

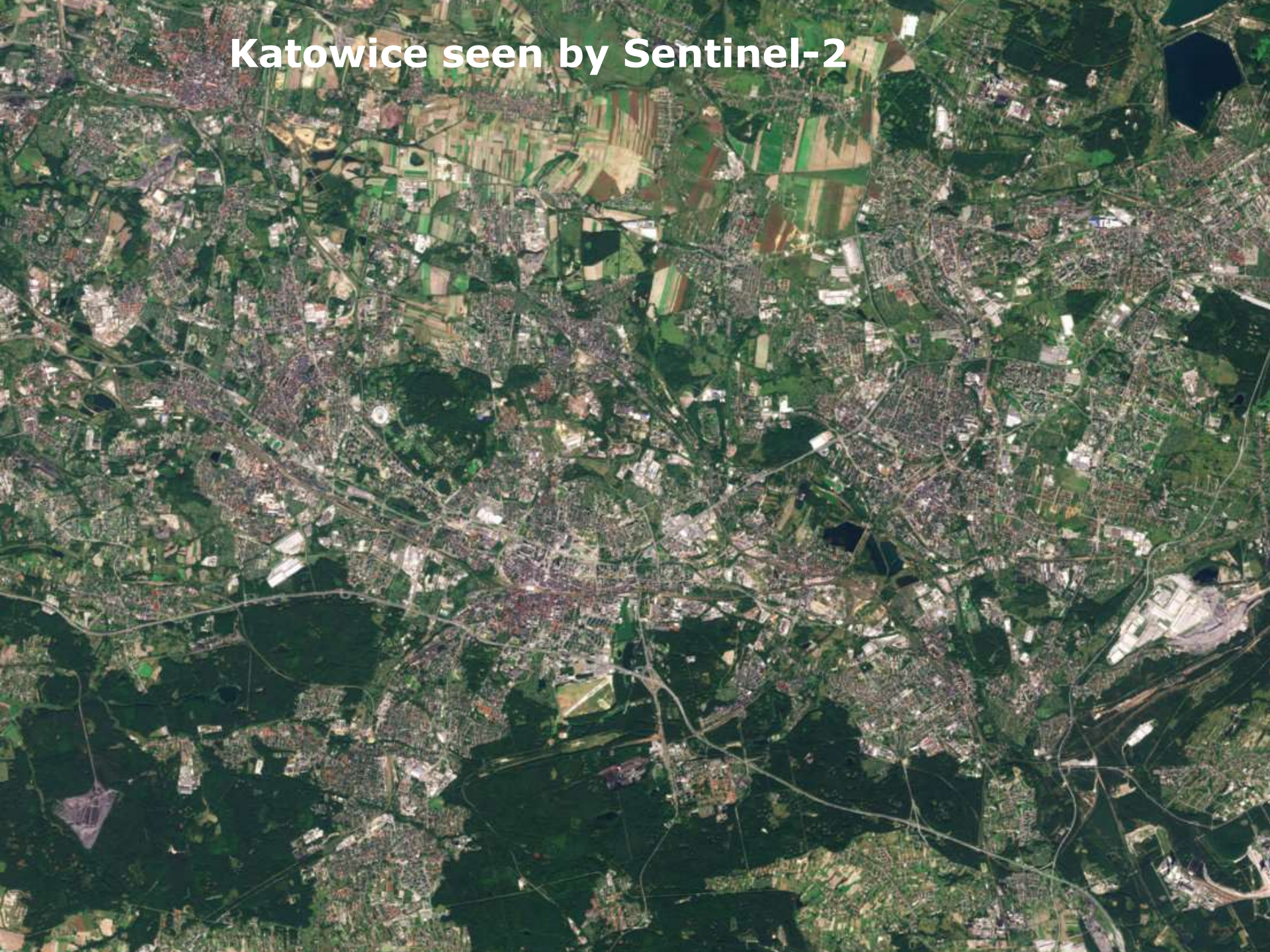
Satellite data providing transparent and independent information

Frank Martin Seifert

ESA Earth Observation Programmes

Transparent Forests @ COP-24 | 5 Dec 2018 | Katowice

Katowice seen by Sentinel-2



Sent-1A/B



Sent-2A/B



Sent-3A/B



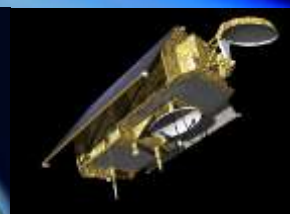
Sent-4A/B



Sent-5/5P



Sent-6/Jason-CS



- Copernicus is a European space flagship programme led by the European Union
- Copernicus provides the necessary data for operational monitoring of the environment and for civil security
- Copernicus consists of an in-situ, a space and a services component, where ESA coordinates the space component
- Data policy: free and open access

➔ <https://scihub.copernicus.eu/>

Core Data from COPERNICUS: the Sentinels



Sentinel-1A / -1B

- night and day radar imaging
- C-band SAR
- 12 days repeat cycle (1 satellite)



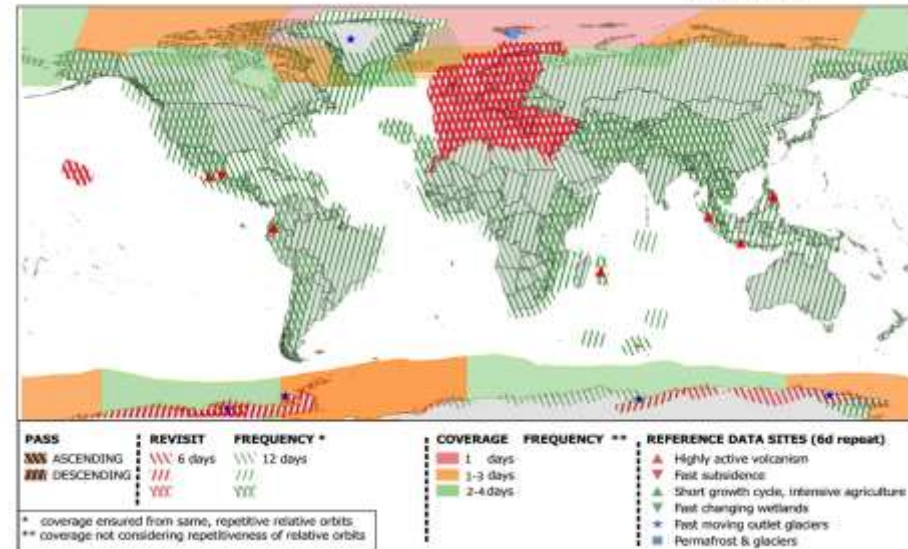
Sentinel-2A / -2B

- multispectral (13 bands)
- 10 days repeat cycle (1 satellite)

Sentinel-1 Constellation Observation Scenario: Revisit & Coverage Frequency



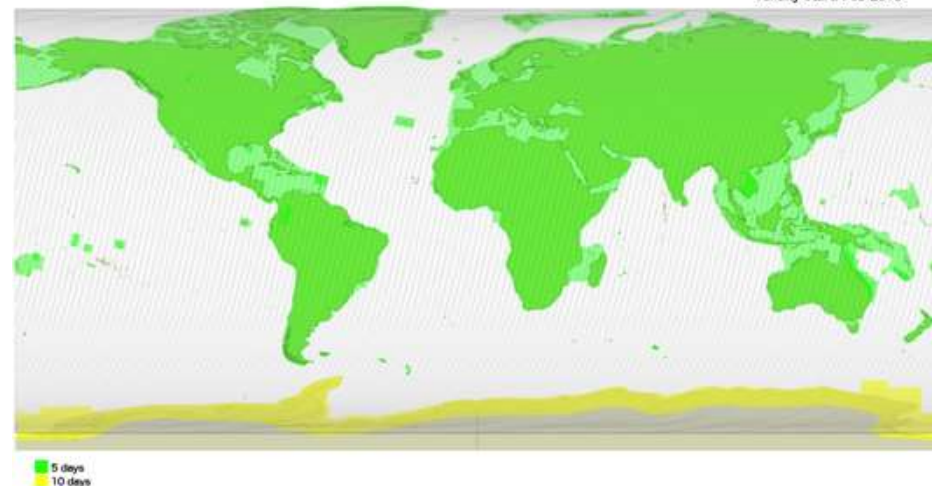
validity start: 02/2018



Sentinel-2 Constellation Observation Scenario: Revisit Frequency



Validity start: Feb 2018



2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Updated September 2018

Current/Past Mission
Future Mission

Radar Sensors

C-band

ERS-1&2 (ESA)

Archive available from 1991

Envisat (ESA)

Sentinel-1A/B/C (ESA)

RADARSAT CONSTELLATION 1/2/3 (CSA)

SAOCOM Series (CONAE)

Data policy to be confirmed

L-band

Optical Sensors

SPOT 1-5 (CNES)

SPOT global archive data older than 5 years is available as core data.
SPOT coverage available over Congo basin 2008 - 2015.

LANDSAT-7/-8/-9 (USGS)

Landsat Archive available from 1972

LS-7 technical/coverage limitations

Sentinel-2A/B/C (ESA)

CBERS Series (INPE/CRESDA)

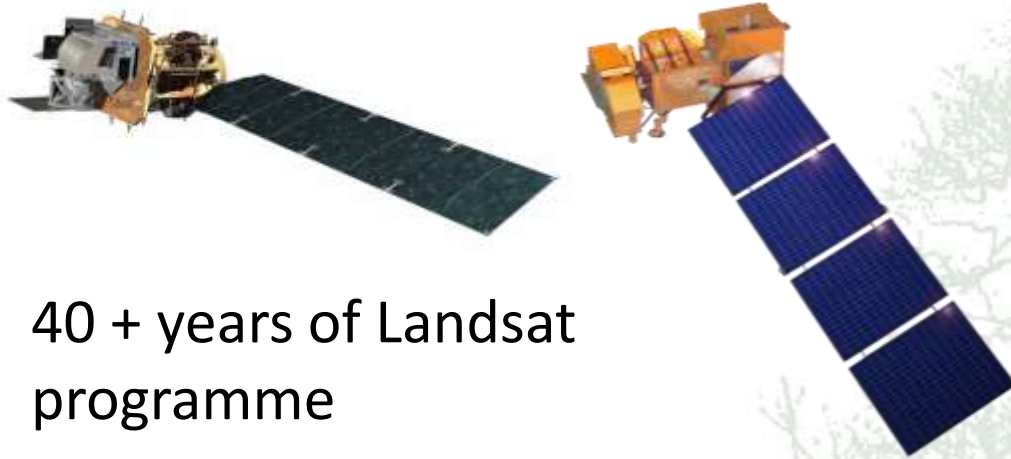
CBERS-4/-4A

Special Core Data Sets

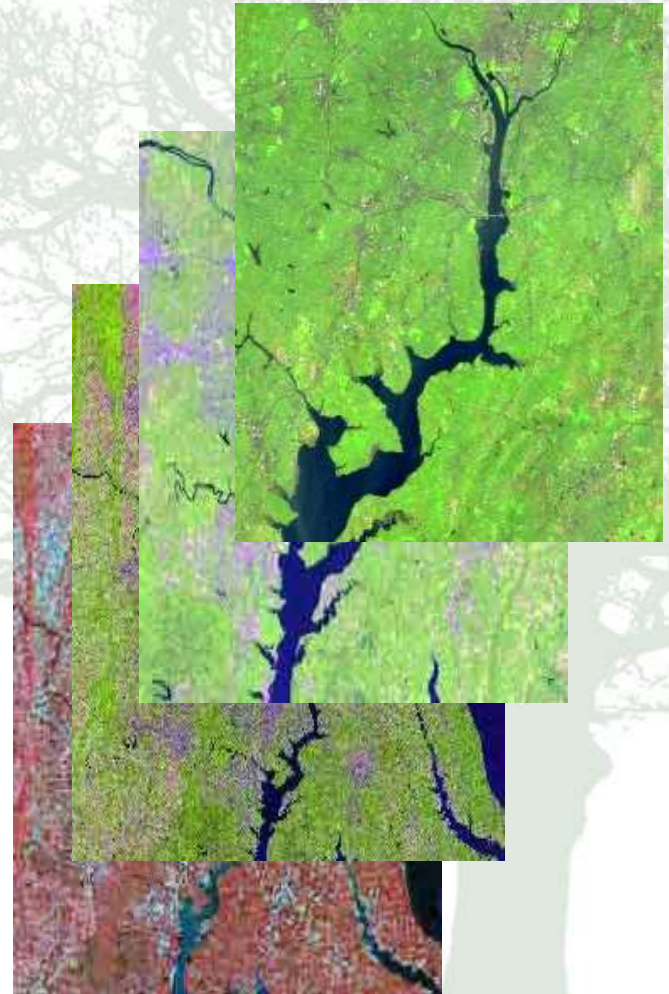
ALOS (JAXA)

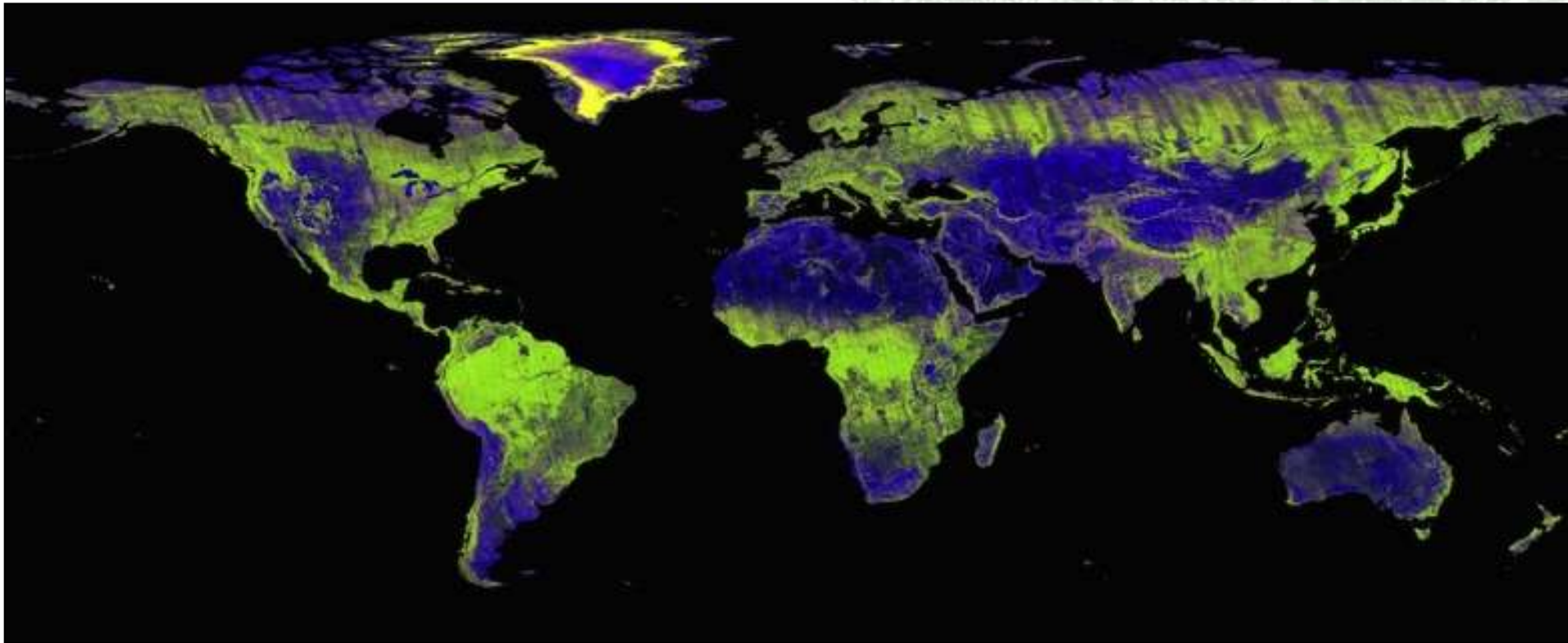
ALOS-2 (JAXA)

2007 - 2010 & 2015 global 25m-resolution PALSAR/PALSAR-2
mosaics and forest/non-forest maps are freely available.



- 40 + years of Landsat programme
- In orbit Landsat 7 & 8 – acquisitions close to 100% of observation capacity over land
- Landsat 9 (fully Class-B rebuild of Landsat 8) for launch in Dec 2020
- Landsat 10 (Class B full spectrum) to launch ~2027-2028





Annual mosaics of PALSAR-2, 25 m resolution, freely available

Gabon Land Cover 2015 and change 2010-2015

Rubber
Plantation



Special Economic Zone



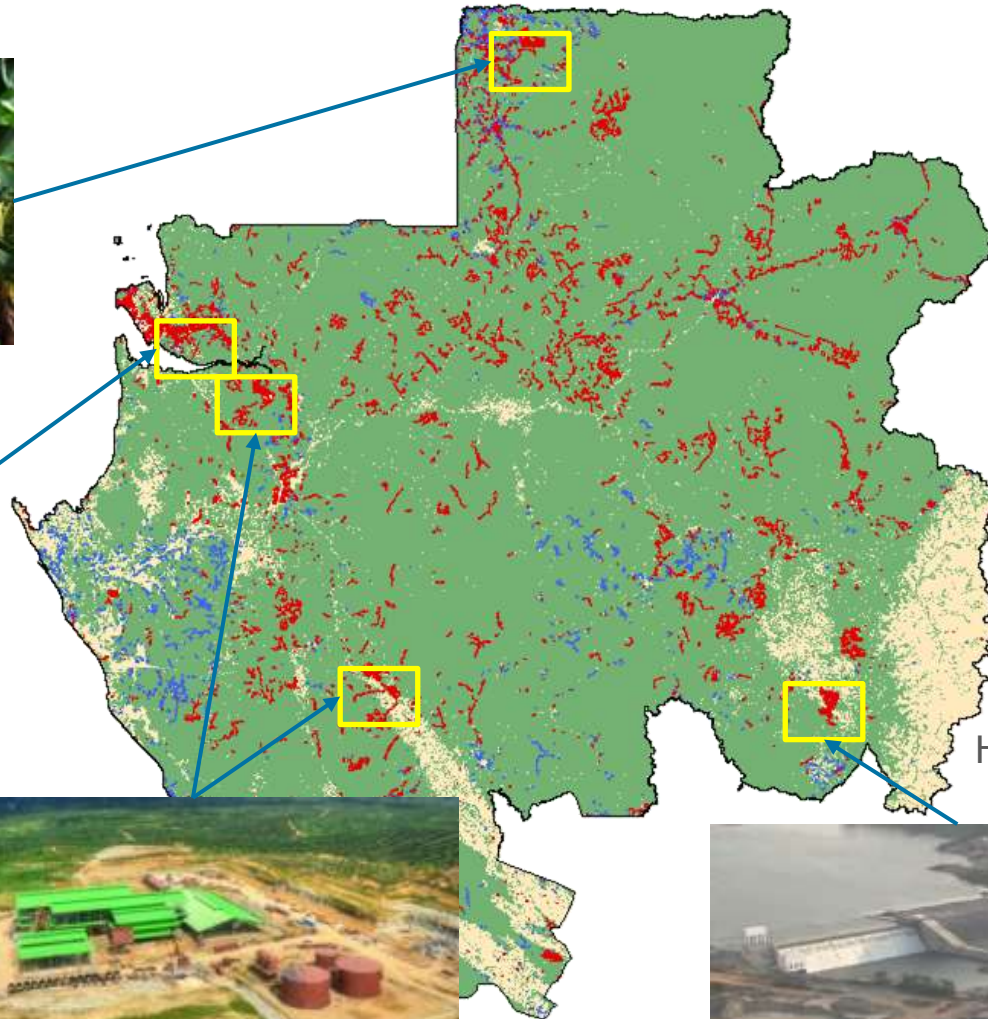
Development of large
agri-business and
infrastructure
projects

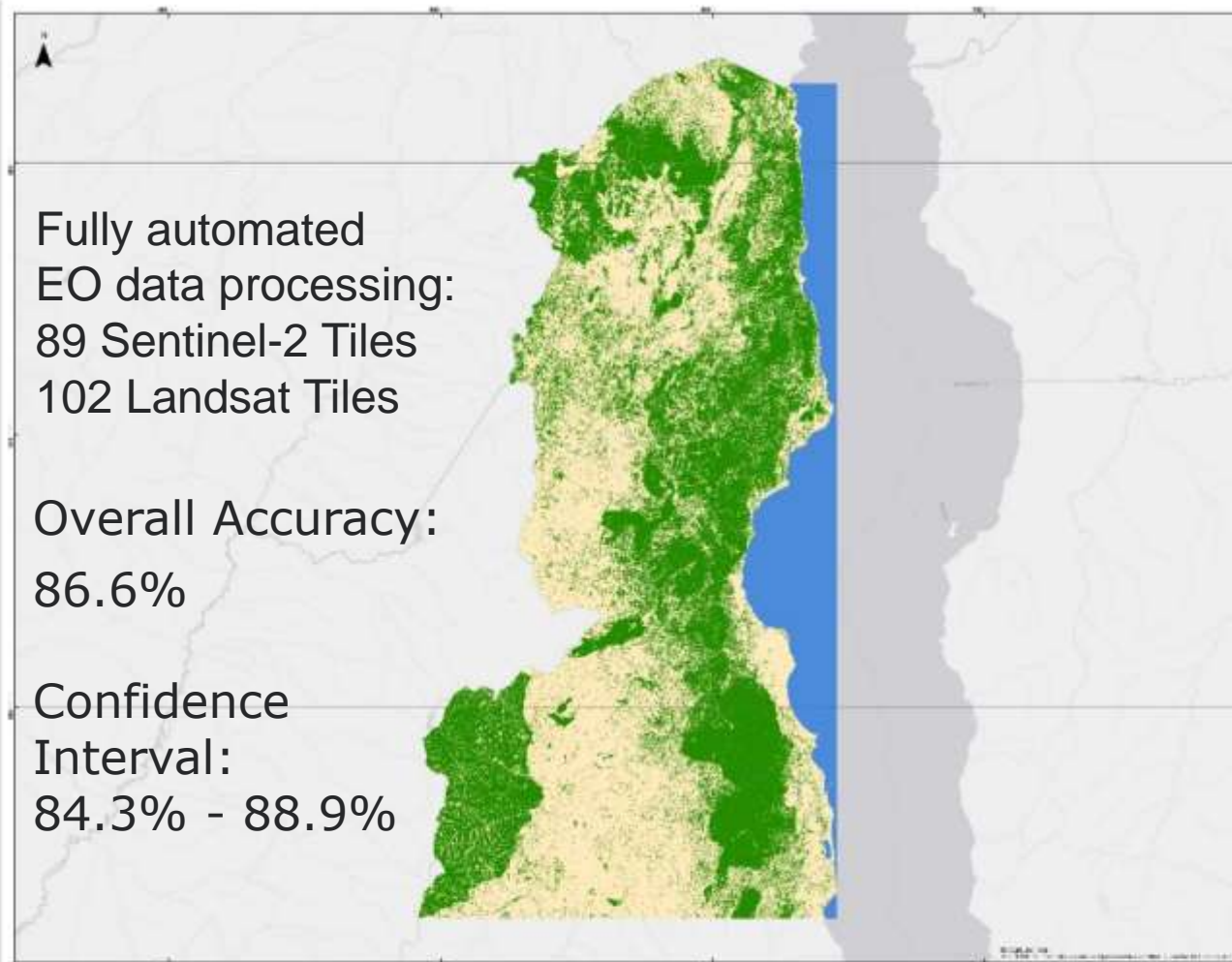


Oil Palm
Plantations



Hydropower
Dam





Fully automated
EO data processing:
89 Sentinel-2 Tiles
102 Landsat Tiles

Overall Accuracy:
86.6%

Confidence
Interval:
84.3% - 88.9%



EO4Africa:
Bringing Earth Observation Services for Monitoring Dynamic
Forest Disturbances to the Users

Map Producer:

GAFAG
GEOGRAPHIC ANALYSIS FOR AFRICA

Interpretation:
The map displays precise Forest Cover information over the Malawi
territorial area of EO4Africa project. The Forest Cover information is
derived from multi-temporal and multi-sensor Earth Observation (EO)
data. Sentinel-2 and Landsat-8 data were integrated into an highly
automated production process.
Mapping results were validated by an stratified random sampling approach.
The statistics analysis revealed an Overall accuracy (OA) of 86.6%.

Source Data:
Landsat-8 images taken between 23.01.2015 and 23.04.2017 / 7 days
provided by the U.S. Geological Survey.
Sentinel-2 images taken between 27.02.2016 and 22.12.2016 data
provided by the European Space Agency.

Vector Data: None used.

Background Map: © 2017 Google

Legend

Forest
Non-Forest
Water

Overview map

Map extent

The EO4Africa Project aims to offer operational Earth Observation (EO)
based tropical forest monitoring services to support countries and a wide
range of users with accurate relevant forest information data for their
management and reporting requirements.
This project has received funding from the European Union's Horizon 2020
research and innovation programme under grant agreement No 645791.

More information please under <http://www.eo4africa.info>



European
Commission

Horizon 2020
European Union Funding
for Research & Innovation

Project lead by:

GAFAG
GEOGRAPHIC ANALYSIS FOR AFRICA

EOMonDis

Coordinate System: WGS_1984 (UT Zone 38E)
with GCRF - 2000meters interval
Datum: WGS 1984
Ellipsoid: GRS80
Datum Shift: 502000.0
Semi-Major Axis: 6378137.0
Scale Factor: 0.9998
Latitude of Origin: 0.00
UT to Merc

Printed on: 20.11.2017
Version: 1.2

FOREST COVER MAP OF MALAWI - Status 2016

0 10 20 30 40 50 60 70 80 90 100 km

EO4Africa project is implemented by a Consortium:

GAFAG
GEOGRAPHIC ANALYSIS FOR AFRICA

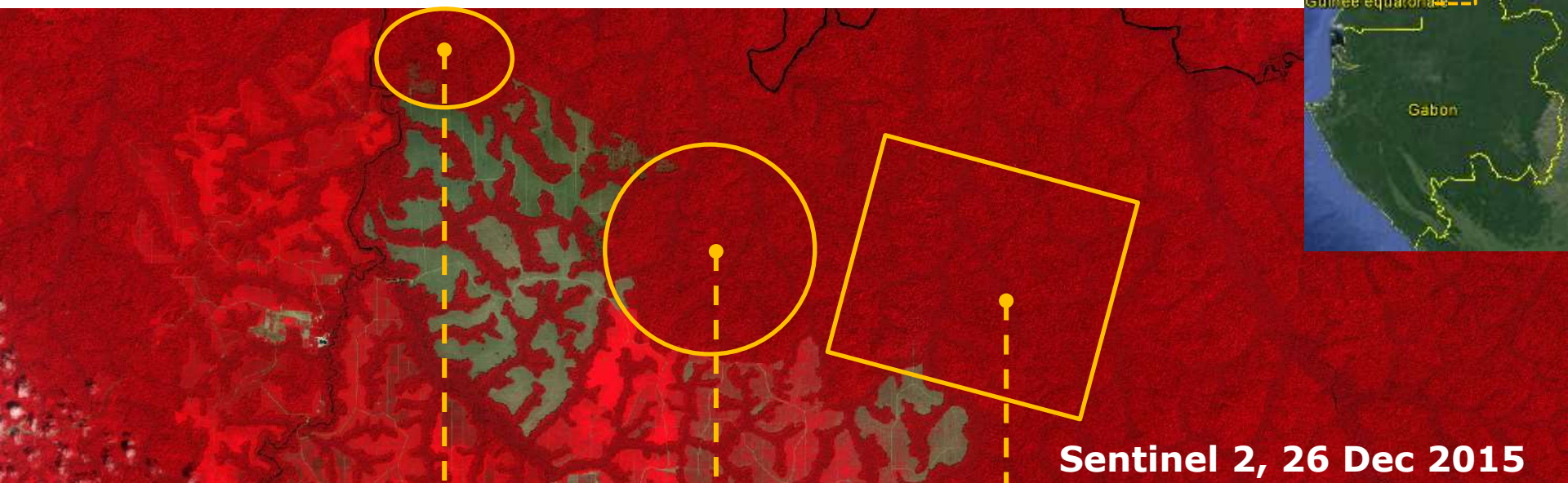
SIRS
SIRIUS

JOHANNES RESEARCH
JOHANNES

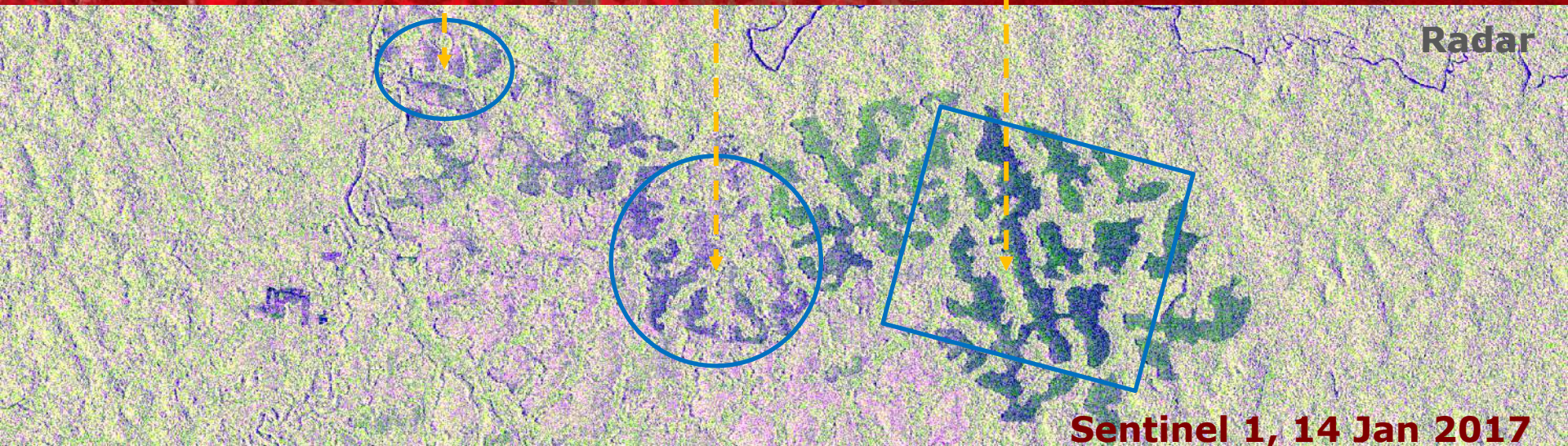
ESSIO
ESSIO

TELESPAZIO
A LEONARDO AND TRUST COMPANY

Monitoring of Expansion of Rubber Plantation with Sentinel-2 / Sentinel-1



Sentinel 2, 26 Dec 2015

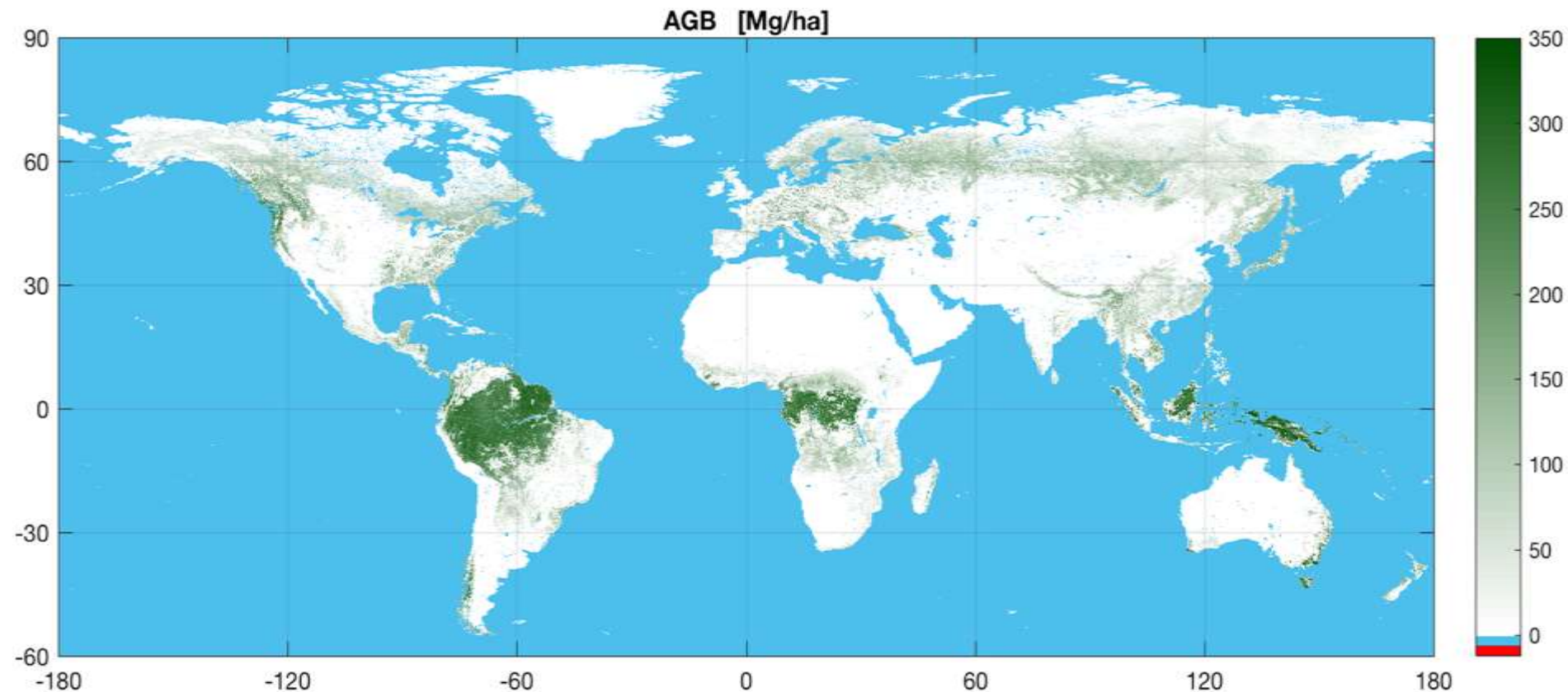


Radar

Sentinel 1, 14 Jan 2017

ESA UNCLASSIFIED - For Official Use

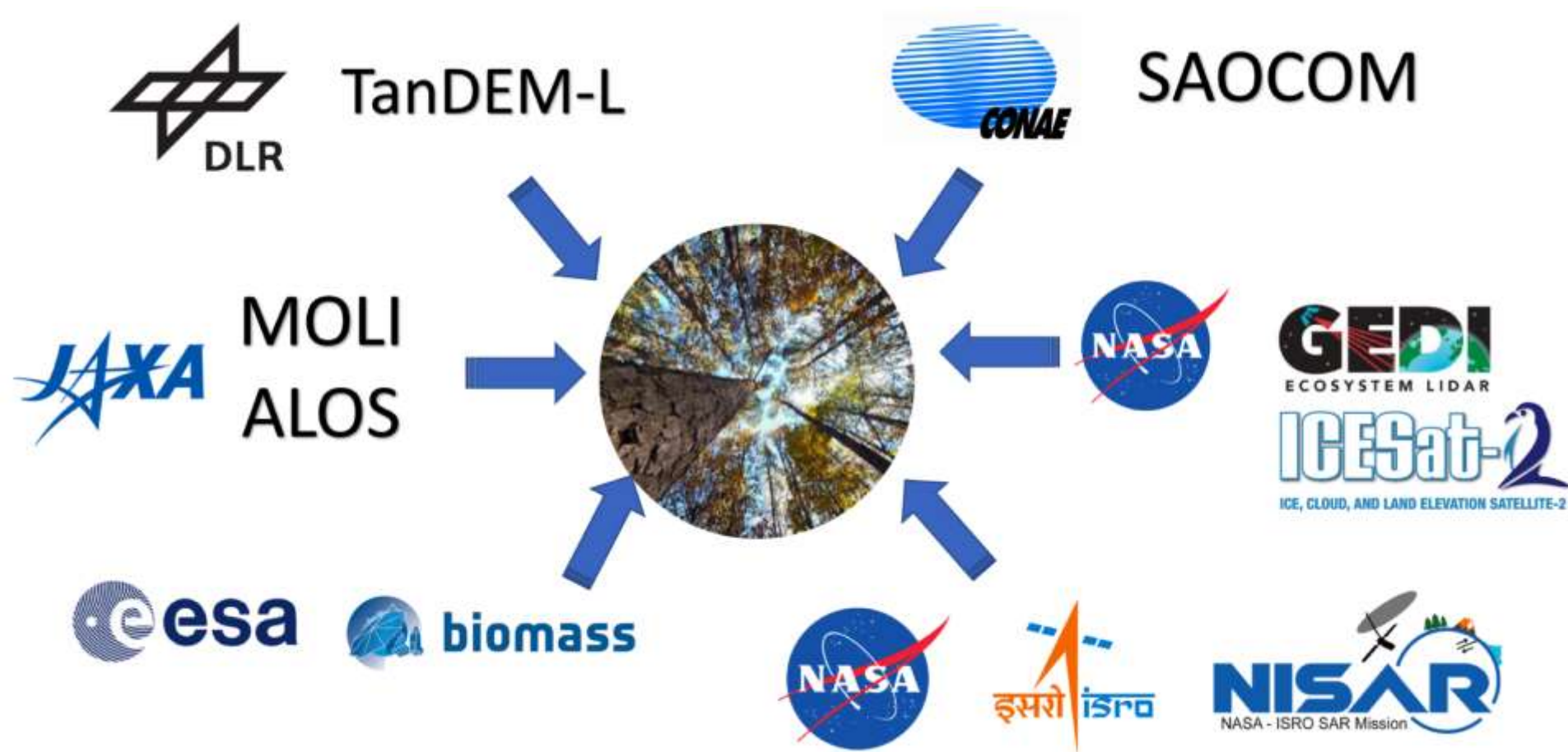
Frank Martin Seibert | 09/11/2017 | Slide 16



Global AGB (Mg/ha) at 100m resolution in 2010

➔ <http://globbiomass.org/products/global-mapping/>

Golden Age for Biomass



- Satellite data provide **transparency** and enable **comparability** in forest monitoring;
 - Today **globally all forests** are covered multiple times with optical and radar sensors annually enabling operational forest monitoring world-wide;
 - EO data availability is secured for the **next decades**, where wall-to-wall mapping can be based on a **free and open data policy**;
- ➔ **GFOI is ready to share and collaborate**