SEPAL & CEOS-ARD



SEPAL
- free, open-source cloud platform built by FAO, with NICFI support

- accessing, processing and analyzing satellite data

- browser-based interface to cloud computing for land monitoring

- no local infrastructure.

22,000+
platform users, 186 countries

300+
partner organizations

44%
returning users – sustained, not one-off, engagement

01 BACKGROUND

SEPAL and country engagement

- **Platform –** Browser-based; recipes run on Google Earth Engine and on-demand cloud workers – nothing installed or hosted locally.
- **No coding required –** Recipe-based workflows are point-and-click; notebooks and scripting are available for advanced users.
- **Engagement –** Hands-on training with national forestry and environment agencies, usually part of NICFI-funded programs.
- **Ownership –** Countries produce their own outputs – REDD+ MRV, forest reference levels, land-cover baselines. Part of FAO's Open Foris suite.
- **Reach –** From a single analyst to a national team, concentrated in tropical forest countries with limited local compute.

02 DATA

What we use, and where it comes from

Imagery, by sensor

- Landsat 4-9 – Collection 2 Surface Reflectance, via USGS/Earth Engine
- Sentinel-2 – Level-2A, Copernicus/ESA, via Earth Engine
- Sentinel-1 – C-band SAR, Copernicus/ESA, via Earth Engine
- Planet NICFI basemaps – Norway-funded high-resolution tropical coverage, integrated directly (when available)
- User-uploaded imagery to GEE as Asset

Ancillary & access

- Terrain – SRTM and other DEM sources
- Reference data – CSV upload, Earth Engine tables, Collect Earth Online
- National baselines – existing land-cover products, supplied by the country
- Access path – pulled live from Earth Engine's public catalog; countries never host the raw archive themselves

03 PREPROCESSING

What SEPAL still does after delivery

- **Cloud & shadow masking –** combines CFMask, our own cloud score, and Sentinel-2 Cloud Score+/Probability
- **Cross-sensor harmonization –** band naming, scaling and spectral differences between Landsat generations and Sentinel-2
- **BRDF normalization –** view- and illumination-angle differences across scenes and sensors
- **Compositing –** median/medoid mosaicking
- **SAR correction –** speckle filtering, radiometric and terrain correction for Sentinel-1

04 ARD - STAC & CLOUD-NATIVE

What this would change for SEPAL

- **Freedom -** from any single commercial vendor of data or services
- **Discovery -** a STAC catalog lets SEPAL query new archives the same way it already queries Earth Engine's; no bespoke integration per source
- **Partial reads -** Cloud-Optimized GeoTIFF (or Zarr for cubes) pulls only the bands and time steps a recipe needs, not whole scenes
- **Static Layers –** parameter layers that enable easy correction (optical and radar)

NEXT YEAR

Candidate case studies

- **ARD / STAC Tests –** SEPAL processing using STAC-catalogued data outside GEE
- **Additional pre-processing –** Static layers for BRDF (optical) and terrain/sensor improvement (radar)
- **BRDF code tests –** Run benchmark tests for BRDF correction (GEE, STAC/Zarr, no static layers, static layers included)
- **Demo at SIT or Plenary –** complete SEPAL demo using CEOS-ARD data for real-world application