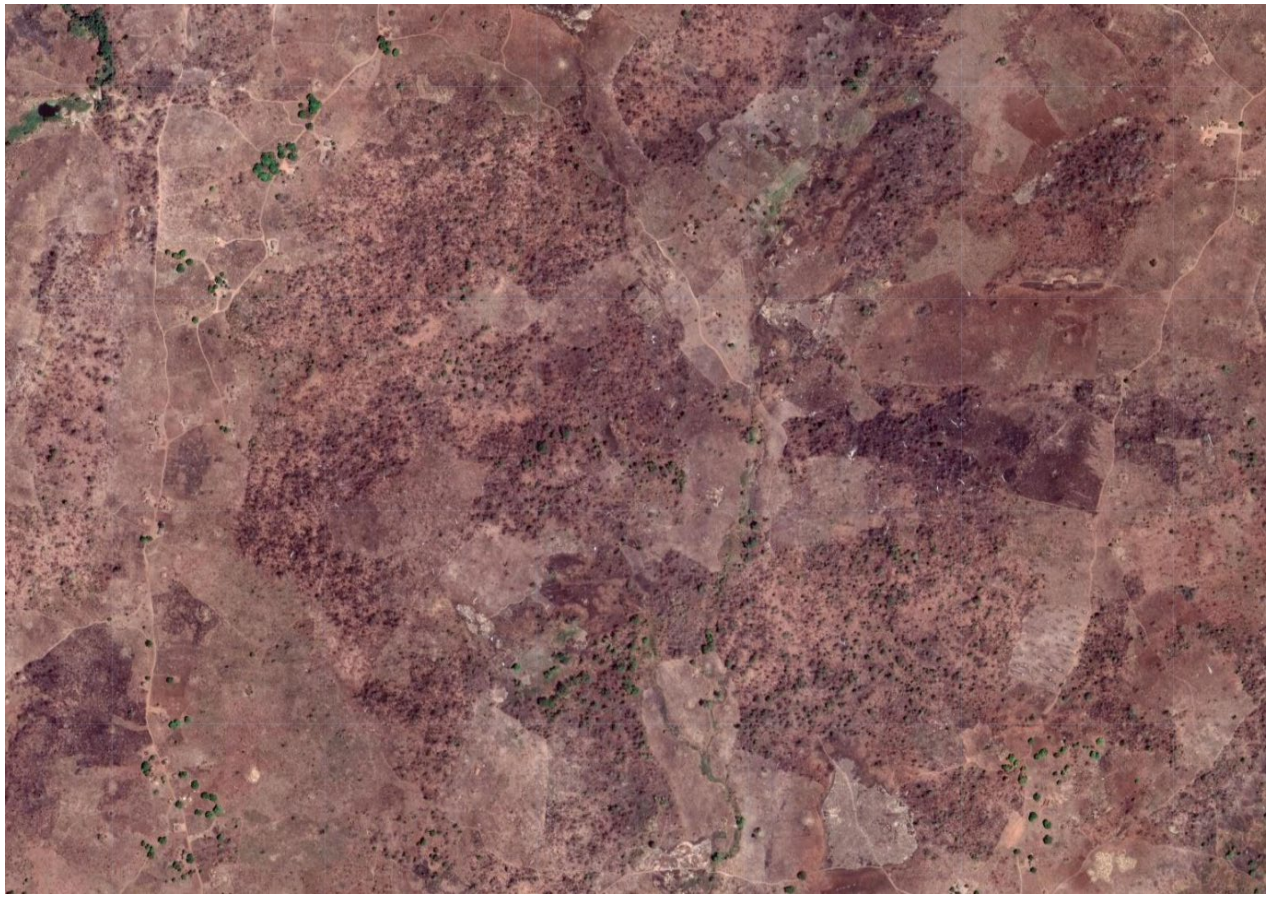
Pastures and soybean fields are excluded

Coordinates: 47.273440 West; 3.026360 South

Good accuracy for forest mapping in structured landscapes

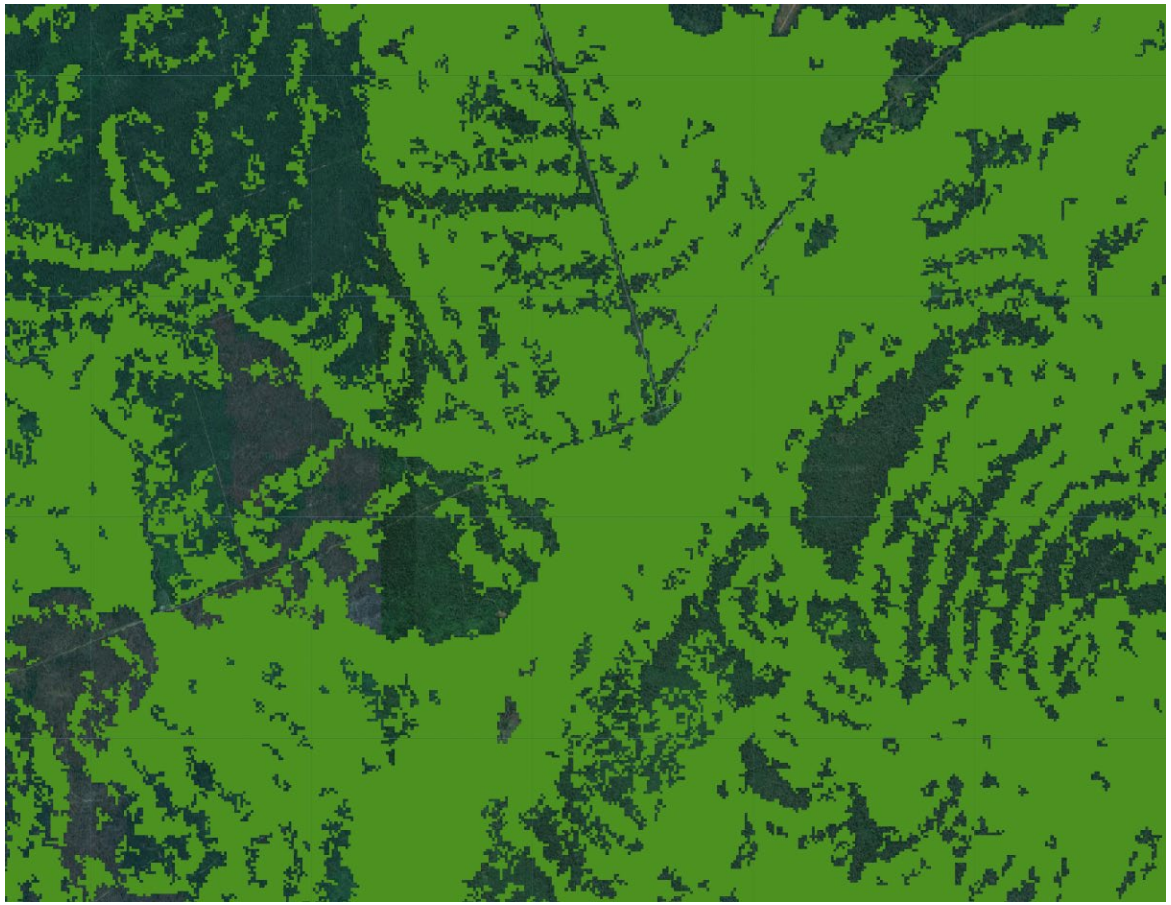
Geographic coordinates: 3.405465 West; 48.166844 North

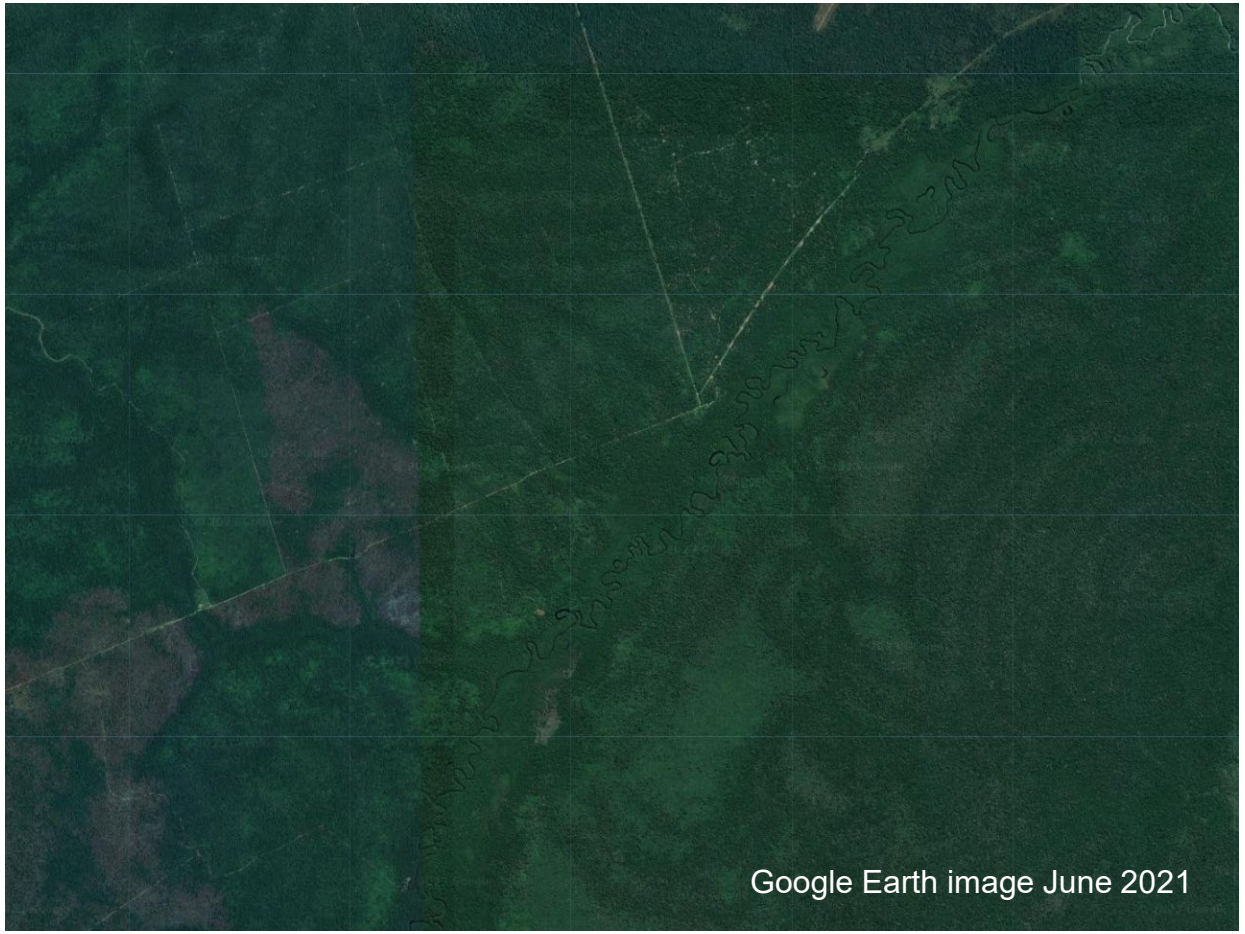
Mapping of open and dry forest areas



Geographic coordinates: 35.854637 East; 16.414390 South

Recently burned forests do not appear as forests due to absence of standing trees





Coordinates: 56.822290 West; 13.025240 South

Challenges in excluding agricultural tree plantations such as Cocoa plantations

Geographic coordinates: 5.814416 West; 5.539970 North

European Commission

Role of global forest map in context of EUDR

Non mandatory

- Legal text does not prescribe the use of this or any other map by operators/traders (or Competent Authorities) to inform their risk assessment

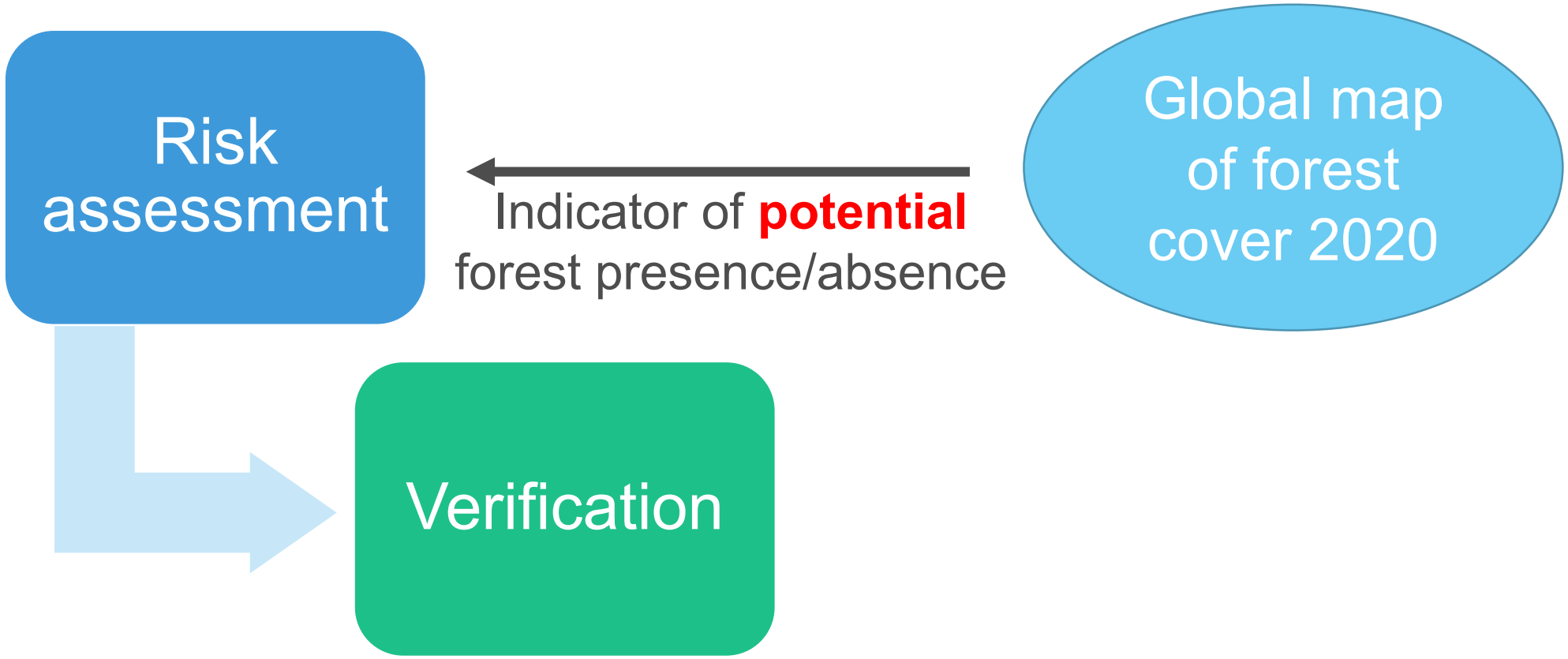
Non-exclusive

- The Observatory – provided by the Commission free-of-charge – is one of many tools
- Other maps may have advantages compared to the information on the Observatory
- The regulation dos not prescribe the modalities of and for map use

Legally non-binding

- The map is one of many tools that may be used to inform the risk assessment
- The use of map does not guarantee compliance

How can the global forest map 2020 be used in EUDR?



Presentation of the component on production and trade of commodities

Mirco Migliavacca

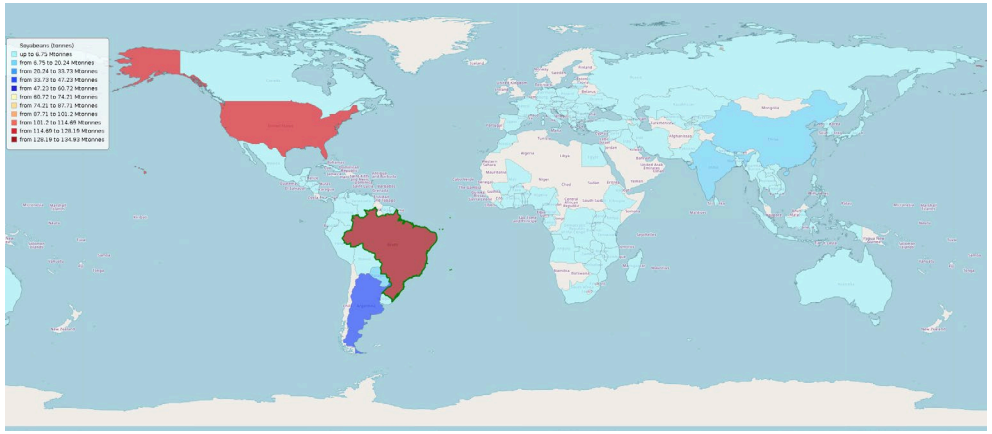
Monitoring production and trade flows

Wall to wall statistics/indicators:

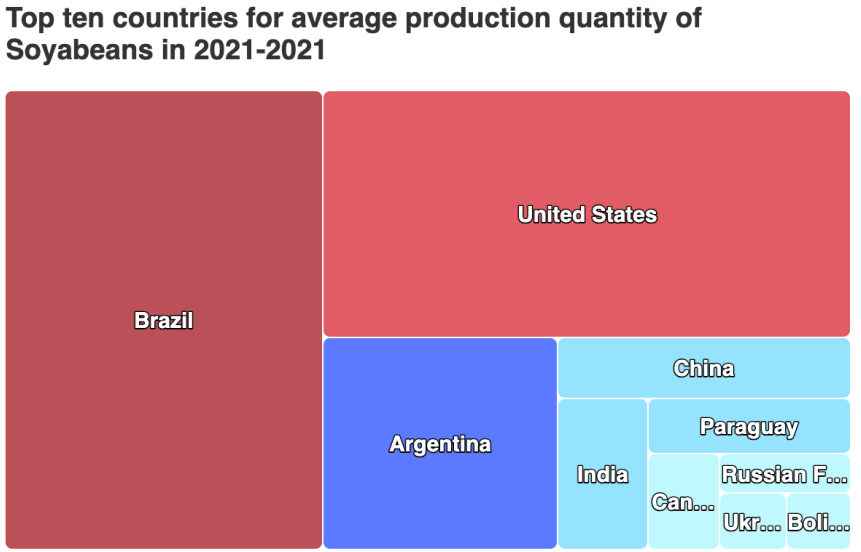
- Production quantity and area harvested for each commodity (FAOSTAT)
- Trade flows from producing country and EU-27 and countries bilateral trades (FAOSTAT and UN COMTRADE)

Provide timely information to Observatory about **production** and **area harvested** for the EUDR commodities (including maize)

Example of production quantity of one commodity (soybeans) in the year 2021 (data source: FAOSTAT)



Example of tree map showing the top 10 producing countries for one commodity (soyabeans) in 2021 (data source: FAOSTAT)



JOSS The Journal of Open Source Software

Biotrade: A Python package to access and analyse the international trade of bio-based products

Paul Rougieux [1¶], Selene Patani [2], and Mirco Migliavacca [1]

1 European Commission, Joint Research Centre, Ispra, Italy 2 JRC Consultant, ARCADIA SIT s.r.l., Vigevano (PV), Italy ¶ Corresponding author

DOI: 10.21105/joss.05550

Monitoring production and trade flows

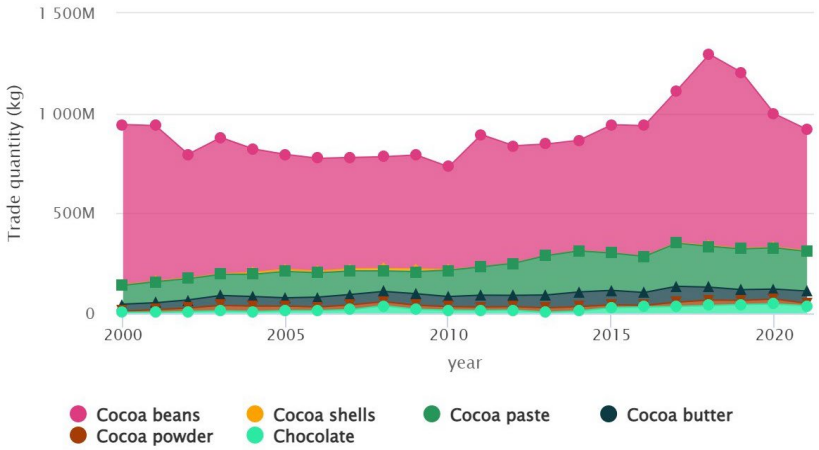
Wall to wall statistics/indicators:

- Production quantity and area harvested for each commodity (FAOSTAT)
- Trade flows from producing country and EU-27 and countries bilateral trades (FAOSTAT and UN COMTRADE)

Provide timely information to Observatory about **trade flows** of products in the **Annex I** of EUDR

Example of trade flow of one commodity (cocoa beans) imported by EU-27 between 2017-2021 (data source: UN Comtrade). Only flows summing up to 95% are reported

Example of time series of annual quantity of cocoa products imported by EU-27 from a third country (Cote d'Ivoire) from 2000 to 2021



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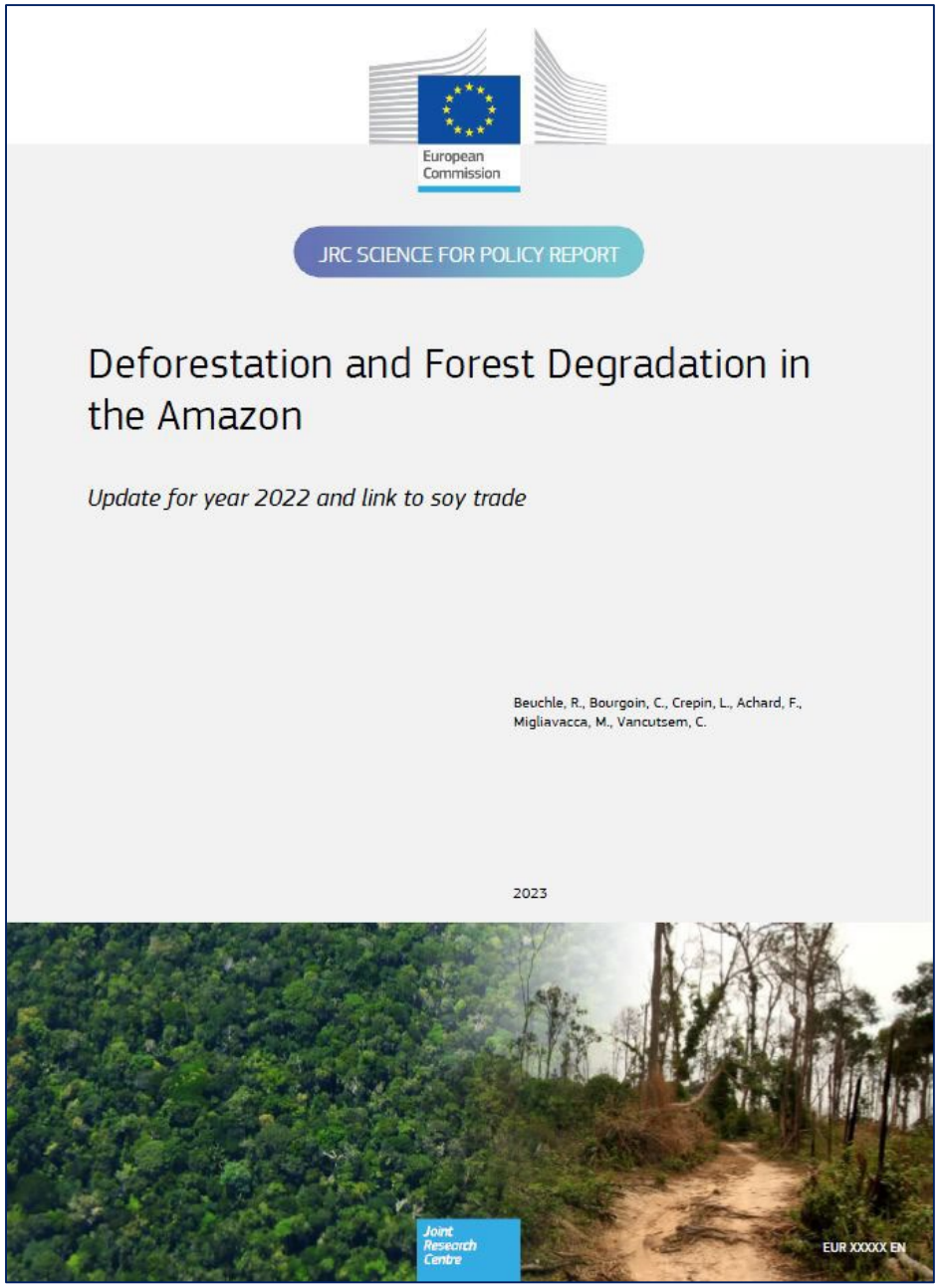
European Commission



New science for policy report on deforestation and forest degradation the Amazon

- Updated forest cover change estimates for all Amazon countries
- Updated statistics related to the Brazilian INPE-PRODES and INPE-DETER forest cover change programs
- Comparison of statistics from JRC and INPE with other data sources
- **Case Study on the link between Brazilian soy trade and deforestation in the Amazon**
- Overview on new relevant scientific publications related to the Amazon forests

https://publications.jrc.ec.europa.eu/repository/handle/JRC134995

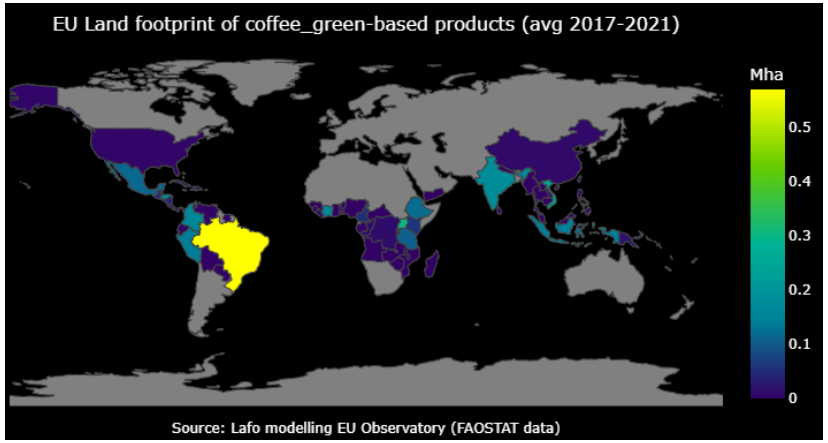
Next steps for component on production and trade of commodities

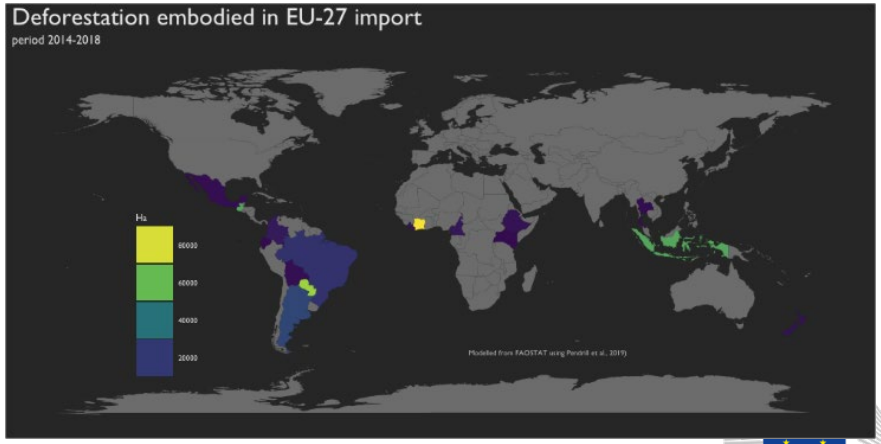
Land footprint

- How much pressure does the EU put on other countries by consuming products and commodities listed in the EUDR?
- Land footprint is the area of land required to meet the EU imports and consumption of bio-based products
- Physical model based on trade flows and FAO coefficient (De Laurentiis et al., 2022; Bausano et al., 2023)
- To be extended to maize and rubber

Deforestation embodied in EU consumption

- How much deforestation is embodied in the trade and consumption of the Annex I products?
- Global land use balance model (Pendrill et al., 2019; Migliavacca et al., 2023)
- Earth observation data and FAO statistics



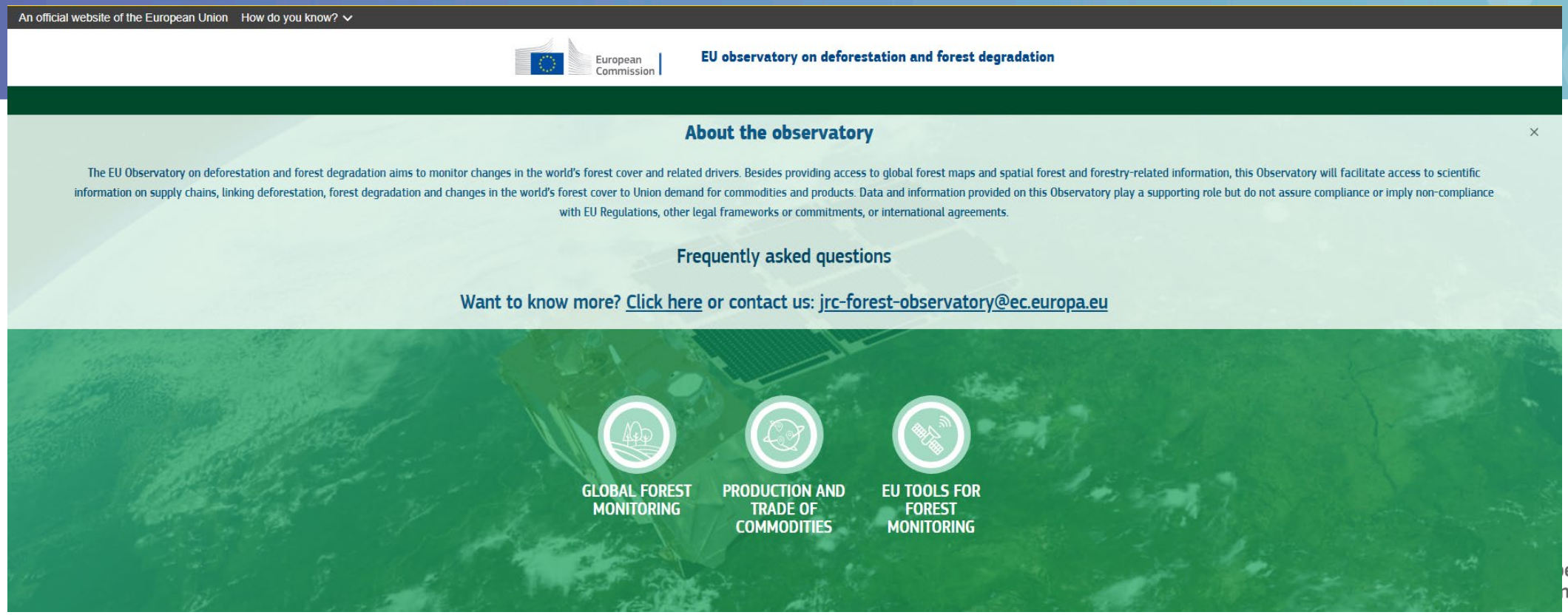


Modified from Migliavacca et al., Science for Policy Report 2023 doi:10.2760/811744

European Commission

Online demonstration of the Web portal

https://forest-observatory.ec.europa.eu



Next steps for the EU Observatory on Deforestation and Forest Degradation

Global forest mapping 2020

- Technical report on global forest map version 1 by March 2024
- Version 2 of the global forest map to be released by end of year 2024
- Integration of forest types relevant for forest degradation of EUDR (e.g. naturally regenerating forests) by end 2024

Production and trade of commodities

- Land footprint of EUDR bio-based products by end 2024
- Deforestation embodied in trade and consumption by end 2024

Global early warning system to be developed from 2025

Web Platform of the EU Observatory on Deforestation and Forest Degradation

Technical references to sources of maps

Frequently asked questions document

Web links for the access / download of datasets

Any question or comments to be addressed at :

jrc-forest-observatory@ec.europa.eu

Thank you

https://forest-observatory.ec.europa.eu

European Commission