

GFOI's supporting activities on sectoral MRV issues for AFOLU sector

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WGIA12 4th – 6th August, 2014, Bangkok, Thailand



Climate Change and Forests

- Deforestation and forest degradation globally are significant sources of CO₂ (nearly 20% to global total emissions)
- The UNFCCC has established REDD+: *Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries*
- REDD+ is an effort to create a financial value for the carbon stored in forests by offering incentives for developing countries to reduce emissions from forested lands and to invest in low-carbon paths to sustainable development.
- REDD+ adopts a phased approach starting with strategy development and culminating in payments for verified emission reductions and removals in the context of low-carbon development.

Reporting

- To demonstrate verified emission reductions and removals countries must implement National Forest Monitoring Systems (NFMS) and Measuring, Reporting and Verification (MRV) systems compliant with the requirements of the UNFCCC and the IPCC guidelines for estimating emissions and removals of greenhouse gases
- NFMS monitor changes in carbon stocks and emissions and removals of greenhouse gases with results should be published in their BUR
- Countries need to estimate emissions and removals from all AFOLU (LULUCF) sectors
 - Report biennially
 - Consistent with any REDD+ reporting
- NFMS form a vital part of managing forests and limiting emissions

Global Forest Observations Initiative (GFOI)

-  *Responding to the urgent need to reduce deforestation and forest degradation, the Global Forest Observations Initiative fosters the sustained availability and use of satellite data for national forest monitoring systems to better manage forest resources.*
-  GFOI will support countries' national efforts to implement the national forest monitoring systems in accordance with relevant international standards, including: UNFCCC & IPCC, by:
 - *providing a platform for coordinating observations:* work with space agencies (CEOS) in order to assure the systematic, sustained and worldwide acquisition and supply of forest observations;
 - *providing assistance and guidance on utilising observations:* in collaboration with national institutions and international bodies such as the FAO, World Bank;
 - *develops methods, guidance and advice;*
 - *provides capacity building;*
 - *promotes ongoing research and development.*



Why GFOI?

- 🌳 There are many organisations supporting the implementation of REDD+ (UNREDD, FAO, World Bank ...)
- 🌳 GFOI's unique features are
 - 🌳 its links to space agencies and their commitment to acquire data needed for annual forest monitoring
 - 🌳 Participation by many experts in Earth Observation, organisations involved in REDD+ and developing countries
- 🌳 GFOI has:
 - 🌳 Active support and involvement of 13 space agencies
 - 🌳 Active involvement of key REDD+ and GHG institutions: UNFCCC, FAO, WB, IPCC
 - 🌳 Explicit endorsement by 90 countries (GEO) and 67 international organisations
 - 🌳 Active involvement of developing country participants



REDD+ Reporting: Roles & responsibilities

- UNFCCC
 - decisions on REDD+, reporting and MRV
- IPCC
 - guidelines on estimating emissions and removals of GHG,
- Countries:
 - implementation, specifically national forest monitoring and MRV
- Support Programmes (UNREDD and FCPF ...)
 - Support to Countries
- GFOI
 - provide a platform for coordinating observations:
 - provide methodological advice and support in using observations



United Nations
Framework Convention on
Climate Change



UN-REDD
PROGRAMME





GFOI ensures the acquisition of core satellite data

GFOI reviews and promotes research and development needed to implement national forest monitoring



GFOI Office



GFOI Methods and Guidance report guiding the use of Satellite and Ground data for national forest monitoring and estimation of carbon stocks and greenhouse gas emissions.

GFOI provides capacity building in coordination with others such as UN-REDD. It supports the use of satellite and ground data to monitor forests, estimate carbon stocks and greenhouse gas emissions



Integrating remote-sensing and ground-based observations for estimation of emissions and removals of greenhouse gases in forests

The United Nations Framework Convention on Climate Change (UNFCCC) meeting in Warsaw, in November 2013, decided on the rules for REDD+.

The Global Forest Observations Initiative (GFOI) now provides operational advice to countries and international organisations on the use of Earth Observations information in the development of national forest monitoring (NFMS) and Measuring, Reporting and Verifying (MRV) systems consistent with the decisions made in Warsaw.

- 🌳 a guide for developing countries and international organisations
- 🌳 in collaboration with leading multilateral and bilateral initiatives
- 🌳 provides advice on how to implement UNFCCC and Intergovernmental Panel on Climate Change (IPCC) approaches
- 🌳 assists in choosing the most appropriate technical solutions
- 🌳 will be translated into French and Spanish and be available electronically
- 🌳 training tools and web support are being developed

Integrating remote-sensing and
ground-based observations for
estimation of emissions and removals
of greenhouse gases in forests

Methods and Guidance from the Global Forest
Observations Initiative

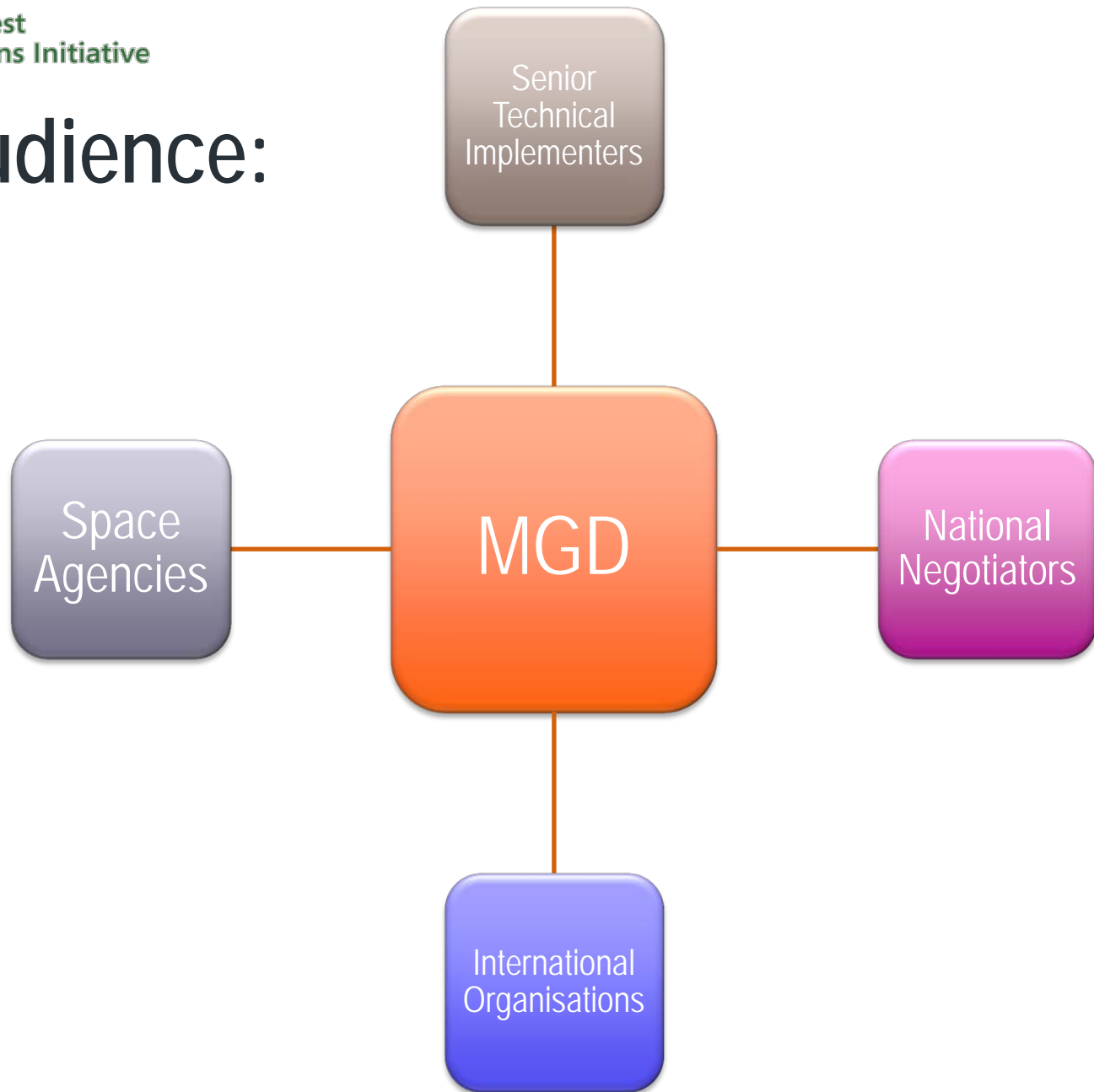
Version 1.0
January 2014



Methods and Guidance

- Gives advice on the use of
 - Earth Observations information in the monitoring of forests, carbon stocks and their associated greenhouse gas fluxes.
 - Integration of remote sensing and ground-based data
- Will not duplicate other guidance
 - UNFCCC mandates the use of IPCC guidelines but they say little about the practical use of remote sensing,
 - MGD gives step-by-step advice on readily implementable approaches
 - GOFC-GOLD provides an annual updated review of science
- Recognises that countries will make their own choices about their forest monitoring needs and definitions
- the MGD is intended to be used with
 - IPCC guidance (by linking IPCC methods more systematically to REDD+ activities than has been done previously) and
 - GOFC-GOLD (which provides an annual review of applicable science).

Target Audience:



Significance of MGD to GFOI

- 🌳 It gives an approach that underlies all GFOI activities
 - Annual wall-to-wall mapping with
 - remote sensing combined for area data, stratification... “*activity data*”
 - ground data for biomass information, validation... “*emission factors*”
 - Validation using ground data and statistical inference to remove bias
 - Medium resolution data required (Landsat, Sentinel...), higher resolution data optional
 - Covers all REDD+ activities including deforestation and forest degradation
- 🌳 Provides Space Data Component with minimum data and mapping needs
 - Allows understanding of needs
- 🌳 Provides a unifying theme to capacity building activities
 - Inside and beyond GFOI
 - Allows common training materials
- 🌳 Identifies areas where existing methods can be improved
 - R&D needs

CEOS Baseline Global Acquisition Strategy for GFOI

Elements:

- 1) A baseline, coordinated global data acquisition strategy involving a number of core data streams that can be shared openly and acquired free-of-charge for GFOI purposes. Systematic and sustained wall-to-wall acquisitions of forested areas, globally repeated on timescales consistent with NFMS & MRV - at least annual monitoring in support of biennial reporting for developing countries under REDD+ provisions.
- 2) A coordinated strategy for national data acquisitions accommodating countries that have specific requirements for working with a particular EO data source or type. This will involve a wider range of satellite data sources, including data that is ordinarily provided on a commercial basis.
- 3) Data supply in support of GFOI R&D activities.

Core Satellite data (>30m) for Sustained Annual Coverage

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

Radar sensors

C-band

← **ERS-1&2 (ESA)**
Archive available from 1991

ENVISAT (ESA)

Sentinel-1A/B/C (ESA)

RADARSAT CONSTELLATION 1/2/3 (CSA)

L-band

← **ALOS (JAXA)**
2007-2010 25m global mosaic product anticipated

ALOS-2 (JAXA)

SAOCOM-1A/B -2A/B (CONAE)

Data policy to be confirmed

Optical sensors

← **LANDSAT-5/-7 & -8 (USGS)**
Landsat Archive available from 1972

LS-7 technical/coverage limitations.

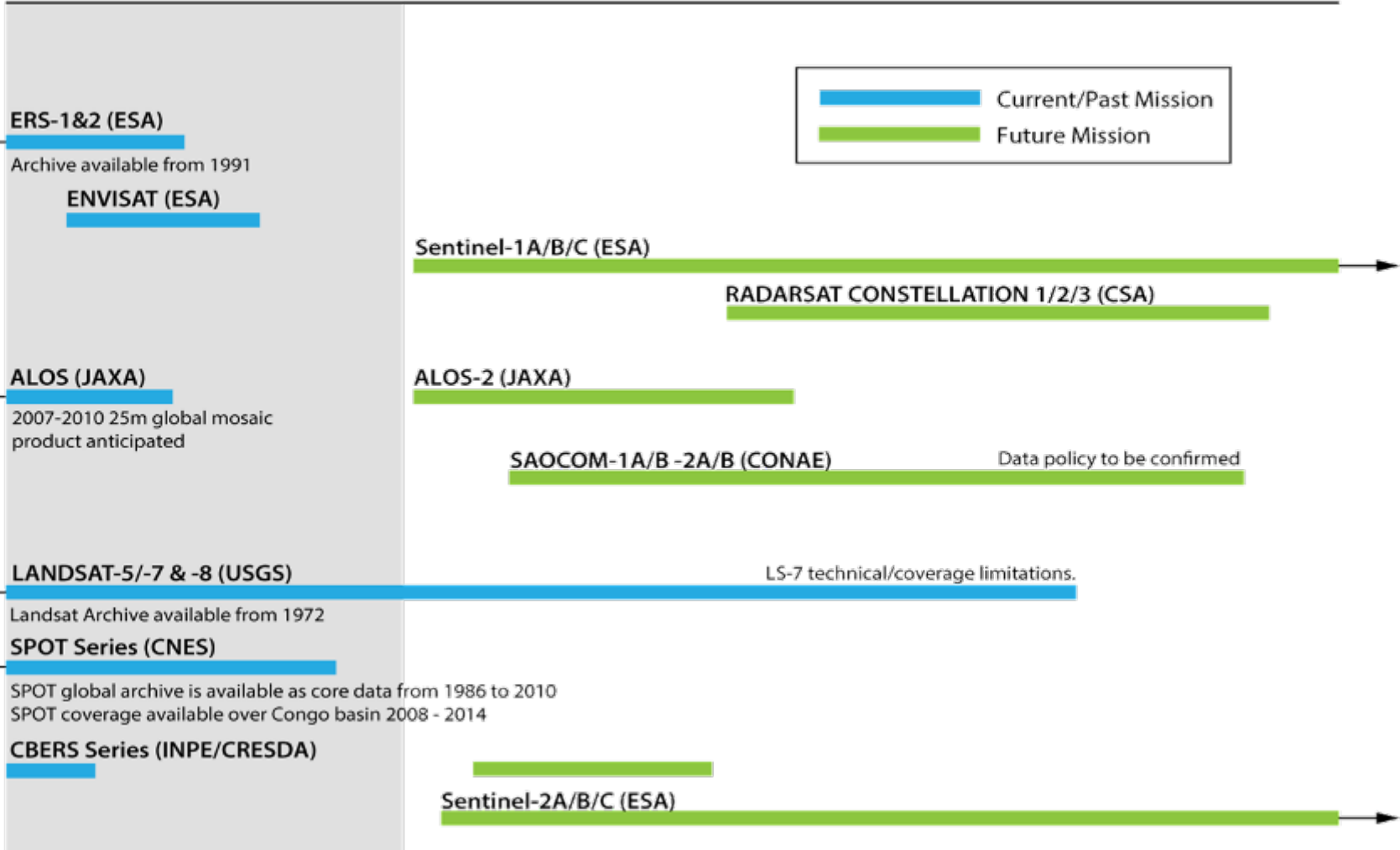
← **SPOT Series (CNES)**
SPOT global archive is available as core data from 1986 to 2010
SPOT coverage available over Congo basin 2008 - 2014

CBERS Series (INPE/CRESDA)

Sentinel-2A/B/C (ESA)

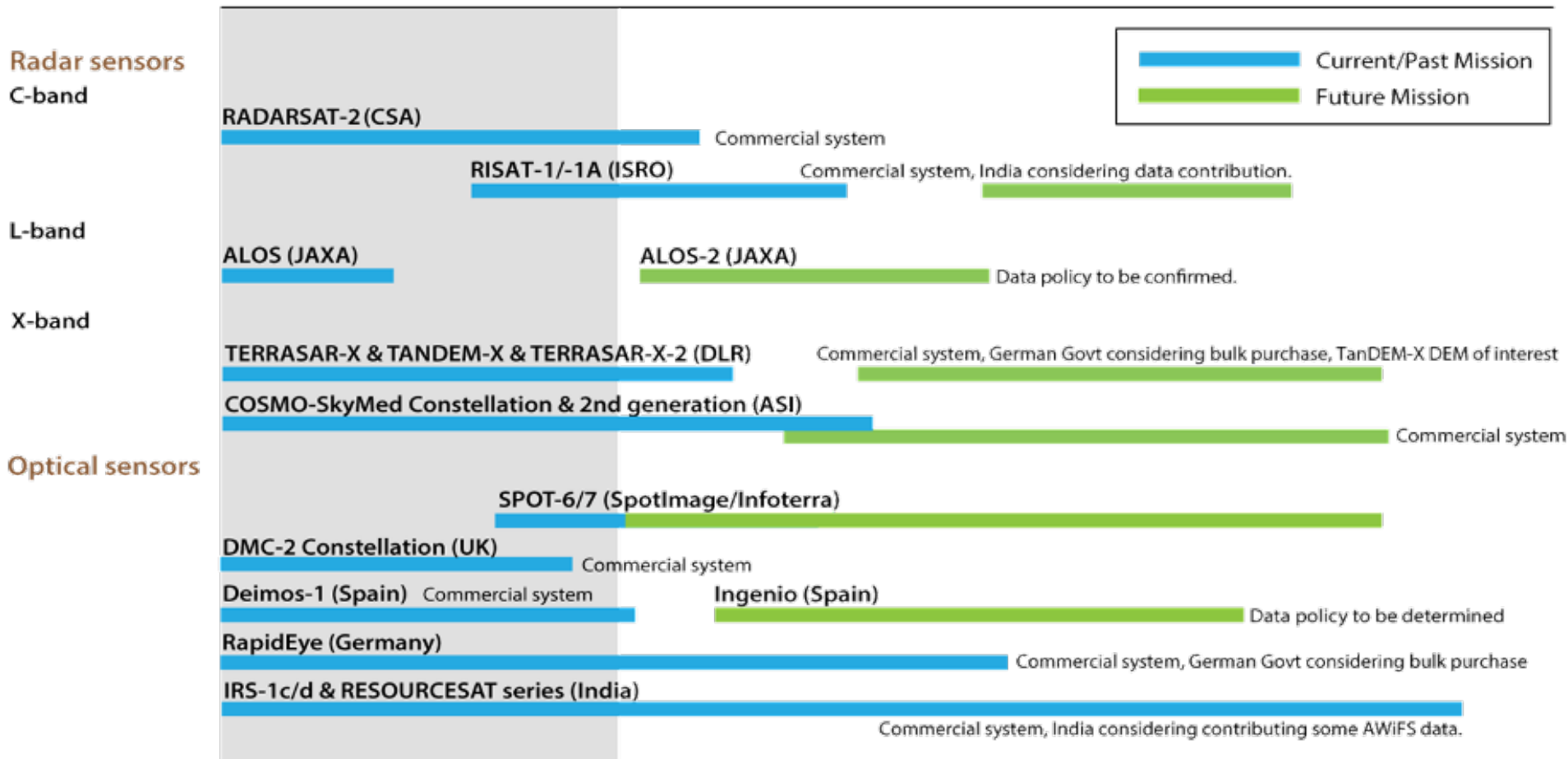
Current/Past Mission

Future Mission



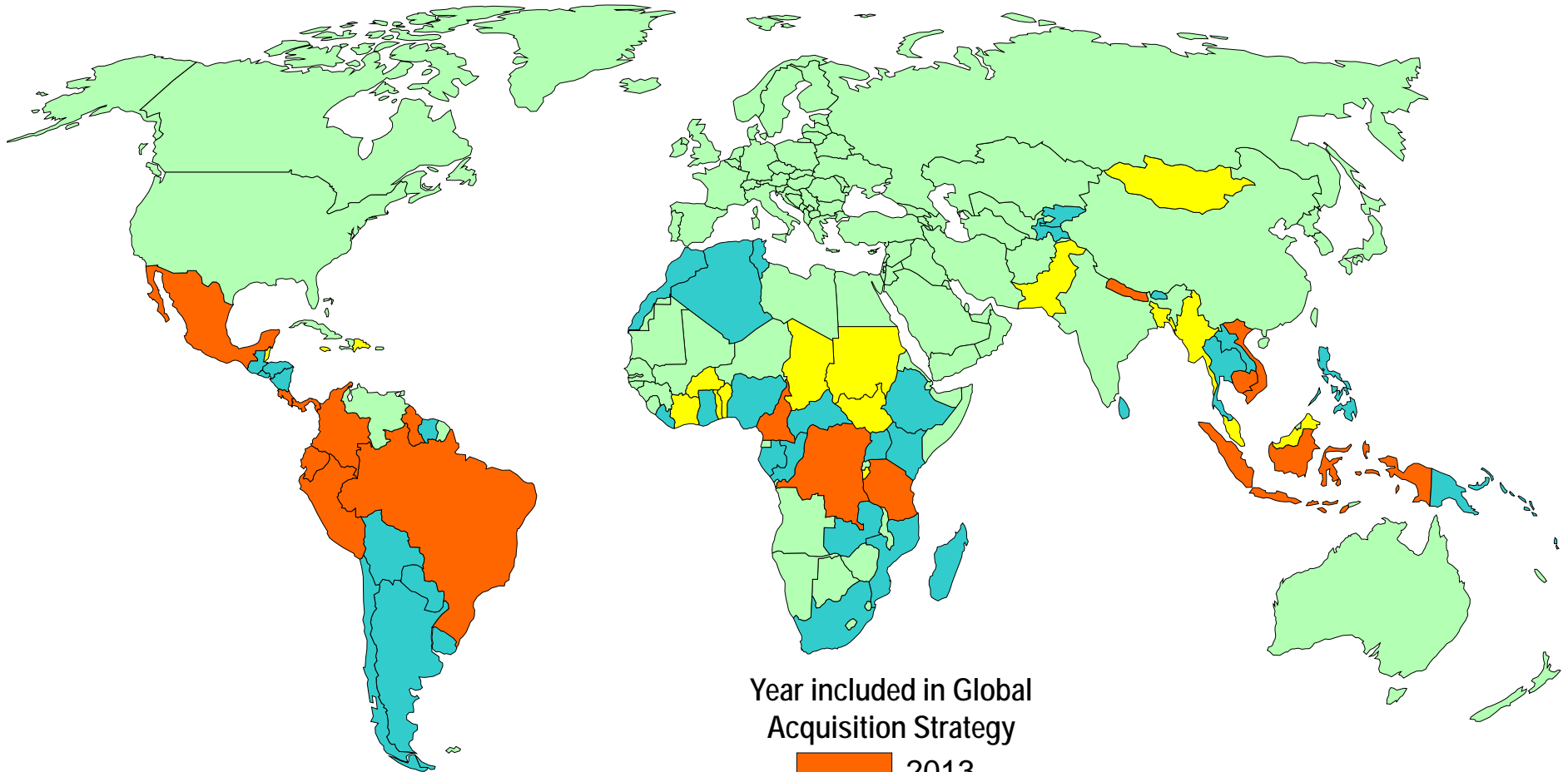
Other Missions of Interest

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

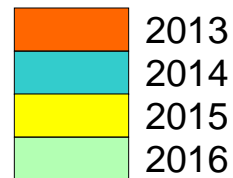


There are also numerous missions in planning by several countries that may be of value - including many high resolution missions of interest for validation. Few datastreams will have the capacity to provide routine global coverage. But many more will be able to contribute to national and regional coverages.

Core Data - Global Acquisition Strategy

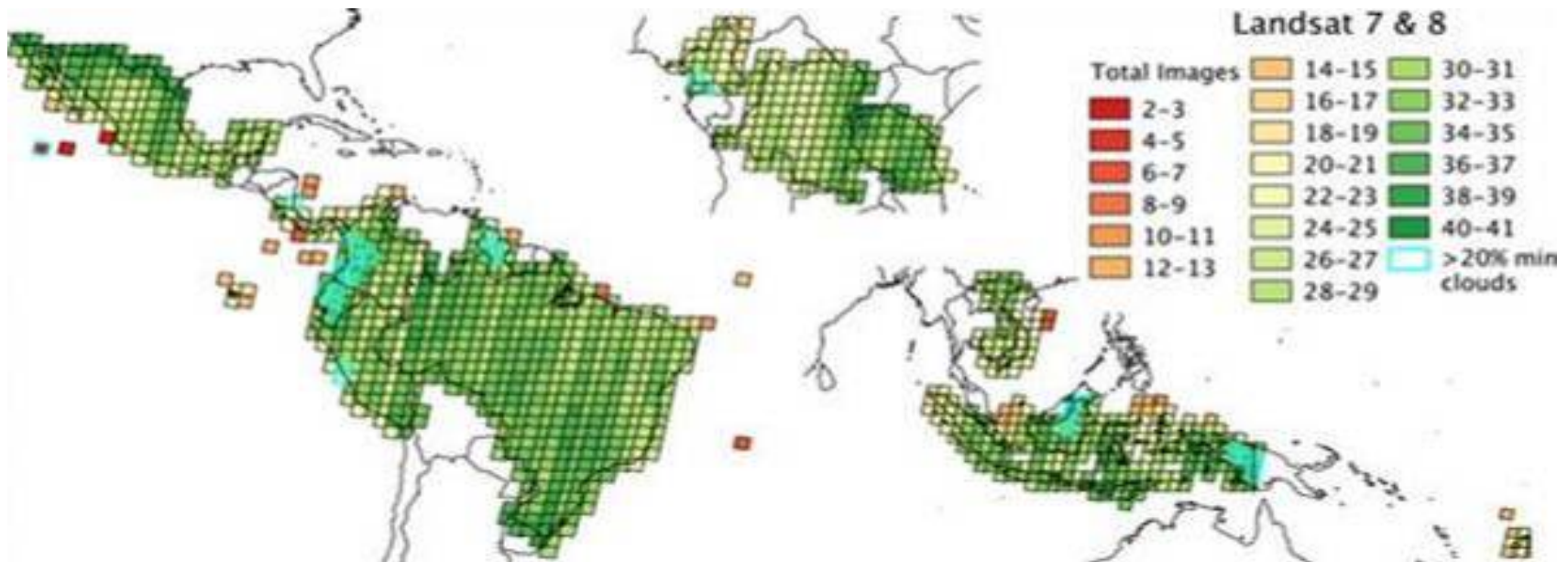


Year included in Global Acquisition Strategy



Clouds...

- The 2013 requirement for cloud free data cannot be met solely with Landsat data
 - For a few areas, cannot get cloud free observations using more than one image
 - Additional optical data from Sentinel 2 and CBERS satellites will improve coverage
- However a few areas will still not be cloud free
- Other methodologies, such as Synthetic Aperture Radar (SAR), may be required



Additional Space Data Services

- Historical Coverage Characterisation
 - Provide tools to determine what exists in the archives
 - Considering adding RADARSAT (CSA), TerraSAR-X (DLR) & SPOT (CNES)
- Ensuring Future Acquisitions
 - Core Coverage tracking
 - Ensuring future core data acquisitions (sustainability)
 - Augmenting Core Data Coverage
- GFOI recognises that the resources and capacity are not always available for direct downloads. For these cases GFOI is looking at alternative delivery methods, financing and leveraging other resources.
- Potential Data Processing Services

Other GFOI Deliverables: R&D

- GFOI is interested in promoting R&D needed to implement operational NFMS and MRV systems rather than longer-term developments
 - GOFC-GOLD programme is reviewing new science
- Review of R&D needs completed in 2013 and work is underway to develop a plan
- GFOI is holding small meetings of invited research groups on specific topics to consider gaps in on-going research and obstacles to operationalising results.
- Funding uncertain, GFOI office will promote this to potential funders

Other GFOI Deliverables: Capacity Building

- On-going (US SilvCarbon, bilateral efforts).
 - This has focused on South America in the past
 - Now expanding with kick-off meetings in South-East Asia and Africa
 - Works with other support programmes such as UN-REDD
- Also bilateral programmes from Australia and Norway.
- Working towards closer collaboration with FAO and World Bank

Website:
gfoi.org



Supporting national forest monitoring systems

In the Methods and Guidance Document, *Integrating remote-sensing and ground-based observations for estimation of emissions and removals of greenhouse gases in forests: Methods and Guidance (MGD)* from the Global Forest Observations Initiative some issues have been found in the table numbering and one of the examples, these are listed [here](#), and a corrected pdf is available [here](#).

The Global Forest Observations Initiative (GFOI) is an initiative of the inter-governmental Group on Earth Observations (GEO) that aims to:

GFOI Video



- foster the sustained availability of observations for national forest monitoring systems;
- support governments that are establishing national systems by providing a platform for coordinating observations, providing assistance and guidance on utilising observations, developing accepted methods and protocols, and promoting ongoing research and development; and
- work with national governments that report into international forest assessments (such as the global Forest Resources Assessment (FRA) of the Food and Agriculture Organization, FAO) and the national greenhouse gas inventories reported to the UN Framework Convention on Climate Change (UNFCCC) using methods of the Intergovernmental Panel on Climate Change (IPCC).

By absorbing and storing atmospheric carbon, forests play an

GFOI

- Aims to support countries in developing sustainable national forest monitoring & MRV systems to meet their individual needs
- Works in collaboration with other international organisations and programmes
- Its current focus is on supporting REDD+ implementation
- Is working with CEOS to ensure the sustained, freely available, supply of core data streams with world-wide coverage by 2016
- Is considering how to address additional data needs and services including processing and delivery
- Is also supporting countries in the use of this data through capacity building, methodological advice and addressing R&D needs

Thank you



Core Data Acquisition Strategy

	Americas	Africa	Asia & Pacific
2013	Brazil Columbia Costa Rica Ecuador Guyana Mexico Peru Panama	Cameroon DRC Tanzania	Cambodia Indonesia Nepal Viet Nam
2014	Argentina Bolivia Chile El Salvador Guatemala Honduras Nicaragua Paraguay Suriname Uruguay	Algeria CAR Congo Ethiopia Gabon Ghana Kenya Liberia Madagascar Morocco Mozambique Nigeria South Africa Tunisia Uganda Zambia	Bhutan Kyrgyzstan Lao Papua New Guinea Philippines Solomon Islands Sri Lanka Tajikistan Thailand Vanuatu
2015	Belize Dominican Republic Jamaica	Benin Burkina Faso Burundi Chad Côte d'Ivoire South Sudan Sudan Togo	Bangladesh Fiji Malaysia Mongolia Myanmar Pakistan
2016	All remaining countries globally		

Asia & Pacific Support

GFOI Core Data Acquisition Asia & Pacific		UN-REDD National Programmes	UN-REDD Partner Countries	FCPF
2013	Cambodia, Indonesia	Nepal, Vietnam		
2014	Bhutan, Kyrgyzstan, Lao Peoples' Democratic Republic, Papua New Guinea, Philippines,	Solomon Islands, Sri Lanka, Tajikistan, Thailand, Vanuatu	Bangladesh Cambodia Indonesia Papua New Guinea The Philippines Solomon Islands Sri Lanka Vietnam	Bhutan Cambodia Fiji Indonesia Lao People's Democratic Republic Nepal Pakistan Papua New Guinea Thailand Vanuatu Vietnam
2015	Bangladesh, Fiji, Malaysia	Mongolia Myanmar Pakistan		
2016	All remaining countries globally			

Plan for data acquisition

	Americas	Africa	Asia & Pacific	Number of Countries	Area (Mkm ²)	Total Area (Mkm ²)
Priority countries for systematic data acquisition (Element 1) for 2013	Brazil, Columbia, Costa Rica, Ecuador, Guyana, Mexico, Peru, Panama,	Cameroon, Democratic Republic of the Congo, United Republic of Tanzania,	Cambodia, Indonesia, Nepal, Viet Nam	15	20.5	205
Additional planned priority countries for 2014	Argentina, Bolivia (Plurinational State of), Chile, El Salvador, Guatemala, Honduras, Nicaragua, Paraguay, Suriname, Uruguay	Algeria, Central African Republic, Congo, Ethiopia, Gabon, Ghana, Kenya, Liberia, Madagascar, Morocco, Mozambique, Nigeria, South Africa, Tunisia, Uganda, Zambia	Bhutan, Kyrgyzstan, Lao People's Democratic Republic, Papua New Guinea, Philippines, Solomon Islands, Sri Lanka, Tajikistan, Thailand, Vanuatu	36	18.5	39.0
Additional planned priority countries for 2015	Belize, Dominican Republic, Jamaica	Benin, Burkina Faso, Burundi, Chad, Côte d'Ivoire, South Sudan, Sudan, Togo,	Bangladesh, Fiji, Malaysia, Mongolia, Myanmar, Pakistan,	17	9.0	48.0
2016	All remaining countries globally			127	84.8	132.8