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GEO Forest Carbon activities, from FCT to GFOI

5th GEOSS AP WG 3 Forest Carbon Tracking

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5th GEOSS AP WG 3 Forest Carbon Tracking

- Co – Chair Yoshiki Yamagata, National Institute for Environmental Studies, Japan
- Co – Chair Miriam Baltuck, Commonwealth Scientific and Industrial Research Organisation, Australia
- Ake Rosenquist, soloEO, Japan
- Hamdan Omar, Forest Research Institute of Malaysia, Malaysia
- Orbita Roswintiarti, Indonesian National Institute of Aeronautics and Space, Indonesia
- Nguyen Phy Hung, Forest Inventory and Planning Institute, Vietnam
- Chandra Shekhar Jha, Indian Space Research Organisation, India
- Masanobu Shimada, Japan Aerospace Exploration Agendy, Japan
- Kenlo Nasahara, University of Tsukuba, Japan
- Tamotsu Sato, Forestry and Forest Products Research Institute, Japan
- Mitsuru Osaki, Hokkaido University, Japan
- Nobuko Saigusa, National Institute for Environmental Studies, Japan

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Fate of Anthropogenic CO_2 Emissions (2010)

9.1±0.5 PgC y^{-1}

+

0.9±0.7 PgC y^{-1}

5.0±0.2 PgC y^{-1}

50%

2.6±1.0 PgC y^{-1}

26%

Calculated as the residual of all other flux components

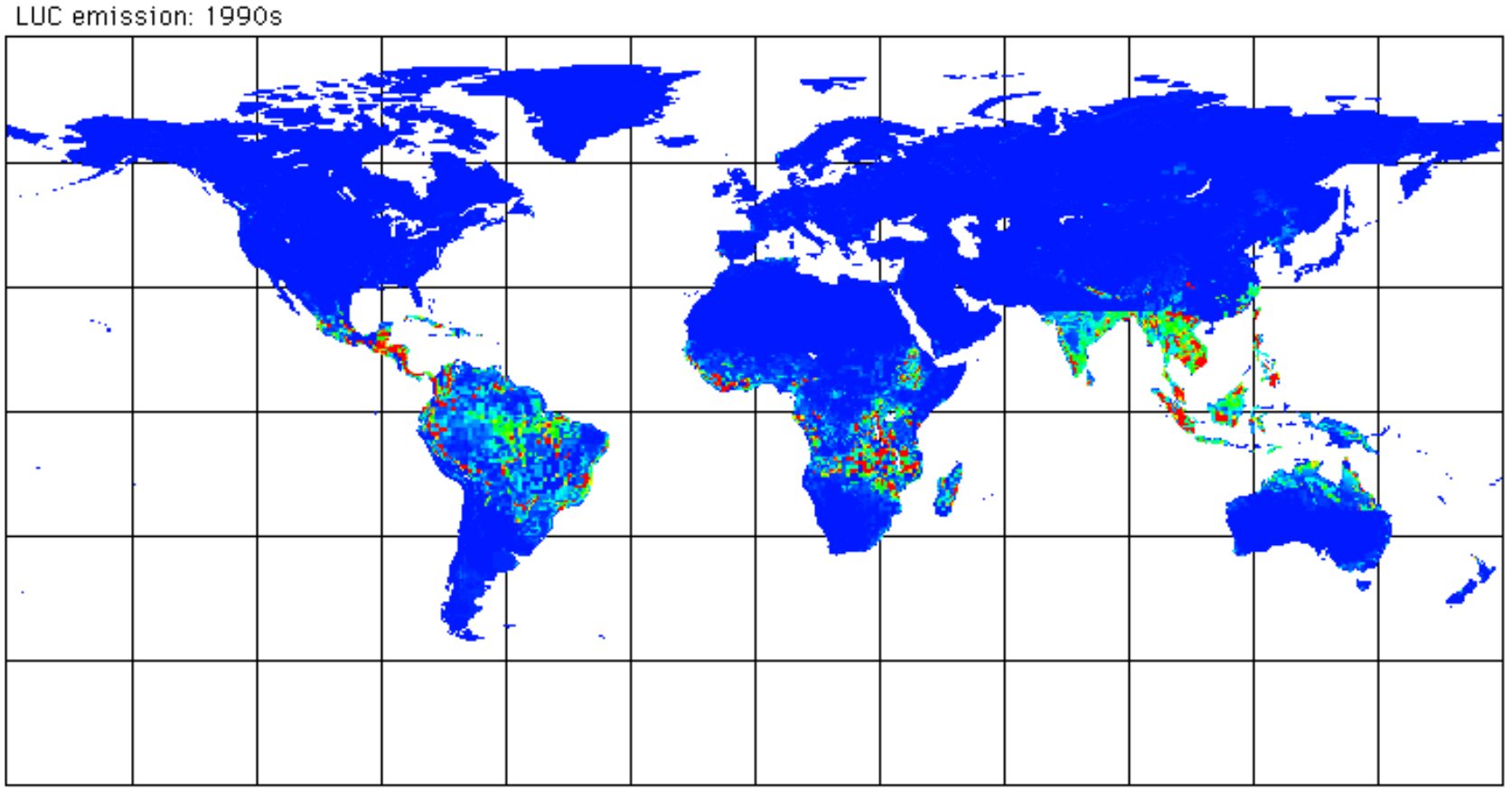
24%

2.4±0.5 PgC y^{-1}

Average of 5 models

Global Carbon Project 2010; Updated from Le Quéré et al. 2009, Nature Geoscience; Canadell et al. 2007, PNAS

CO2 emission from deforestation, 1990s



Huge emissions from tropics

NIES (Ito et.al)

The Need for Forest Observations

Latest UNFCCC COP's (15 in Copenhagen, 16 in Cancun and 17 in Durban) have confirmed that comprehensive, continuous and systematic information on forests is a key component of national Measurement, Monitoring, Reporting and Verification (MRV) Systems for REDD+.

The Conference has also invited developing countries to move towards implementing these systems, taking into account the need and the opportunity of using all available observations (from satellite Remote Sensing data to ground measurements).

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The GEO Forest Carbon Tracking Task

GEO established in 2008 the Forest Carbon Tracking (FCT) task demonstrate that coordinated Observations from satellites, validated by in situ measurements and properly linked to carbon modeling can provide reliable, accurate, consistent and continuous information to address the monitoring component of national MRVs.

The FCT overall goals are

1. to show the feasibility of performing coordinated, large scale satellite observations and
2. to test and compare the use of various observations, models, tools and methodologies in order to provide options, advice and guidelines to Countries willing to implement national systems.

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FCT logic and activities

GEO FCT has built a cooperating framework, which has progressively involved the scientific and technical community, the space community and countries willing to implement MRV systems for REDD+.

FCT is currently organized along four main lines of support activities:

- **Satellite data** coordinated acquisitions and data provision, as needed by the demonstration campaigns
- **Demonstration campaigns,** through the involvement of countries, the NDs, the appointment of a dedicated Product Development Team and processing of FCT products over the ND's
- **R&D**, definition of R&D topics, R&D plan
- **Development of Methodology Guidance Documents**

as well as:

- **Associated Capacity Building actions**

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Background and Purpose

25th CEOS Plenary (November 2011):

- Endorsed the implementation of a ***CEOS STRATEGY FOR SPACE DATA COVERAGE AND CONTINUITY IN SUPPORT OF THE GEO GLOBAL FOREST OBSERVATIONS INITIATIVE (GFOI) AND FOREST CARBON TRACKING (FCT) TASK ("CEOS DATA STRATEGY")***
- Established the GFOI Space Data Coordination Group (**SDCG**)
- The SDCG serves to **implement *the CEOS Data Strategy***

CEOS

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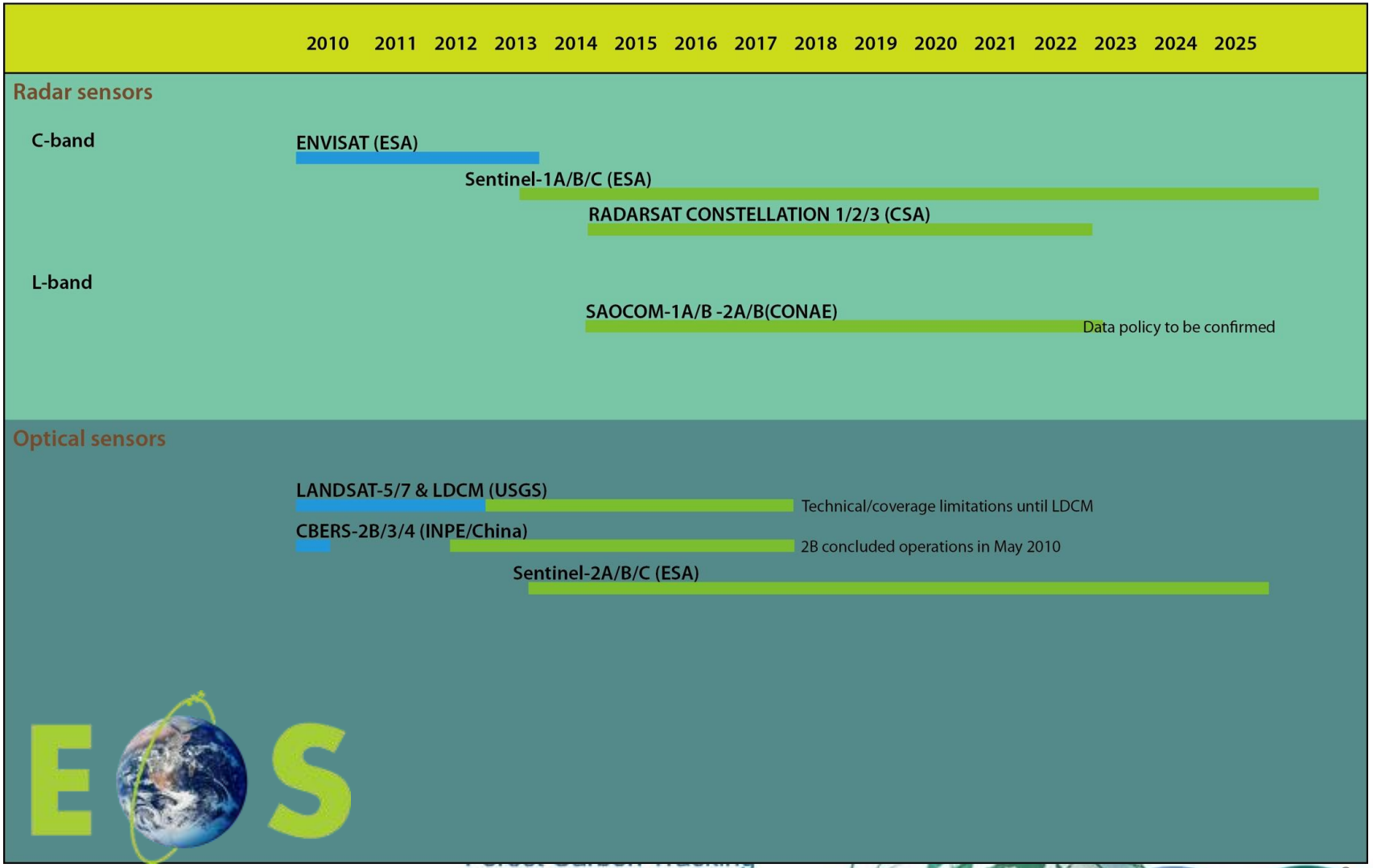
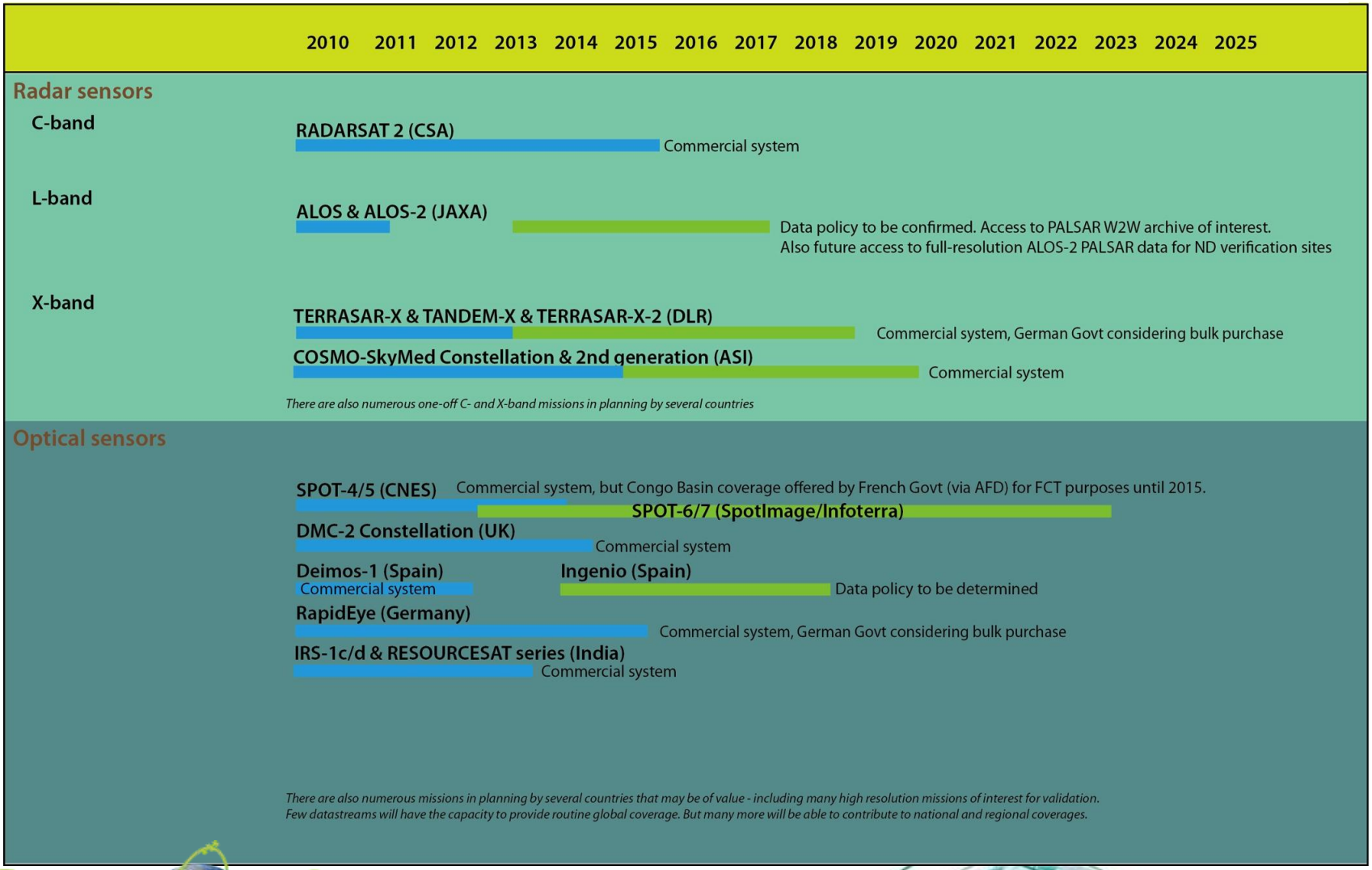
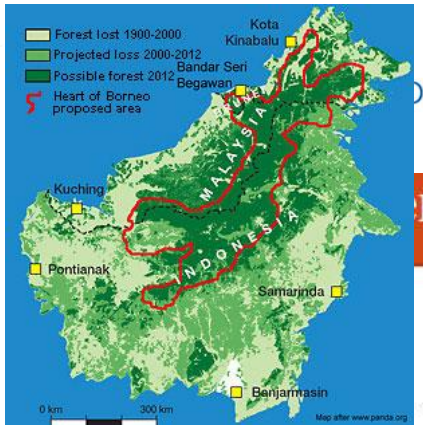
Core satellite data streams for global baseline



CEOS

Further satellite data streams





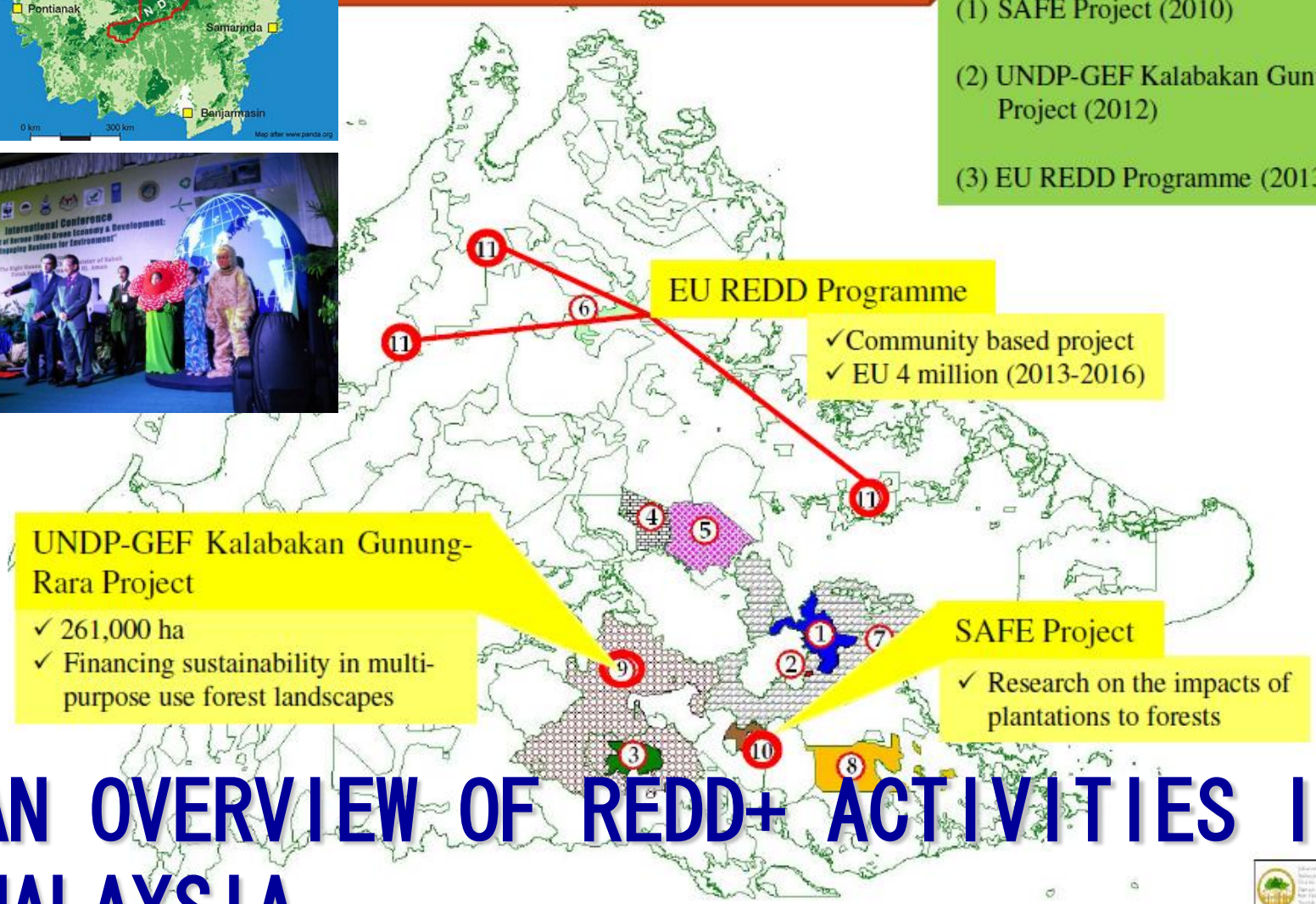
r Carbon Related Initiatives

NEW & UPCOMING PROJECTS:

(1) SAFE Project (2010)

(2) UNDP-GEF Kalabakan Gunung-Rara Project (2012)

(3) EU REDD Programme (2013)



EU REDD Programme

- ✓Community based project
- ✓ EU 4 million (2013-2016)

UNDP-GEF Kalabakan Gunung-Rara Project

- ✓ 261,000 ha
- ✓ Financing sustainability in multi-purpose use forest landscapes

SAFE Project

- ✓ Research on the impacts of plantations to forests

AN OVERVIEW OF REDD+ ACTIVITIES IN MALAYSIA

Carbon accounting and reporting model

A Annual Forest Cover and Cover Change

Annual time-series defining areas of:

- Deforestation (permanent loss of forest cover)
- Degradation (forest clearance and regeneration or partial removal)

By biomass class

B Forest Disturbance Class Mapping

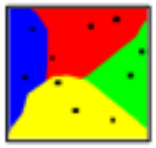
National map of forest disturbance classes at known date

- Minimal disturbance
- Moderate disturbance
- Heavy disturbance

E Carbon Accounting and Reporting Model (ICARM)

C Biomass Classification

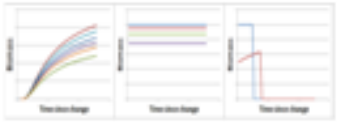
Classification of forests into groups (biomass classes) with common biomass characteristics



D Biomass Estimation

Biomass estimates for each biomass class:

- Aboveground biomass
- Root:Shoot ratios
- Litter
- Debris
- Soil
- Growth / loss rate by management



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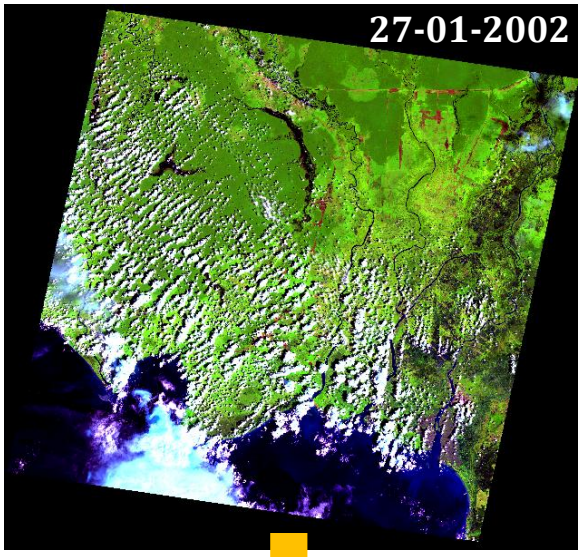
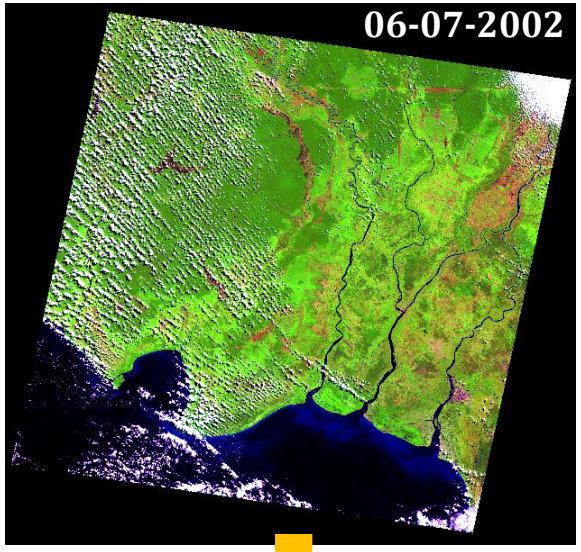
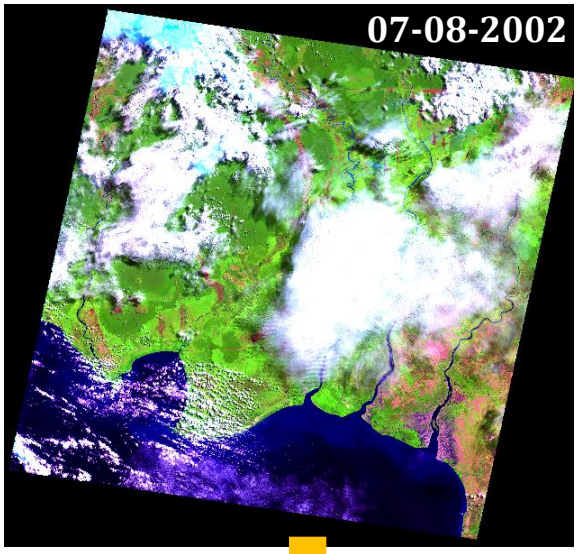
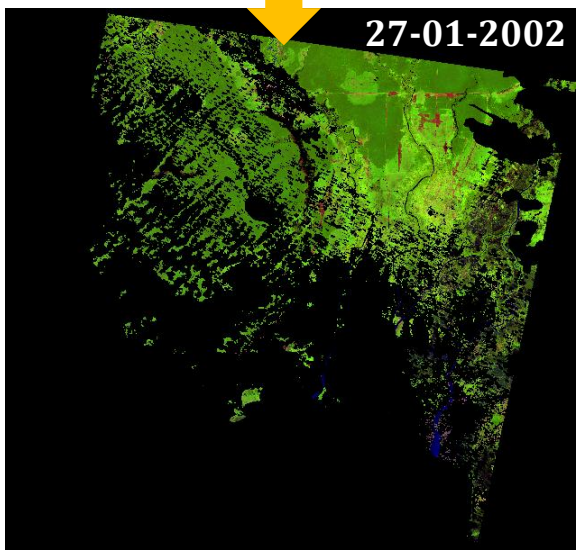
Cloud masking

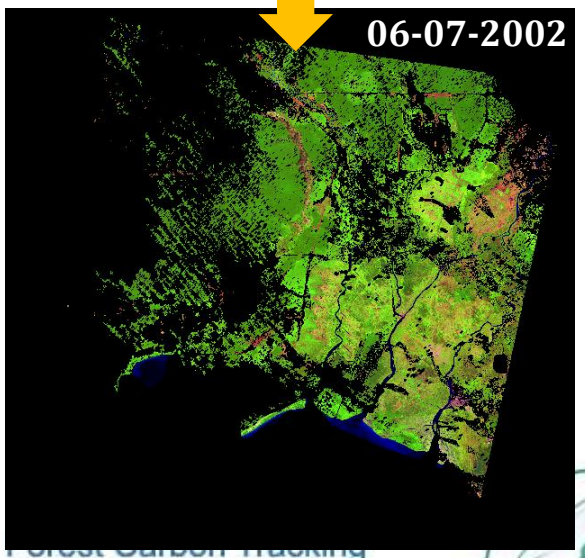
Terrain corrected scenes

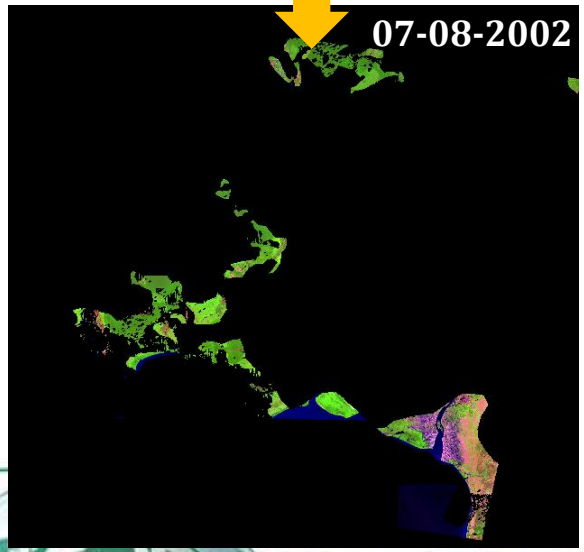












Cloud masked scenes

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Overview

Period	Image	Interpretation method	Scale of map	Mapped area
1970-1984	**Aerial photos, Landsat MSS**	**Visual on printed images**	**1/10,000 1/250.000**	**Pilot areas**
1985-1990	**Landsat TM**	**- Visual on printed images - Digital classification**	**1/100,000**	**Pilot areas**
1991-1995	**Landsat TM**	**- Visual on printed images**	**1/100,000**	**Entire country**
1996-2000	**SPOT 3**	**- Visual on printed images**	**1/100,000**	**Entire country**
2001-2005	**Landsat ETM+**	**- Digital classification**	**1/100,000**	**Entire country**
2006-2010	**SPOT 5**	**- Visual on screen**	**1/25,000**	**Entire country**

Forest Cover Monitoring – Global and National Scenario

Global Scenario

14.6 Mha deforesration ,

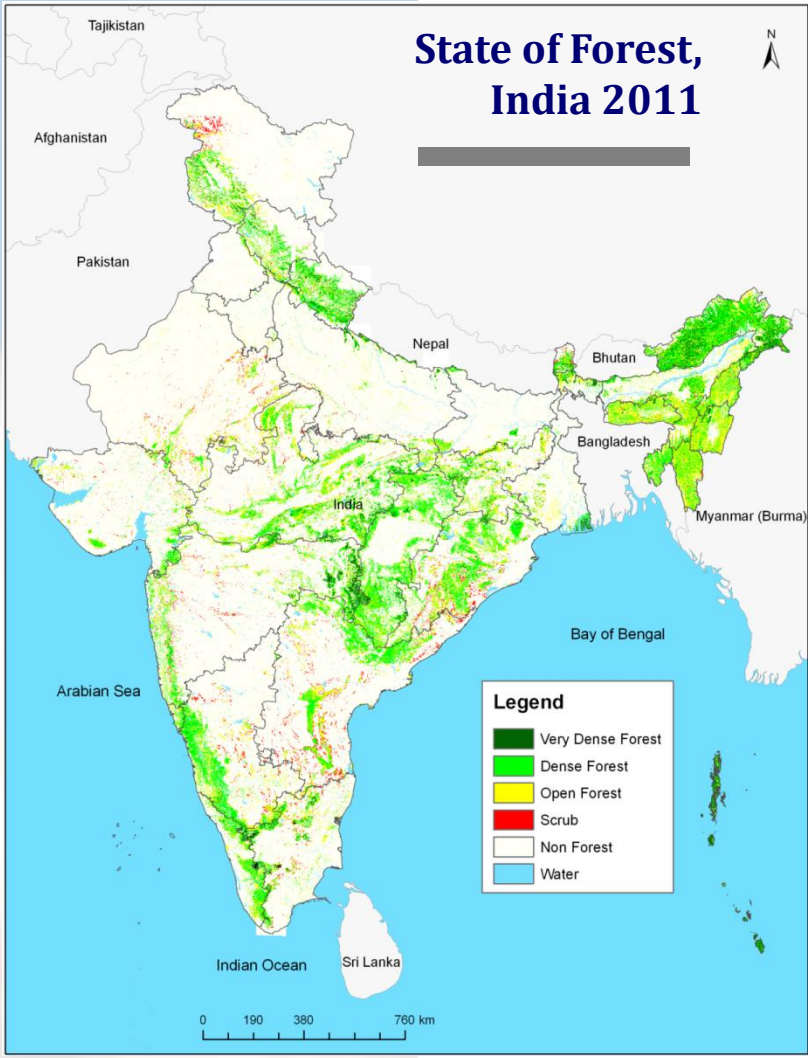
5.2 Mha plantations,

30% secondary formations

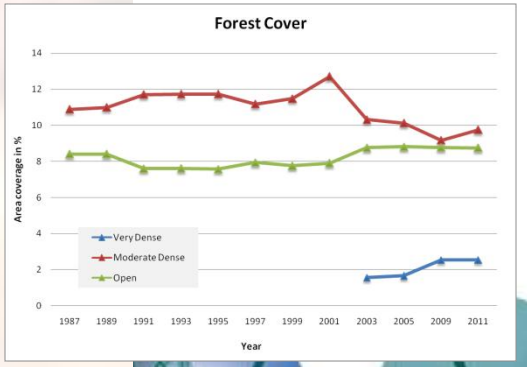
650 definitions,

National Scenario

- Periodical forest cover assessments in India since 1980 (XII reporting)
- Uses IRS satellite data
- 4 density classes delineated
- Report submitted to Indian Parliament



22/137 developing countries have NO repeat inventories

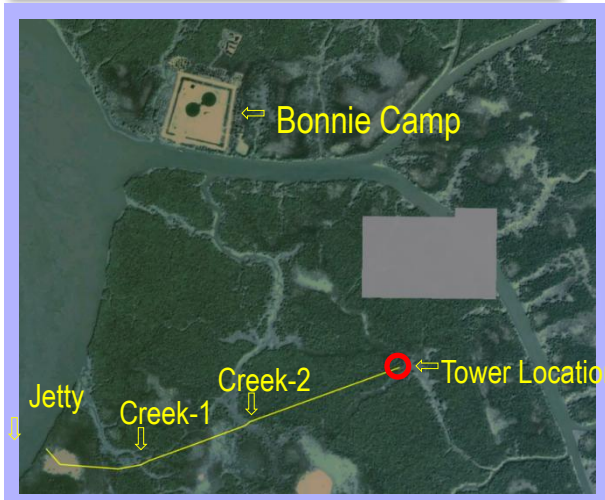


Progress at Sunderban and Betul Towers

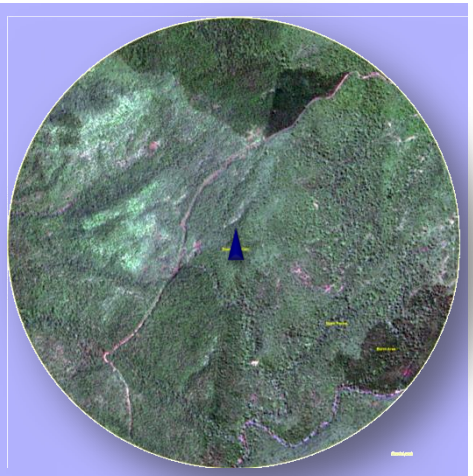
Access Path for tower in tiger habitat swamps

Sunderaban Tower, Sensors shown on different levels

Betul Tower ,Sonic anemometer , IRGA CO_2/H_2O analyser , Fast sensors) ; Hygrometer and anemometer ,(Slow sensors) at the lowest height



Sunderban Tower



Betul Tower

Positions on IRS Carto + LISS IV natural color merge

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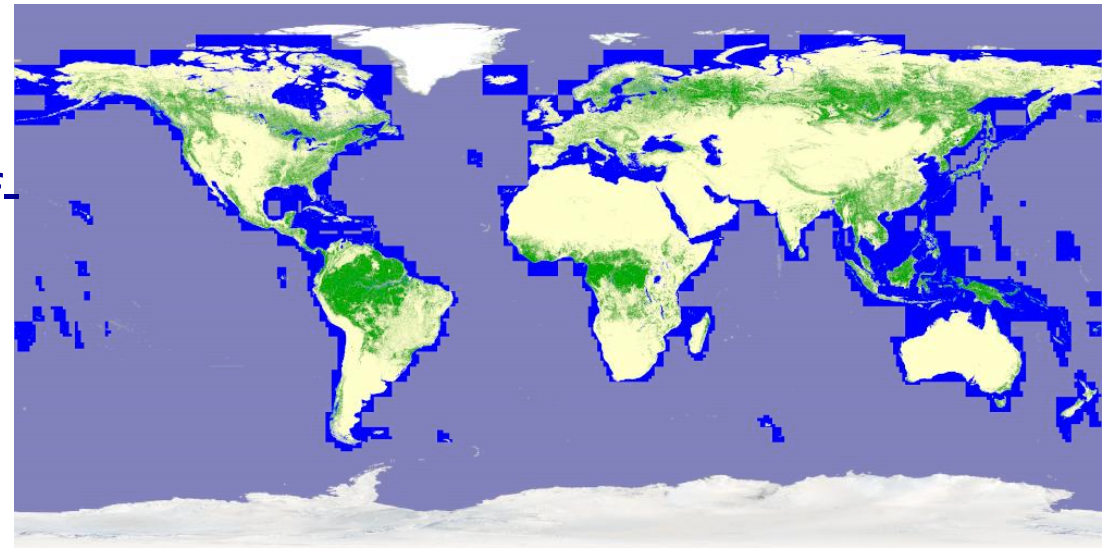
1. Introduction
2. PALSAR Global Mosaic
3. Gamma-naught stability
4. MRV system development
   - gamma-naught change
   - LULUCF
   - FNF
   - Effectiveness of slope/off-slope
   - Ground Truth Data Collection
   - Global Mangrove Map
5. Conclusion

PALSAR 10m Global Forest/Non-Forest Map 2009

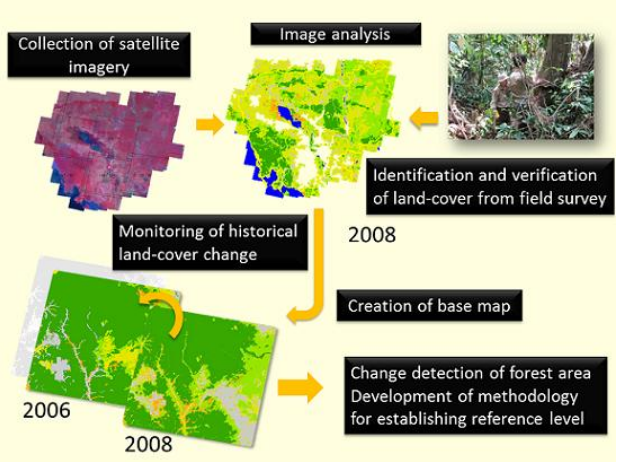


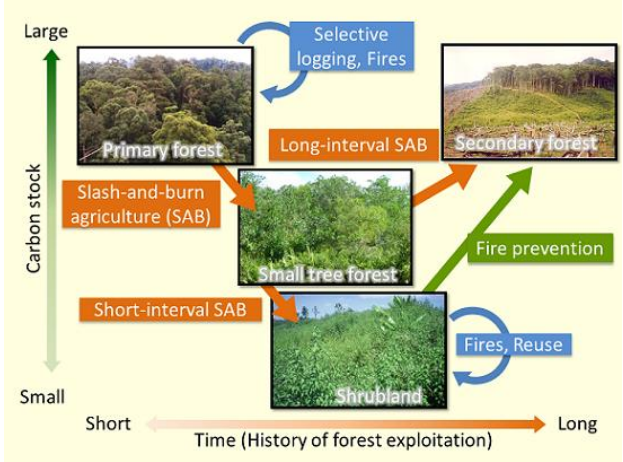
Forest Carbon Tracking

The REDD R&D Center in FFPRI

- On July 2010, "REDD Research and Development Center (REDD R&D Center)" was launched within the Forestry and Forest Products Research Institute (FFPRI).

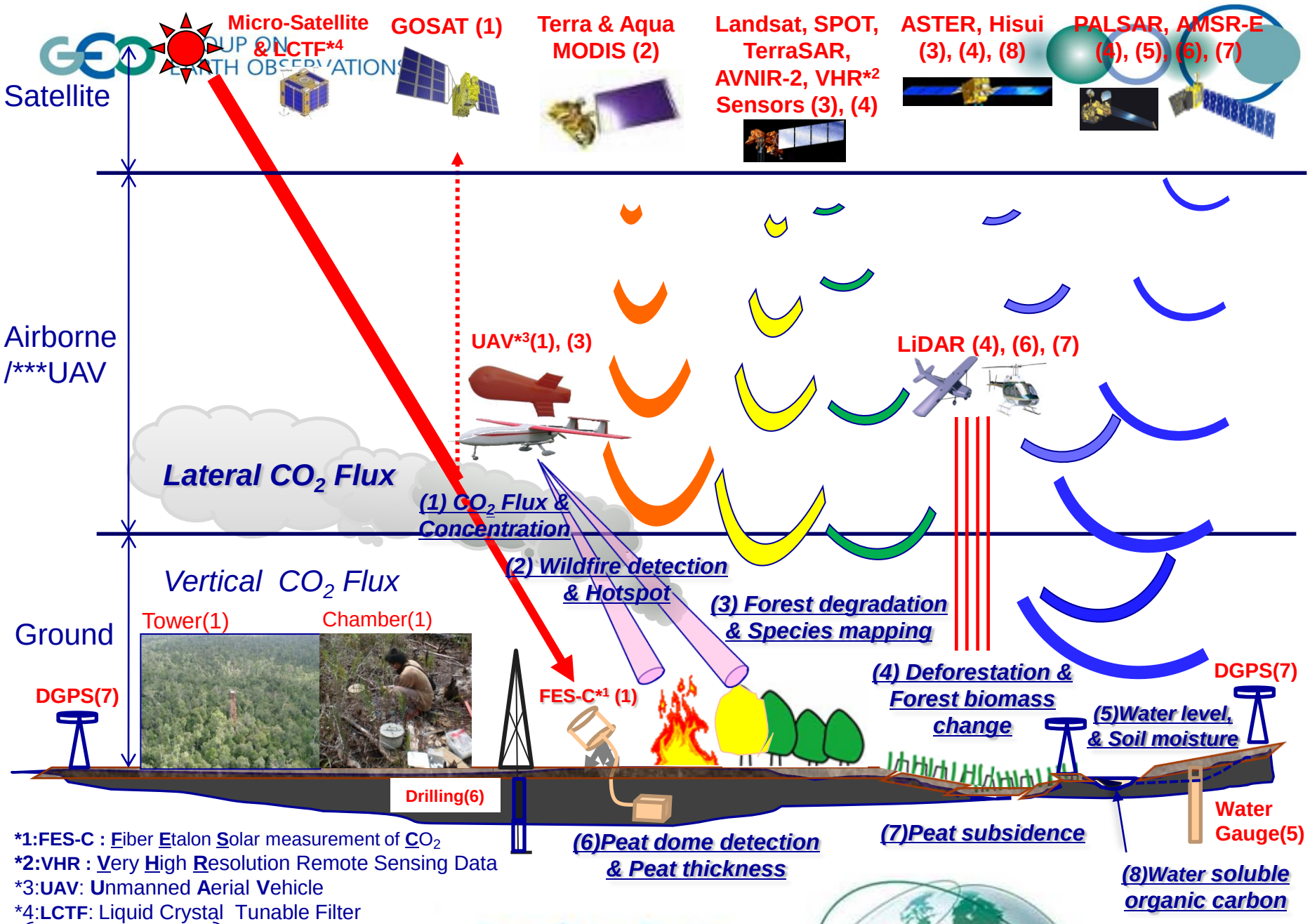
- The REDD R&D Center is working on strengthening the measurement, reporting and verification (**MRV**) system of monitoring greenhouse gas emissions and developing the technologies required to establish reference levels of emissions.





Development of methods for:

- **monitoring GHG emission and removal**
- **estimating the reference level**



*1:FES-C : Fiber Etalon Solar measurement of CO_2
*2:VHR : Very High Resolution Remote Sensing Data
*3:UAV: Unmanned Aerial Vehicle
*4:LCTF: Liquid Crystal Tunable Filter

Red: Instrument
Black: Target

Forest Carbon Tracking

Key Elements of Tropical Peatland MRV System

Seasonal patterns of C-budget

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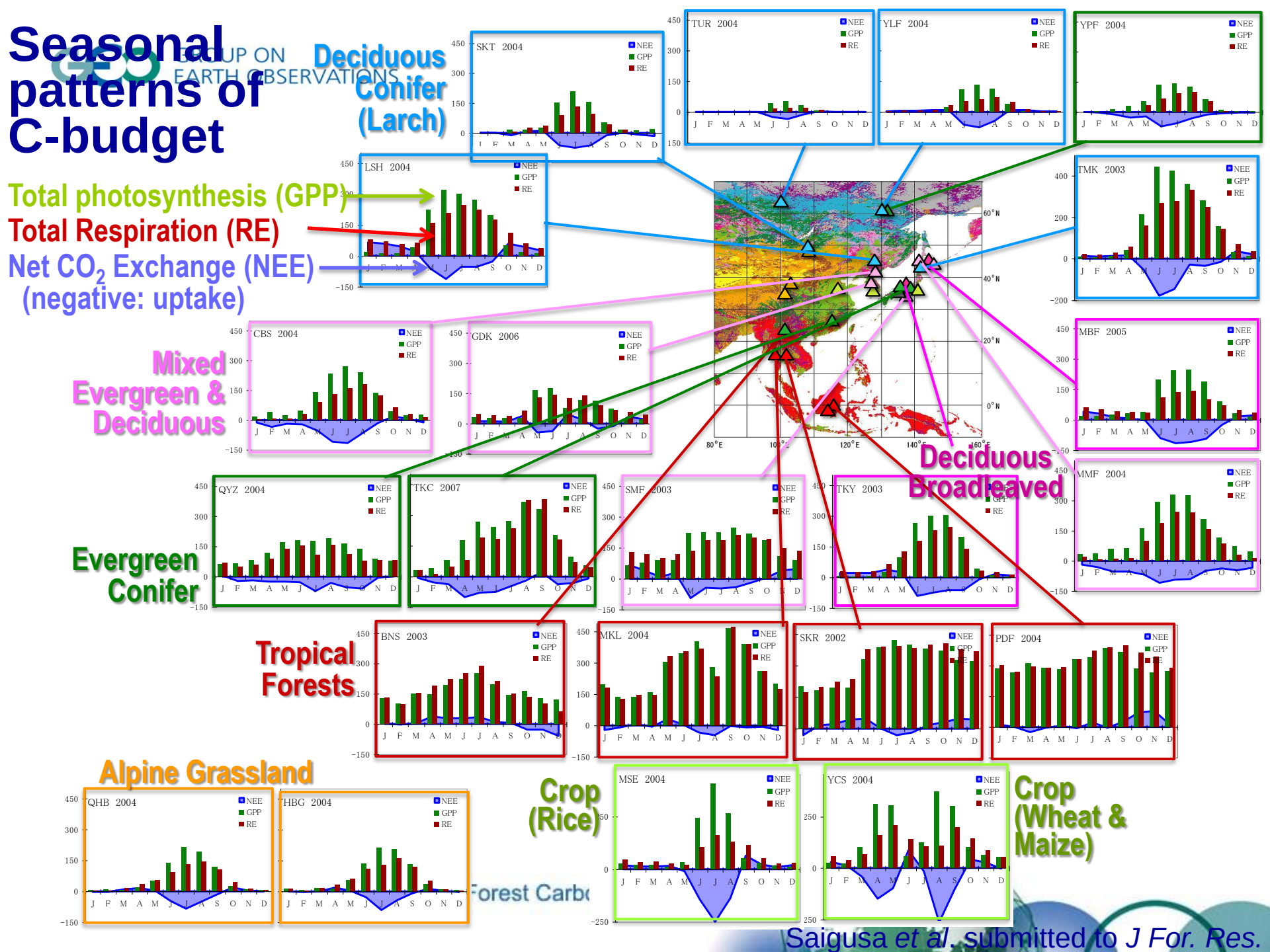
Total photosynthesis (GPP)

Total Respiration (RE)

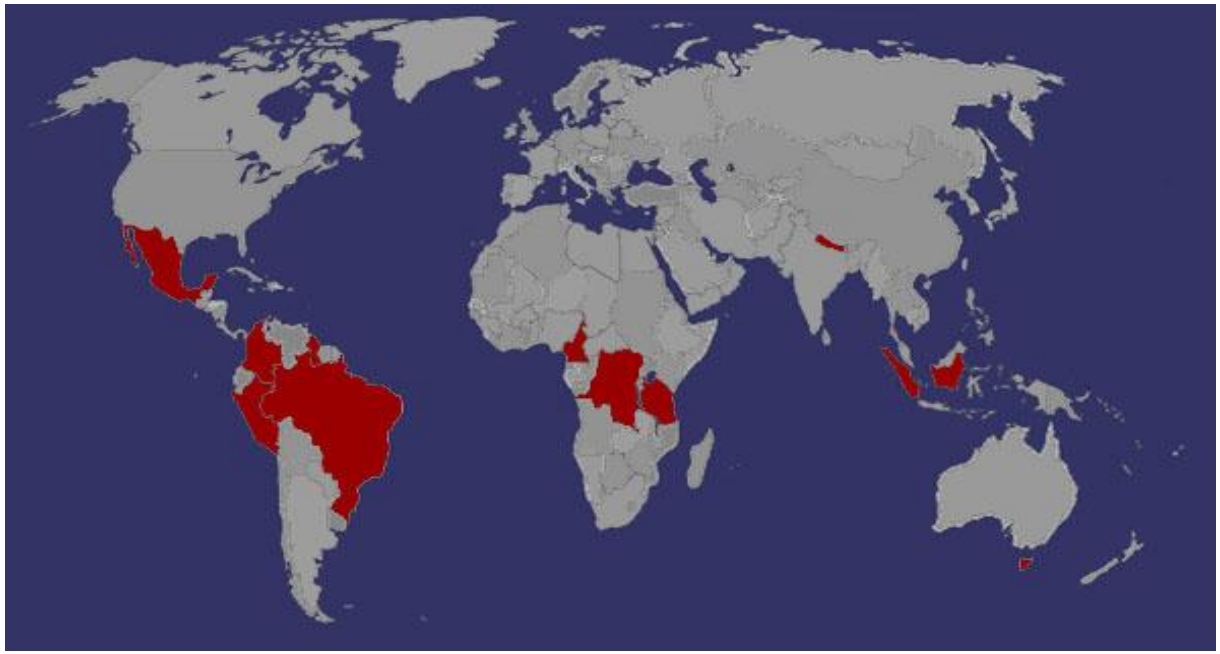
Net CO_2 Exchange (NEE)
(negative: uptake)



Forest Carbo

Saigusa *et al.* submitted to *J For. Res.*

FCT Network of "National Demonstrators"



11 ND Countries

- Australia (Tasmania)
- Brazil
- Cameroon
- Colombia
- DR Congo
- Guyana
- Indonesia (Sumatra, Kalimantan)
- Mexico
- Nepal
- Peru
- Tanzania.

From 2009
- Brazil
- Guyana
- Mexico
- Indonesia (Kalimantan)
- Australia (Tasmania)
- Cameroon
- Tanzania

From June 2010
- Colombia
- DR Congo
- Peru, and
- adding Sumatra to Indonesia

From June 2011
- Nepal

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WG3 Priorities and Next Steps for the Global Forest Observation Initiative (GFOI)

Priority: **A fundamental priority for GFOI is the completion of the Methodology Guidance documents (planned for completion in late 2012)**

Important next steps:

-Broaden Asian Country Participation
-While GFOI does not invite participants, it welcomes new countries to participate as the program is implemented.
-Outreach opportunities in the region include
  - the CR3 (Climate Regional Readiness Review; an APRSAF program with a meeting in Perth on May 24-25.
  - the CEOS plenary (September 2012 in Hyderabad)
  - the FCT Science Data Summit in February 2013 (venue tbd but in the Asia Pacific Region)
-Develop methodologies to address Forest Degradation
-Develop methodologies to address other forest-related carbon (e.g. peatland)
-Develop the relationship to BioDiversity and pursue common interests
-Anticipate that the SDCG will also consider Agricultural Monitoring and Food Security (GEO GLAM) using approaches developed in service to GFOI