



# **GEO Global Forest Observations Initiative and CEOS EO Data Coordination**

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Satellite Data and Monitoring Systems for REDD+  
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BMZ, Bonn





- GFOI Background, Objectives and Set-up
- GFOI Components
- Space Data Coordination
- Challenges ahead





The Group on Earth Observations (GEO) is coordinating efforts to build a Global Earth Observation System of Systems, or GEOSS

THE GLOBAL EARTH OBSERVATION  
SYSTEM OF SYSTEMS





2008 FCT establishment

2009+ FCT demonstration based on National Demonstrators

2010 GFOI Concept plan

2011 GFOI Implementation plan

November: Accepted by the GEO-VIII Plenary

2012 GFOI Start-Up Phase / FCT continues as R&D and  
Demonstrator for GFOI

2013 Transition towards operations phase

2014+ Operations Phase

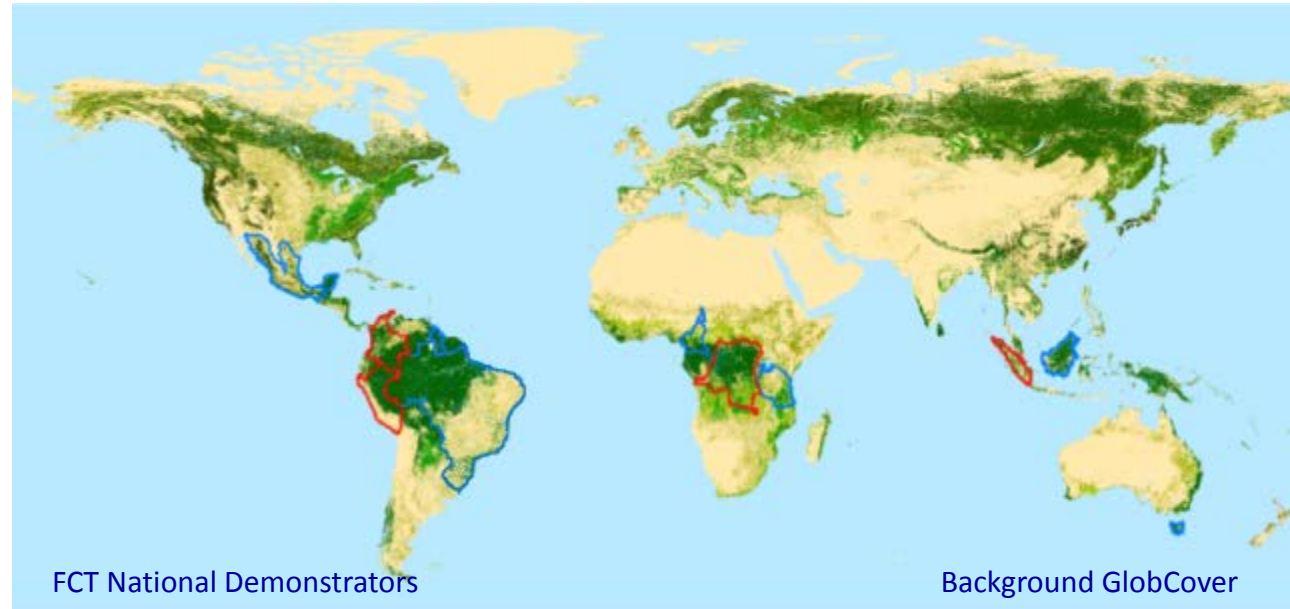




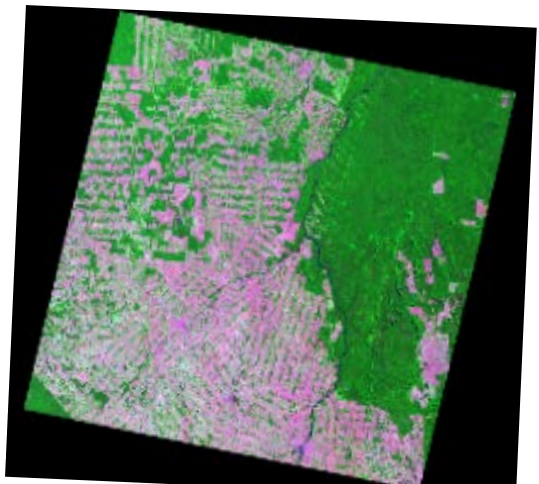
# Forest Carbon Tracking

## Co-leads

- Norway (NSC)
- Japan (JAXA)
- Australia (DCC & CSIRO)
- Canada (CFS-CSA)
- USA (USGS)
- FAO
- CEOS (ESA)



Demonstrate that coordinated Earth Observations, validated by in situ measurements and properly linked to modeling can provide reliable, accurate, consistent and continuous information, constituting the basis for national systems.







## From FCT to GFOI

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## GFOI Objectives

- The Global Forest Observation Initiative (GFOI) will foster sustained availability of satellite and ground observation in support of national forest information systems
- Support countries in the use of observations for their national forest information systems - respecting national choices of data and tools





## GFOI Partnership

### Co-leads:

- Australia (CISRO, DCCEE)
- Norway (NSC)
- USA (USGS)
- FAO
- CEOS (ESA, NSC, USGS)

### Members:

- IPCC
- World Bank
- GOFC-GOLD
- National institutions from GEO member states







## GFOI Participating Countries

- NDs served FCT to demonstrate the overall approach and served as research platform – a more formal and sustained arrangement is needed for GFOI
- Developing criteria for addition of new countries to participate in GFOI - which include official recognition and necessary links to national REDD+ & MRV efforts
- Developing avenues for transition of National Demonstrator countries to be GFOI participating countries
- Strengthen links to UN-REDD via FAO and FCPF of the World Bank





# GFOI Components

- Methods and Guidance Documentation
- Coordination of satellite data supply (SDCG)
- R&D on technical challenges (FCT)
- Capacity Building





## Methods & Guidance Documentation (Australia lead)

The GFOI Methods and Guidance Documentation (MGD) will provide support to countries in the use of *in situ* and remotely sensed data and methodologies for the establishment of their national Forest Monitoring and Carbon Tracking systems, focused on addressing REDD+ objectives in compliance with IPCC good practice guidelines.

- GFOI established an Advisory Group (AG)
  - AG chaired by IPCC GPG lead-author (Jim Penman)
- GFOI assembled an expert authors team which met in June
- September the first draft has been reviewed by the AG,
- Oct / Nov will go out to external review
- March-Aug 2013 Beta version will be rigorously reviewed by recipient countries
- GEO Plenary X (2013) - Final version





## R&D (Norway lead)

The GFOI Implementation Plan explicitly did not include a budget for GFOI R&D, leaving this to be addressed through synergies with other R&D and donor organisations.

### New R&D structure under development by FCT/GFOI

- R&D structure similar to that of the MGD, including external AG
- Enhanced collaboration with CEOS space agencies foreseen (AG involvement, coordinated research agenda, supply of EO data)
- Active role for the GFOI Office (liaison with donor organisations, issuance of RA's, etc.)
- FCT National Demonstrators potential "test beds" for R&D and assessment of MGD approaches
- R&D plan which identifies priority areas where research is required to achieve long term FCT/GFOI goals
- New R&D Plan foreseen for launch in connection with FCT Science & Data Summit (Feb 2013)





## R&D Priorities

- Forest degradation
- Mapping of particular forest types (mangrove, peat forests, etc.)
- Interoperability of EO data
- Comparison of uncertainties associated to different forest biomass and allometrics estimation methodologies
- Data model integration
- Accuracy assessment
- Robustness and portability





## Capacity Building (US lead)

Capacity-building has continued during from 2010 to present largely through focussed workshops organised and funded by US SilvaCarbon and supported by Australia and Norway.

- US SilvaCarbon hold six workshops in 2011/2012 in Latin America and plans an additional six workshops in the 2013/14 timeframe.
- Bilateral capacity-building activities in Indonesia (supported by Australia) and Tanzania (supported by Norway) have been ongoing in 2012.





# Data Coordination Background on CEOS



- Committee of Earth Observation Satellites was established in 1984
- Recommendation from a Panel of Experts on Remote Sensing from space
- Participated by 32 space agencies and 20 other national and international bodies
- "Space Arm" of GEO



# Data Coordination Scope of the SDCG



- Support **coordinated acquisition planning of all relevant Earth observing missions** supporting GFOI and FCT.
  - Emphasis on CEOS agency missions, but also to communicate needs to commercial operators.
- Initially limit **coordination to acquisition planning.**
  - Data processing and distribution through GFOI implementation with potential **future** roles for the SDCG.



## Space Data Coordination Group

### CEOS

### Commercial

#### OPTICAL

##### LSI Constellation

- USGS (USA)
- CNES (France)
- INPE (Brazil)
- ISRO (India)
- GISTDA (Thailand)
- JAXA (Japan)

#### SAR

- JAXA (Japan)
- CSA (Canada)
- ESA (Europe)
- DLR (Germany)

#### (V)HR

- GeoEye
- Ikonos
- Quickbird
- (RapidEye)
- DMC
- (Spot)
- (CSM e-Geos)
- (TSX Astrium GIS)
- (RS-2 MDA)

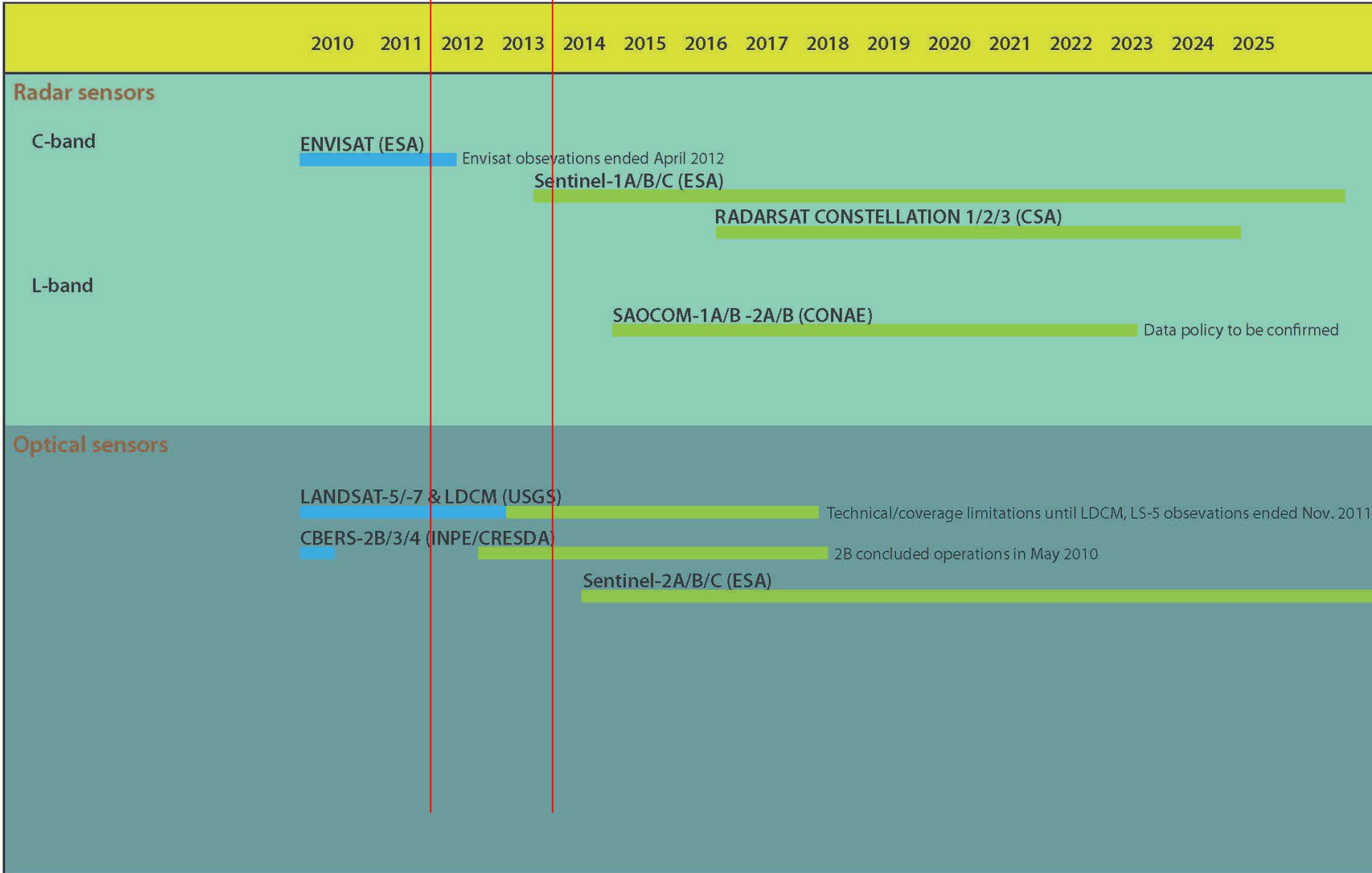


Campaign	Total
ALOS PALSAR*	42545
RADARSAT-2	5001
ENVISAT ASAR*	9753
COSMO - Skymed	274
TerraSAR-X	756
Landsat 5* & 7	44770
SPOT	11254
CBERS-2B*	3580
IRS	20976



\* mission lost





## Further data streams of interest

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

**Radar sensors**

C-band

**RADARSAT 2 (CSA)**  
 Commercial system

L-band

**ALOS & ALOS-2 (JAXA)**  
 Data policy to be confirmed. Access to PALSAR W2W archive of interest.  
 Also future access to full-resolution ALOS-2 PALSAR data for ND verification sites

X-band

**TERRASAR-X & TANDEM-X & TERRASAR-X-2 (DLR)**  
 Commercial system, German Govt considering bulk purchase, TanDEM-X DEM of interest  
**COSMO-SkyMed Constellation & 2nd generation (ASI)**  
 Commercial system

*There are also numerous one-off C- and X-band missions in planning by several countries*
**Optical sensors**
**SPOT-4/5 (CNES)** Commercial system, but Congo Basin coverage offered by French Govt (via AFD) for FCT purposes until 2015.

**SPOT-6/7 (SpotImage/Infoterra)**
**DMC-2 Constellation (UK)**  
 Commercial system

**Deimos-1 (Spain)** Commercial system  
**Ingenio (Spain)** Data policy to be determined

**RapidEye (Germany)**  
 Commercial system, German Govt considering bulk purchase

**IRS-1c/d & RESOURCESAT series (India)**  
 Commercial system

*There are also numerous missions in planning by several countries that may be of value - including many high resolution missions of interest for validation. Few datastreams will have the capacity to provide routine global coverage. But many more will be able to contribute to national and regional coverages.*





## SDCG – Data Strategy for GFOI

Overall SDCG objective: To build a living global archive of spatio-temporally consistent data for each sensor type, that responds to GFOI information requirements

Level-1: A baseline, coordinated global data acquisition strategy (wall-to-wall) involving a number of 'core data streams' that can be used free-of-charge for GFOI purposes.

Level-2: Coordinated national data acquisition strategies in response to national needs assessments undertaken in the course of GFOI implementation.

Level-3 [GEO-FCT National Demonstrator countries]: Data supply in support of the GEO-FCT, including in support of the R&D studies assisting the development and evolution of the GFOI Methods and Guidance Document.





# SDCG Expansion Strategy

## Expansion Criteria:

1. National Demonstrators from GEO FCT expanded to full national coverage (except Australia)
2. Country receives funding from UN-REDD or is selected for the Supplementary Grant Agreement of the Forest Carbon Partnership Facility of the World Bank
3. Neighbouring countries or entire regions to facilitate seamless satellite observation of large areas

## Other Elements:

- countries and donor countries suggestions seeking access to GFOI will be taken into consideration by SDCG if satellite resources allow.





- **Up to now: FCT National Demonstrator countries**
  - Brazil (Legal Amazon), Cameroon, Colombia, Democratic Republic of The Congo, Guyana, Indonesia (Borneo, Sumatra), Nepal, Mexico, Peru, Tanzania, Australia (Tasmania)
  
- **Near Term: 2012 – mid 2013**
  - Expand ND Indonesia to whole country
  - Add Cambodia, Republic of Congo, Costa Rica, Ecuador, Panama, Viet Nam
  
- **Mid term: mid 2013 – end 2014**
  - Whole tropical and subtropical forest
  
- **Long term: 2015+**
  - Temperate and boreal forest



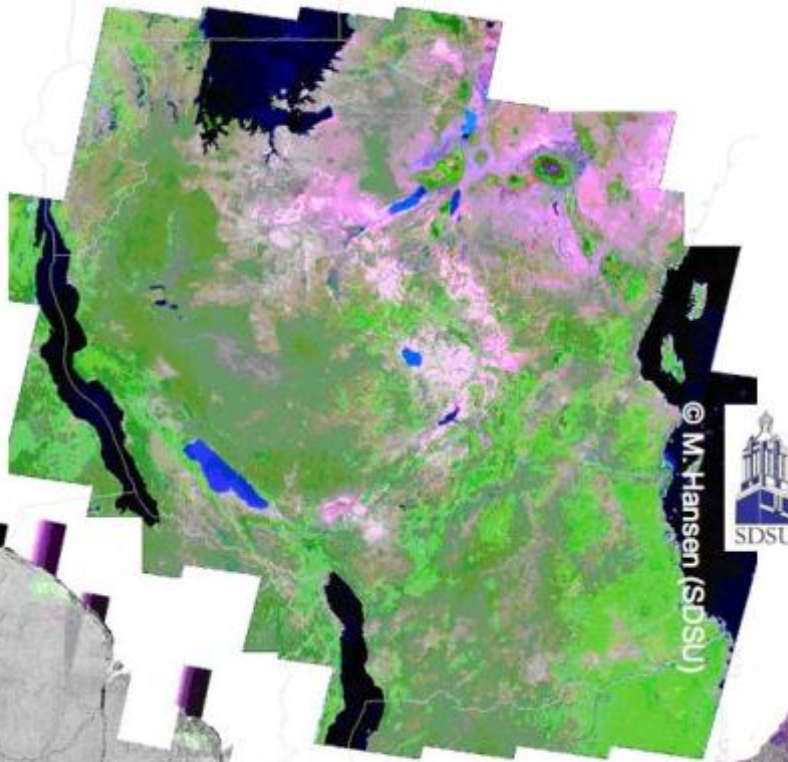
# Challenges



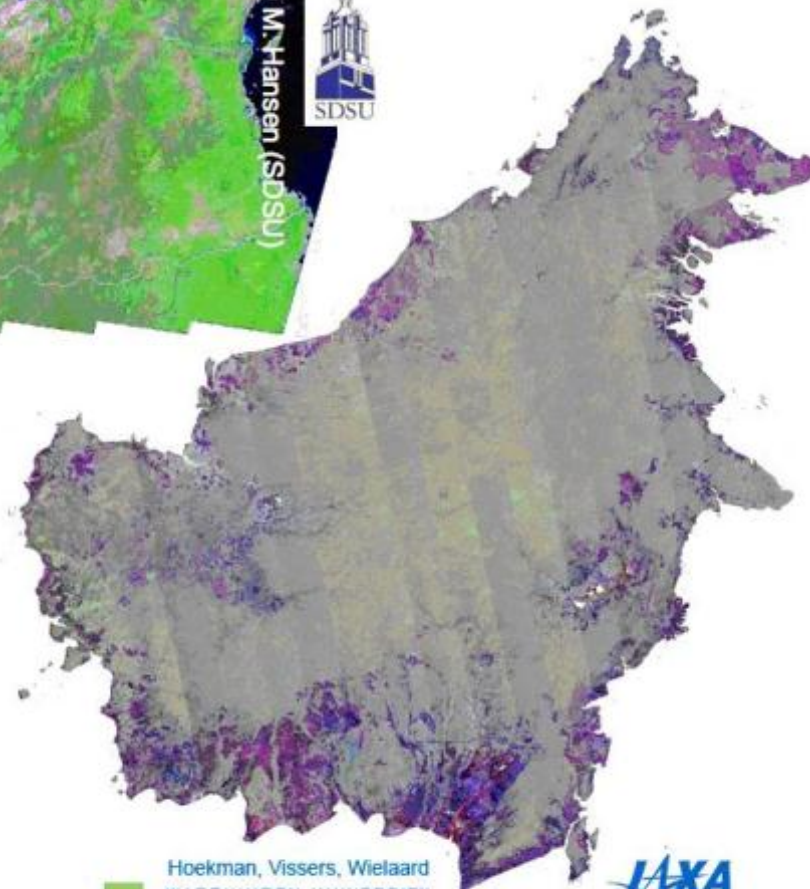
- Data mobilisation and assembly to assist the core effort is well within capability of CEOS agencies
- Progressing beyond acquisitions: GFOI sample national datasets will need heavy-lifting and €\$ and a specialist company/organisation – beyond CEOS scope for the foreseeable future
- SDCG strategy implementation
- Coordinated research agenda and R&D effort
- Long term capacity building and use
- ...



Tanzania by  
Landsat



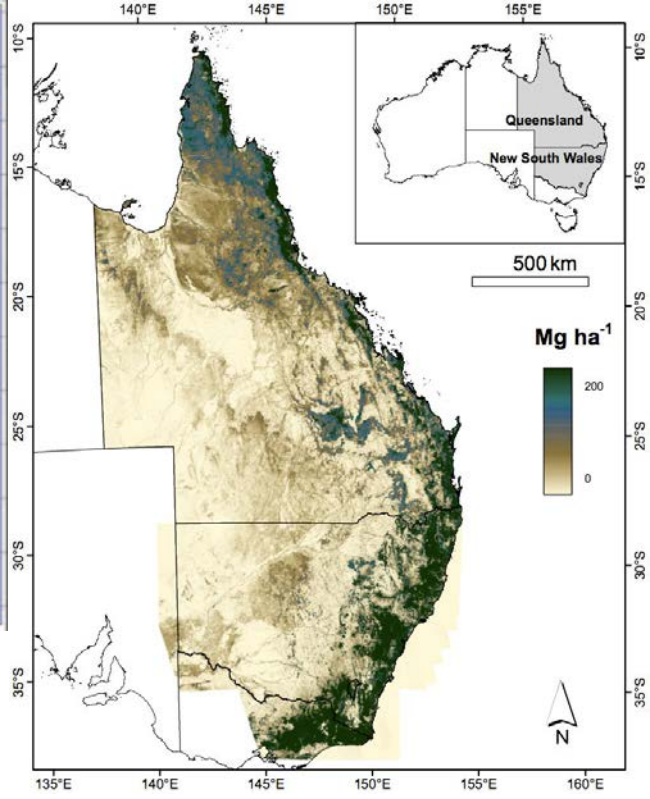
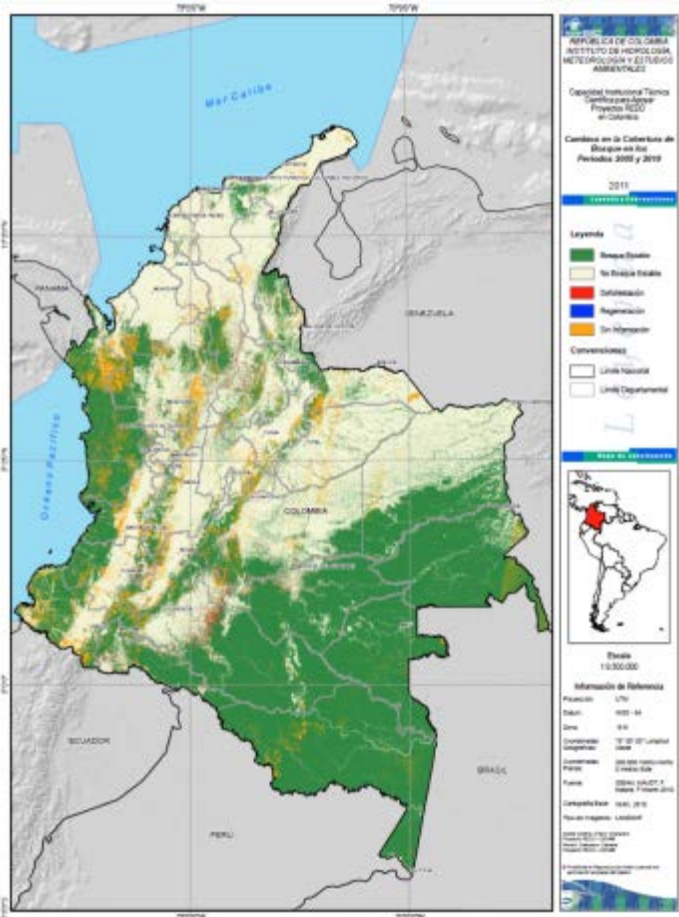
Borneo by  
PALSAR



Guyana  
by ASAR







**GFOI**  
 Global Forest Observations Initiative

