Due diligence for deforestation-free supply chainswith Sentinel-2 imagery from the Copernicus DataSpace Ecosystem

Heiko Balzter[1], **Nezha Acil**[1,2], Ivan Reading[1], Konstantina Bika[1], Toby Drakesmith[1], Chris McNeill[3], Sarah Cheesbrough[3], and Justin Byrne[3]

[1]University of Leicester, Institute for Environmental Futures, Centre for Landscape and Climate Research, School of Geography, Geology and the Environment, Space Park Leicester, 92 Corporation Road, Leicester, LE4 5SP, UK
[2]National Centre for Earth Observation, University of Leicester, Space Park Leicester, 92 Corporation Road, Leicester, LE4 5SP, UK
[3]Satellite Applications Catapult; Electron Building, Fermi Ave, Didcot OX11 0QR, UK

At COP26, the Glasgow Leaders Declaration committed the majority of the world's nations to ending deforestation by 2030. On 29 June 2023, the EU Regulation on deforestation-free products (EU) 2023/1115 entered into force. The main driver of deforestation and forest degradation is the expansion of agricultural land for the production of commodities like cattle, wood, cocoa, soy, palm oil, coffee, rubber and derived products. Any trader wishing to sell these commodities on the EU single market or export from within it, must prove that the products do not originate from recently deforested land or have contributed to forest degradation. Satellite imagery provides the means of addressing the implementation of the EU Regulation on deforestation-free supply chains, and of strengthening forest governance through the provision of timely information to national forest services. We present the PyEO near-real-time forest alert system from Sentinel-2, a current operational application to reduce illegal logging in Kenya, and its potential to support im- and exporters in demonstrating deforestation-free supply chains developed by the ForestMind project.

The software implementation used the Python for Earth Observation (PyEO) library to automatically extract information on forest loss from Sentinel-2 satellite imagery. It queries the Copernicus Data Space Ecosystem for new imagery, downloads the automatically selected Sentinel-2 images, applies a previously trained random forest machine learning model to detect forest loss, and generates a multi-layer analyst report.
For the forest law enforcement in Kenya, the latest forest alerts are sifted and prioritised by the Kenya Forest Service's Forest Information Centre in Nairobi, and delegated to forest rangers in the field for investigation. Forest rangers navigate to the field site inside the forest reserve, accompanied by a local community scout, and report back to head office with their observations and whether any arrests for illegal logging were made. Since its introduction in Kwale County in 2019, over 2000 forest alerts have been investigated. The dominant cause of the deforestation is illegal logging, followed by charcoal production.
For the due diligence application, a Forest Analyst can then use the analyst-report and

additional software tools to create company reports suitable for communication to im- and exporters for monitoring the impact of their supply chains on deforestation and forest degradation.