Introducing the Forest Canopy Disturbance Monitoring (FCDM) Tool

FCDM-optical and FCDM-radar Monitoring Approaches

GEO GFOI WORKSHOP

16.-17.06.2021

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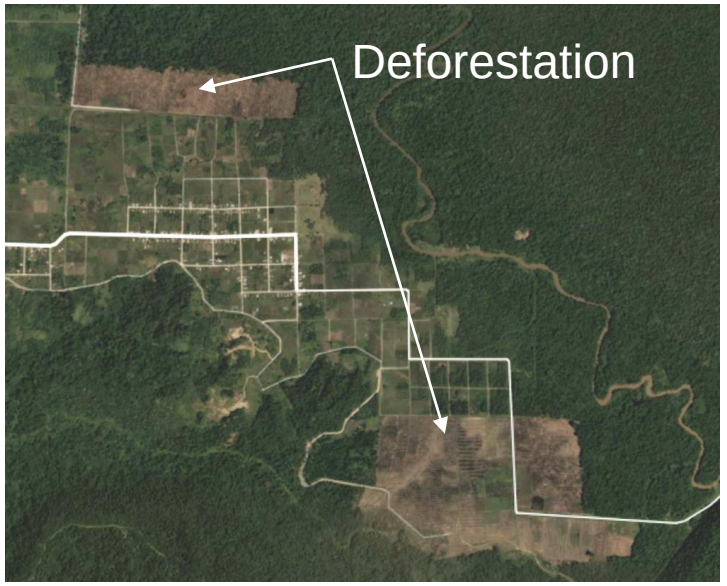
JRC.D1

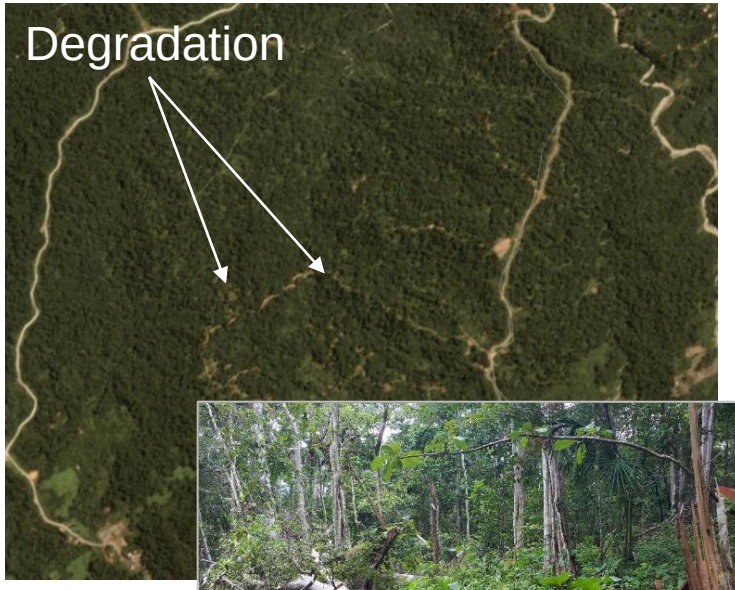
Challenges of Monitoring Disturbances

Problems to detect forest disturbances/ degradation

- Small-scale signal (e.g. removal of single trees)
- Weak signal (low signal-to-noise ratio)
- Signal only detectable over a short period due to
  - Fast vegetation regrowth in tropics
  - Frequent cloud coverage in tropics
- Differentiation between natural phenological changes (e.g. seasonality) and actual disturbance events

→ **FCDM targets the detection of small-scale and short duration disturbances** that are not accurately detected by other approaches



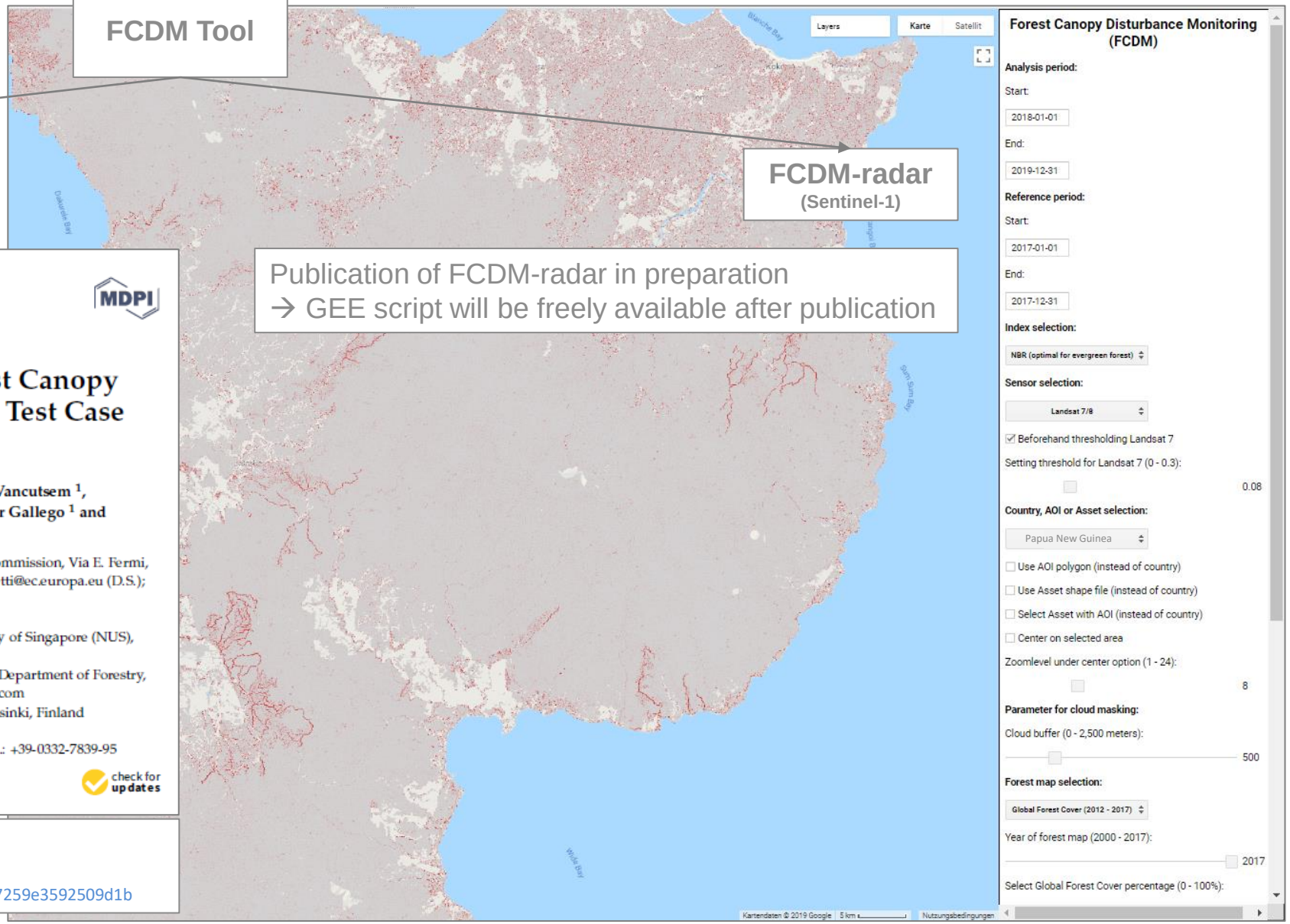


GUI of FCDM Tool in Google Earth Engine

FCDM Tool

FCDM-optical
(Landsat, Sentinel-2)

FCDM-radar
(Sentinel-1)



Publication of FCDM-radar in preparation
→ GEE script will be freely available after publication

remote sensing

MDPI

Article

Towards Operational Monitoring of Forest Canopy Disturbance in Evergreen Rain Forests: A Test Case in Continental Southeast Asia

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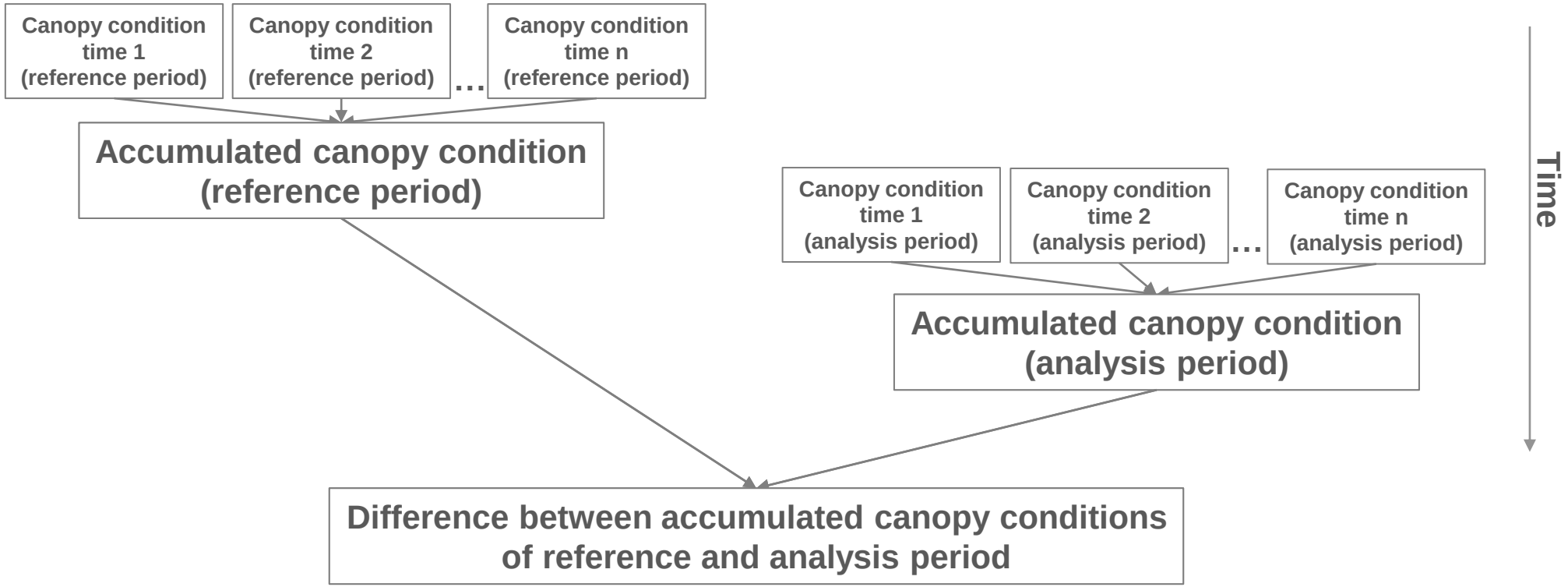
check for updates

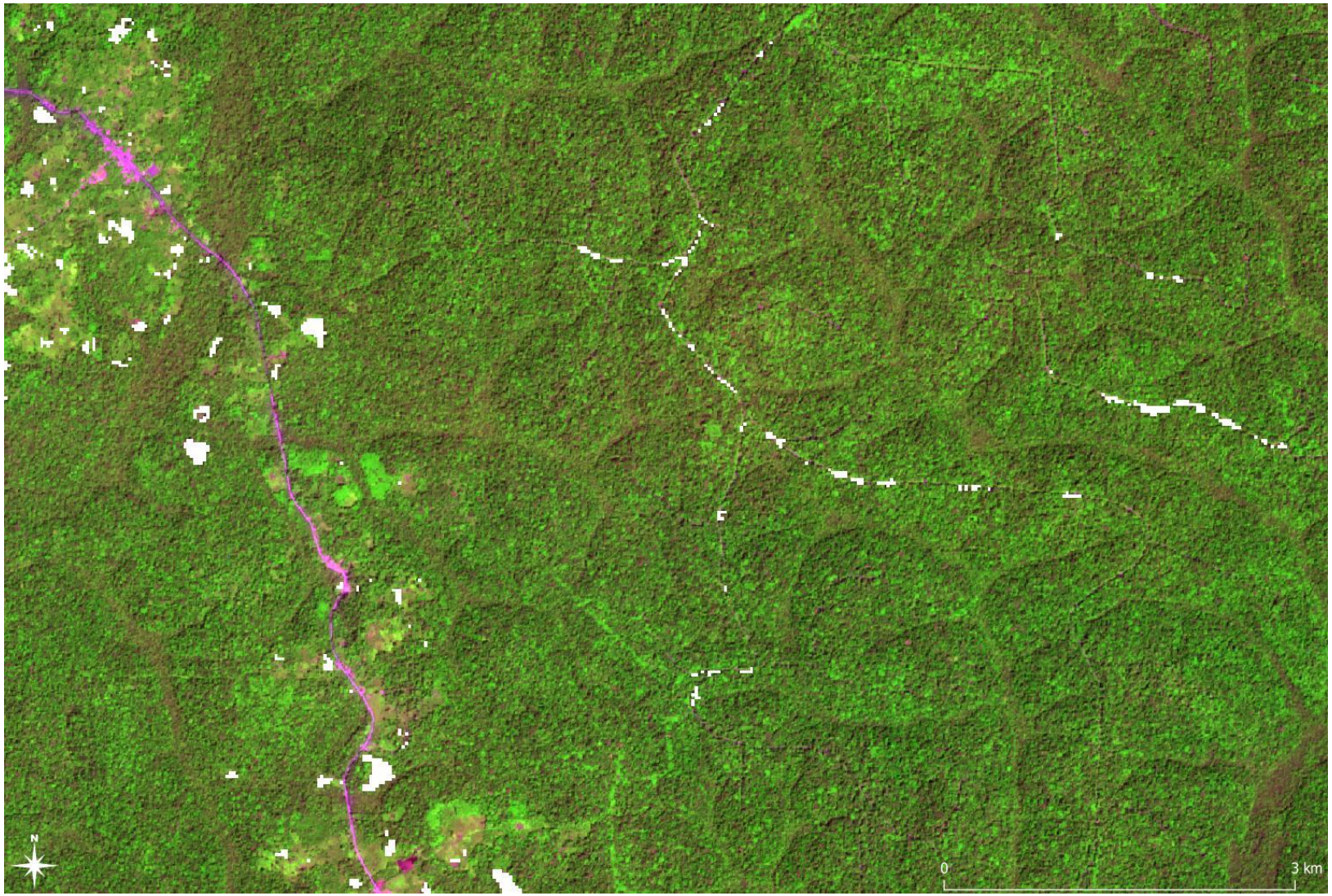
→ GEE script is freely available
Paper: http://www.mdpi.com/2072-4292/10/4/544
Script v2.4.1: https://code.earthengine.google.com/c08ef143fa94c22bc7259e3592509d1b

Basic Concept of the two FCDM Methodologies



	Reference period	Analysis period	FCDM result
Canopy Opening	No	Yes	Disturbance
	Yes	No	Regrowth*
	Yes	Yes	No change
	No	No	No change

Comparison of Different Monitoring Approaches (GFW)

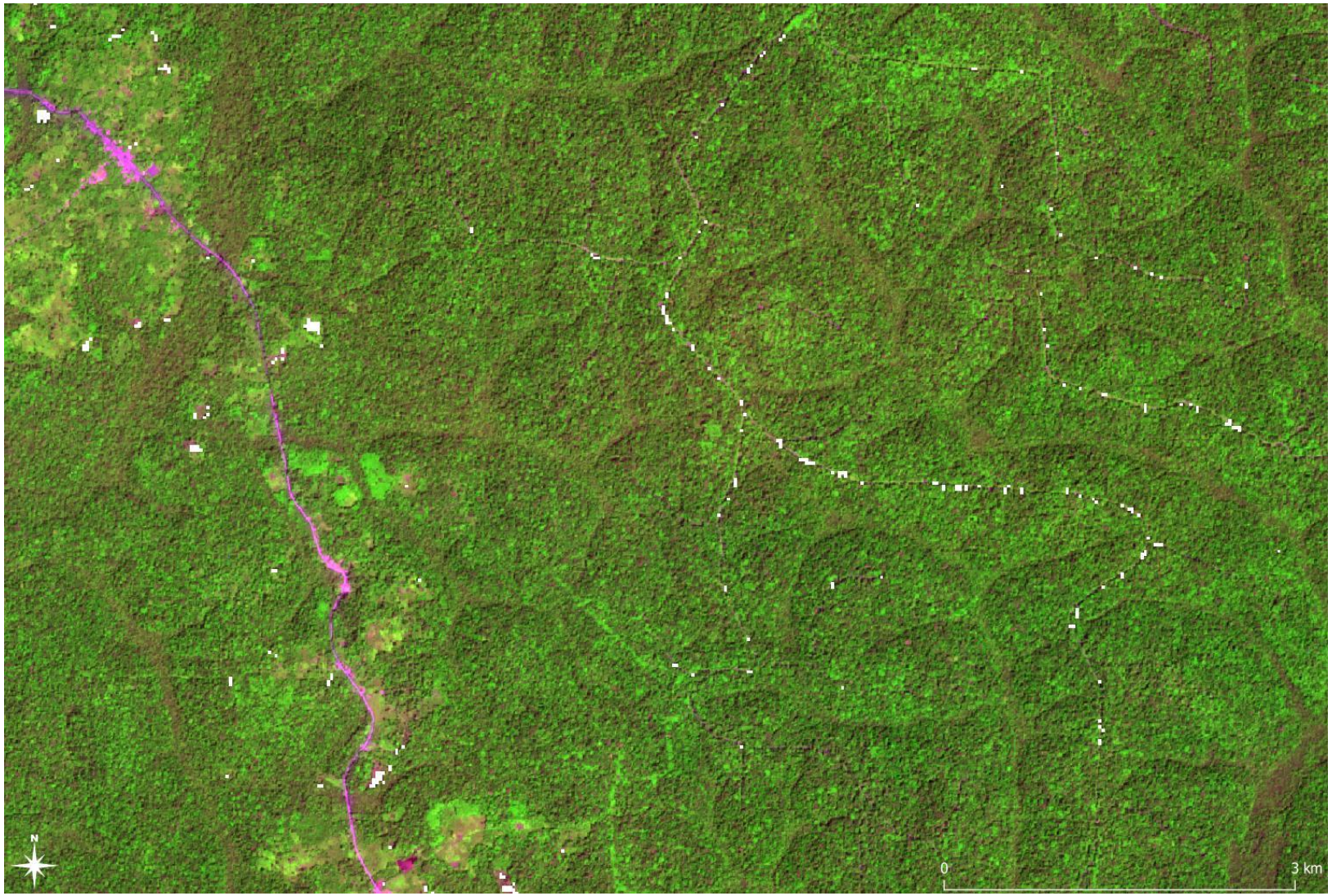


Cameroon:
Analysis period:
01.01.2020 – 31.12.2020

- Planet data (01.12.2020)
- GFW loss 2020

European Commission

Comparison of Different Monitoring Approaches (GLAD)



Cameroon:
Analysis period:
01.01.2020 – 31.12.2020

- Planet data (01.12.2020)
- GFW loss 2020
- GLAD alerts 2020

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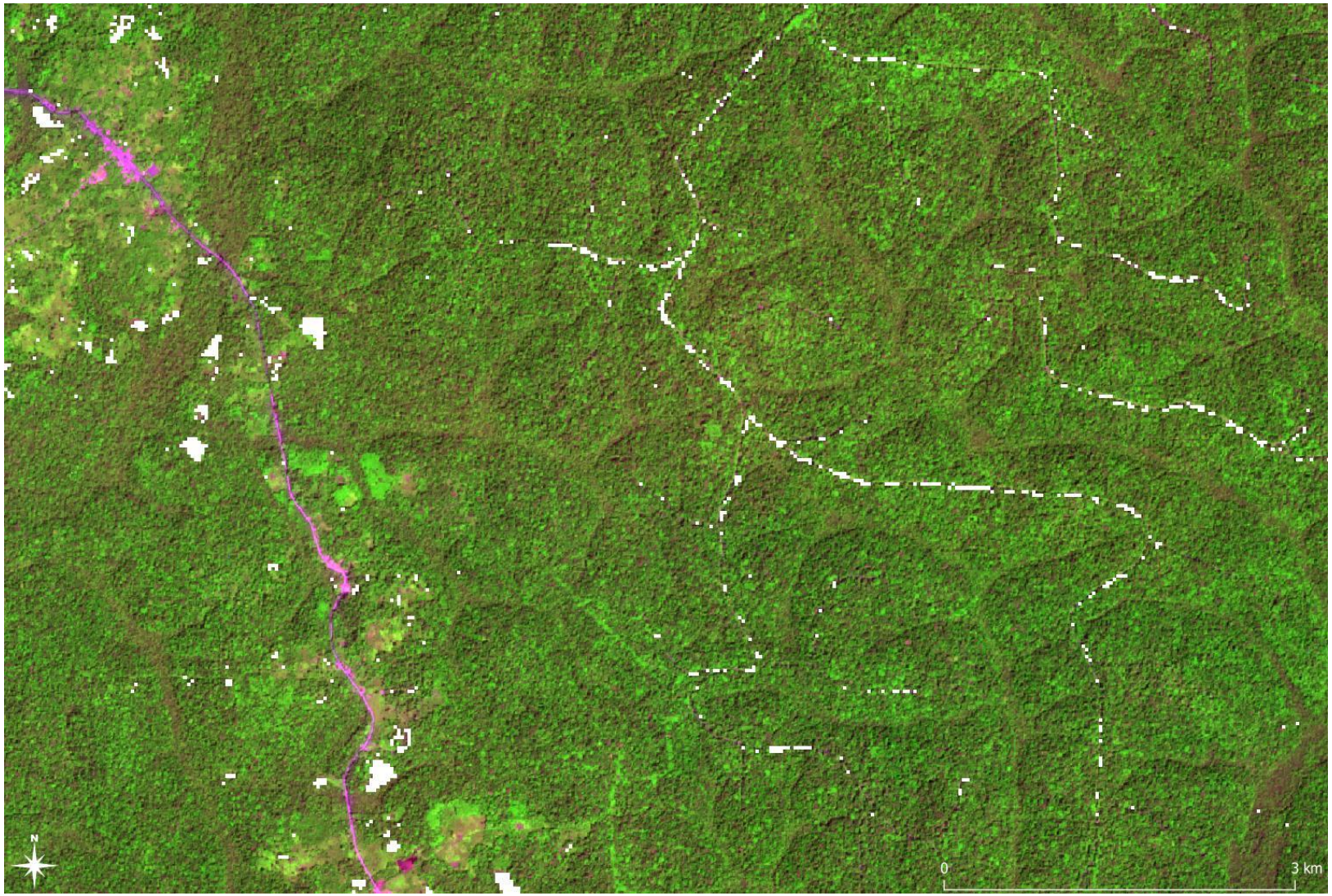
Comparison of Different Monitoring Approaches (TMF)



Cameroon:
Analysis period:
01.01.2020 – 31.12.2020

- Planet data (01.12.2020)
- GFW loss 2020
- GLAD alerts 2020
- TMF 2020

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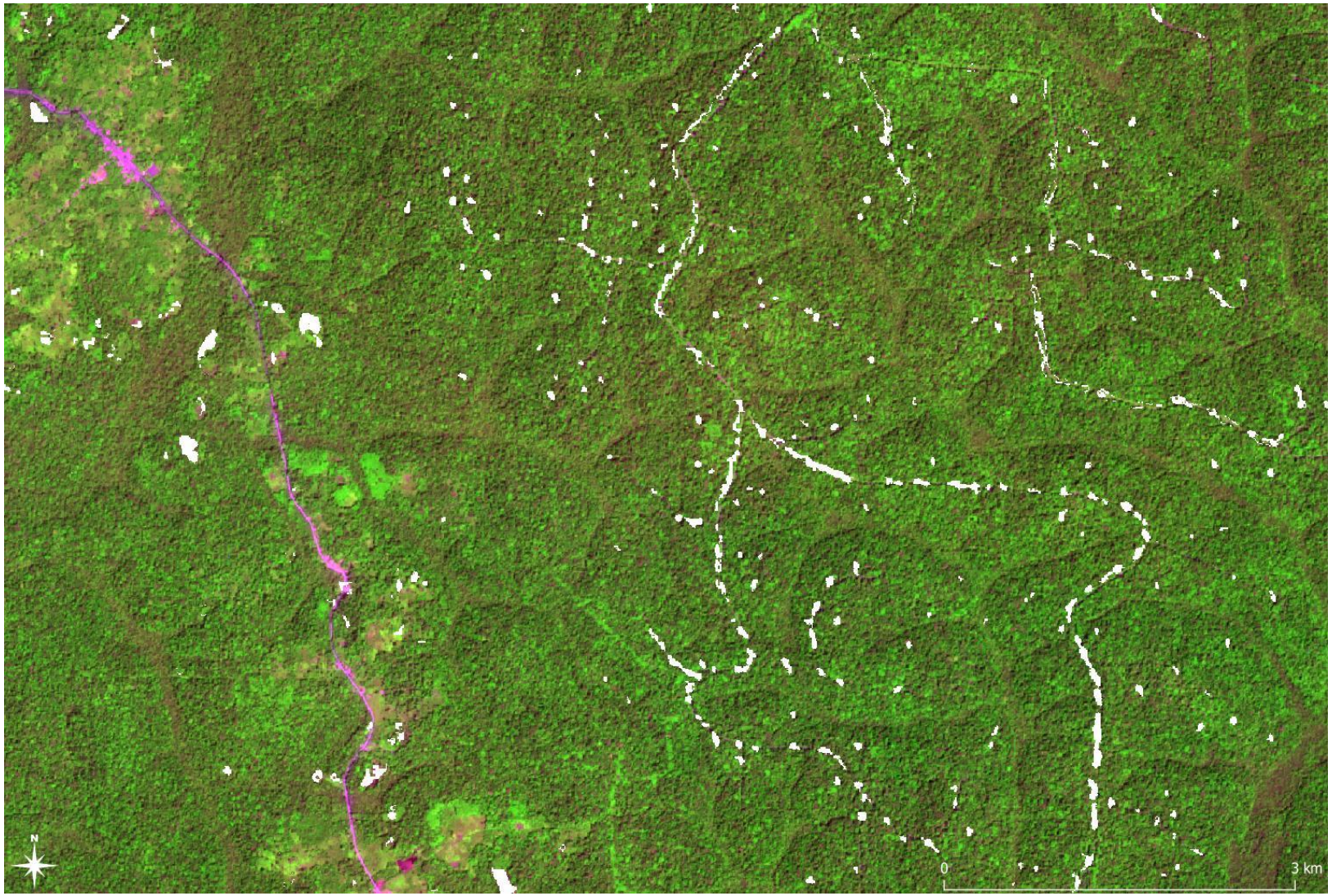
Comparison of Different Monitoring Approaches (RADD)



Cameroon:
Analysis period:
01.01.2020 – 31.12.2020

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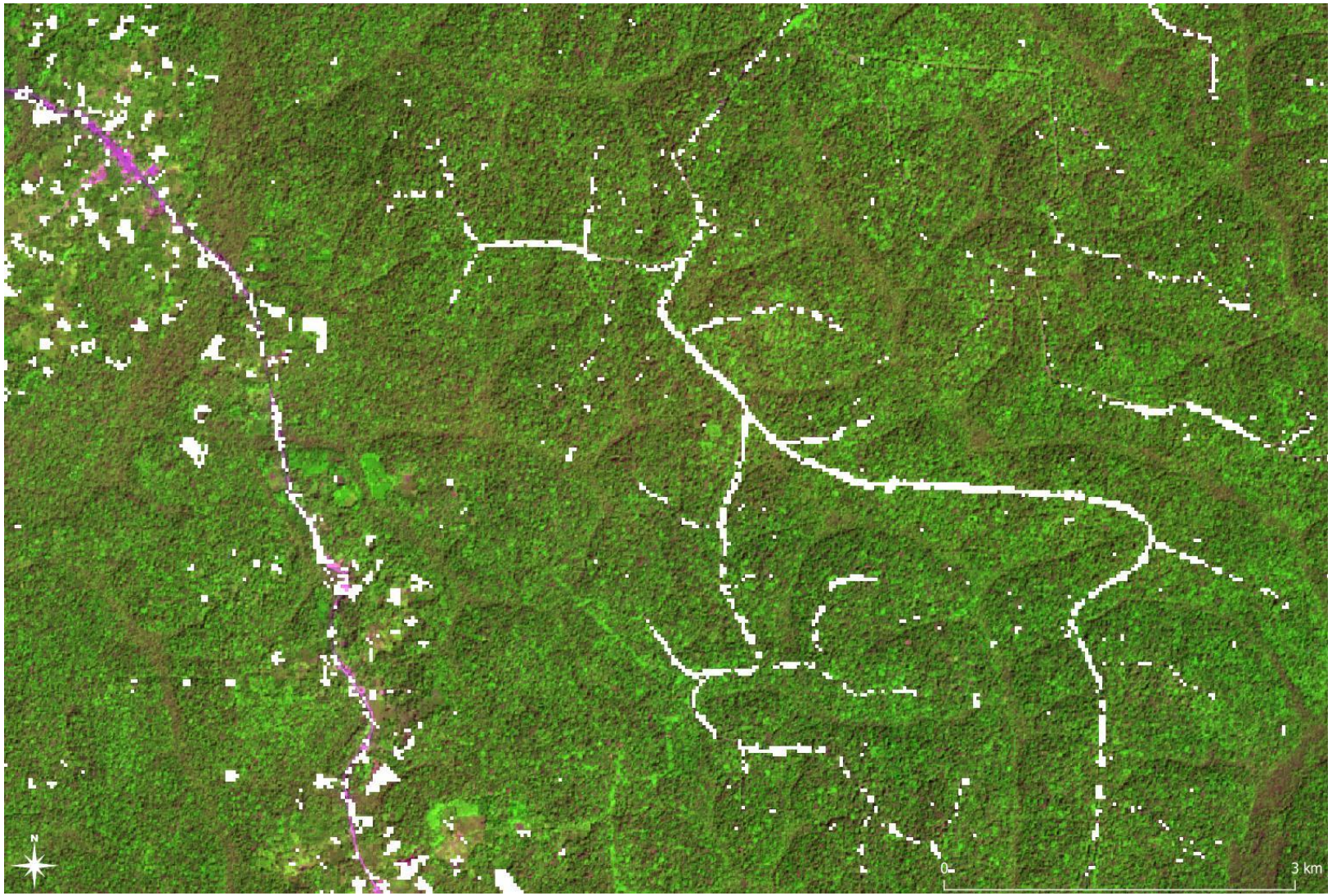
- GFW loss 2020
- GLAD alerts 2020
- TMF 2020
- RADD alerts 2020

European Commission

Comparison of Different Monitoring Approaches (FCDM)



Cameroon:
Analysis period:
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- Planet data (01.12.2020)
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- TMF 2020
- RADD alerts 2020

- FCDM-optical (L7/ L8) 2020

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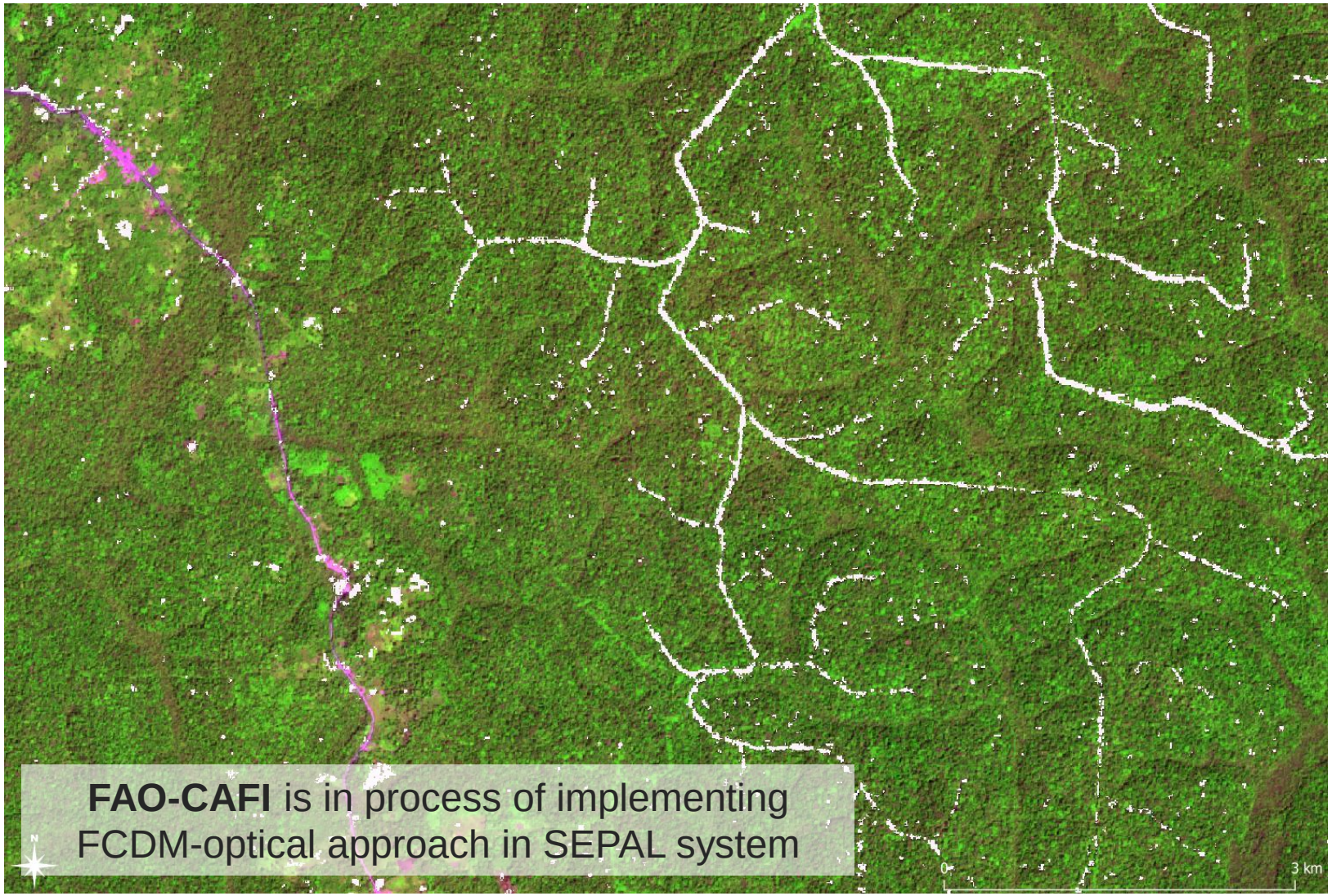
Comparison of Different Monitoring Approaches (FCDM)



FAO-CAFI is in process of implementing FCDM-optical approach in SEPAL system

Cameroon:
Analysis period:
01.01.2020 – 31.12.2020

- Planet data (01.12.2020)
- GFW loss 2020
- GLAD alerts 2020
- TMF 2020
- RADD alerts 2020

- FCDM-optical (L7/ L8) 2020
- FCDM-optical (S2) 2020

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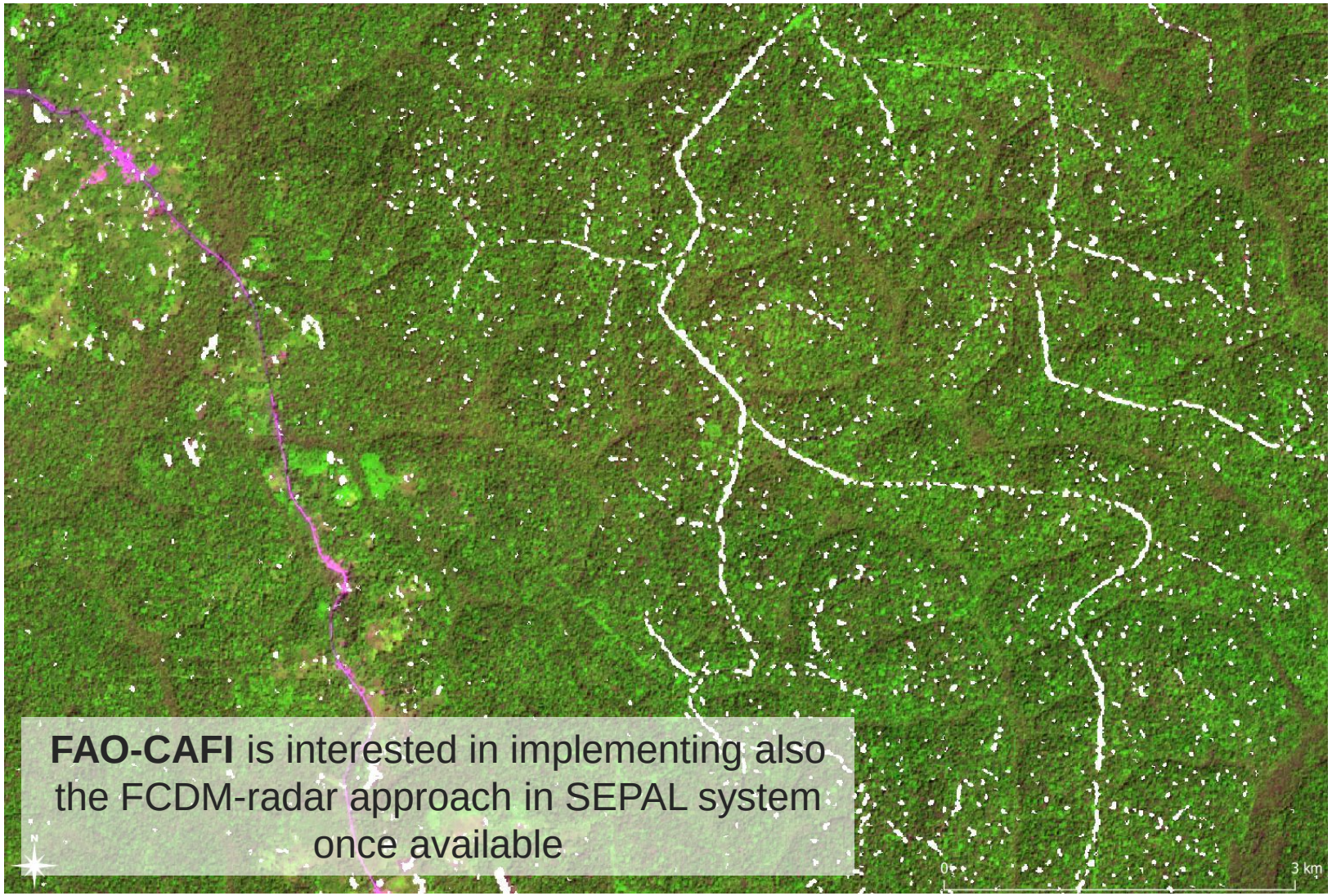
Comparison of Different Monitoring Approaches (FCDM)



FAO-CAFI is interested in implementing also the FCDM-radar approach in SEPAL system once available

Cameroon:
Analysis period:
01.01.2020 – 31.12.2020

- Planet data (01.12.2020)
- GFW loss 2020
- GLAD alerts 2020
- TMF 2020
- RADD alerts 2020

- FCDM-optical (L7/ L8) 2020
- FCDM-optical (S2) 2020
- FCDM-radar (S1) 2020

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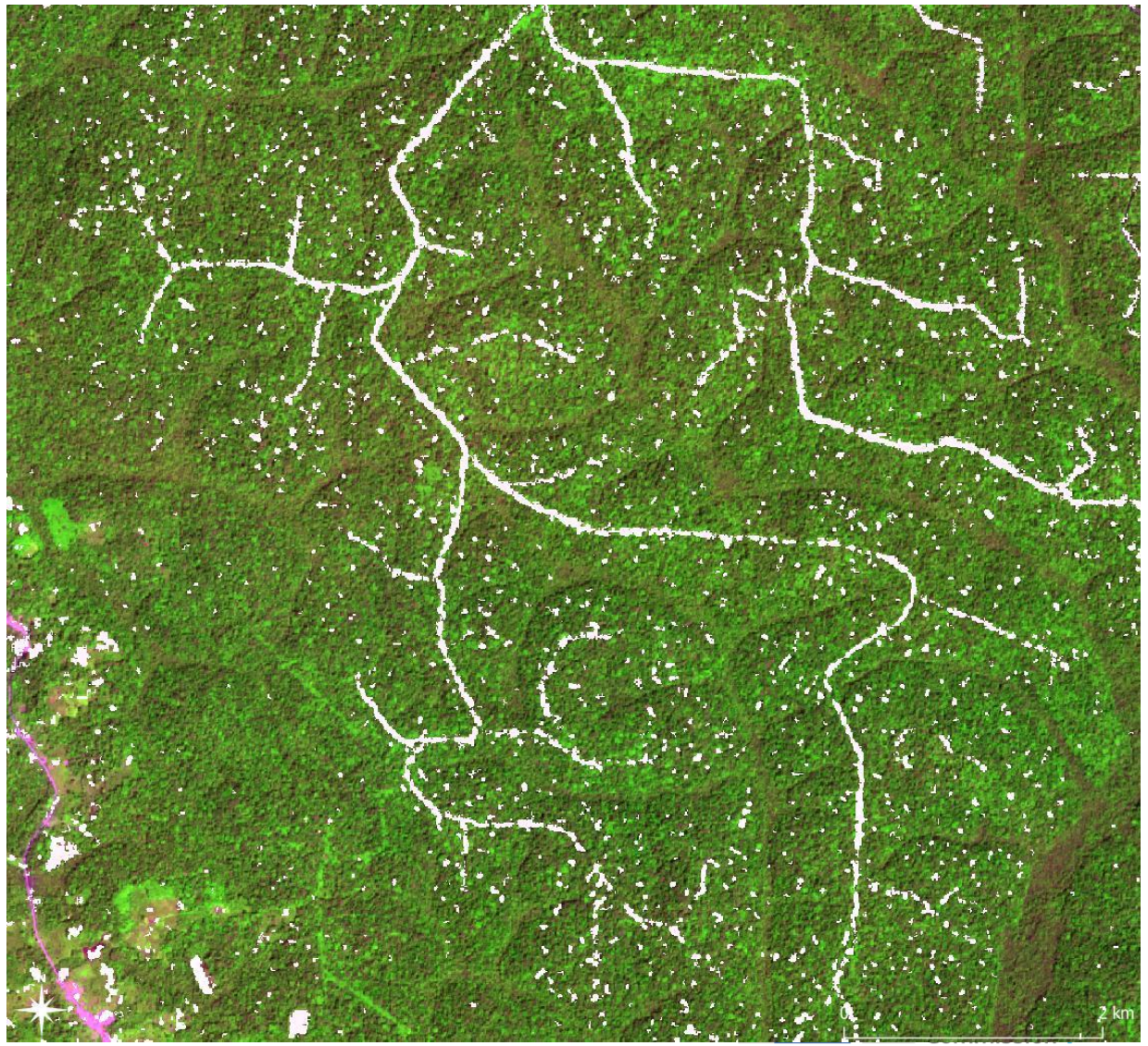
Comparison of Different Monitoring Approaches

GFW, GLAD, TMF, RADD for the year 2020

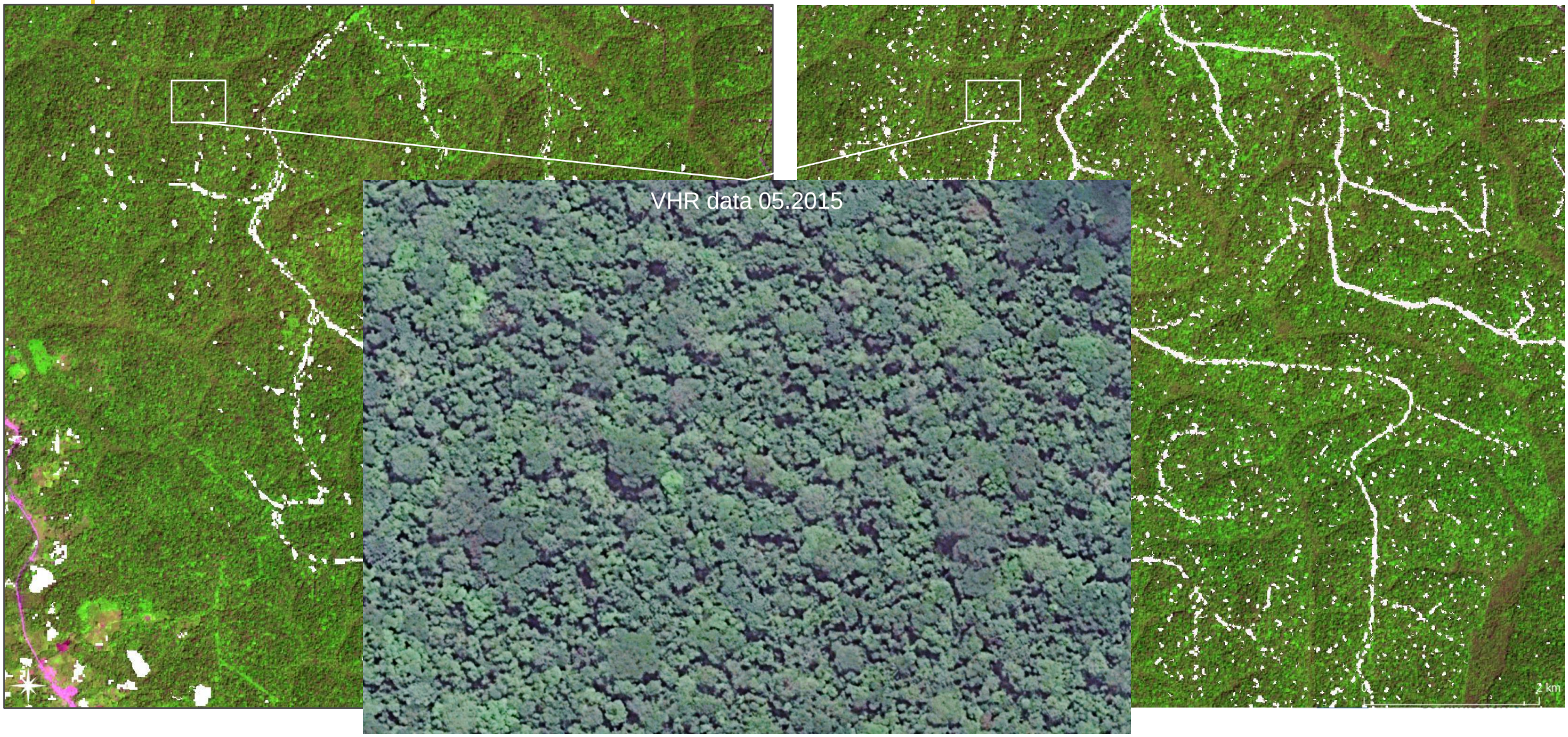
FCDM-optical (S2), FCDM-radar (S1) for the year 2020



Comparison of Different Monitoring Approaches

GFW, GLAD, TMF, RADD for the year 2020

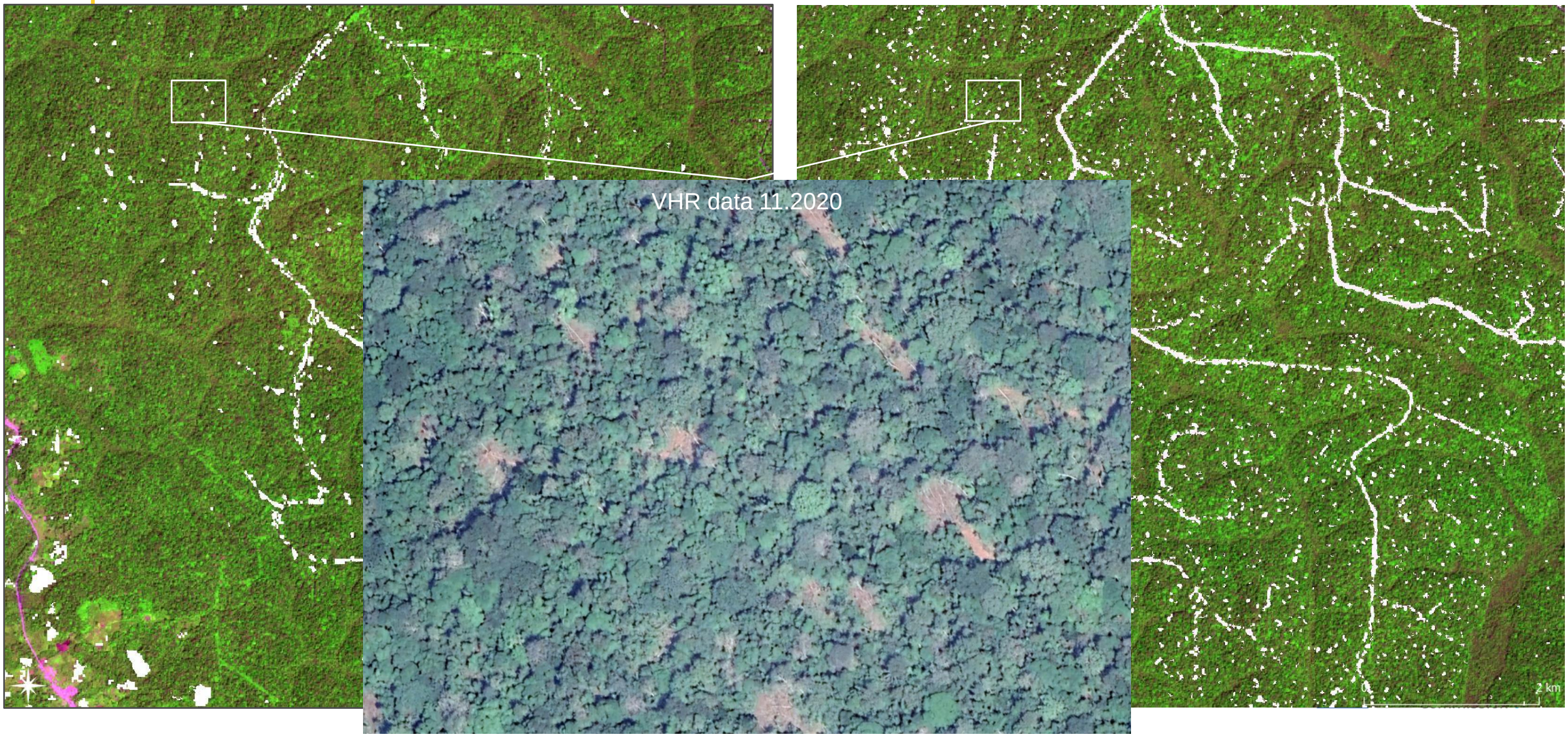
FCDM-optical (S2), FCDM-radar (S1) for the year 2020



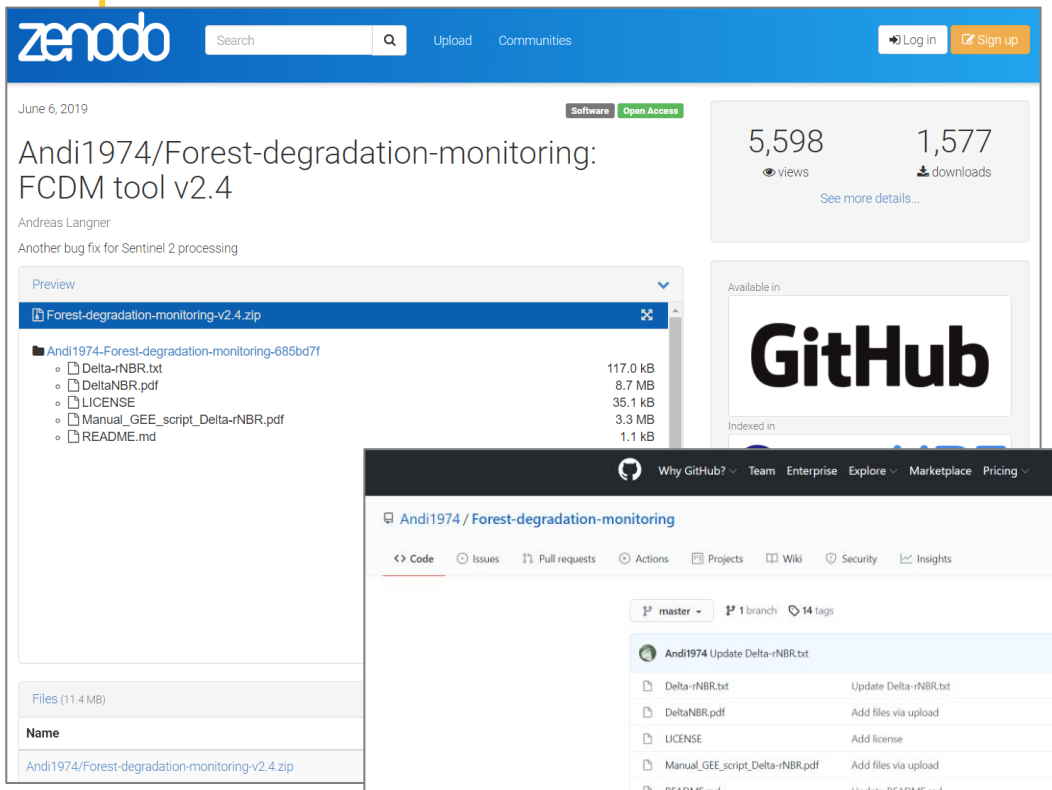
Comparison of Different Monitoring Approaches

GFW, GLAD, TMF, RADD for the year 2020

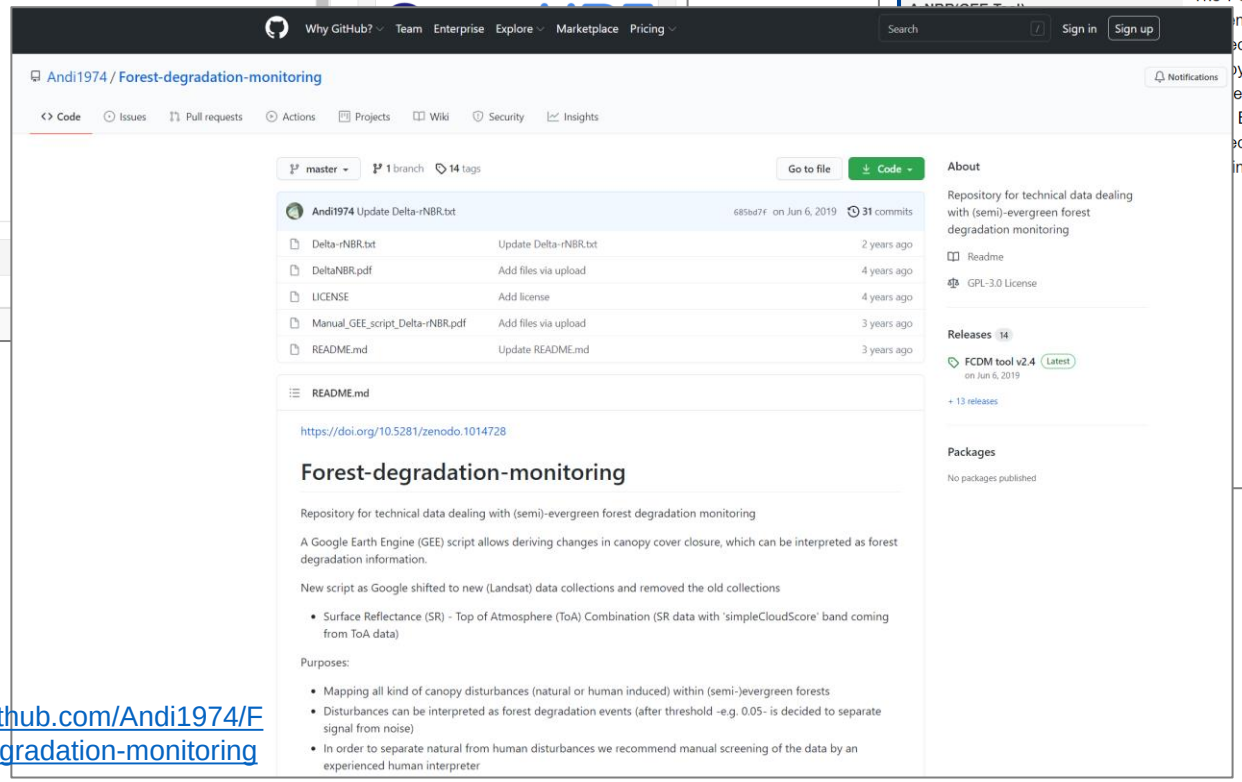
FCDM-optical (S2), FCDM-radar (S1) for the year 2020



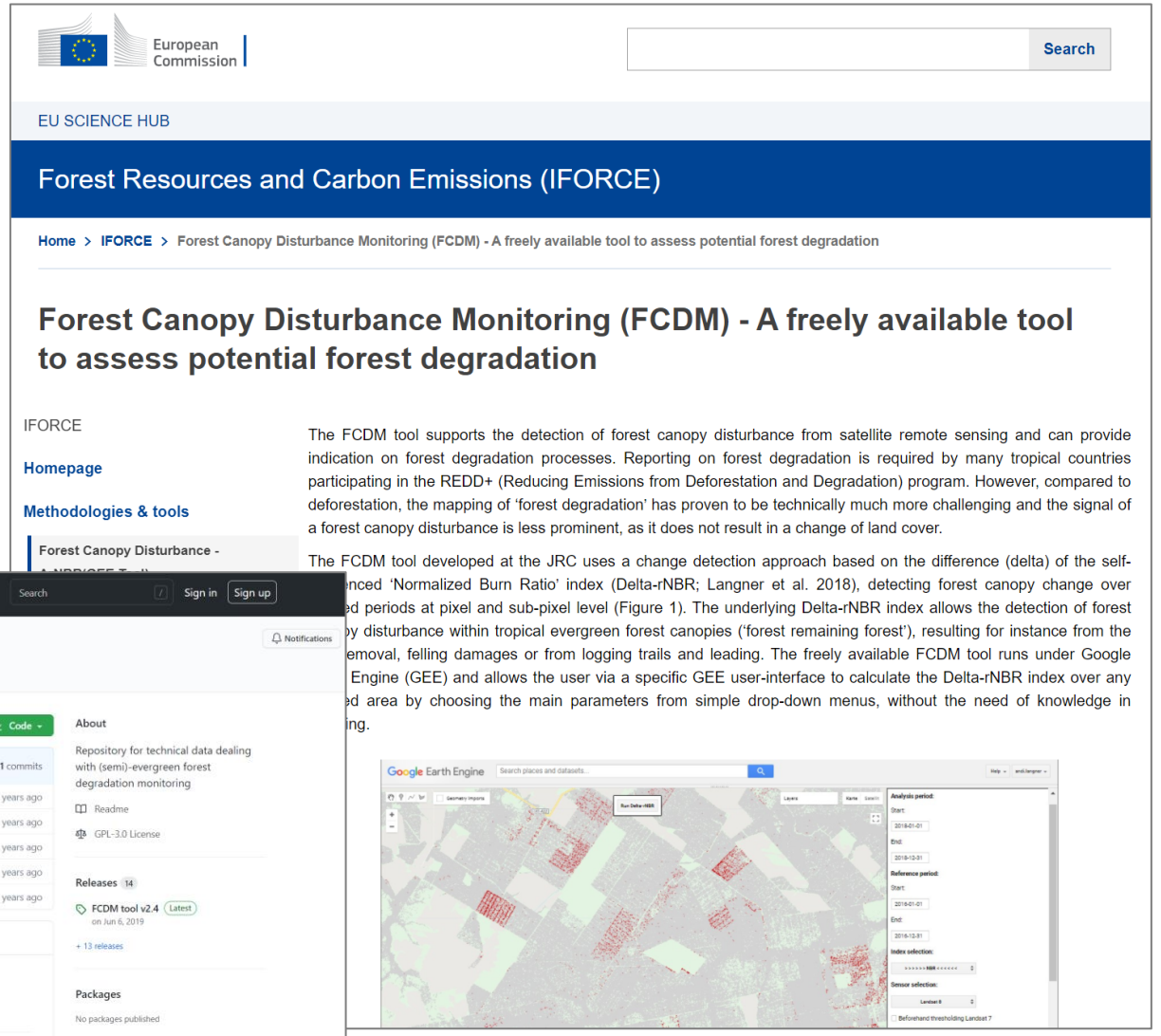
Documentation of FCDM



https://zenodo.org/record/3240021#.YMsoCagzaJY



https://github.com/Andi1974/Forest-degradation-monitoring



https://forobs.jrc.ec.europa.eu/iforce/dNBR.php

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Application of FCDM

- **Vietnam**:
  - **Forest Inventory and Planning Institute (FIPI)** uses the FCDM-optical approach for revising all cycles of NFIs
- **Laos:**
  - **Department of Forest Inspection (DOFI)** requested training on FCDM-optical approach at province level
  - **Forest Inventory and Planning Division (FIPD)** of the Department of Forestry and **F-REDD (JICA Japan)** with **SilvaCarbon (USAID)** test whether FCDM approaches can replace field work for degradation monitoring
  - **Pro-FLEGT (GIZ Germany)** together with **Aruna Technology** uses the FCDM-optical and FCDM-radar approach for Operational Logging & Degradation Monitoring (OLDM)
- **Cambodia:**
  - **General Directorate for Nature Conservation and Protection (GDANCP)** of the **Ministry of Environment (MoE)** underlines interest in further training on the FCDM approaches for monitoring of illegal logging
  - **CEEJA project (Copenhagen University, DANMISSION)** uses FCDM-radar for monitoring forest disturbances within PAs
- **Thailand + Myanmar:**
  - **Royal Forest Department (RFD), Department of National Park, Wildlife and Plant Conservation (DNP)** and **Forest Department** (**MoNREF)** interested in training and technical support on FCDM approaches
- **Indonesia:**
  - **DG Forest Planning (MEF)** and **DG Climate Change (MEF)** sees in the FCDM approaches a suitable replacement for visual/ manual monitoring of degradation. A tailored workshop is desired.
- **EU Commission Horizon 2020 REDDCopernicus Project:**
  - **Evaluation of FCDM approaches to develop products of a future Copernicus Forest Monitoring (FM) and REDD+ Service Component**
- **CAFI (Africa):**
  - **FAO-CAFI** is in process of implementing FCDM-optical approach in SEPAL system
  - **FAO-CAFI** is interested in implementing also the FCDM-radar approach in SEPAL system once available