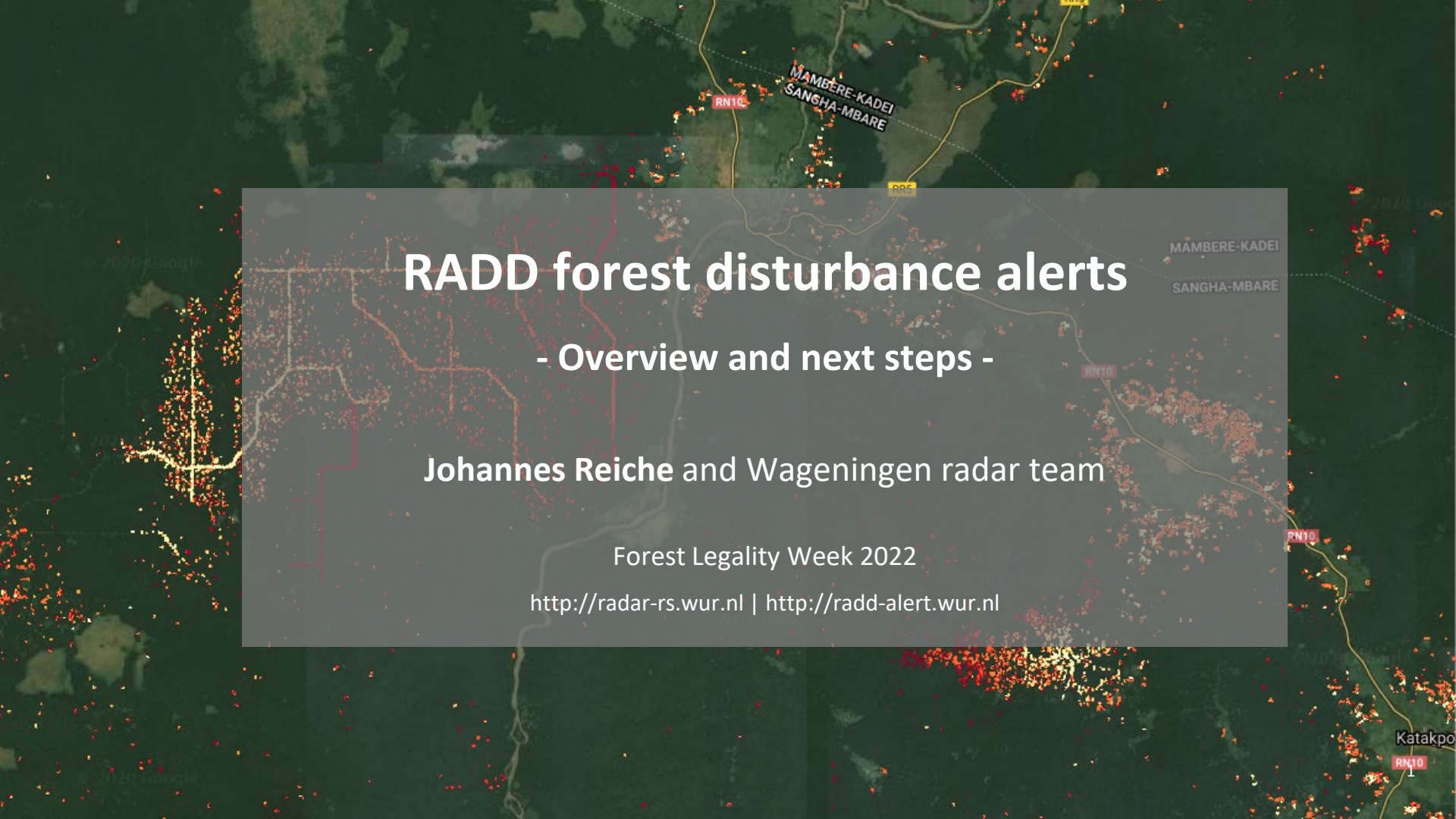


RADD forest disturbance alerts

- Overview and next steps -

Johannes Reiche and Wageningen radar team

Forest Legality Week 2022

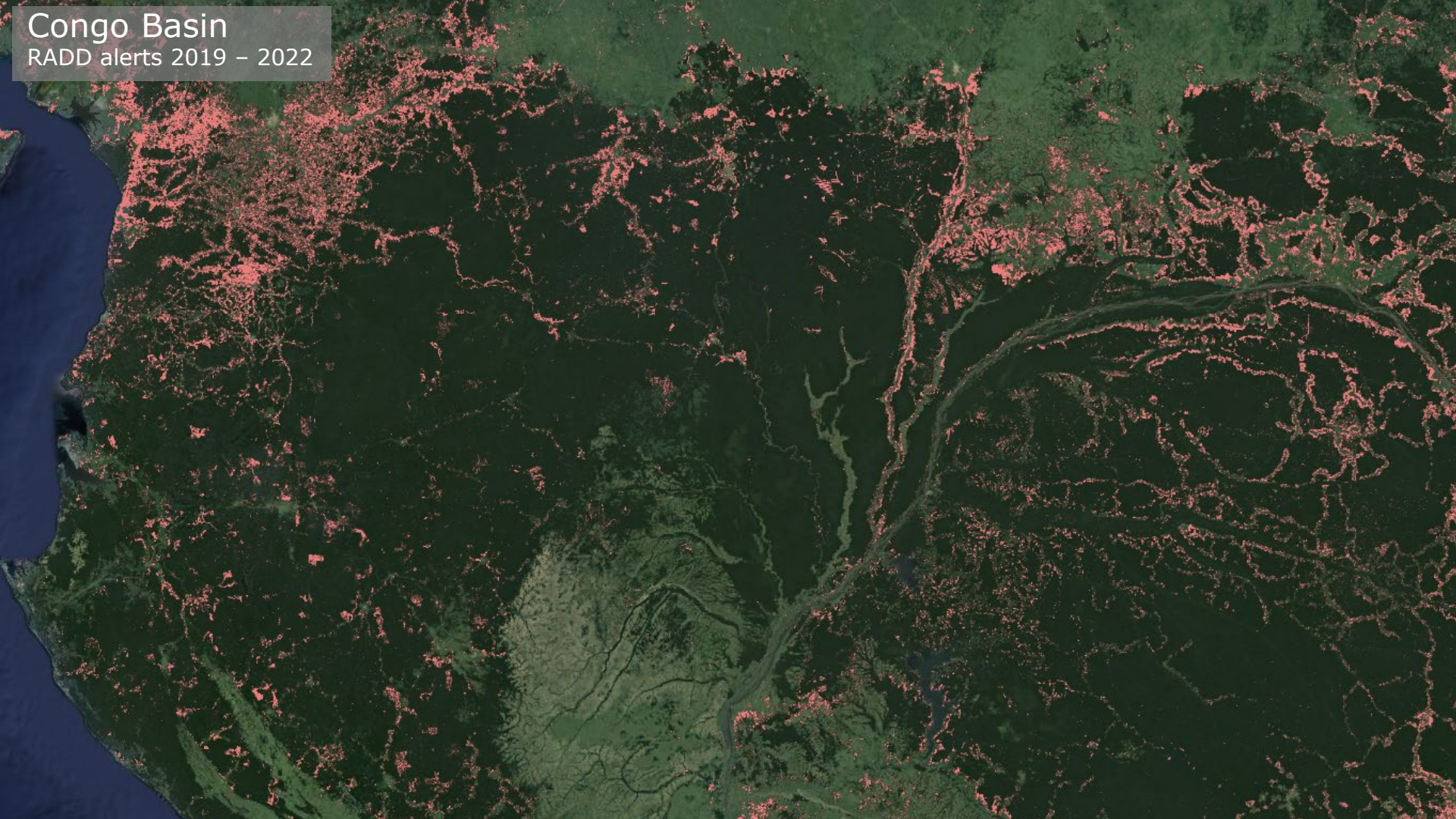
http://radar-rs.wur.nl | http://radd-alert.wur.nl

RADD (RAdar for Detecting Deforestation) alerts

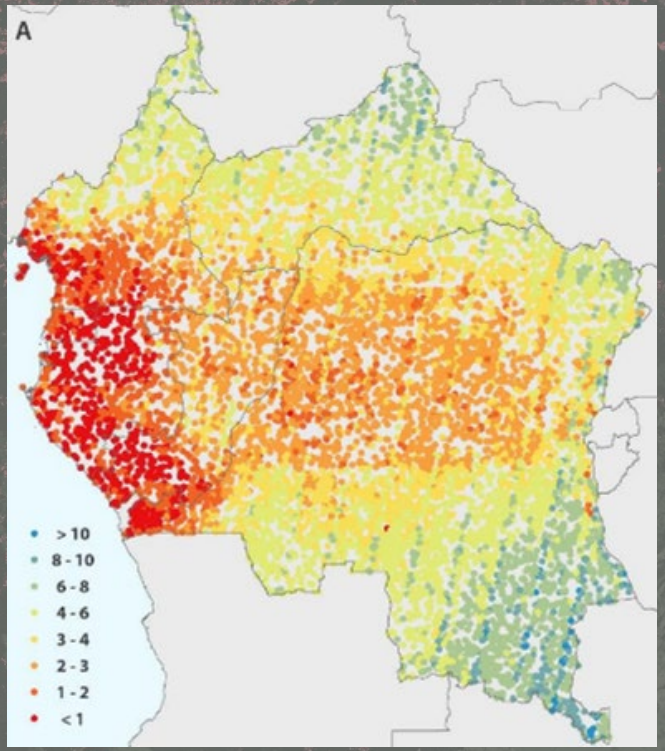
- Forest disturbances alerts for the humid tropics using cloud-penetrating Sentinel-1 radar
- Collaboration with, e.g. Global Forest Watch, Google, UMD, ESA
- Weekly updates available via Global Forest Watch, SEPAL, GEE and http://radd-alert.wur.nl
- Complement existing alerts (e.g. GLAD, JJ-FAST) with the aim to support law enforcement & transparency

Current geographies: South America, Africa & Insular Southeast Asia

Reiche & many others (2021), ERL


Congo Basin
RADD alerts 2019 – 2022

Congo Basin
RADD alerts 2019 – 2022



Tyukavina et al. 2018, Science Advances

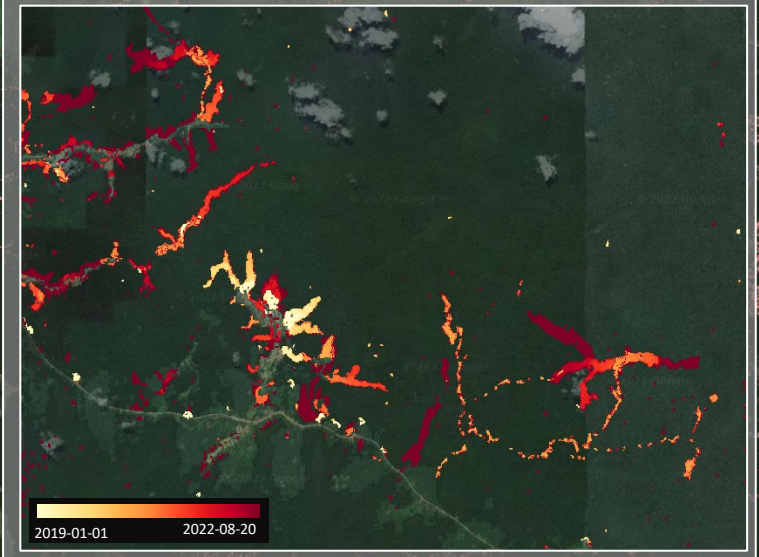
- Congo Basin countries among the cloudiest in the world
- Delayed information on new forest disturbances limits law enforcement activities

Average number of cloud-free Landsat observations/year

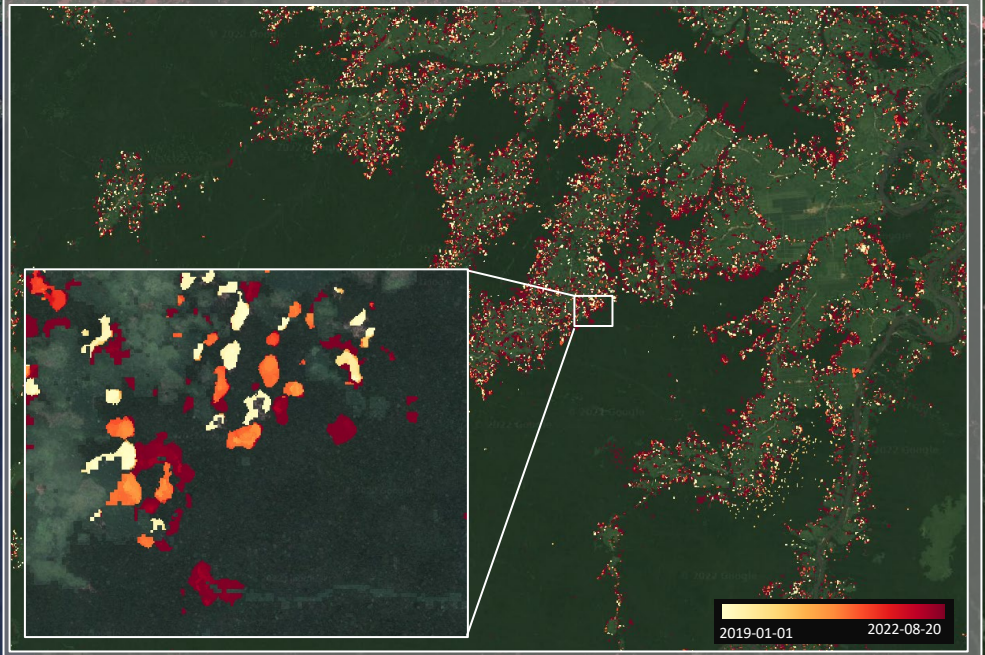
Selective tree logging
(Central African Republic)


January
February
March
September
October
November
Selective logging signal disappears quickly
Planet Labs imagery
Reiche et al., 2021 (ERL)

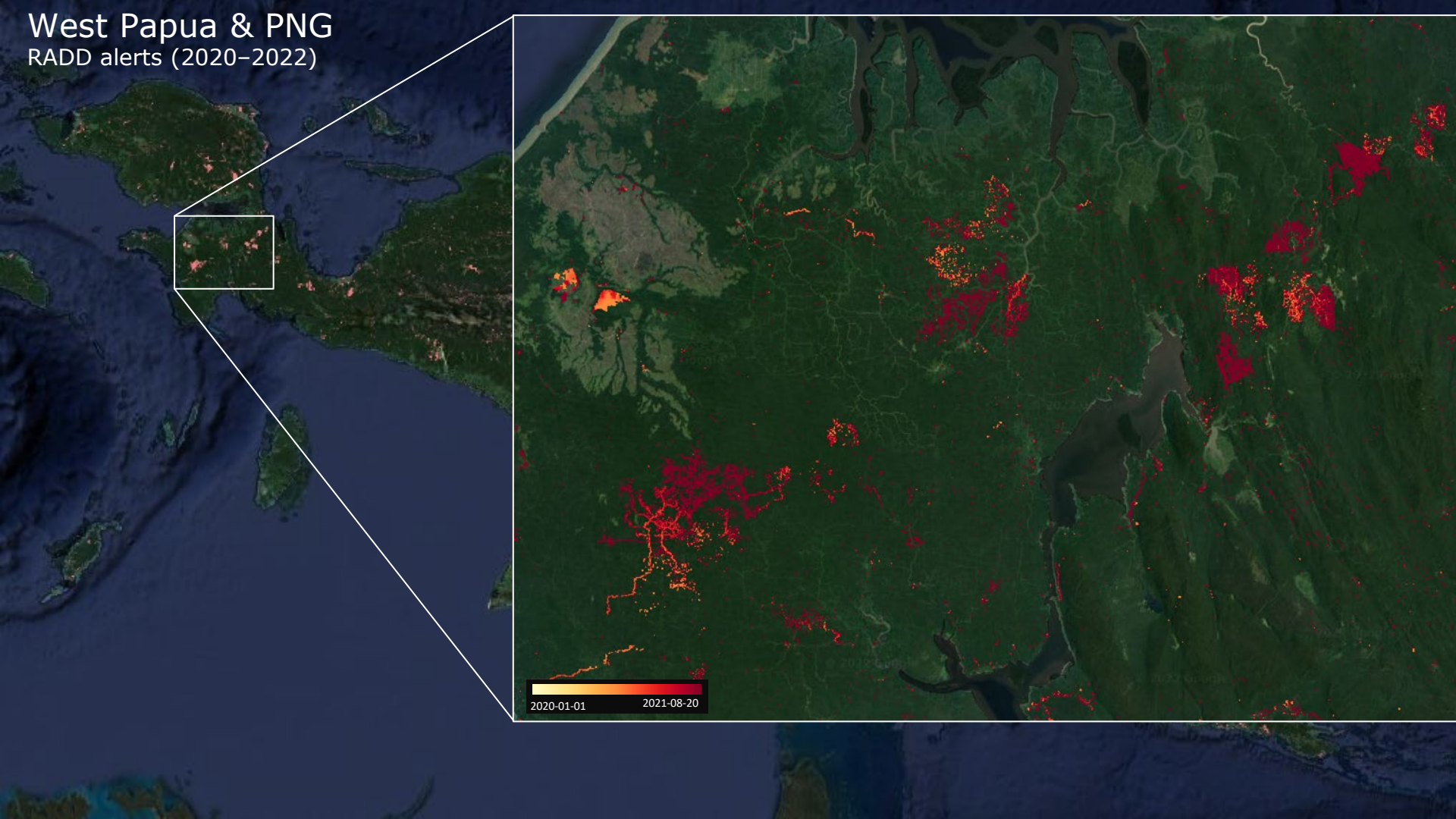
Gold mining (Republic of the Congo)

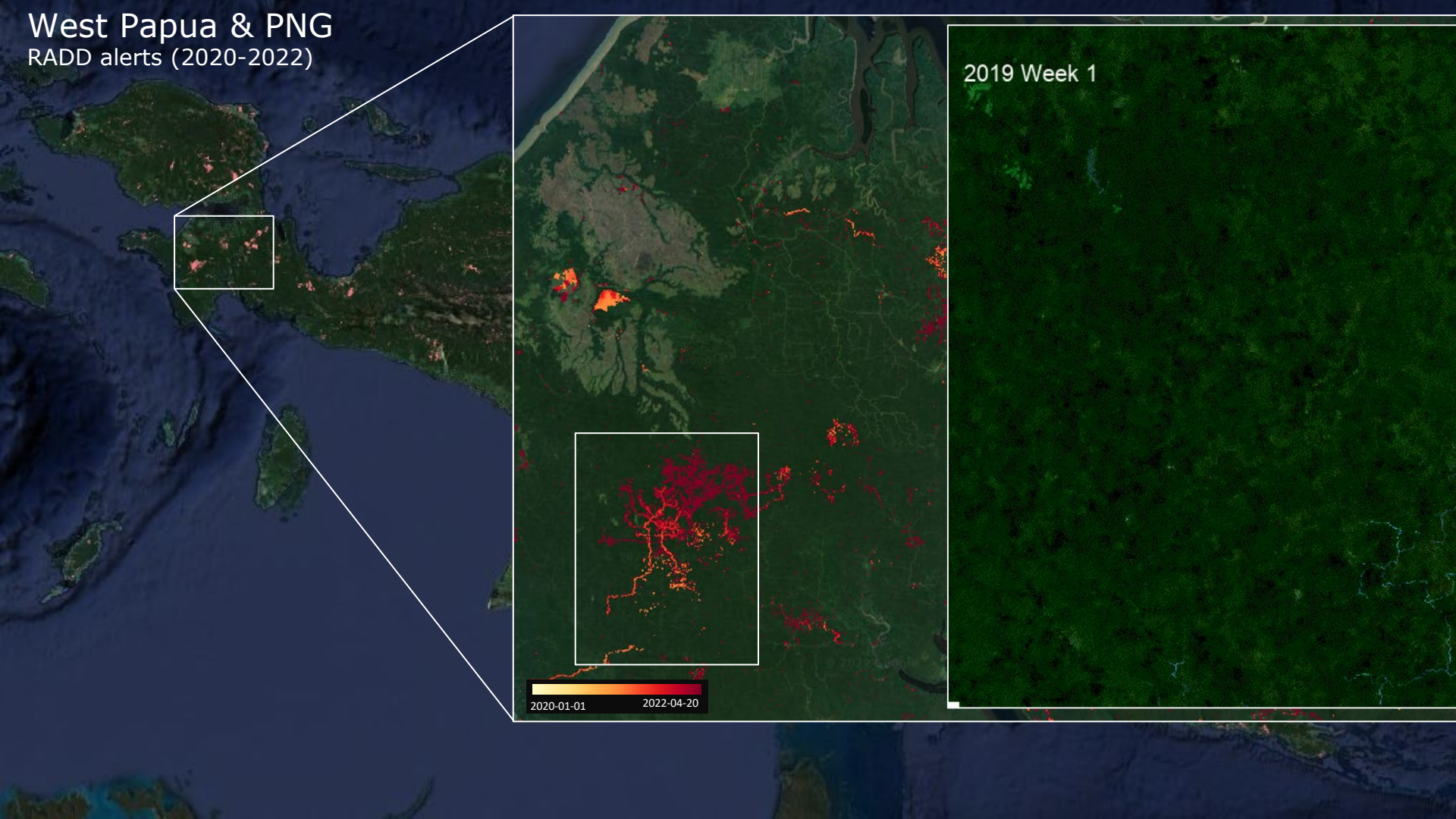


Smallholder agriculture (DRC)




West Papua & PNG
RADD alerts (2020–2022)


West Papua & PNG
RADD alerts (2020–2022)
2020-01-01
2021-08-20


West Papua & PNG
RADD alerts (2020-2022)
2019 Week 1
2020-01-01
2022-04-20

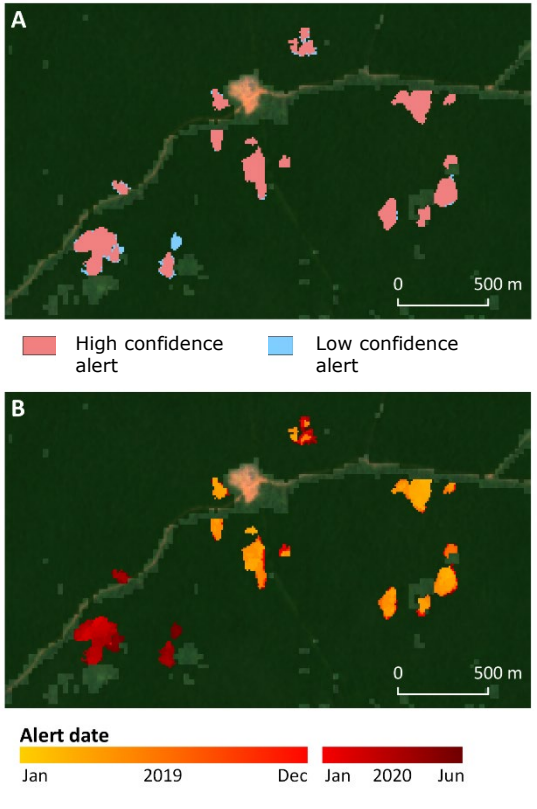
What does RADD detect

- Forest disturbance definition (similar to GLAD alerts)
  - Complete or partial removal of tree cover within a 10 m Sentinel-1 pixel
    - Complete tree cover removal associated with stand-replacement disturbance at Sentinel-1 pixel scale
    - Partial removal mainly represents disturbances associated with boundary pixels & selective logging
    - No separation between human and natural forest disturbances

Credit: Mongabay.com

RADD data access

- www.globalforestwatch.org
    - Visualisation, Data download (tiff) and available in GFW Pro
- http://radd-alert.wur.nl
    - App, Method updates ...
    - Data access via Google Earth Engine
- RADD alerts @ other platforms
    - Sepal, Borneo atlas ...



Reiche et al. (2021), ERL

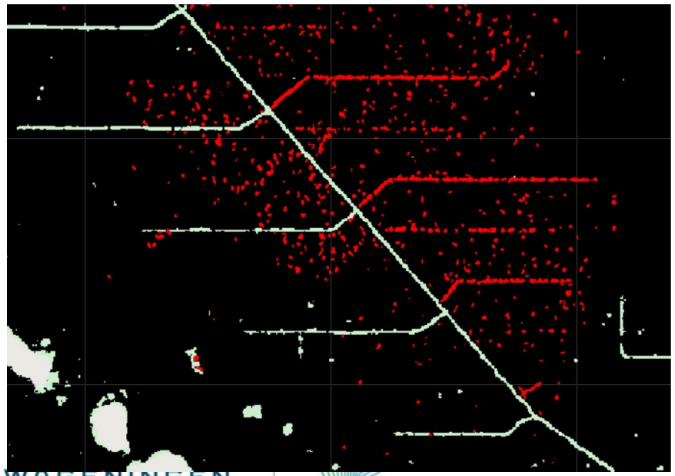
RADD alert improvements and expansion

- Expansion to Central America (2022) and Continental Southeast Asia and Pacific (2023)
- Dry forest alerts (pilot in 2023)
- Method implementation @ SEPAL (2023)

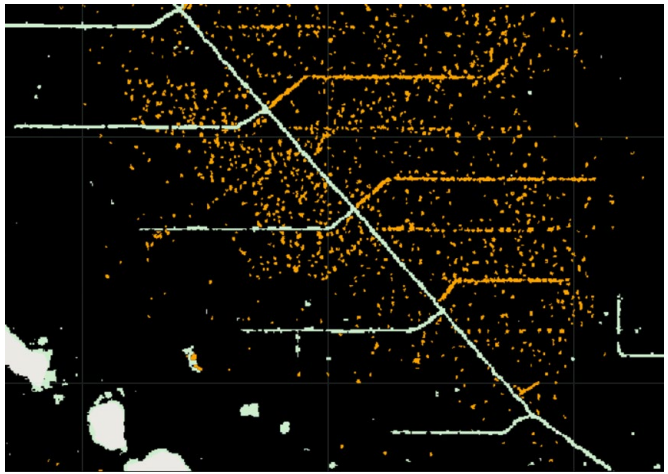
RADD alert improvements and expansion

- RADD version 2
  - Improved mapping of large-scale disturbances with radar texture
  - Improved MMU
  - …

MMU 0.1 ha (current)



MMU 0.05 ha (version 2)

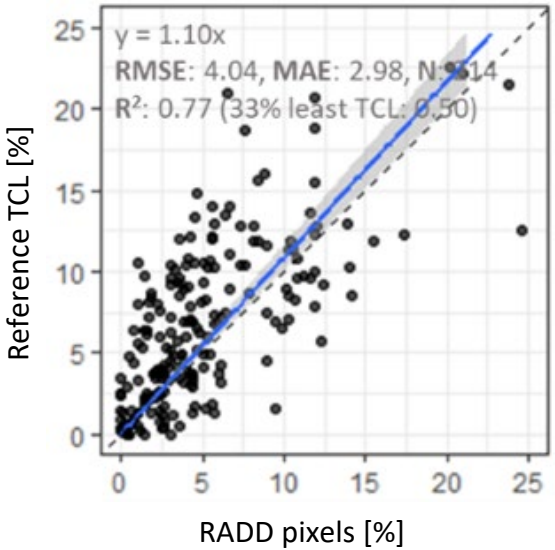


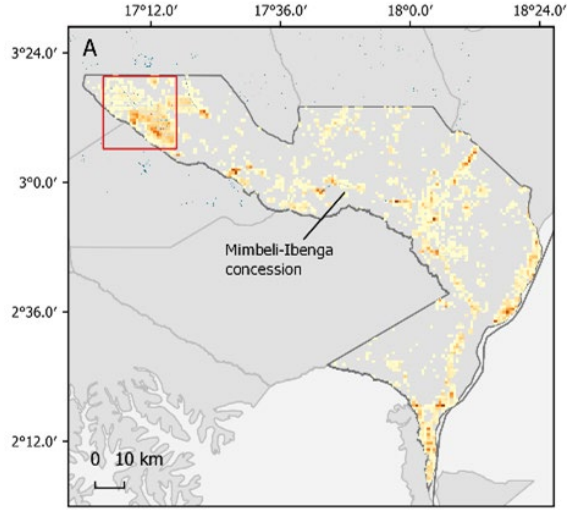
PhD Johannes Balling

WAGENINGEN UNIVERSITY & RESEARCH

Beyond I: Assessing logging intensity

- Assessing relationship between RADD alerts and logging intensity
  (using Planet tree cover information as a proxy)



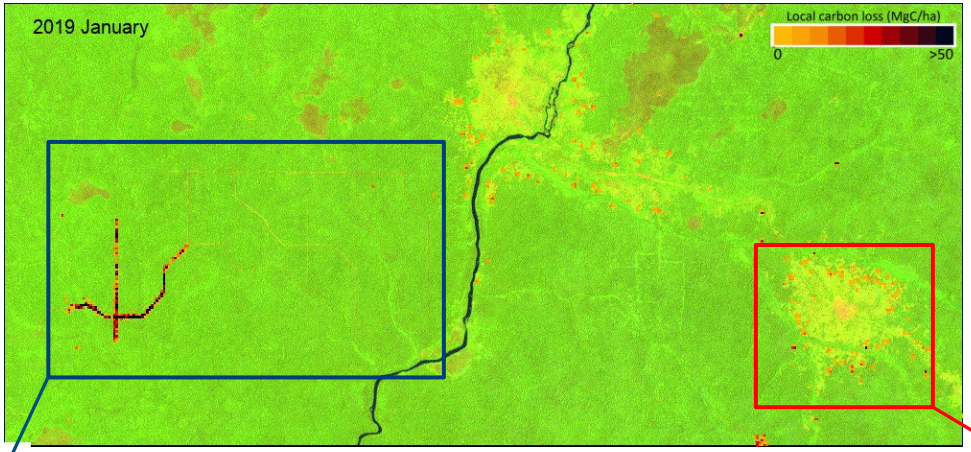


Mapping logging intensity
(tree cover loss used as proxy)

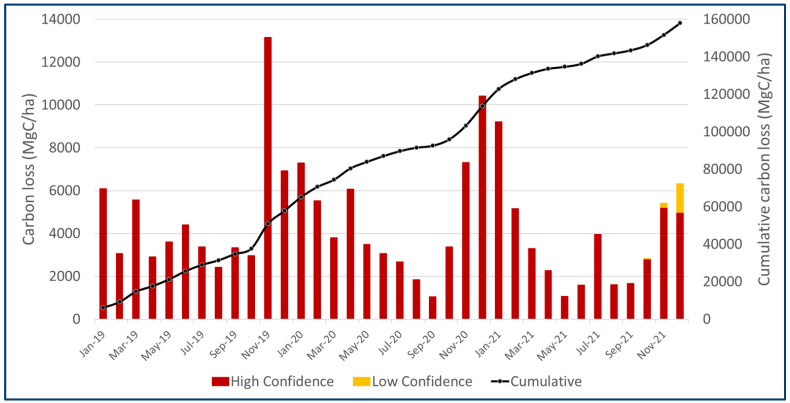
PhD Anne-Juul Welsink

WAGENINGEN UNIVERSITY & RESEARCH

Beyond II: Rapid carbon loss monitoring

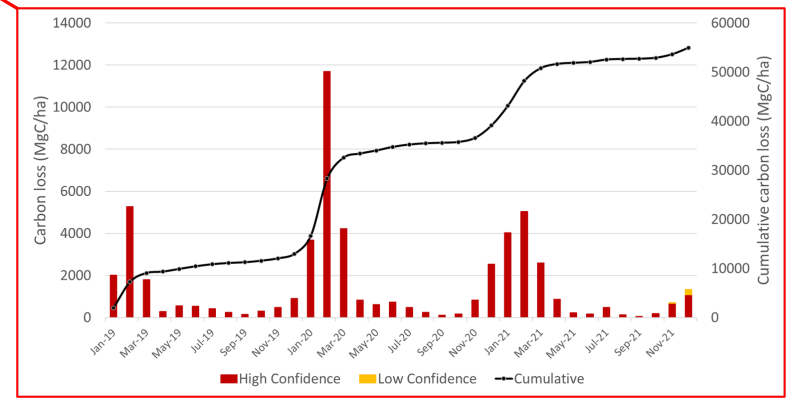


- Combining RADD alerts with new CCI Biomass map
  (Santoro et al., 2021)
- Extensive uncertainty framework



Selective logging

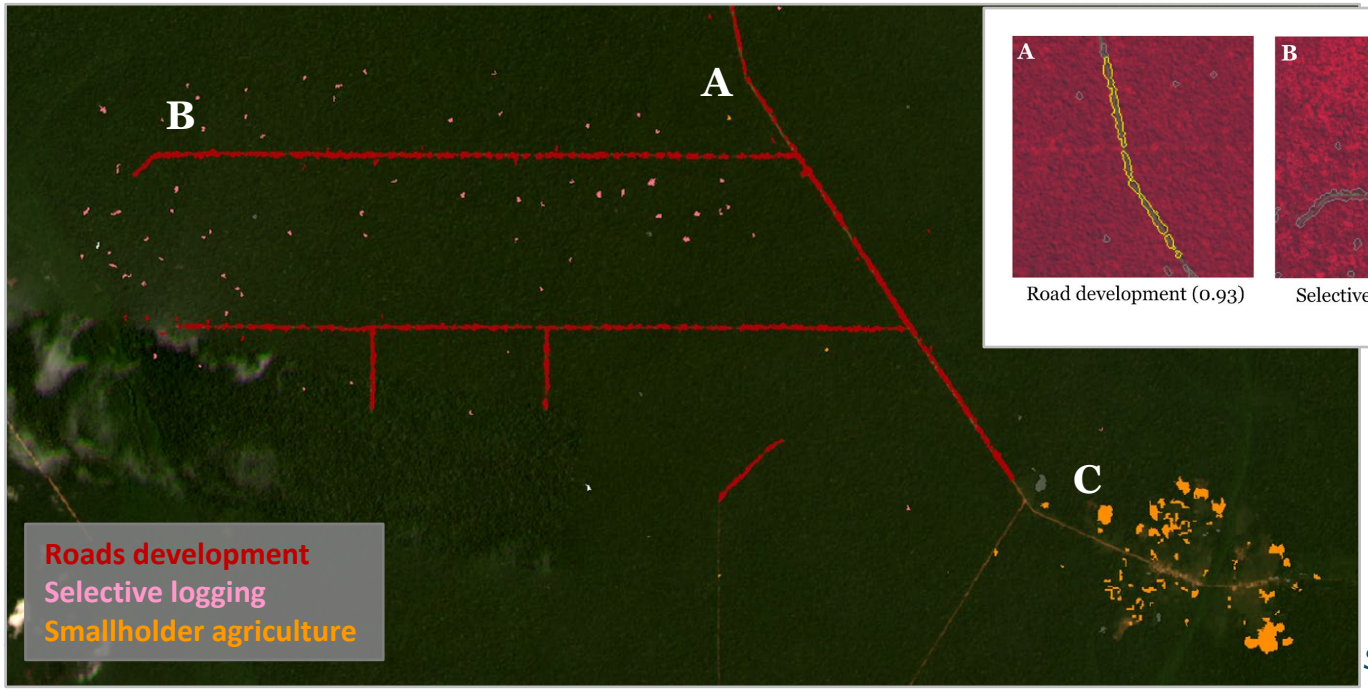
Smallholder agriculture

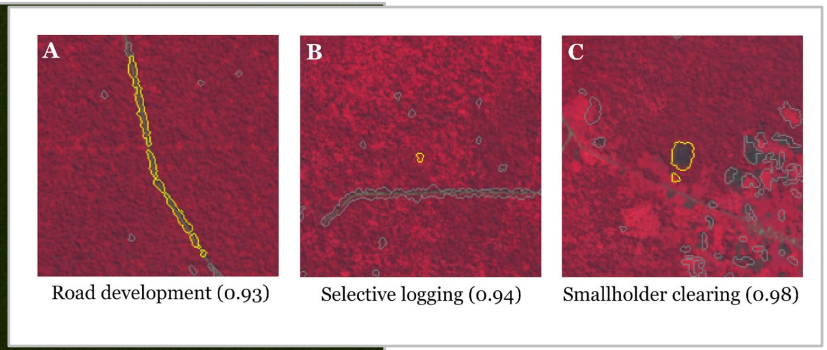


O. Csillik et al., 2022 (Nature CEE)

Beyond III: Rapid driver mapping

- Classifying direct drivers of forest disturbance using deep-learning (RADD+S1+S2)
- Testing results: F1 score >90% (5 classes)





PhD Bart Slagter

Slagter et al., (under review)

Beyond IV: Alert integration

GLAD-L (Landsat, formerly GLAD)

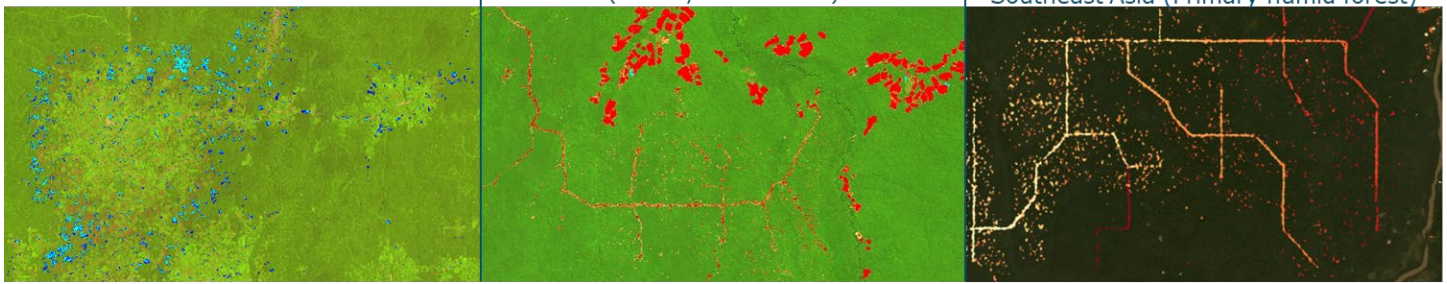
Pan-tropical (30°N - 30°S)

GLAD-S2 (Sentinel-2)

Amazon basin
(Primary humid forest)

RADD (Sentinel-1 RADAR)

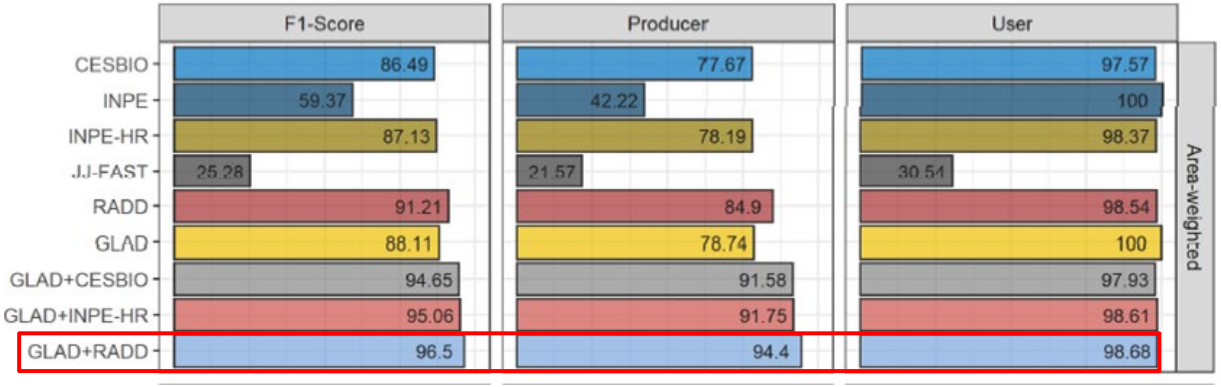
South America, Africa and Insular
Southeast Asia (Primary humid forest)



- Forest disturbance defined as (complete or partial) loss of tree cover within a pixel
- Map all kinds of forest disturbances and do not separate human and natural causes
- Employ same basic processing steps
- Differences and limitations stem largely from differences in satellite data characteristics

Beyond IV: Alert integration

- Alert integration (GLAD-L/S2 + RADD) using spatial and temporal proximity (2023)
- Leads to more timely and confident alerting



Results for 5 test areas across the Amazon Basin *(INPE, Doblas et al., under review)*

Thank you for your attention and please reach out!

Johannes Reiche & Radar team (Wageningen University)

http://radar-rs.wur.nl | http://radd-alert.wur.nl