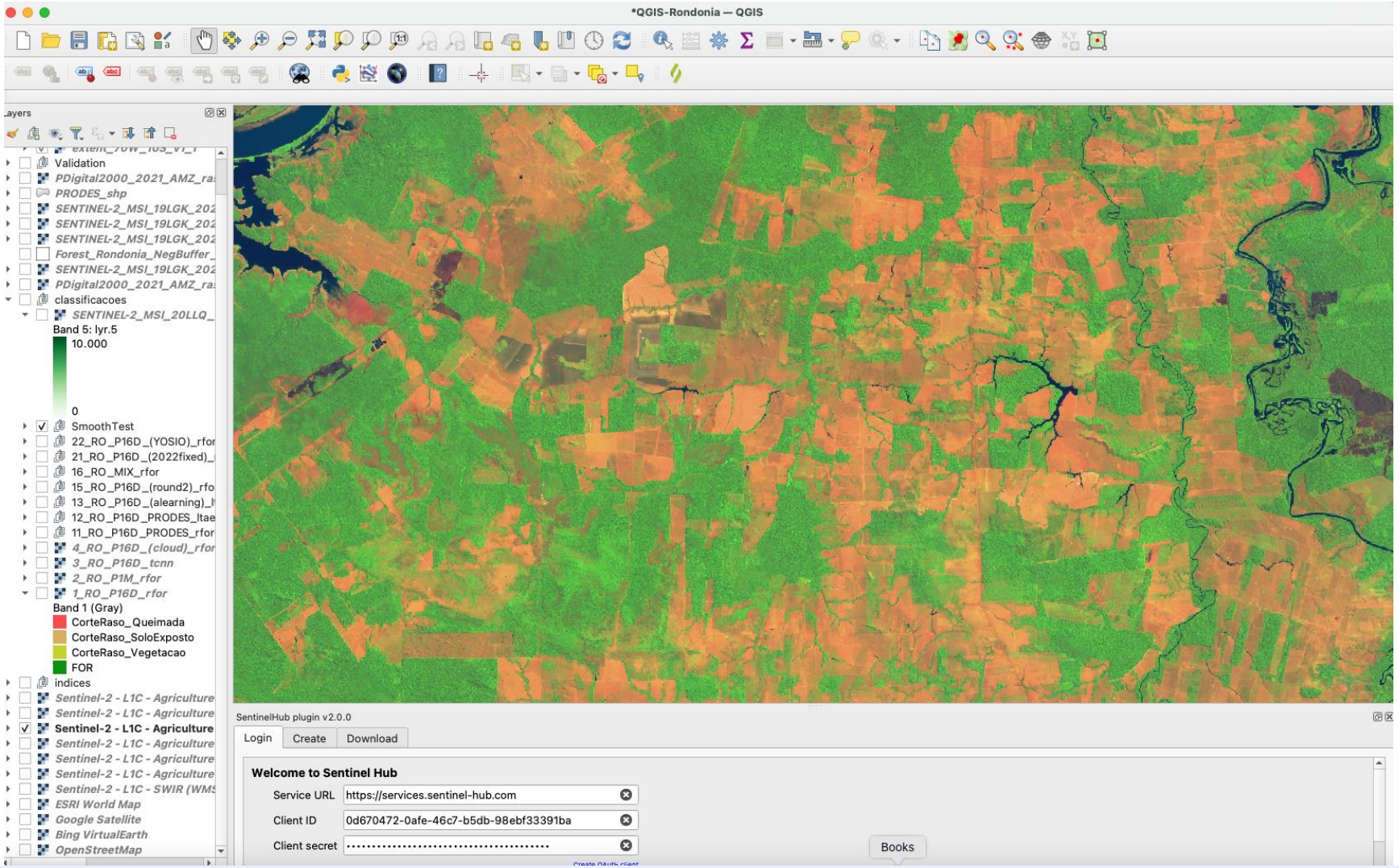
LUCC classification with satellite image time series supported by ESA-NoR

Gilberto Camara

https://gilbertocamara.org

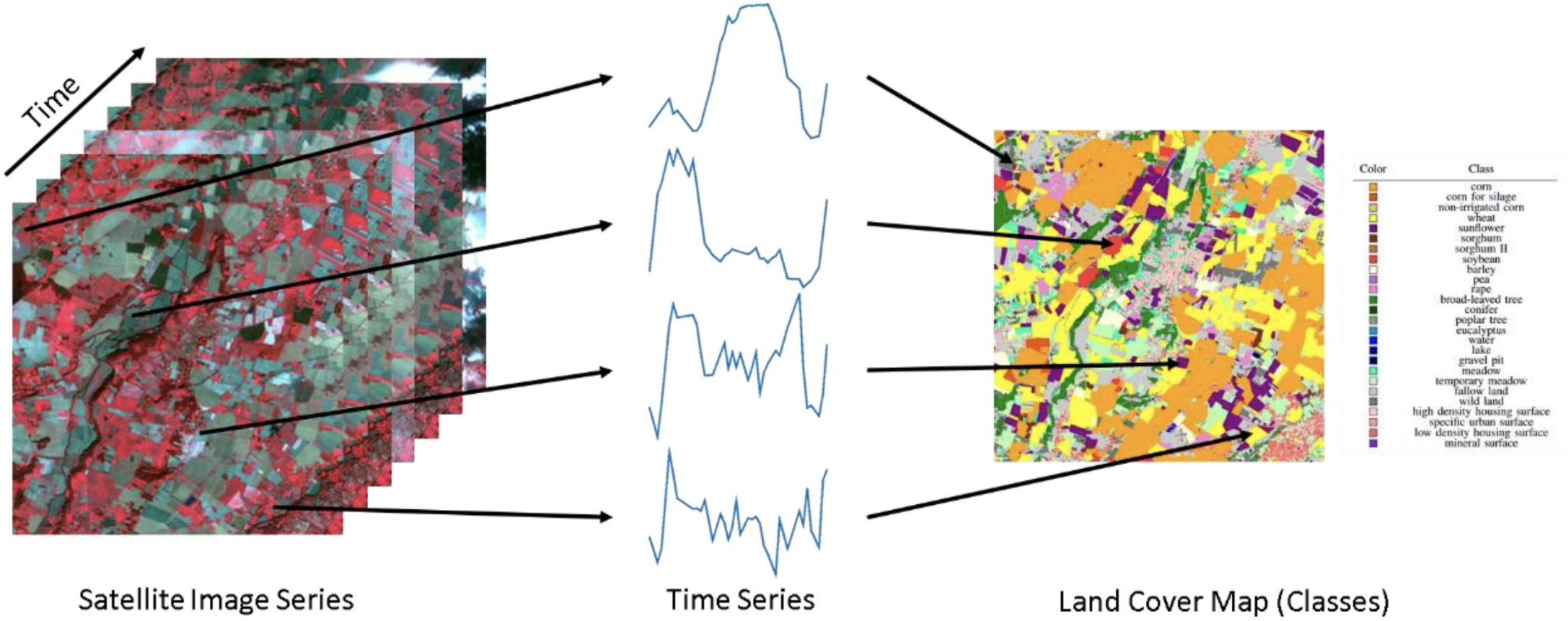
image: Alamy

Use of ESA NoR resources



Access to Sentinel Hub monthly Sentinel-2 level 1C images over Amazon rain forest

Big EO data: access to image time series

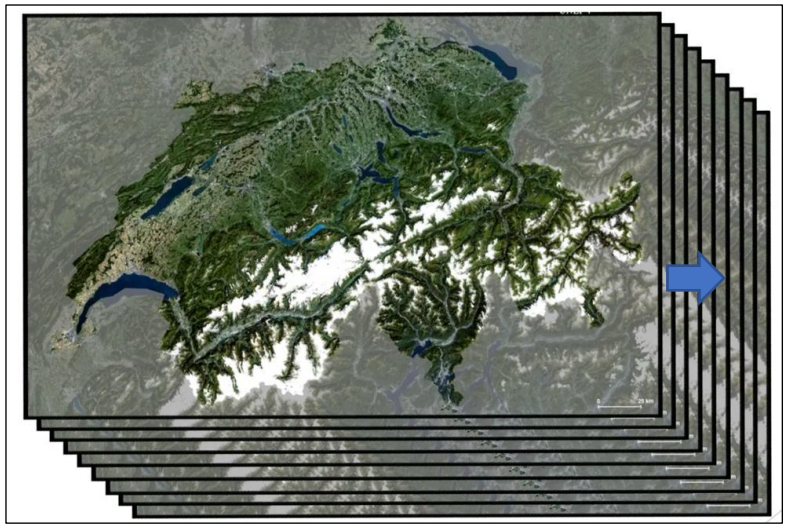


Sentinel-2 level 1C images over Amazon rain forest (NoR enabled):
support for training samples and verification data

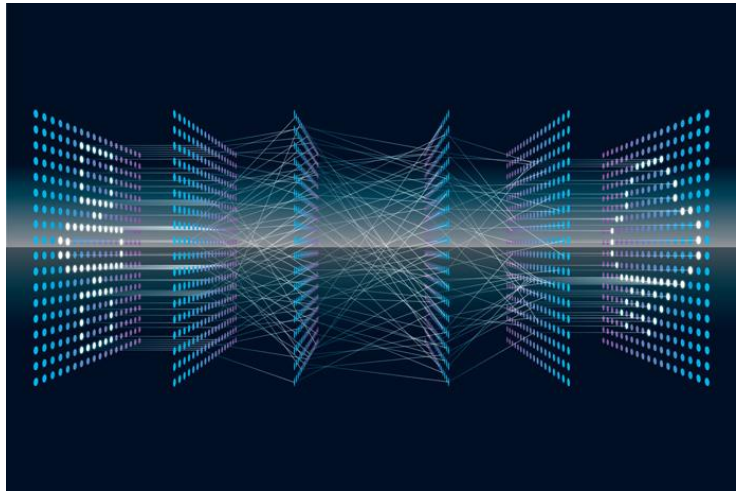
Image: F. Petitjean, Monash Univ

LUCC classification using machine learning

Sentinel-2 level 2A



Data cubes

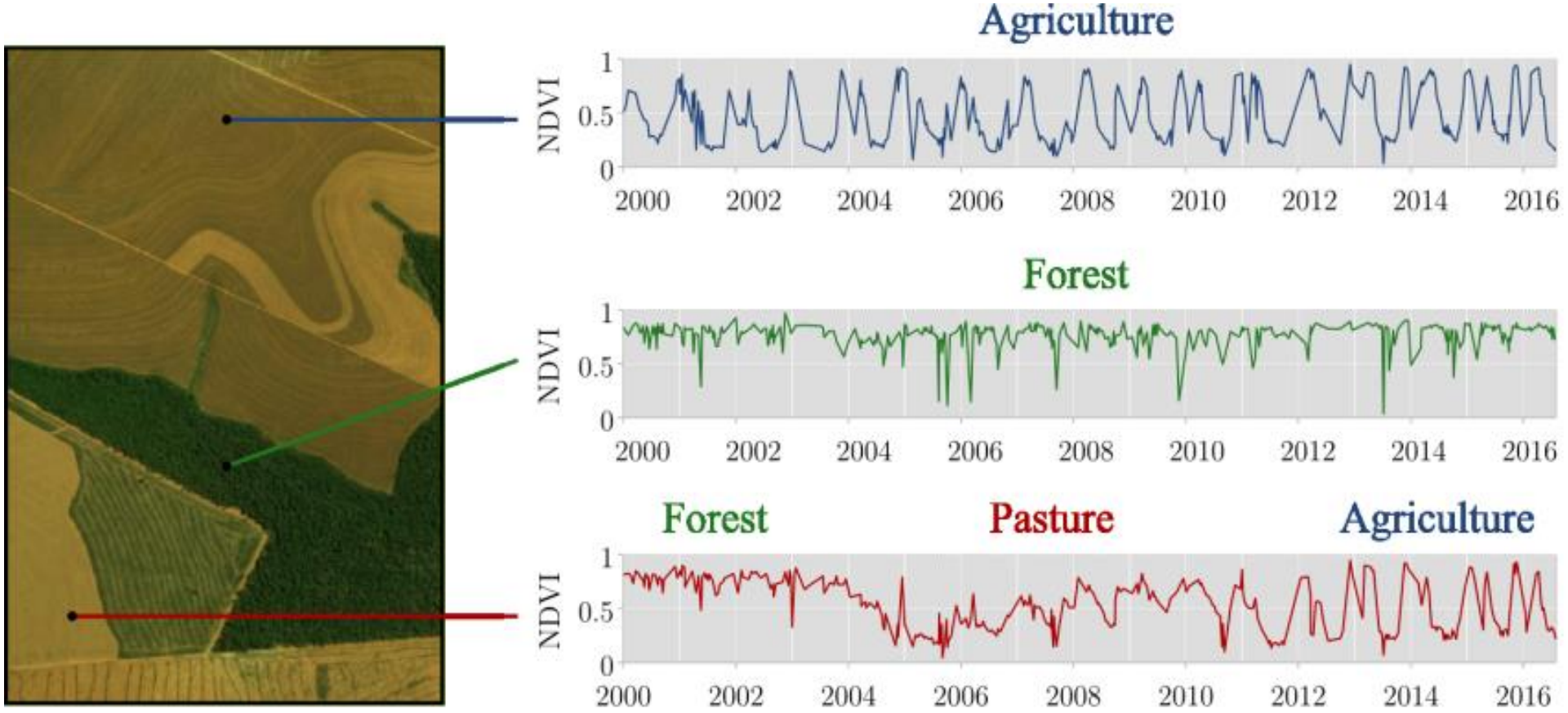


Machine learning

Sentinel-2 Level-2A data cubes: Microsoft Planetary Computer
Training data: Sentinel Hub via NoR
Machine learning and classification software: R sits package
Accuracy assessment: Sentinel Hub via NoR

Images: NASA, Swiss Data Cube, ECMWF

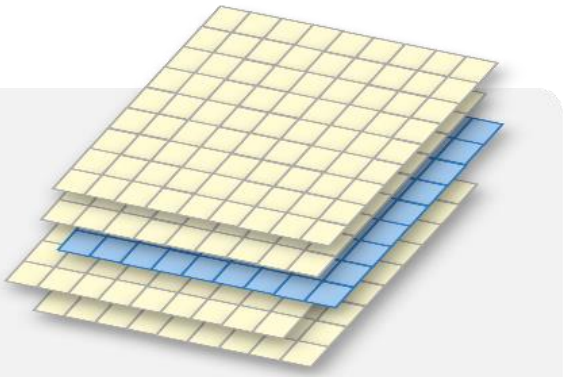
Give users all the data!



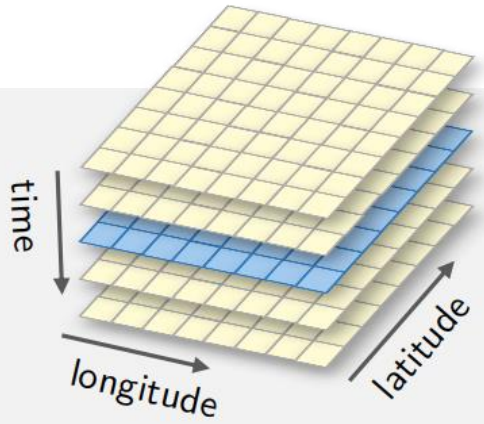
Using time series – significant increase in LUCC accuracy

graphics: Maus, Victor

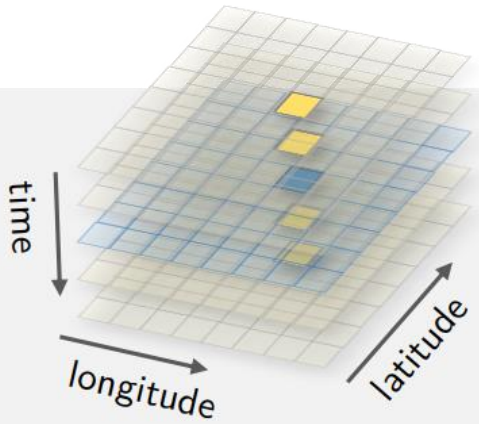
What is an EO data cube?



EO image collection



EO data cube



Time series selection

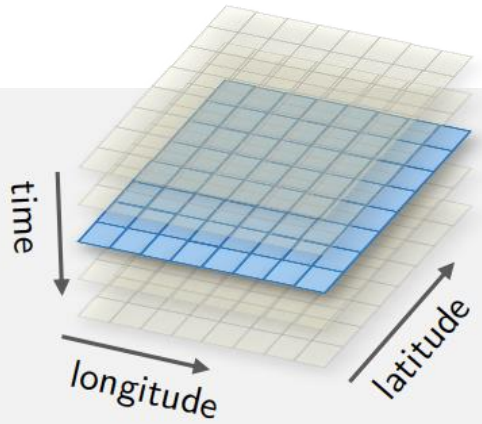
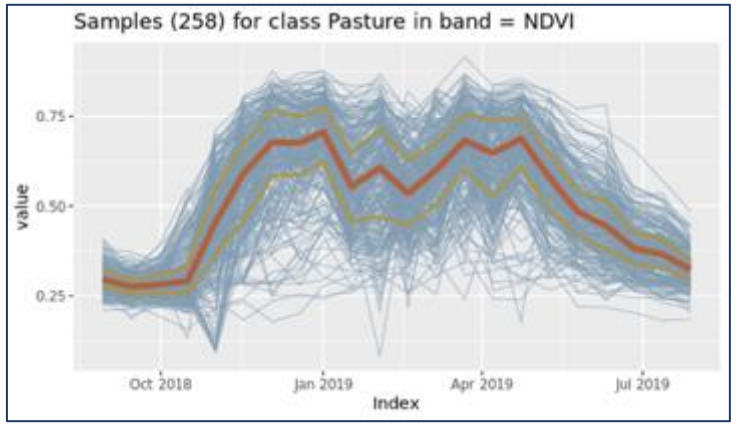
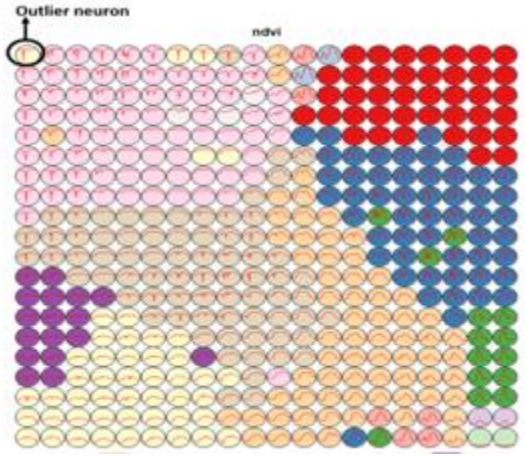


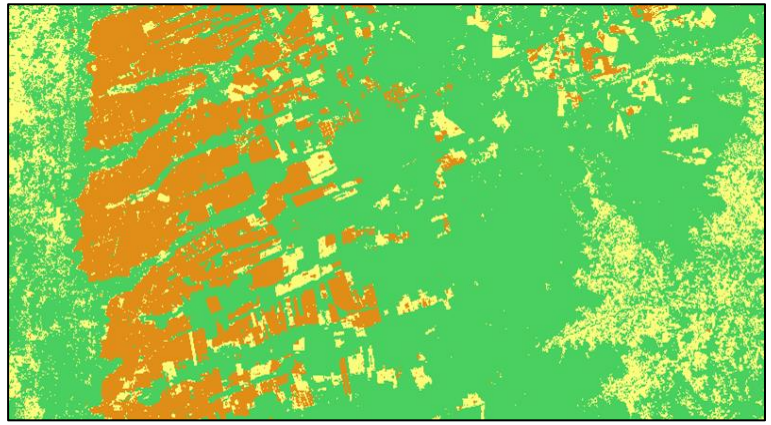
Image selection

Data cube = regular partitions of space and time

SITS land classification workflow







LUCC samples

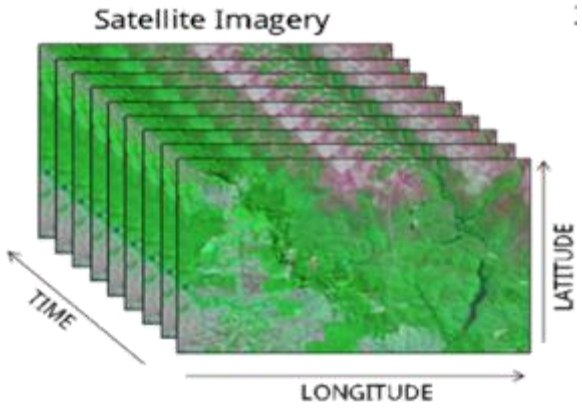
Quality Analysis

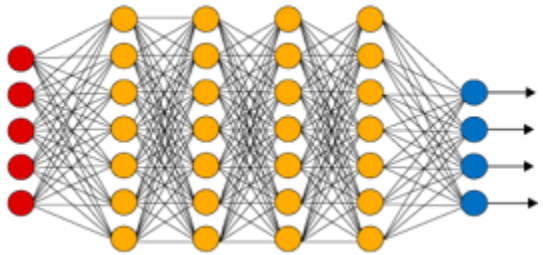
LUCC maps

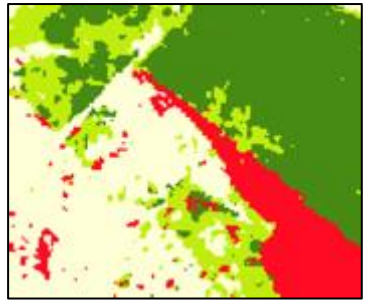
EO data cubes

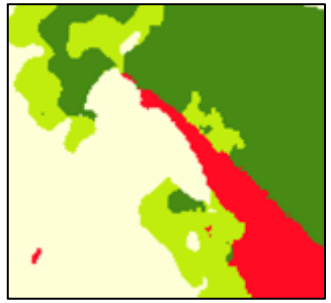
ML models

Classification and smoothing

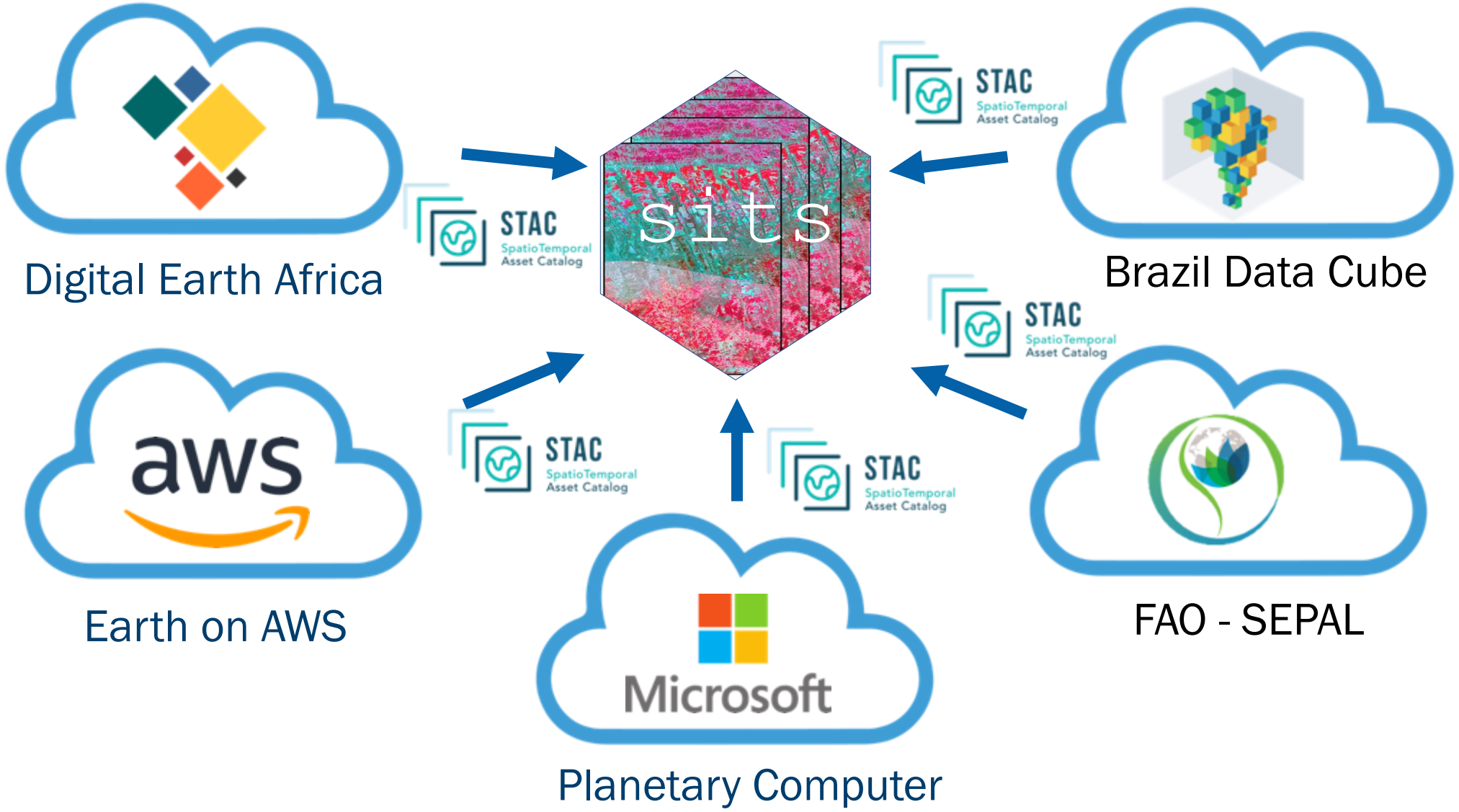




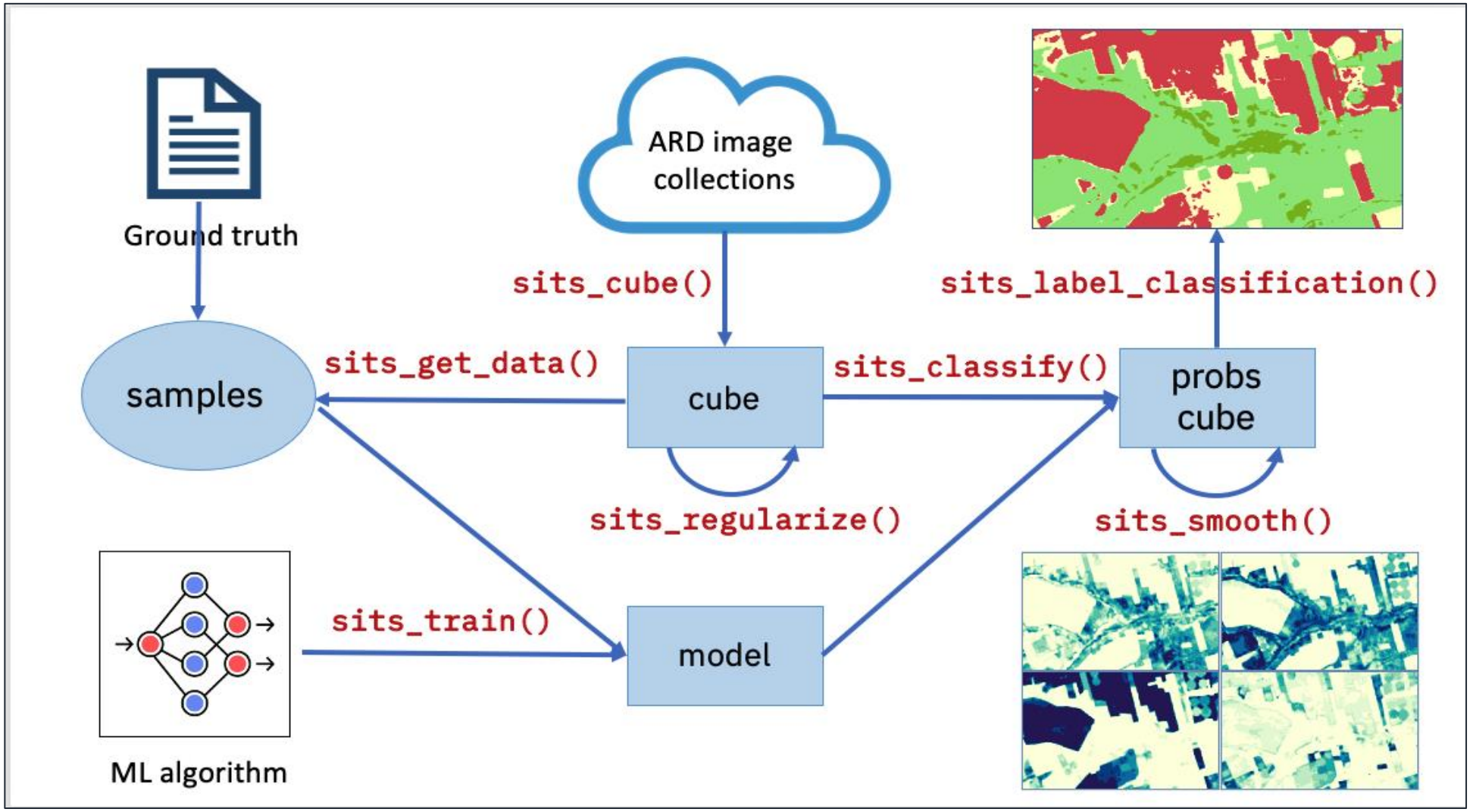




End-user tool for cloud services (TRL 8)



SITS: easy-to-learn API



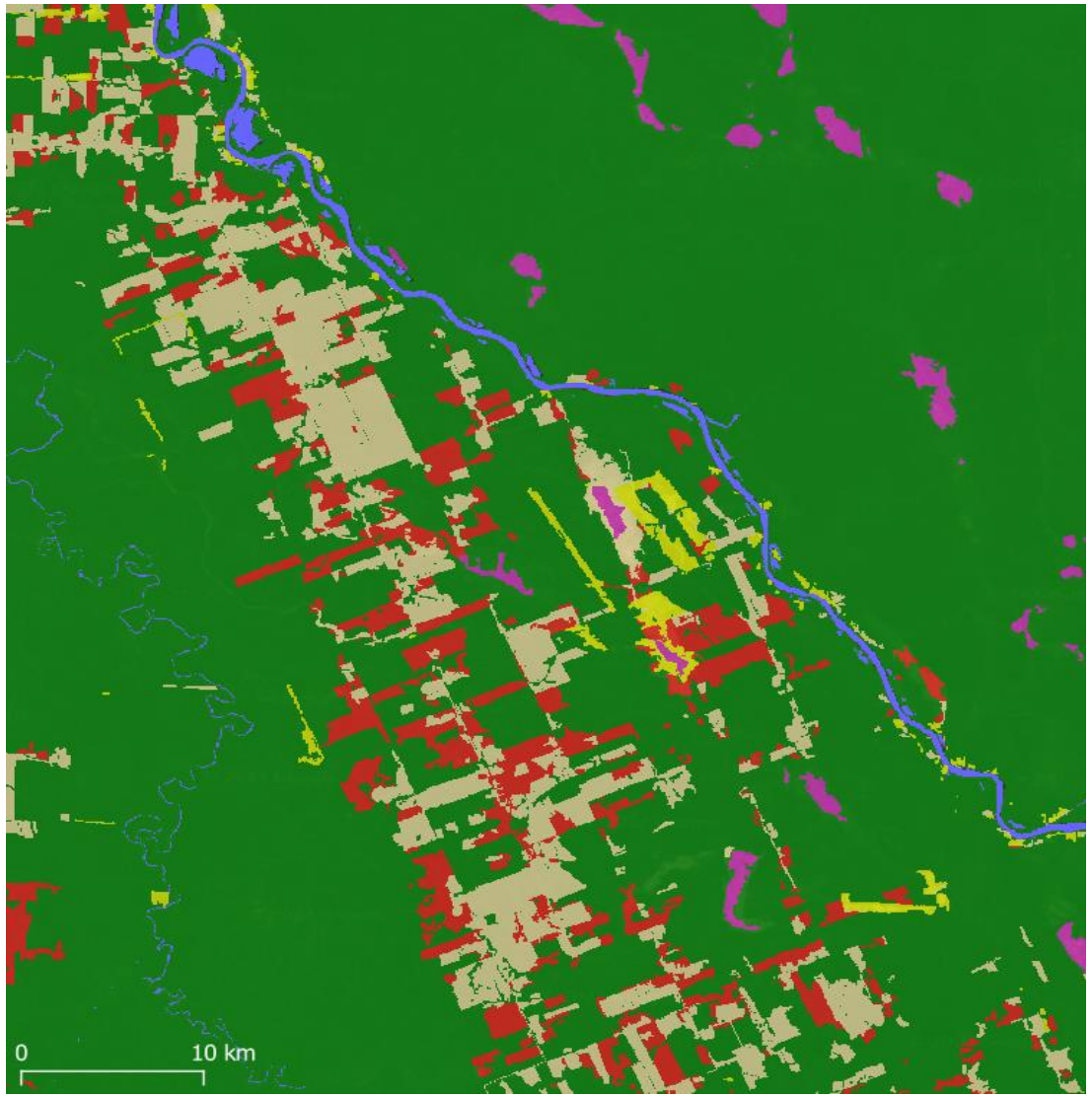
Target user community: Earth science experts

Deforestation mapping with Sentinel-2

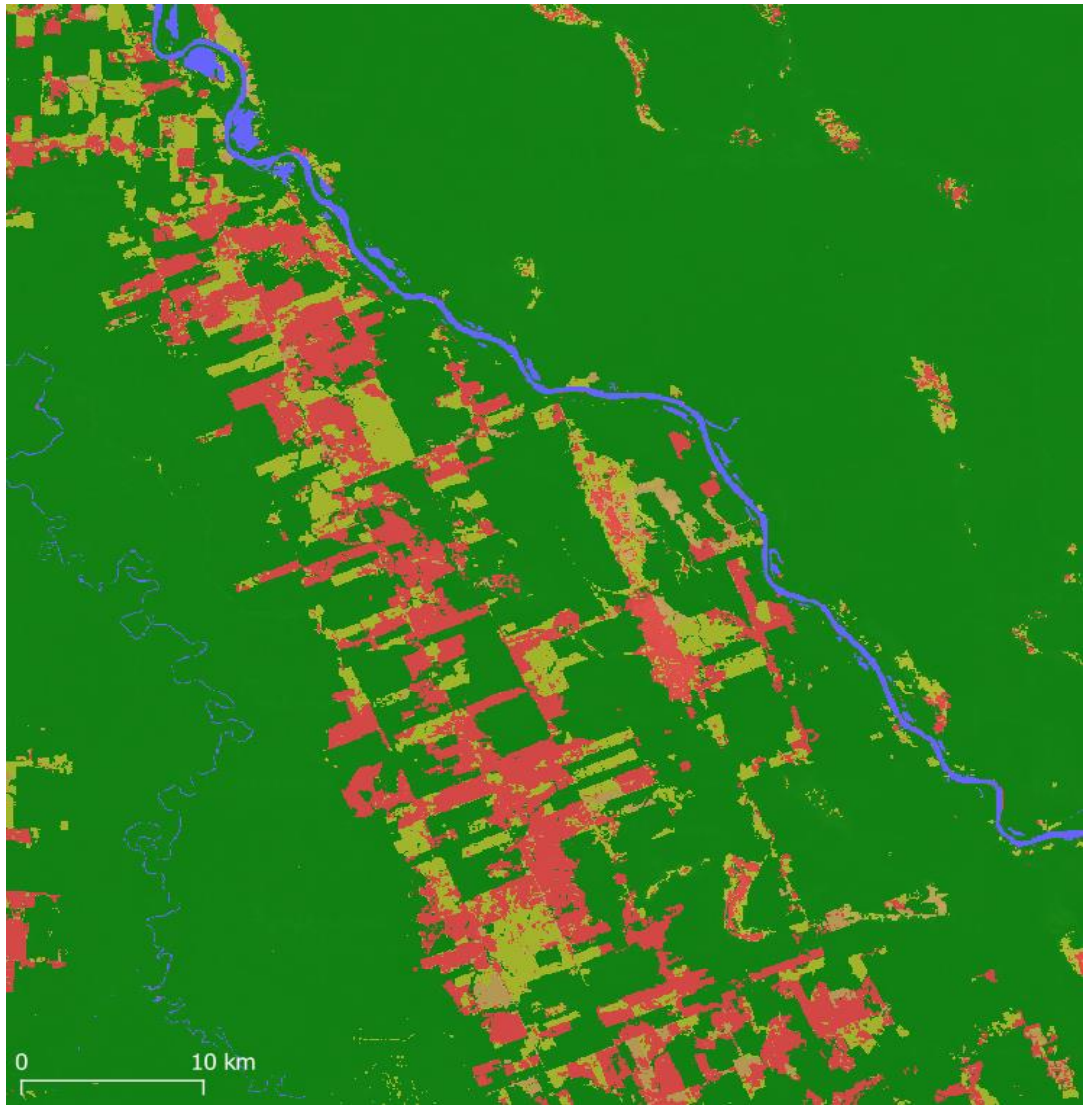
Sentinel-2 data (08/2021)

SITS classification 2021

Tropical deforestation monitoring



PRODES (the “gold standard”)



400 samples, LTAE (97% agreement)

References (author)

1. Rolf Simoes, Gilberto Camara, et al. “Satellite Image Time Series Analysis for Big Earth Observation Data”. Remote Sensing, 13, p. 2428, 2021.
2. Lorena Santos, Karine Ferreira, et al., “Quality control and class noise reduction of satellite image time series”. ISPRS Journal of Photogrammetry and Remote Sensing, vol. 177, pp 75-88, 2021.
3. Gilberto Câmara, “On the semantics of big Earth observation data for land classification”, Journal of Spatial Information Science, 20, p. 21–34, 2020.