Global Land Cover and Forest Monitoring Services

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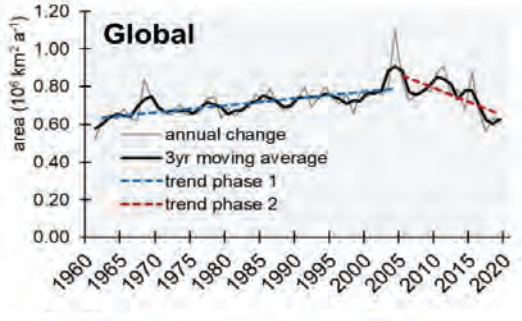
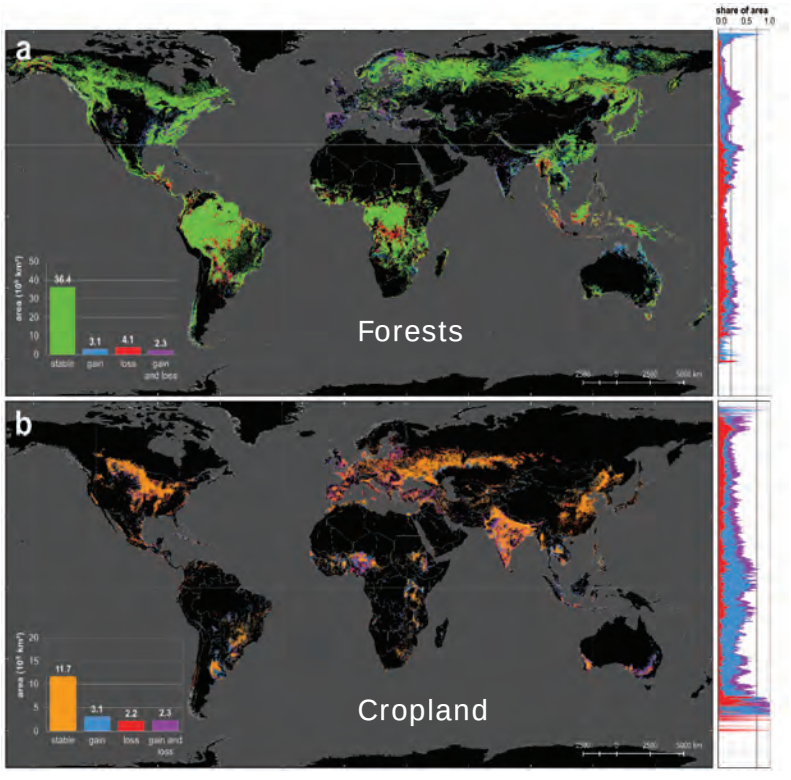
(with contributions by many)

- Copernicus global land cover service
- Evolving global forest monitoring service
- What's next for global land/forest monitoring

Global land cover/use change 1960-2020

- 32% of land area affected in 60 years
- Four times greater than previously assumed
- Phases of acceleration and deceleration



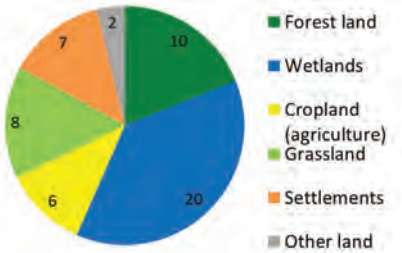


Winkler et al., (in press), Nature Com.

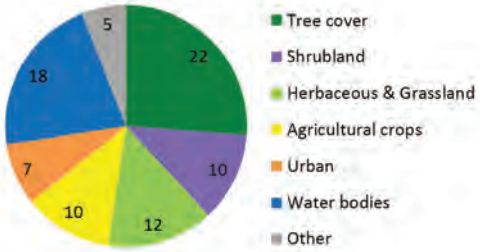
SDG indicator data requirements for land sub-categories

LU / LC monitoring provides important data to monitor 8 goals, 29 targets, and 33 indicators

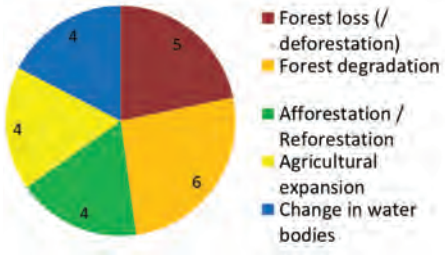
Land Use data



Land Cover data



Land Cover Change data



GOFC-GOLD SDG assessment:
http://www.gofcgold.wur.nl/documents/newsletter/Sustainable_Development_Goals-infobrief.pdf

Earth observations contribution to the SDGs with a focus on land cover datasets:
http://ggim.un.org/UNGGIM-wg6/

The numbers in the pie charts refer to the number of indicators for which the spatial data requirements apply

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GOFC-GOLD Land Cover Project Office

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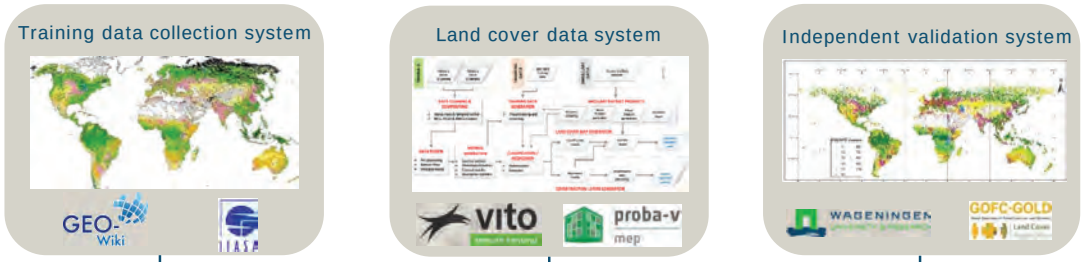
https://land.copernicus.eu/global/

vito vision on technology

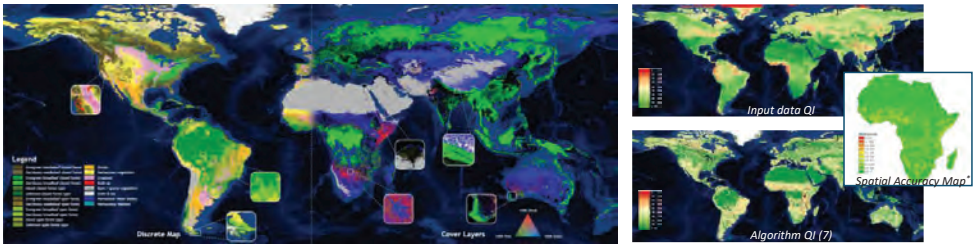
Copernicus Global Land Cover Monitoring Service



- Annual (since 2015)
- Global
- 100m
- Land cover classes and fractions

https://land.copernicus.eu/global/products/lc

*A systematic **service** providing dynamic, **yearly, user-oriented global** land cover maps from 2015*



Discrete Map (21 classes) | 10 Continuous Cover Fractions (0-100%) | Quality Indicators

Permanent water is derived from GSW (Pekel et al.)
Built-up is derived from WSF (Marconcini et al.)

(*) demonstration over Africa, global maps under release test

Buchhorn et al., 2020, Rem.Sens.
Szantoi et al., 2020, ESP, 112

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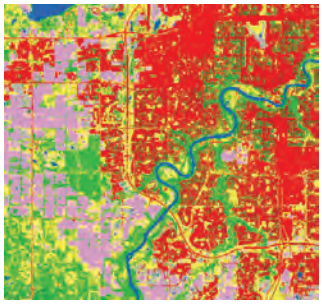
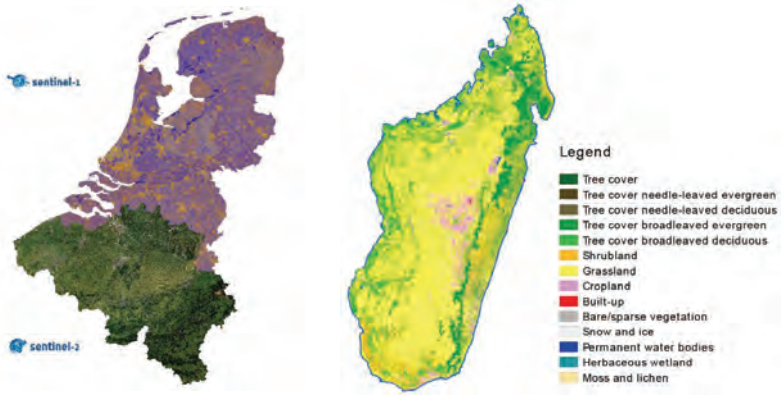
https://blog.vito.be/remotesensing/annual-global-land-cover-maps

ESA WorldCover

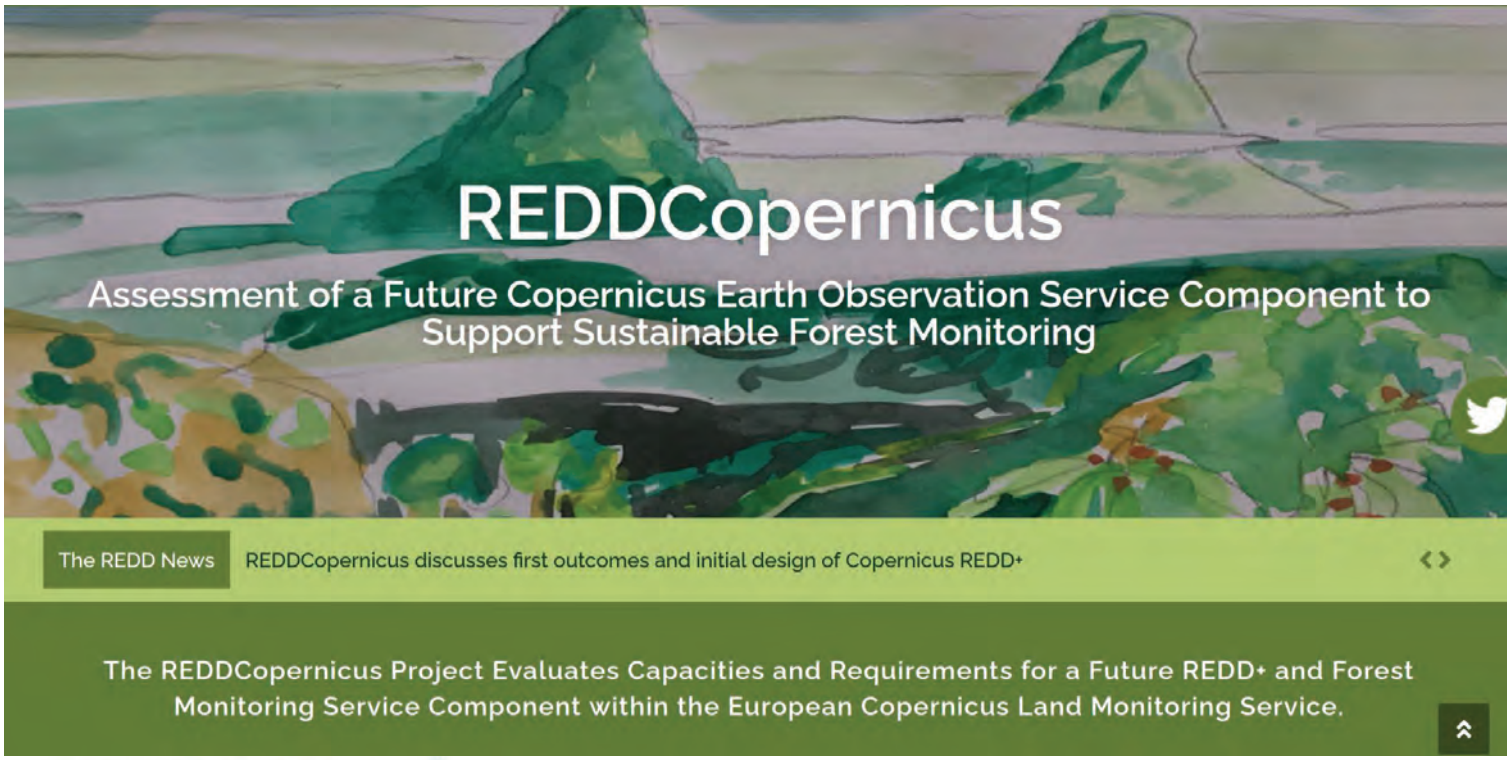
- **2020 Global Land Cover** map at **10m** resolution based on **S1/S2**
- Min **10 classes** & **75%** overall accuracy
- Target release date **June 2021**





vito remote sensing | Brockmann Consult | ES La force de l'innovation | GAMMA REMOTE SENSING | IIASA | WAGENINGEN UNIVERSITY & RESEARCH

esa-worldcover.org



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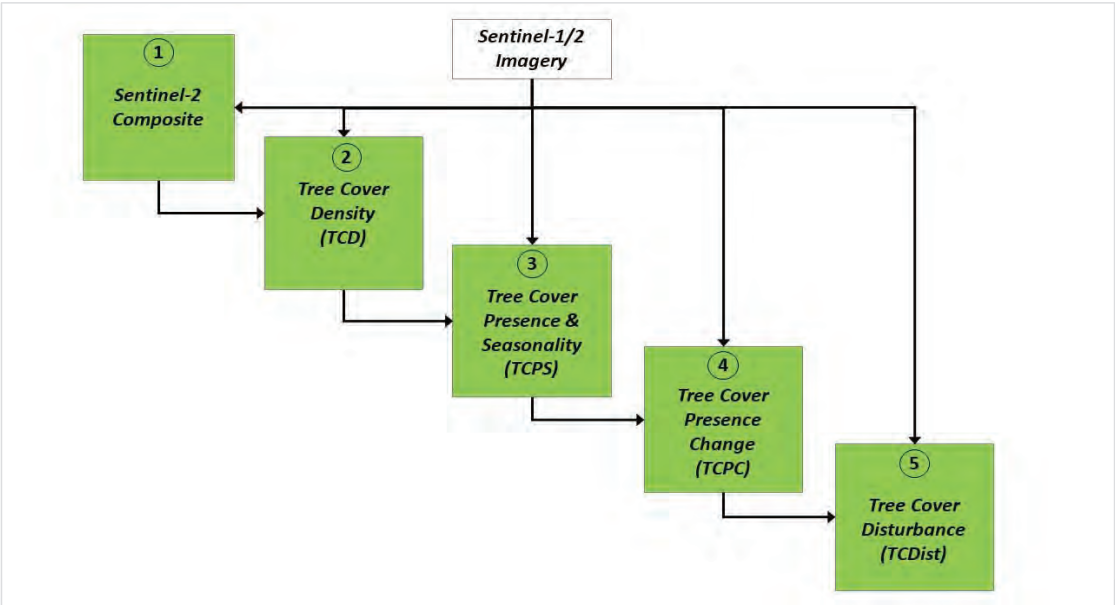
H2020 - https://www.reddcopernicus.info//

Framework for a global forest monitoring service



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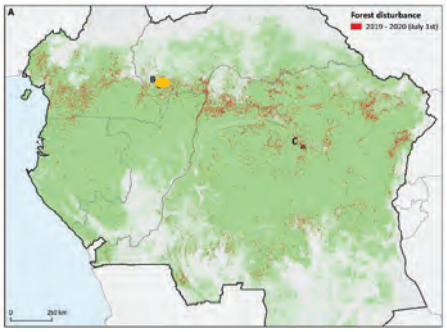
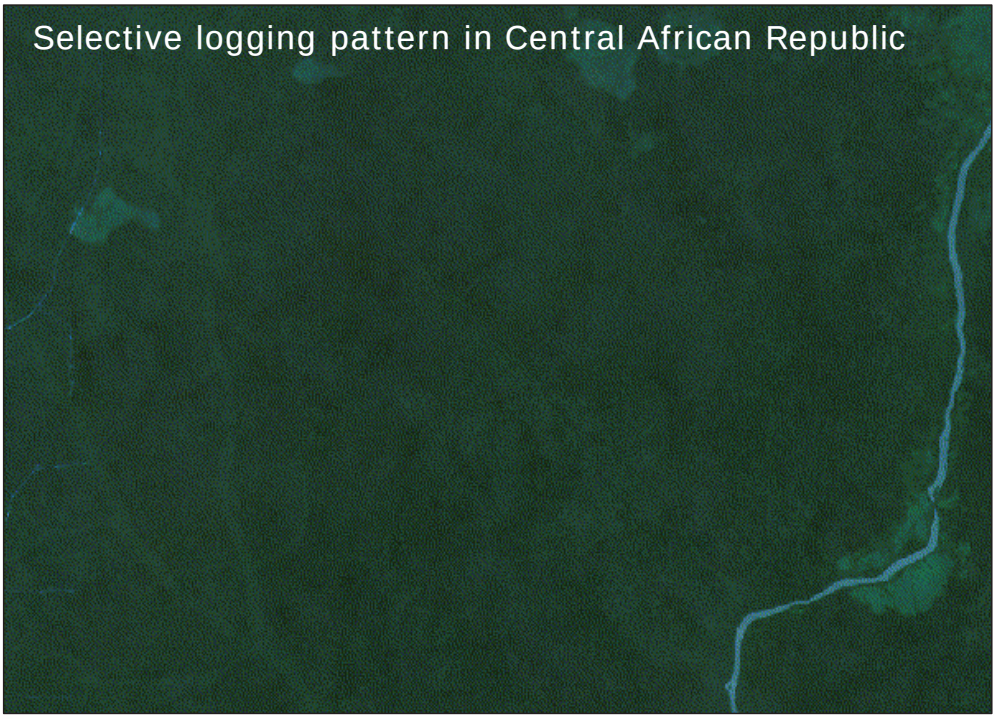
REDDCopernicus



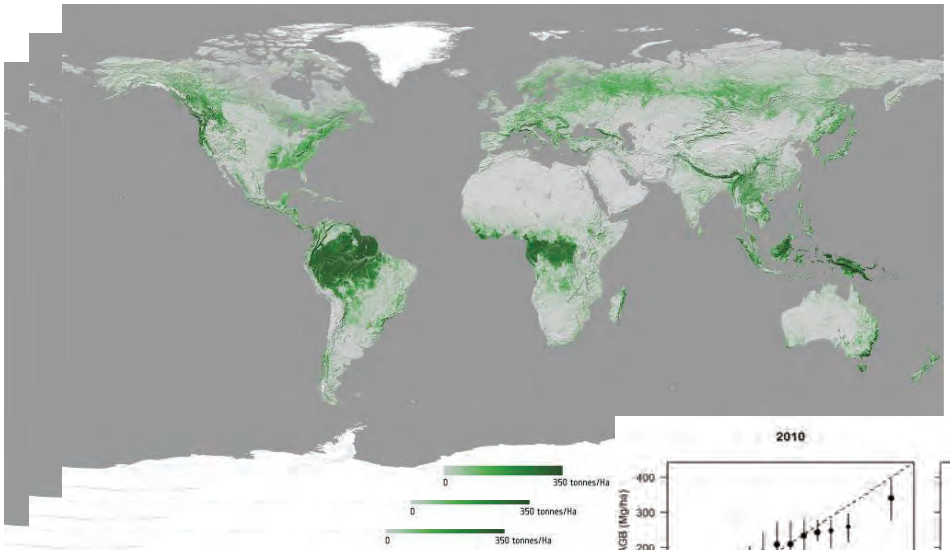
Sentinel-1-based weekly forest disturbance alerts at 10 m resolution for humid tropics in 31 countries (RADD alerts)

Paper: https://iopscience.iop.org/article/10.1088/1748-9326/abd0a8
RADD alert app:
https://gena.users.earthengine.app/view/raddalert
RADD alert website and data access: http://radd-alert.wur.nl



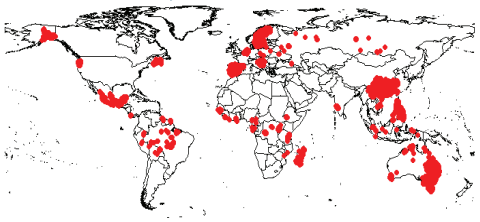
Sentinel-1-based weekly alerts, period Jan. 2019 – Dec. 2020
http://radd-alert.wur.nl

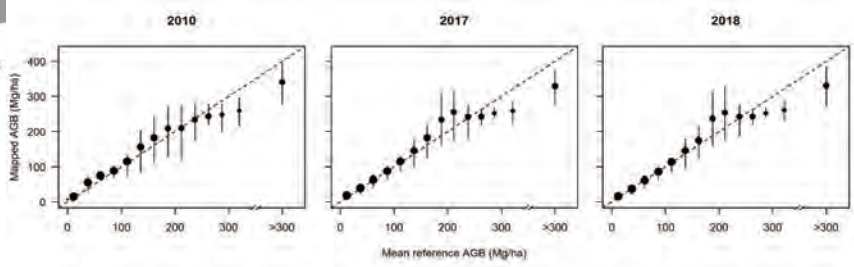
Global aboveground biomass monitoring



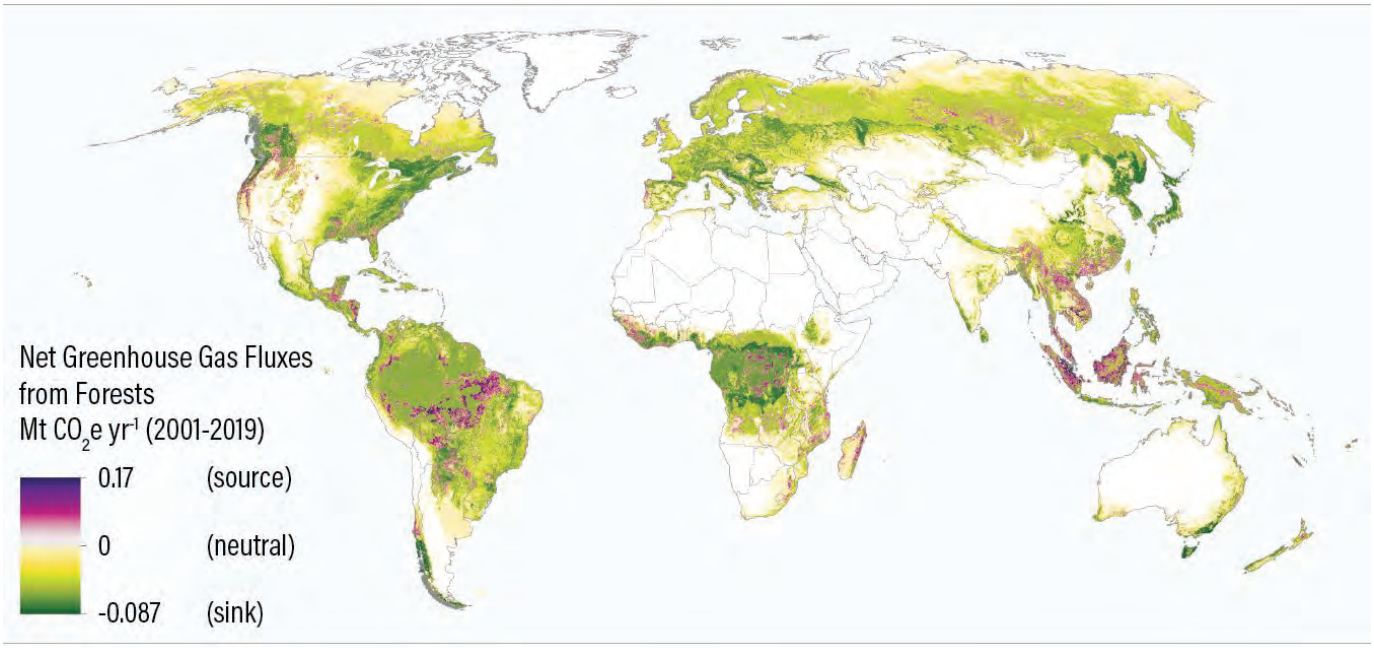
Global aboveground biomass for 2010, 2017, 2018
http://cci.esa.int/biomass

Global plot reference database (~109.000)





Earth Observation data-driven, spatially explicit forest GHG inventories



Paper: Harris et al., 2021, Nature CC
Data: https://gfw.global/315sv5h

Concluding remarks

- Operational experience for Copernicus global land cover monitoring:
  - Serving many users (i.e. SDGs)
  - Combining satellite and reference data collection systems
  - Opportunity moving to 10-20 m soon (Worldcover)
- Design for Copernicus global forest monitoring service:
  - Developing countries needs and REDD+ as key drivers
  - Might start as early as next year
- Moving forest/land monitoring research into operations:
  - Near-real time alerting and early warning
  - Spatially-explicit monitoring of biomass and land carbon fluxes