Evaluating Forest Cover Mapping Accuracy for EUDR

Space Intelligence, JRC GFC, MapBiomas

One of the most important EUDR checks relies on forest cover data. Space Intelligence's forest cover maps, produced specifically for EUDR, have consistently been testing as over **twice** as accurate as the best freely available map for coffee and cocoa, meaning fewer false rejections, while retaining high confidence that farms that do not comply with EUDR will be detected. This enables ICE Commodity Traceability service (ICE CoT), powered by this data, to give confidence about the EUDR status of farms and pass this on through the whole supply chain.

Land cover map for Brazil, 2024

While we already knew our maps perform exceptionally well in these tropical forest countries, we wanted to confirm that this improved level of accuracy holds even in Brazil, a country where open maps perform best. To do that, we expanded our testing across the entire country, comparing Space Intelligence's results against two widely used open datasets: JRC GFC v2 and MapBiomas.

About the datasets

- **JRC GFC v2** is a dataset collated and funded by the European Union to 'support' EUDR compliance. It attempts to follow the EUDR forest definition, and to match the EUDR cutoff date of end 2020, at 10m x 10m pixel resolution, though with many constituent datasets at 30m x 30m resolution or coarser.

- **MapBiomas** is a high quality 30m x 30m pixel resolution annual landcover dataset produced by Brazilian scientists at INPE and other government bodies and research institutes. It is well known to be one of the best national landcover maps produced by a country, and is the basis of thousands of peer reviewed scientific papers. However, it was not designed to specifically meet EUDR definitions.

- **Space Intelligence's landcover dataset** is built from raw optical and radar satellite data specifically for EUDR testing purposes, following EUDR's definition of forest at 10m x 10m pixel resolution.

Why build new maps when open data exists?

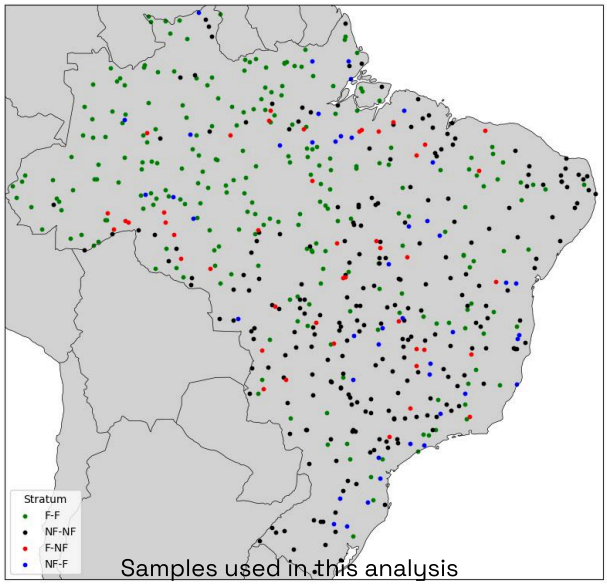
In a word: accuracy.

When a farm polygon fails a forest-cover test, users need to be confident that the failure reflects true deforestation – not a mapping error or a badly drawn farm boundary. But in many regions, particularly cloudy areas like West and Central Africa, western South America, and island nations of Southeast Asia, open maps simply aren't reliable enough for EUDR. Without reliable maps behind a solution, it is impossible to work out if a reported 'fail' is due to a genuine likely EUDR infraction, a poor boundary, or a map error. Good maps largely take 'map error' out of the equation.

Even in countries with strong open data – such as Brazil, where the natively produced MapBiomas maps are excellent, and JRC GFC v2 is widely used – our testing shows that Space Intelligence maps deliver consistently higher accuracy.

How we tested

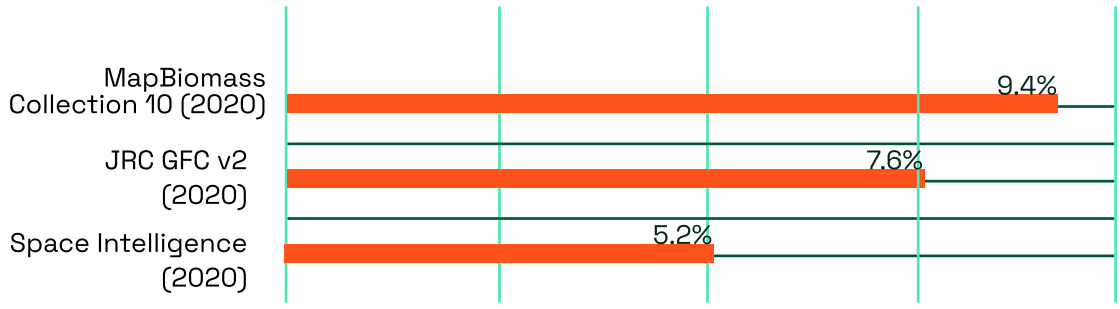
To assess performance objectively, we followed best statistical practice,[1,2] and placed 570 random sample points across Brazil. Each point was independently classified as forest or non-forest according to the official EUDR forest definition, using very high-resolution imagery. Our ecology experts performed these assessments "blind," without seeing any of the maps being tested, and all low-confidence points were reviewed by a range of experts to ensure quality and consistency.



Samples used in this analysis

This assessment measures the accuracy of random 10m x 10m pixels across Brazil. It does not directly reflect likely false results when testing a farm boundary, but it provides a clear indication of success and failure rates.

Results



Comparison of error rates

[1] Stehman, Stephen. (2014). Estimating area and map accuracy for stratified random sampling when the strata are different from the map classes. International Journal of Remote Sensing. 35. 10.1080/01431161.2014.930207.

[2] Olofsson, P; Foody, G M.; Herold, M; Stehman, S V.;. Woodcock, C E; Wulder, M A. Good practices for estimating area and assessing accuracy of land change, Remote Sensing of Environment, Volume 148, 2014, Pages 42-57, ISSN 0034-4257, https://doi.org/10.1016/j.rse.2014.02.015.

Overall, JRC GFC v2 was closest to the Space Intelligence map, but made about 46% more errors than the Space Intelligence dataset. The MapBiomass data performed worse still, making about 81% more errors.

That means that for every 100 pixels tested, Space Intelligence would misclassify about 5, while JRC would misclassify 7-9, and MapBiomas 9-10. Those extra errors will translate indirectly into false rejections which could exclude smallholder commodity farms from trading in the EU and harm local production, or alternatively could mean misses where farms that should fail EUDR test are erroneously let through.

Both JRC GFC v2 and Mapbiomas are excellent datasets, powerful in their own right. However, they were never intended to be used for testing EUDR compliance, and therefore have not been calibrated to follow the EUDR forest definition and distinguish between natural forest and plantations.

EUDR definition of forest

Land spanning more than 0.5 ha with trees higher than 5 m 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 use.**

The errors with the JRC GFC v2 map related mostly to incorrectly mapping timber or coffee/cocoa plantations as forest, or not mapping low canopy cover woodland as forest.

The main cause of the 'errors' in the Mapbiomas maps related to the different forest definition used in creating those maps, in particular including some agroforestry crop areas as forest. These are not true errors, but they have the same effect.

Using Space Intelligence maps

Space Intelligence has produced forest cover maps across 39 countries, purpose-built to support EUDR compliance. These datasets are updated annually using data from manual assessments of farms that fail, aiming to have <1% failure rates for farms that should pass EUDR, while catching 99% of farms that should fail.

These maps underpin ICE Commodity Traceability (ICE CoT) service, where companies throughout agricultural commodity supply chains can upload farm boundaries, test them against all aspects of EUDR, and instantly generate the required insights, reports, and due-diligence statements for the EU system.

Learn more about ICE CoT