



PROGRAMME OF THE
EUROPEAN UNION



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Session 4b: Downstream Product Validation



Hyperboost project:

- Hyperspectral Bio-optical Observations collected on TARA ship + coastal team to monitor Coastal ecosystem health
 - In situ data collection mission traversing European Coastlines (Iberian Coast, North Sea, Baltic Sea, Med Sea)
 - 120 coastal sites (coastline, Estuary, super sites) with different monitoring intensity
- Use satellite data to support the sampling strategy for TARA ship (climatology + NRT data)
- Measurements (! **THEY MEASURE EVERYTHING!**)
 - Bio-optical measurements/hyperspectral radiometry/optical properties/biogeochemical and optically active components (above water, underwater, continuous underway systems)
 - Solar tracking hyperspectral radiometer (validation of aquatic reflectance)
 - Validation data in optically complex waters for several missions (S2, S3, L8, L9, PRISMA, ENMAP PACE) → 31/73 S3 matchups, 5/73 S2 matchups
- Future work:
 - Process in situ data (collocation + QC) and optical characterizing of EU Coastal waters
 - Publish dataset (first to validation teams, further strategy under discussion)
 - Matchup analysis for validation of reflectance, IOPs and BioGeoChemical variables



S2GM:

- Presenting Phase 2 of the S2GM (June 22 – June 2026)
 - Free of cloud surface reflectance
 - On demand production of Free of cloud surface reflectance (10-20-60m)
 - Temporal Mosaic (all bands)/BrightEarth Pixel (3 bands)/Time Series (1x1 and 3x3 pixels)
 - 60-80 new users per month / 300-500 orders per month covering 550 million km²
- Use cases: Finnish Meteorological Institute, Bordeaux, GeoScience Australia, Canadian Mosaic, Copenhagen
 - Publicity, computation of % of coniferous trees in Canada, cropland field boundary mapping
- Predefined Mosaics: REDD+ and EU27 countries
- New features
 - Alternative L2 processing: SIAC
 - Albedo (+ unc)
 - LAI (+ unc), FAPAR (+ unc)
 - Basic version of S2GM for general users (quick looks, no need for downloader installation)



GROUNDLED EO project:

- Bias in the currently available products (SL2P) and potential methods to address
- Validation of SL2P from GBOV data
- S2LP trained on SAIL (turbid medium)
- Validation over updated GBOV data
 - Good agreement for LAI but LAI has a bias (underestimation)
 - Bias for FAPAR data and FCOVER
 - Little bias for homogeneous canopies (pasture/crops)
 - Heterogeneous canopies (forest) → bias (needs addressing)
- Potential options include bias correction, more complex RTMs (difficult to invert), and training on ground data with machine learning (GPR)
- GROUNDLED EO is producing a large harmonized database which will be publicly available
 - Will train directly GPR models directly on ground data

CEOS L3 Validation of SL2P and SL2P-CCRS:

- Composites for Canada available, also ported to GEE
- Validated SL2P, 10 m version of SL2P (G,R,NIR only) and SL2P-CCRS (based on semi-discrete RT model, 4SAIL2)
- SL2P-CCRS reduces SL2P's bias for LAI, but not uncertainty (reduced precision)
- 10 m shows ~50% more invalid retrievals - not accounting for lateral photon flux
 - Georegistration between bands is more critical for 10 m
 - Is it physically useful?
- Why can't we improve uncertainty – fundamental limit of passive optical limit?
 - Map what can be retrieved well e.g. use DASF to monitor canopy structure
- Recommendations
 - Code verification needed for CEOS L0...SNAP implementation not correct w.r.t ATBD – should be fixed
 - Open data is a step forward but open source code for algorithms needed too
 - Use SL2P 10 m with caution
 - Bias correction useful for LAI
 - Need to validate L3 (spatiotemporal synthesis)
 - Global products should be produced



Eucalyptus plantation mapping:

- 78% of new plantations in Brazil are Eucalyptus and 18% pine (Sao Paulo State in the lead)
- Assess extend of eucalypt plant area In Sao Paulo using spectral indices and fraction images from LSMM method (Linear Spectral Mixing Model) from 2016-2017 S2 images
- Able to monitor rotation cycle of eucalyptus plant
- Classification approach (vegetation, soil and shade) was validated using 1045 samples (overall accuracy of classification = 86.70%/kappa = 0.821)
- Max values of vegetation fraction accurately highlighted the areas occupied with forest plantation
- Used for planning and management, especially for private companies and government and automatic method to map forest plantation areas at regional and global scales
- Request for data availability if GEE