PROBA-V Collection 2: What is new?

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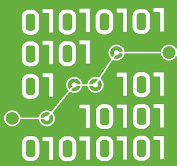
[1] VITO Remote Sensing, Mol, Belgium, [2] Universidad de Valencia, Spain, [3] HYGEOS, France, [4] ESA-ESRIN, Frascati, Italy, [5] Brockmann Consult

Living Planet Symposium, Bonn, 23-27 May 2022

PROBA-V

- Daily global EO data
- Spatial resolution 1 km– 333 m – 100 m
- 21/10/2013– 30/06/2020
- https://proba-v.vgt.vito.be
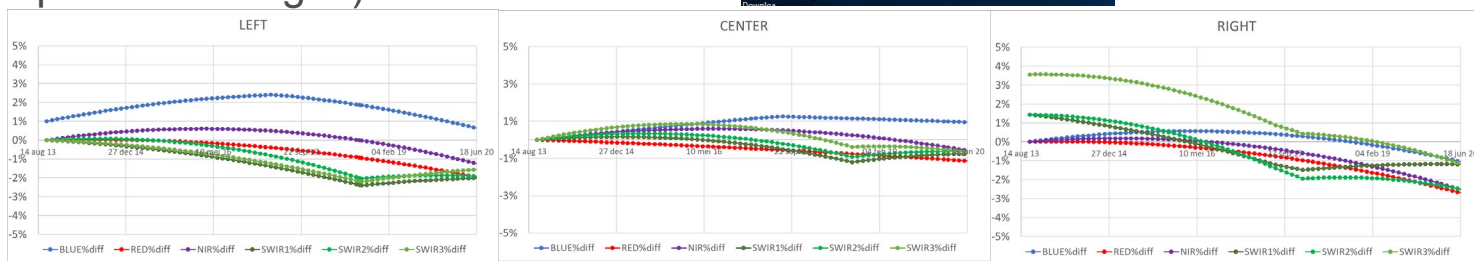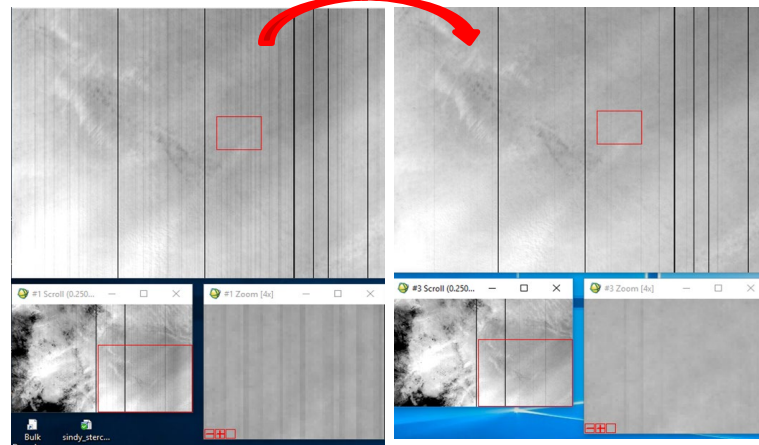
GOING BEYOND
EXPECTATIONS FOR
GLOBAL VEGETATION
MONITORING

Proba-V Collection 2

1) updated radiometric calibration
2) a new and better cloud detection method and improved cloud shadow detections
3) an improved atmospheric correction
4) harmonisation of the compositing among the resolutions
5) update of the product format
6) a new catalogue to distribute the data

Radiometric calibration: changes

Sindy Sterckx, Stefan Adriaensen (VITO)

- 2nd degree polynomial model for observed radiometric change (both increase & decrease of responsivity)

- Correction for small negative bias in LEFT BLUE and SWIR RIGHT

- Updates to SWIR equalization/multiangular calibration coefficients based on yaw maneuver data (pixel depended changes)
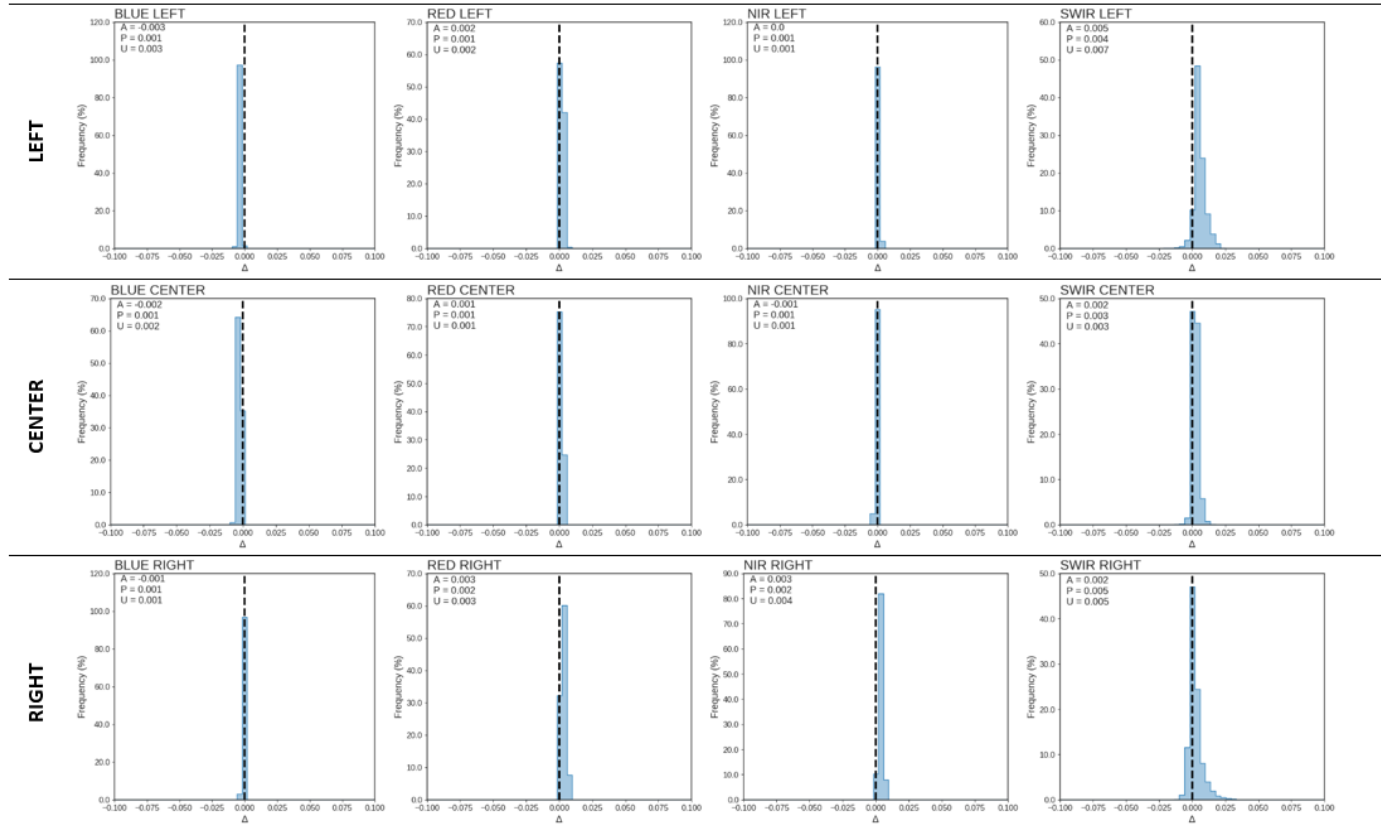

See poster: Benhadj et al., PROBA-V overview of calibration and trending analysis (B1.02 Monday 17:30-19:00)
See presentation: Adriaensen et al. Lunar Irradiance Model of ESA (LIME) and its application for PROBA-V radiometric calibration (B1.02.1 Monday 14:10)

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Radiometric calibration: impact
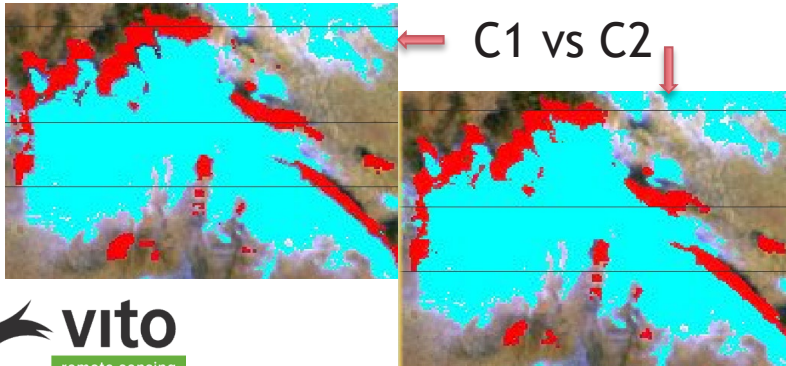
1 year TOA data
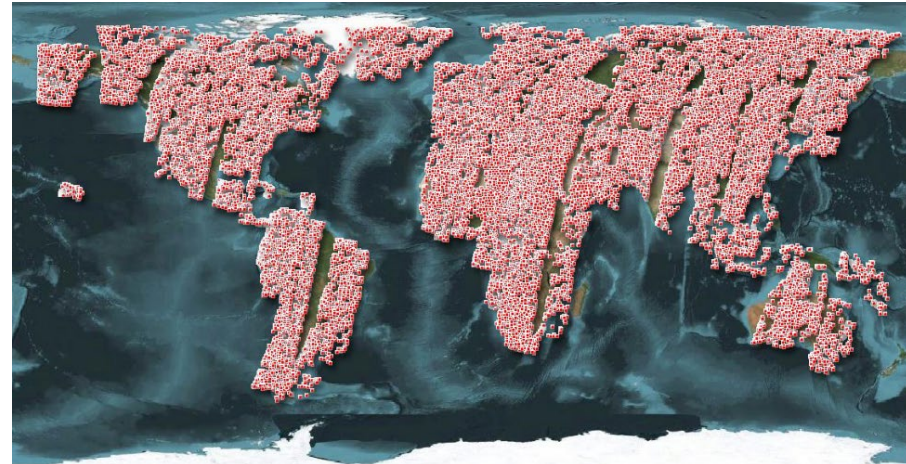(07/2018 – 06/2019)

Bias C1 – C2

Cloud detection: changes

Luis Gómez Chova (UV), Kerstin Stelzer (BC)

- Multi-Layer Perceptron (MLP) neural network algorithm
- Training and validation data on large data set
- No dependency on auxiliary data input
- Performance of cloud detection greatly improved
- Adaptation of the cloud shadow detection
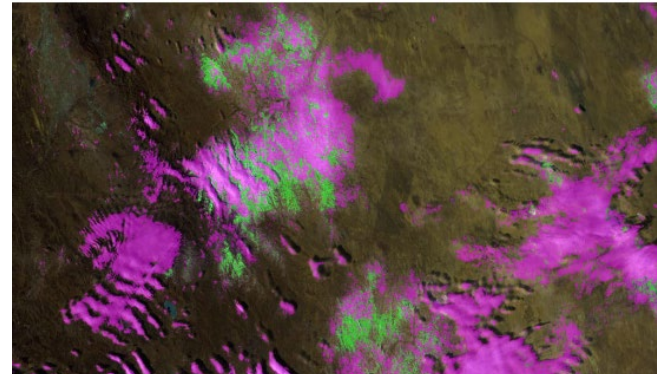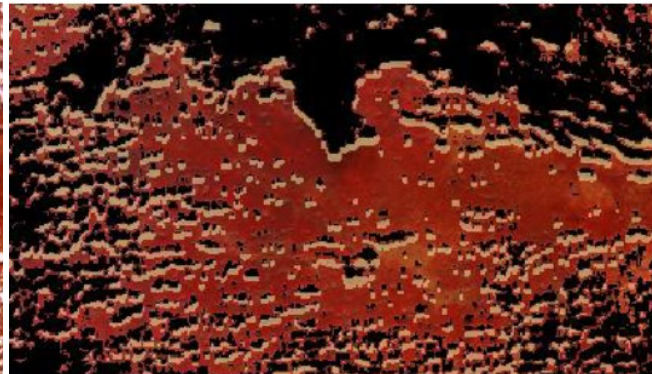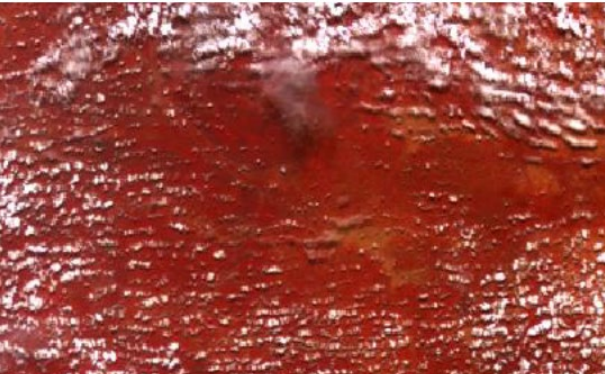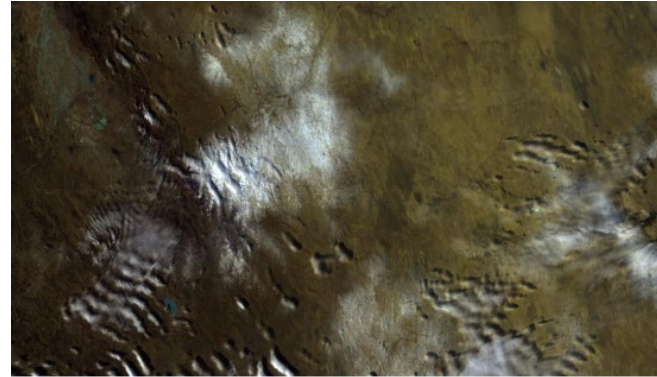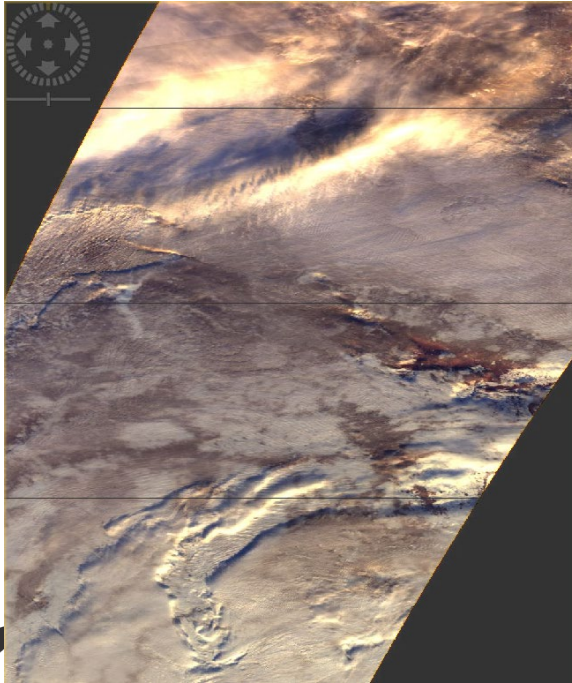
Collection of data points

C1 vs C2

Cloud detection: impact

Kerstin Stelzer (BC)

- **Very good performance!**
  - Under-detection in winter in C1 solved (dependence on auxiliary data)
  - Over-detection in C1 is solved
  - Good separation between cloud and snow/ice
- Trade-offs
  - Some overestimation on salt lakes and urban areas
  - Thin semi-transparent clouds: 50% detected
  - Sparse snow or melting ice often not detected
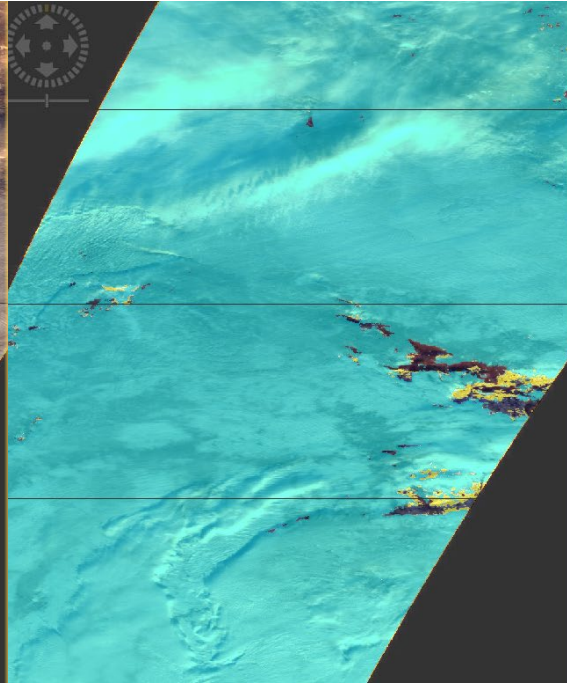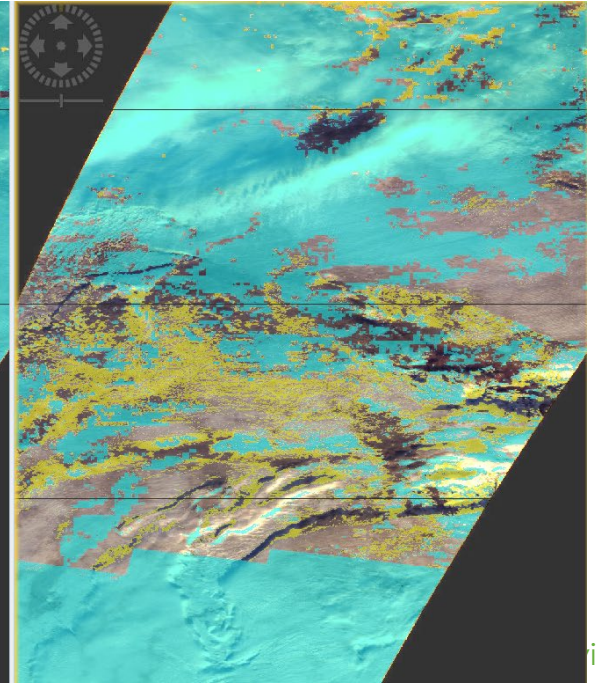- Cloud shadow masking of medium quality

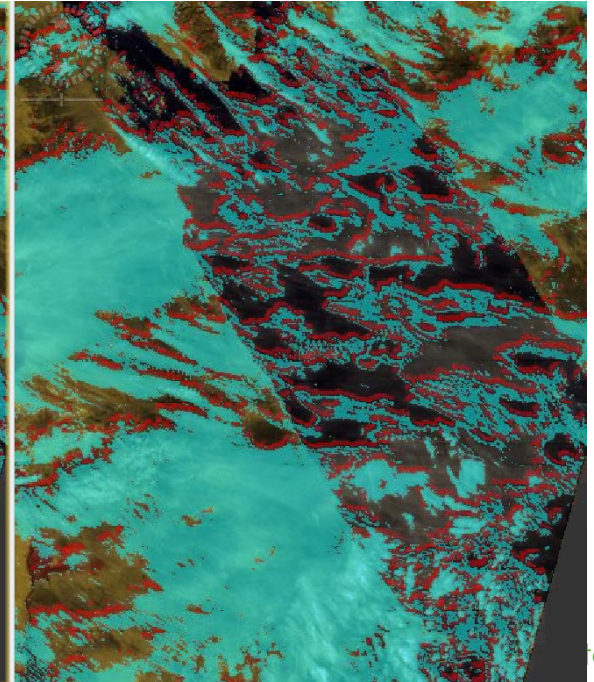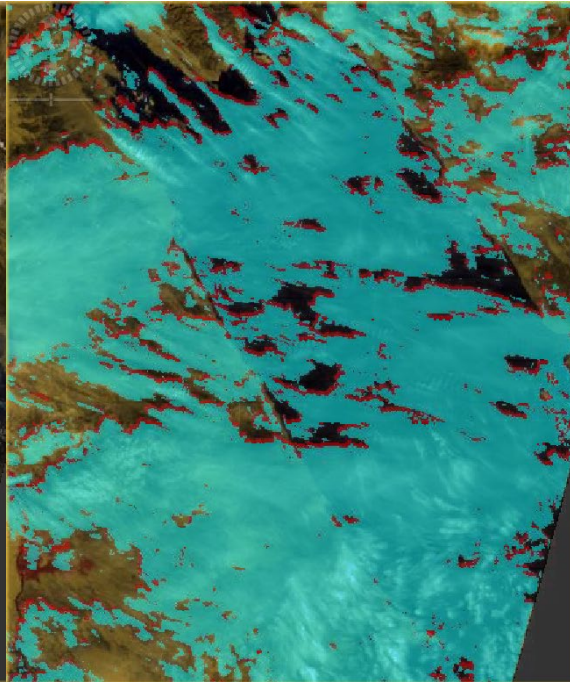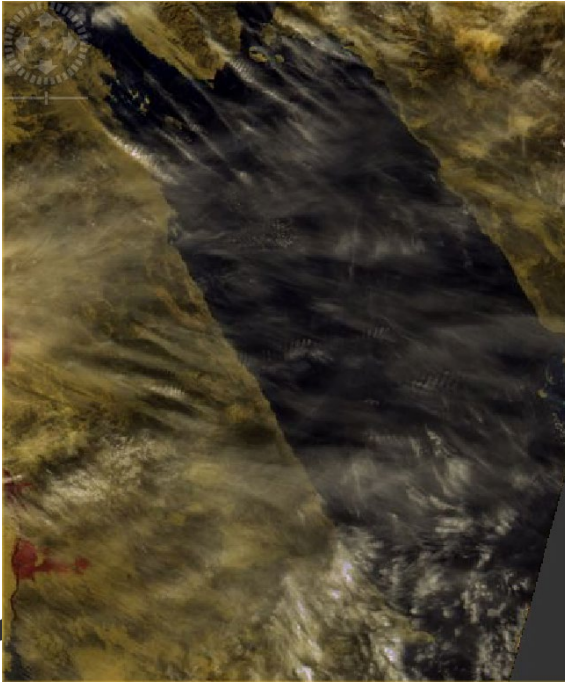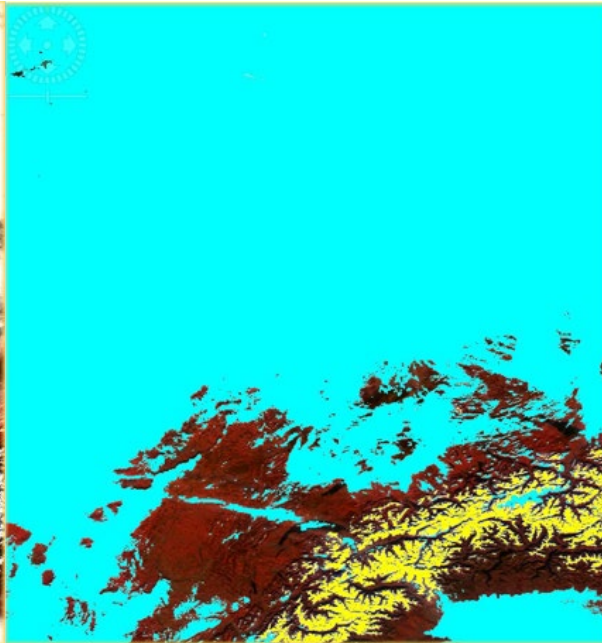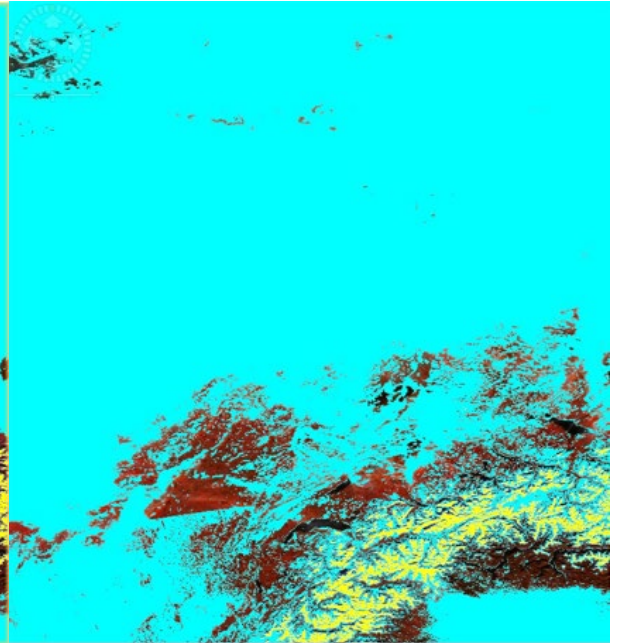# Cloud detection: impact

RGB

C2

C1

Cloud detection: impact

RGB
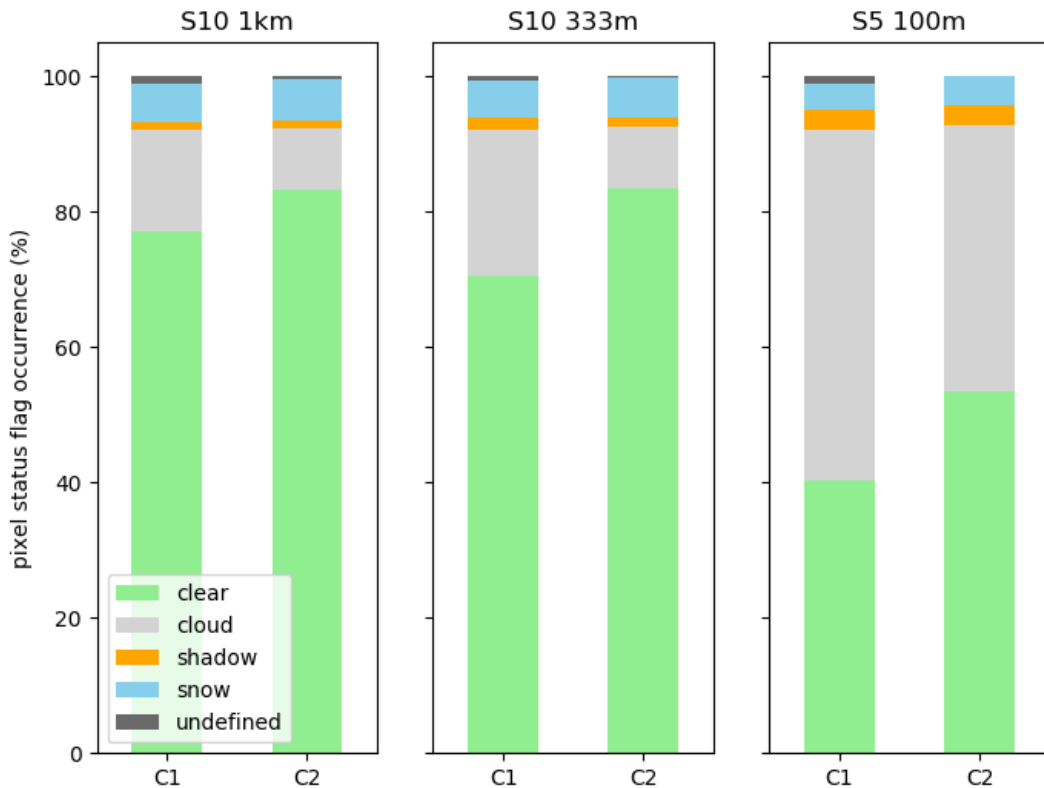
C2

C1

Cloud detection: impact

RGB   C2   C1

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Cloud detection: impact

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Atmospheric correction: changes

Didier Ramon, Dominique Jolivet (HYGEOS)

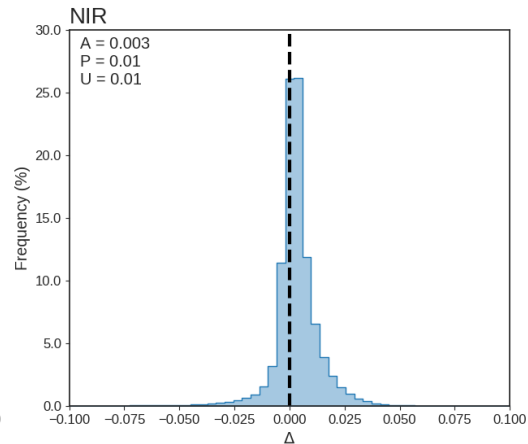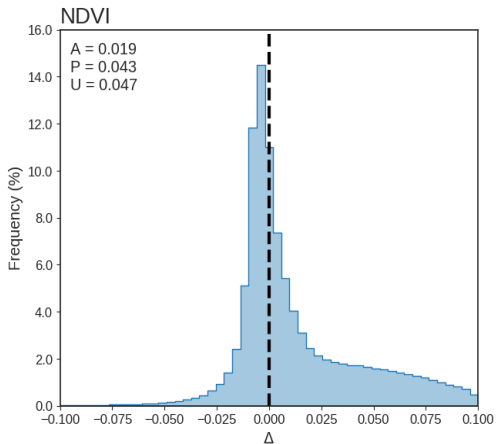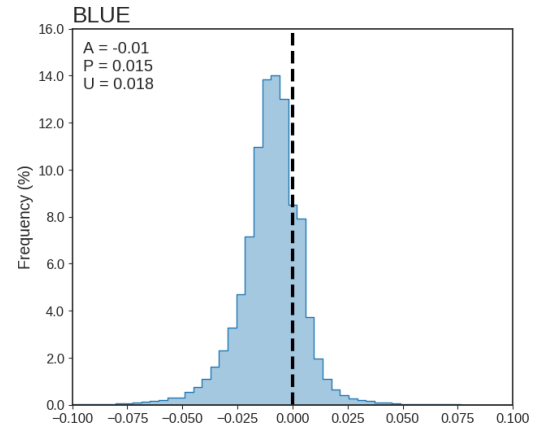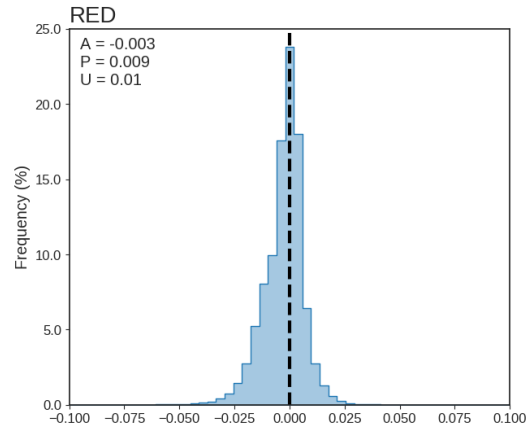- Simplified Model for Atmospheric Correction (SMAC)

- MERRA2 (Modern-Era Retrospective analysis for Research and Applications, version 2) for the inputs of the atmospheric correction

- Validation: based on the Atmospheric Correction Inter-Comparison Exercise (ACIX) approach

- Results:
  - Top-Of-Canopy (TOC) reflectances are better characterized
  - Artefacts due to the image-based Aerosol Optical Thickness (AOT) retrieval are removed

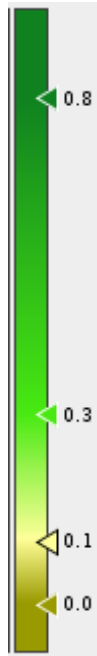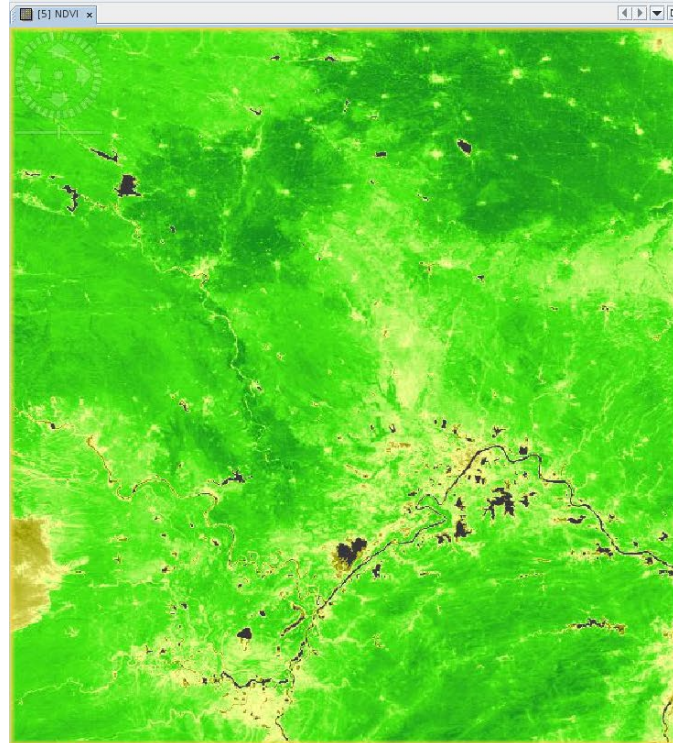# Atmospheric correction: impact

S10 TOC 1km
07/2018 – 06/2019
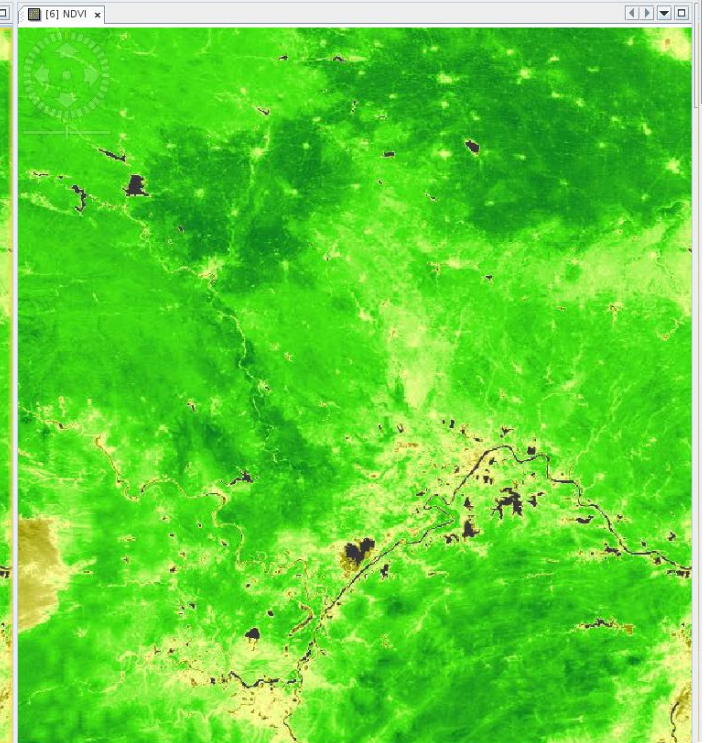
Atmospheric correction: impact

S1-TOC 1km
20141221
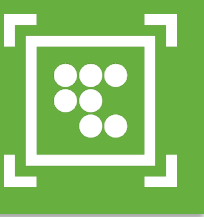X29Y04
BLUE (B0)

PROBA-V C2

PROBA-V C1

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Harmonization of compositing: changes

- C1: Different compositing rule for 1 km & 300/100 m
  - 1 km: rad qual BLUE = RED – NIR
  - 300/100 m: rad qual BLUE – RED – NIR – SWIR

- In 10-day period:
  - only 1 CLEAR observation, but with SWIR = bad
    → cloud observation enters composite, stripe is visible in S10

- C2: all resolutions: rad qual BLUE – RED - NIR

Harmonization of compositing: impact

C2 with change in compositing rule: SM reflects bad quality SWIR

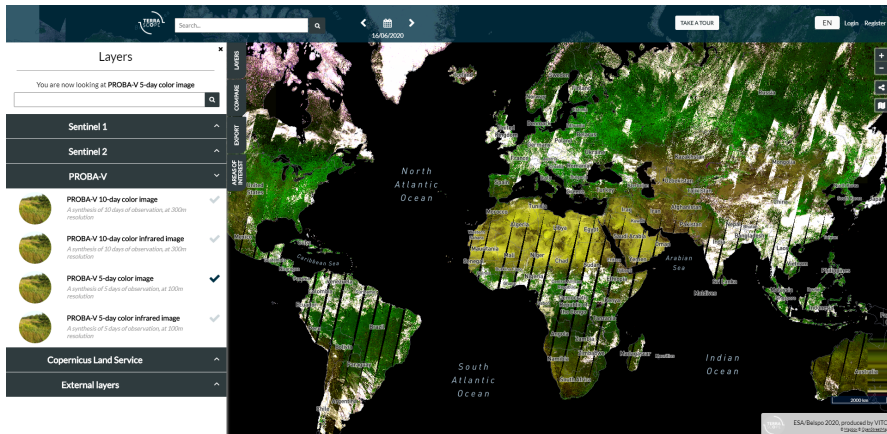C1: good quality SWIR in composite, but cloudy observations are selected
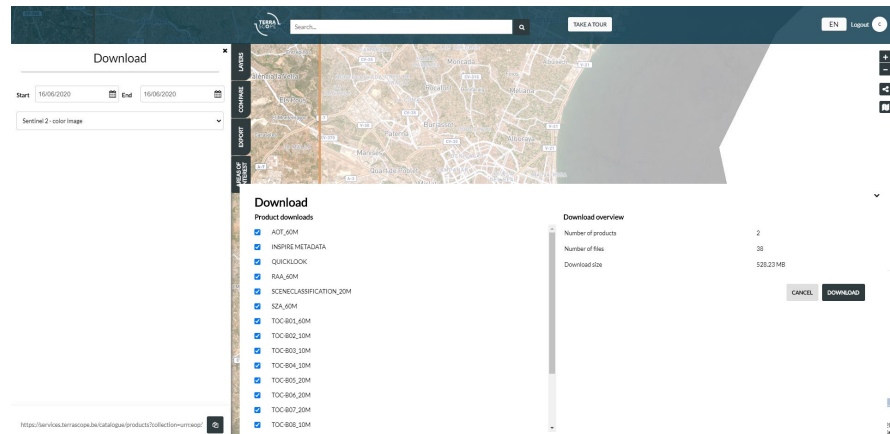
Product format: changes

- C1
  - HDF5 and GeoTIFF
- C2
  - HDF5 and Cloud Optimized GeoTIFF (https://www.cogeo.org/)
  - Update of metadata to allow for threshold compliancy with the CEOS Analysis Ready Data for Land (CARD4L)

New catalogue

New user interface
Integrated time series
Comparison features

New catalogue: OSCARS
Authentication update
(Edugain, Google, Facebook, EOSC)

Current status

- Status of production
  - ✔ 2013 – 2018 – 2019 – 2020: processed
  - 2014: processing ongoing
  - 2015 – 2015 – 2016 – 2017: ready by Q1/2023
- Validation
  - ✔ **Phase I**: Verification
  - ✔ **Phase II**: Analysis of 1 year of data & comparison with external data
    - Report: [Product Evaluation Collection 2 | PROBA-V (vito.be)](#)
    - Poster: Toté et al. (B3.03 PROBA-V and PV-CC)
  - **Phase III**: Validation of full data set (Q1/2023)