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The GEO Forest Carbon Tracking (FCT) initiative

Towards the Implementation of a global Forest Carbon Tracking System

Giovanni Rum,
GEO Secretariat

COMIFAC Regional Workshop
Monitoring Carbon Stocks and Fluxes in the Congo Basin
February 2 – 4, 2010 Brazzaville, Republic of Congo

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GEO, the Group on Earth Observations

An Intergovernmental Organization with 81 Members and 58 Participating Organizations

U.S. Department of State, Washington DC
July 31, 2003

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The Group on Earth Observations

The Group on Earth Observations was established at the EO Ministerial Summit in 2005 in Brussels with one major objective:

To establish a coordinated and sustained Global Earth Observation System of Systems GEOSS

to enhance informed decision making in different areas of the Society.

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GEO outcomes

- Improve and Coordinate Observation Systems
- Provide Easier & More Open Data Access
- Foster Use (Science, Applications)
- Build Capacity

GEOSS will be built from the expansion and interlinking of existing observation and information systems and the investments of Members and Participating Organizations in new systems.

Forest Carbon Tracking

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THE GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS

Forest Carbon Tracking

The Forest Carbon Tracking (FCT) initiative Summary

National bodies, space agencies and research institutions are working together within GEO, to

- facilitate access to satellite, airborne and in situ data,
- establish interoperability standards for the use of different processing and analysis tools and methodologies, and
- create the appropriate framework for the implementation a global forest carbon tracking system, based on a network of national systems

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The need

An operational global forest monitoring system based on a network of national systems is needed, *inter alia,* to support reducing greenhouse gas emissions from deforestation and forest degradation (REDD)

- inclusion of forests in a post-2012 climate agreement is important for many developing countries and this has been fully recognized by COP 15
- Monitoring, Reporting and Verification (MRV) systems will be critical, and require global Earth observation systems

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The GEO FCT Partnership

- Leadership of Australia, Canada, Japan and Norway
- CEOS, the Committee on Earth Observation Satellites, and its members agencies
- FAO, GOFC-GOLD, EC-JRC & research groups
- Google
- Seven 'National Demonstrators' for the project in 2009-2010
  - Australia, Brazil, Cameroon, Guyana, Indonesia, Mexico and Tanzania.

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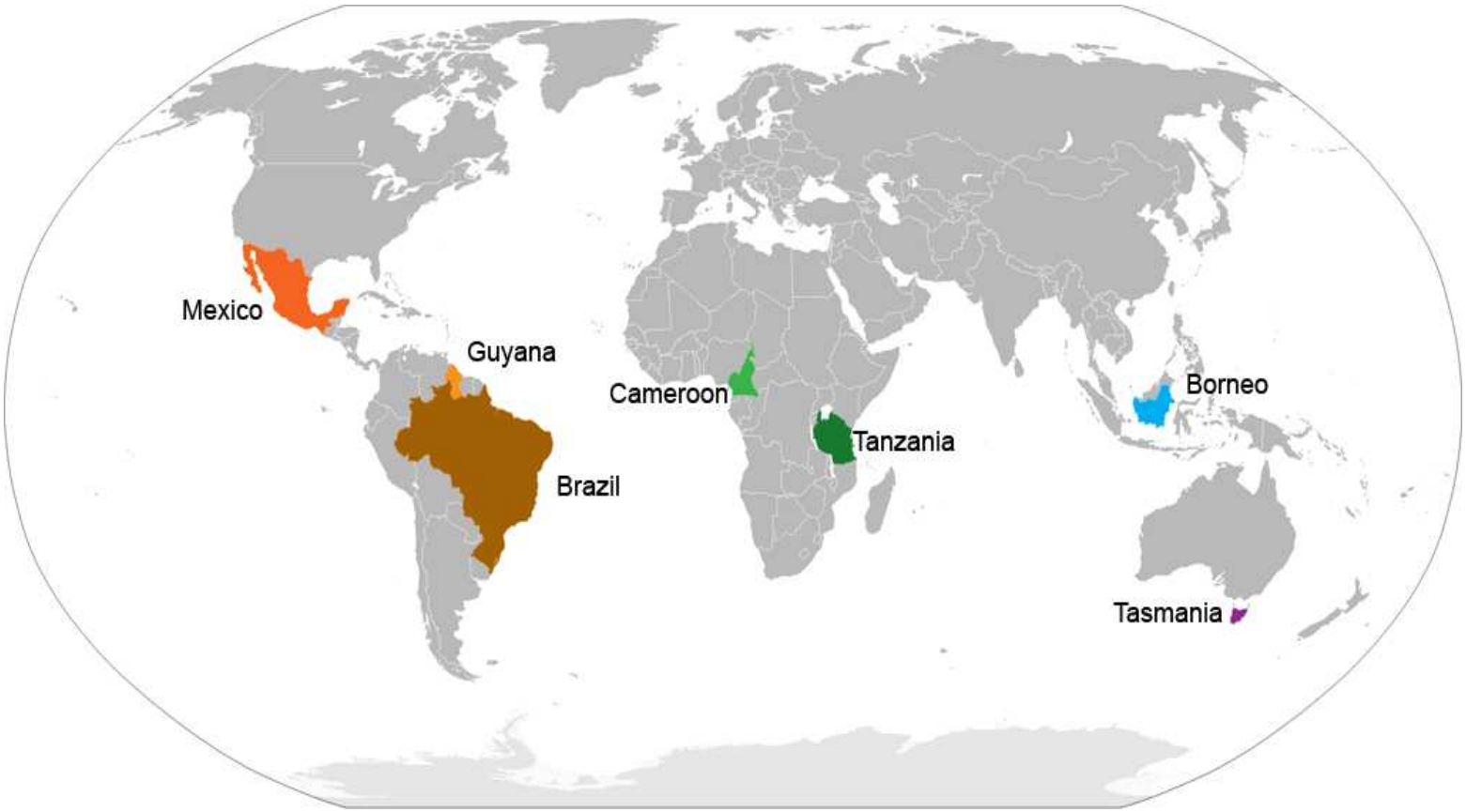
GEO FCT Partnership: NDs



Growing list of candidates for 2010 participation

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The GEO FCT initiative How is it unique ?

GEO FCT is a framework for coordination among governments, space and forest agencies, research institutions and early adopter countries to:

- Establish National end-to-end demonstrators showing the elements and operations of a global system of systems
- Develop institutional arrangements for secure data access and continuity
- Initiate, validate and promote the standards and the protocols for comparability and interoperability

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The GEO FCT initiative
What will be made available to Countries ?

GEO FCT developments are aimed at supporting countries establishing national systems for forest carbon tracking by:

- Ensuring access to long-term satellite, airborne and in situ data, and the associated analysis and prediction tools
- creating the framework and technical standards for a global network of national systems
- developing methodologies and products that follow UNFCCC/IPCC guidelines

GEO FCT monitoring approach

A yearly, wall-to-wall, medium-resolution monitoring approach has been identified as the best suited to cover a wide range of potential outcomes of the policy-framework negotiations. Two sets of corresponding of information products were identified

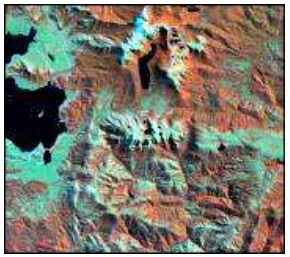
"Horizon-1" products, addressing IPCC requirements, which have reached a level of processing 'maturity', and which can now be potentially produced by different remote sensing teams around the world. These are the highest-priority 'pre-operational' products for each FCT National Demonstrator country,

"Horizon-2" products that constitute a range of more specific demonstration products and will gradually complement Horizon-1 products depending on their levels of algorithm development, demonstration results and validation, transferability from country to country, and operational readiness.

GEO FCT
Products identification

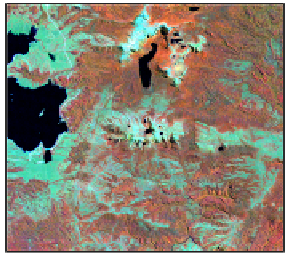
Horizon 1

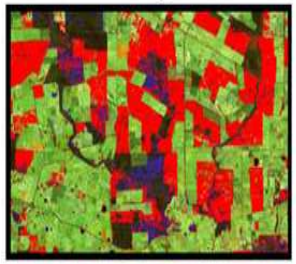
- 1a. – Annual, wall-to-wall, Forest Area Change and updated Forest/Non-Forest coverage maps, which can be used for estimation of trends and associated accuracy metrics.
- 1b. – Land-cover/use map (including agriculture, plantations, native forest, grassland)



Horizon-2

- 2.a - Coarse-resolution, high-frequency forest change detection/ anomalies product (derived from low-resolution, but high frequency satellite sensors such as MODIS (optical) or PALSAR ScanSAR (radar).
- 2b. - Forest-type : Softwood, hardwood, native, primary, secondary
- 2c. - Forest trends
- 2d. -Sparse woody perennial cover
- 2e.- High-resolution forest change, structure or physiology products (from satellite, airborne systems – eg. lidar, x-band SAR, imaging spectrometers)
- 2f.- Forest Degradation





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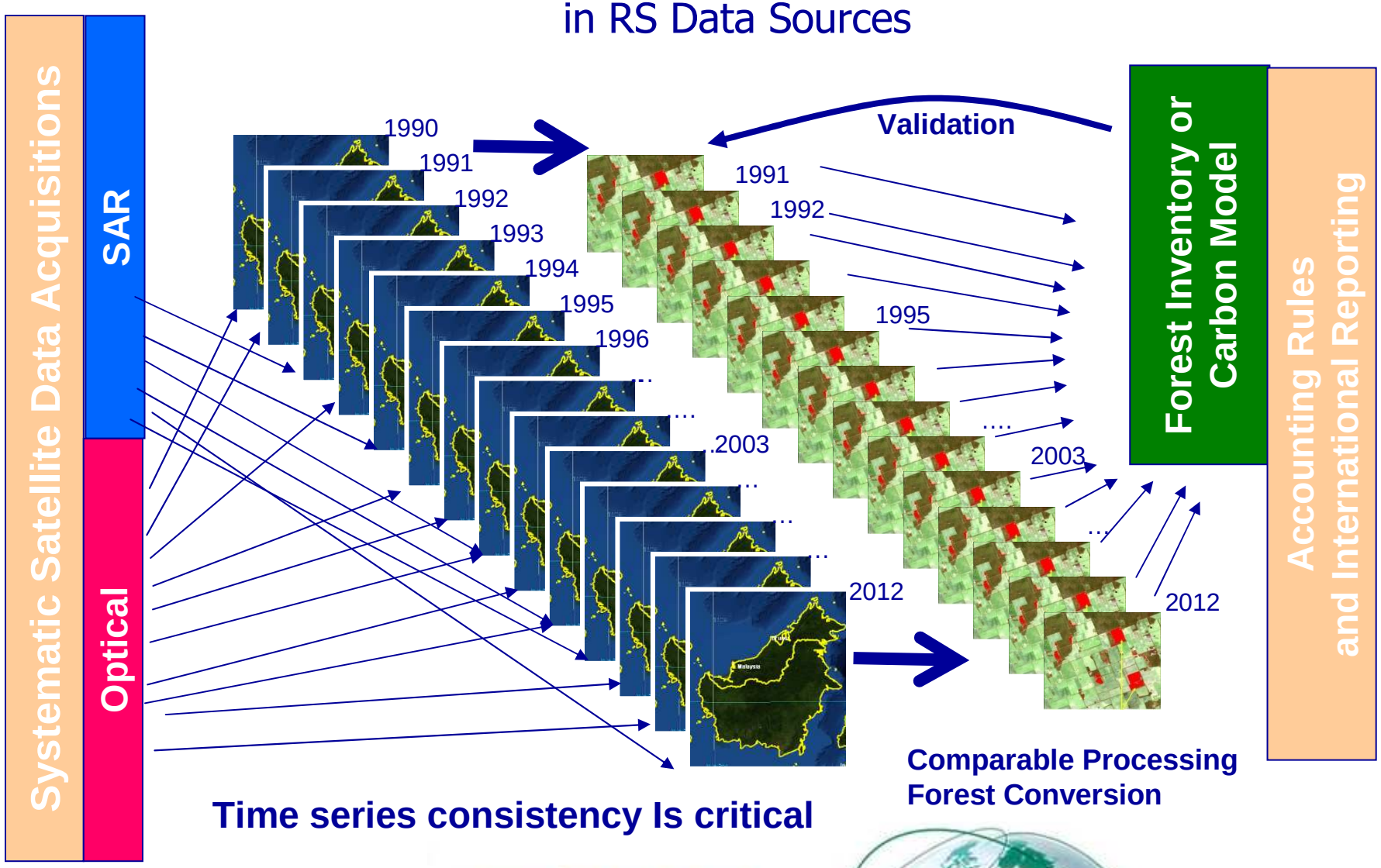
Interoperability and complementarity in RS Data Sources



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FCT activities flow

The Task aims at demonstrating this capability, initially via the establishment of robust methodologies, satellite acquisition plans and a series of national demonstration areas (ND – National Demonstrators).

Through a coordinated and iterative process, ND's will provide the elements to define a template for the roll-out of a consistent and reliable global system.

The task therefore includes three main interconnected phases:

- Requirements definition
- Demonstration
- Implementation of the operational system

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The Path to Implementation

The GEO FTC initiative will pave the way for countries to establish national MRV systems as part of a global network via eight main actions:

1. A commitment by CEOS members to provide satellite data, tools and training for national wall-to-wall forest carbon tracking.
2. Provide guidance to countries on methods and standards to produce forest information products.
3. Provide guidance on linking ground measured forest inventories, remote-sensing data and carbon models.

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The Path to Implementation

4. Develop validation and accuracy assessment procedures for forested area and carbon stocks.
5. Grow the network of 'National Demonstrator' countries: Southeast Asia, Africa and South America.
6. Raise awareness of the demonstrations to the UNFCCC and other major fora, showing the policy implications of new capabilities.
7. Create a coordinated network of processing facilities to ensure countries are supported in data processing.
8. Prepare for a transition from demonstration to operation.

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National Demonstrators

The Task has initially established a number of reference demonstration areas – "National Demonstrators" for developing and testing approaches and methods and demonstrating the use of current Earth observation capabilities for assessing long-term, operational forest-cover change and carbon monitoring.

These national demonstrators are defined as areas large enough to demonstrate the wall-to-wall capability and they contain several Verification sites, where the in situ/aerial measurement will take place and higher resolution/higher temporal frequency satellite data will be acquired.

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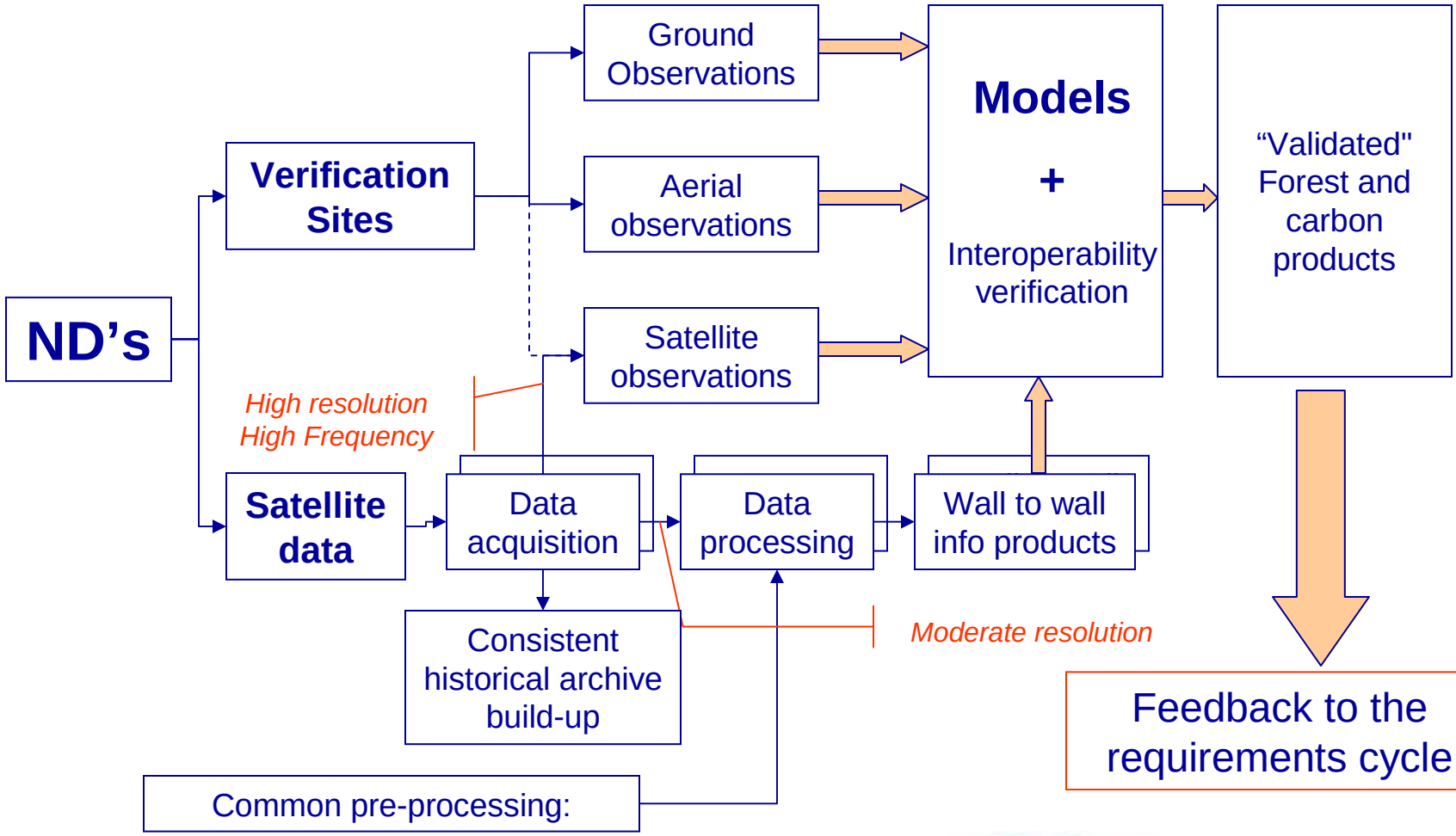
GEO FCT task
Demonstration activities simplified flow



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2009 progress

- Task Team established, key Technical and Management processes identified and in place. Modular approach ready to include additional contributions and participations
- Satellite data acquire over all ND's (at least one optical and one SAR coverage)
- Network of organizations and institutions ready to support National Demonstrators Countries for 2009 data processing identified
- Coordination with other major initiatives in the domain (such as UN-REDD) active

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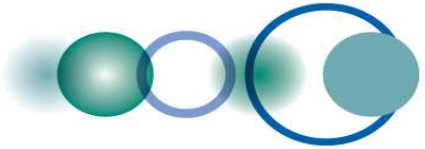
2009 progress

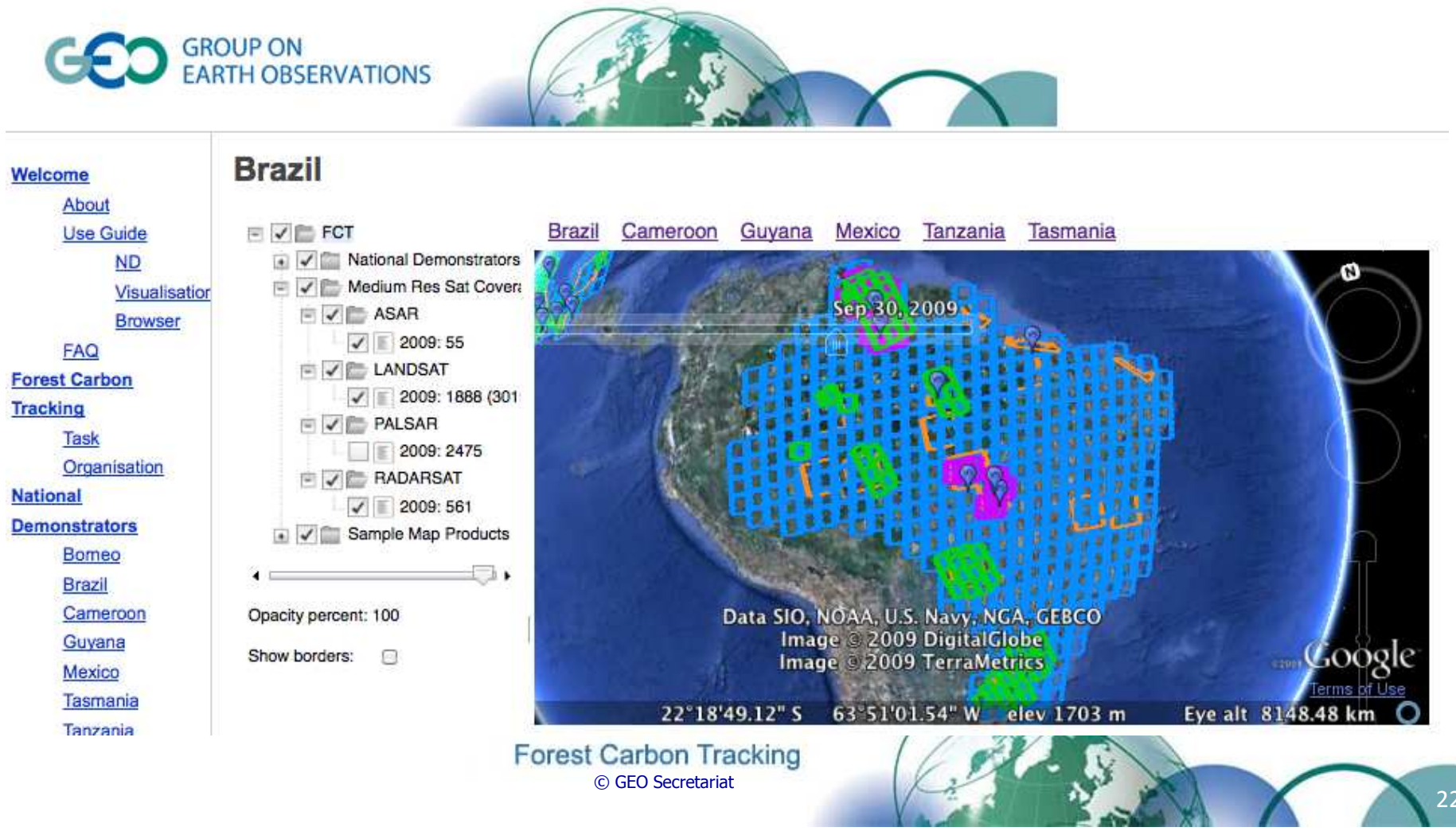


- GEO Forest Carbon Tracking dataset specification, close to conclusion
- Satellite interoperability standards, initiated and progressing
- Standards for in-situ measurement, validation procedures and accuracy assessment for the remote sensing of forested areas and for carbon stock estimates, initiated
- Guidelines for Countries to join the initiative and act as National Demonstrator, drafted

The relevant documents are available on request and will be posted on the web portal once reached a suitable level of maturity.

2009 progress

GEO FCT Prototype Portal launched,
http://www.geo-fct.org/



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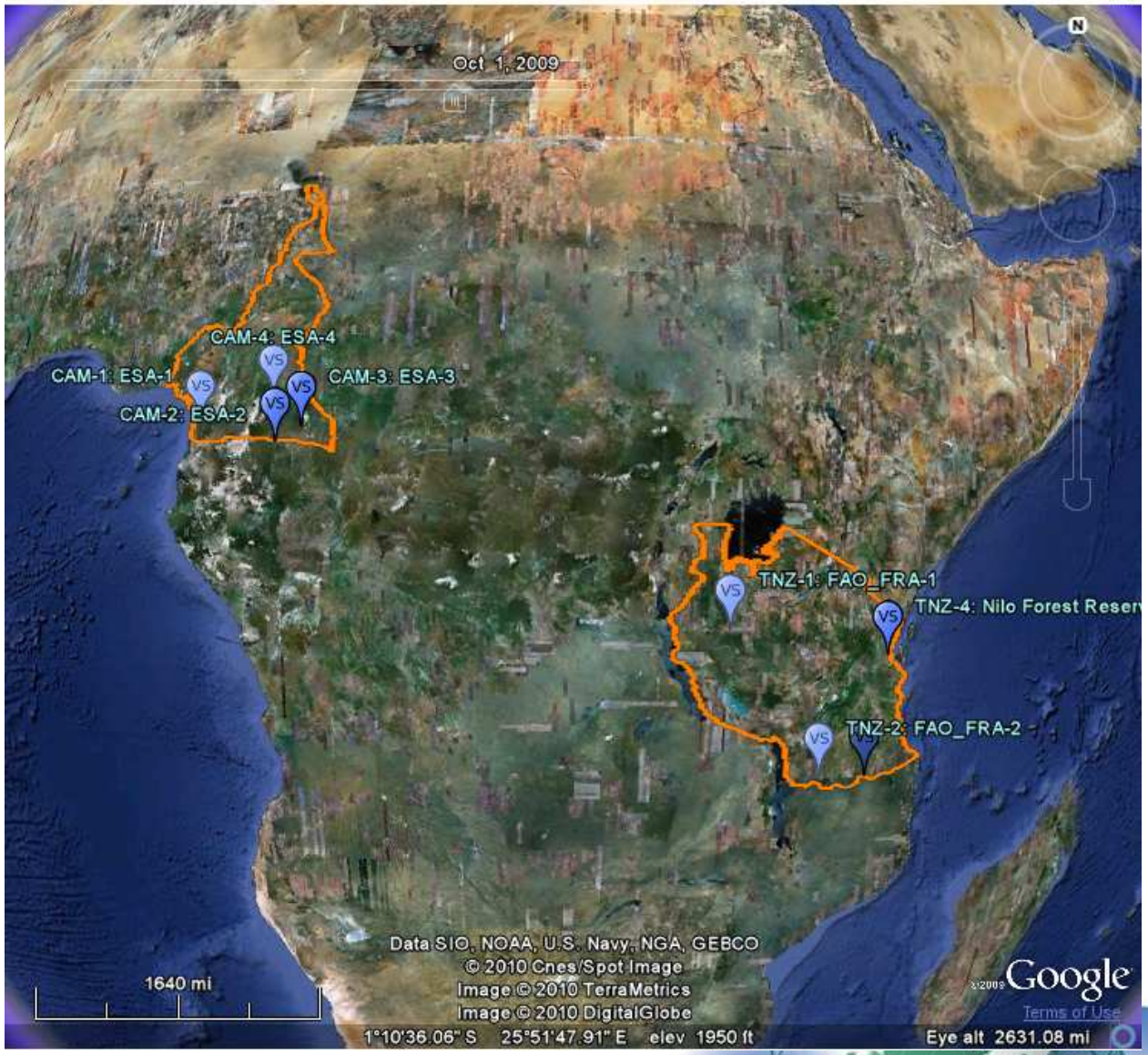
Africa ND's (with VS's)



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Cameroon 2009

ASAR Data

ASAR 2009

	Name	Links	Date	Orbit
1	row-1-34	Outline	2009/08/12	38953

ESA | ASAR

Cameroon 2009

ASAR Data

Landsat Data

ASAR 2009

	Name	Links	Date	Orbit
1	row-1-34	Outline	2009/08/12	38953

ESA | ASAR

LANDSAT 2009

	Image	Name	Links	Date	Cloud Cover
1		LE71830542009133ASN00	Outline | Full metadata	2009/05/13	35.9%

USGS | LANDSAT | Dataset Information

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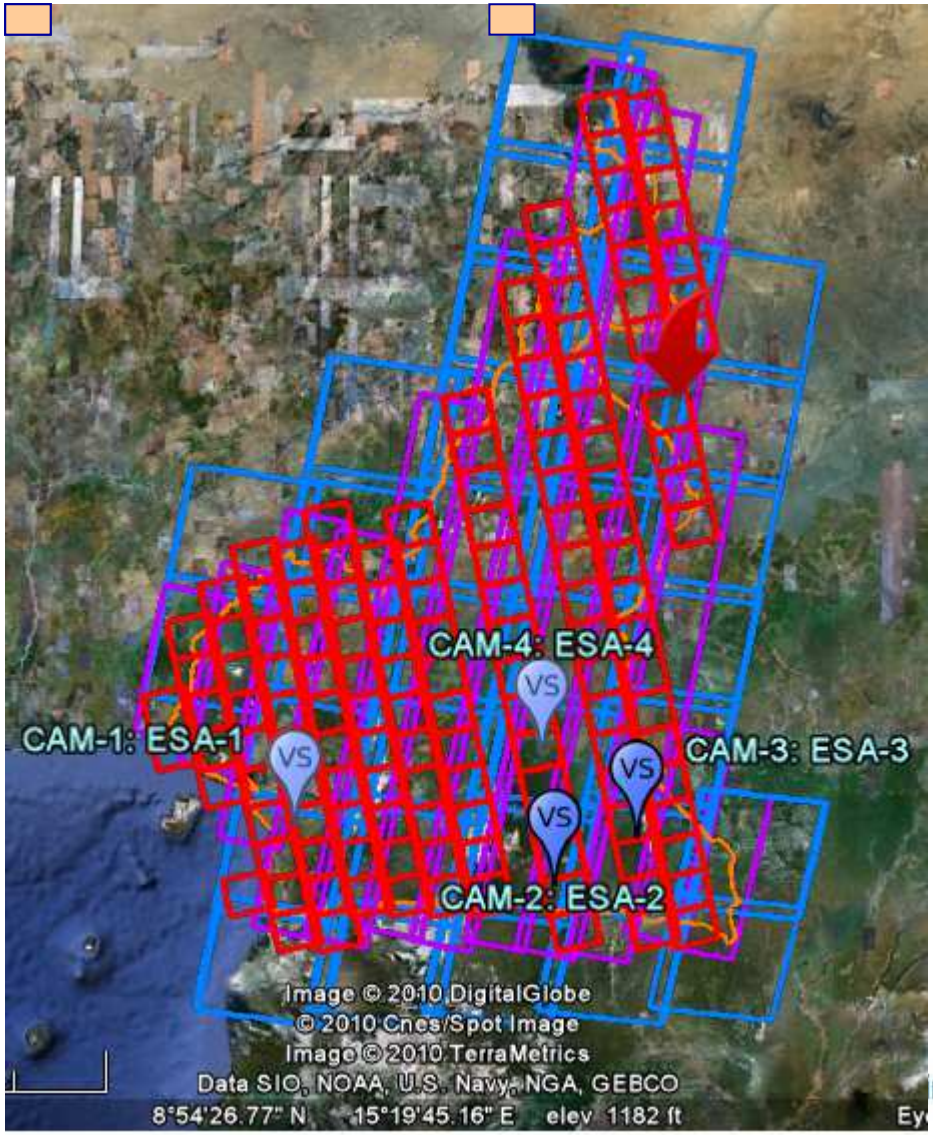
Cameroon 2009

ASAR Data Landsat Data PALSAR Data



ASAR 2009

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ESA | ASAR

LANDSAT 2009

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USGS | LANDSAT | Dataset Information

ASAR 2009 | LANDSAT 2009 | PALSAR 2009

	Name	Links	Date	Orbit	Row	Comment
1	ALPSRP195150160	Outline	2009/09/22	648	160	Observation Mode: FBD, 34.3, A

GEO FCT in 2010

- Produce and promote the 2009 GEO FCT datasets and results
- Perform the 2010 Demonstration campaign repeating annual dataset and results for the existing National Demonstrators plus engagement of additional Countries
  - test satellite data coordination mechanisms
  - test systems, standards and protocols to provide consistent results for multiple circumstances
  - Continue to build-up a consistent historical archive

GEO FCT in 2010

- Progress and promote key GEO-branded standards and protocols
  - refined as lessons are learned from 2009 & 2010 demonstrations
- Support 'architecture planning' of global system architecture for transition to operations

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Concluding remarks

- GEO FCT is well suited to provide the right framework to harmonize/coordinate/integrate different projects and initiatives
- GEO FCT is highly complementary and synergic with UN-REDD action
- Is putting the basis to implement an operational coordination mechanism to make available necessary satellite data to countries (including SAR data)
- Is aiming at comparing, through practical demonstrations, different methodologies, assess their suitability (and accuracy) to derive required information, rather than recommend or prescribe specific solutions to implement national MRV's

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Thank you

Giovanni Rum
GEO Secretariat
grum@geosec.org
www.earthobservations.org

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BACK-UP SLIDES

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2009 Outcomes

CEOS Satellite observations 2009

Sensor	Brazil	Guyana	Mexico	Cameroon	Tanzania	Borneo	Tasmania
ALOS PALSAR	4541	159	375	116	405	507	86
RADARSAT-2	126	41	243	acquisition by ENVISAT	acquisition by ENVISAT	161	24
ENVISAT ASAR	303	67	acquisition by RADARSAT	107	182	acquisition by RADARSAT	25
Landsat 5 & 7	1665 (+ 3500 INPE)	107 (+ 88 INPE)	484	115	115	173	41
CBERS-2B: CCD	3500	80	N/A	N/A	N/A	N/A	N/A

Scenes acquired over the 7 NDs during June-Sept 2009

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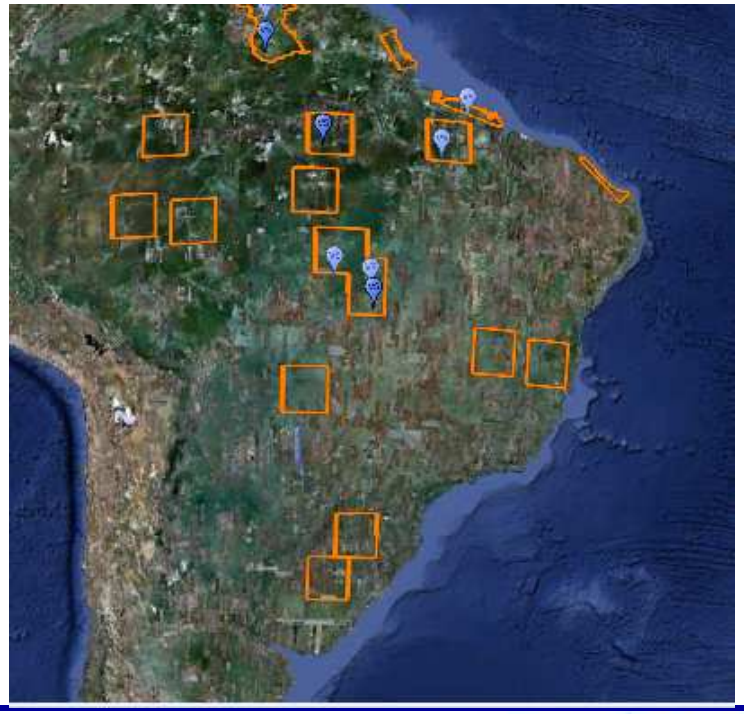
2009-10 National Demonstrators

Mexico
500.000

Out of
1.970.000

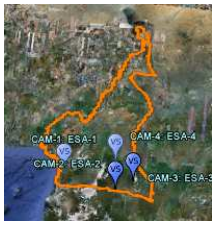
Borneo
743.000

Tasmania
68.000



Brazil
1.400.000

Out of
8.500.000



Cameroon
475.000

Tanzania
945.000

Guyana
215.000

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2009-10 Verification sites

ND	VS	Name	lat	long
Brazil	BRA-1	INPE_IFT	S3.74	W48.34
	BRA-2	INPE_Tapajos	S3.20	W55.50
	BRA-3	INPE_Marcelandia	S11.30	W54.75
	BRA-4	INPE_Braganca	S0.85	W46.65
	BRA-5	WHRC_Xingu-1	S11.91	W52.58
	BRA-6	WHRC_Xingu-2	S13.06	W52.38
Guyana	GUY-1	WUR_FRASAR-1	N5.00	W59.00
	GUY-2	WUR_FRASAR-2	N3.00	W59.00
Mexico	MEX-1	Chiapas-1	N17.00	W93.55
	MEX-2	Chiapas-2	N16.33	W90.65
	MEX-3	Campeche	N18.52	W92.25
	MEX-4	Oaxaca	N17.58	W96.46
	MEX-5	Hidalgo	N20.62	W98.62
	MEX-6	Nuevo León	N25.43	W98.52
	MEX-7	Michoacán	N19.57	W101.18
Cameroon	CAM-1	ESA-1	N4.03	E10.23
	CAM-2	ESA-2	N3.22	E13.68
	CAM-3	ESA-3	N3.87	E14.78
	CAM-4	ESA-4	N5.00	E13.51
Tanzania	TNZ-1	FAO_FRA-1	S4.00	E32.00
	TNZ-2	FAO_FRA-2	S10.00	E36.00
	TNZ-3	FAO_FRA-3	S10.00	E38.00
	TNZ-4	Nilo Forest Reserve	S4.92	E38.66
Borneo	BOR-1	WUR_E-Kalim/Sbh	N4.33	E117.01
	BOR-2	WUR_SW-Kalimantan	S1.82	E111.61
	BOR-3	WUR_SE-Kalimantan	S2.24	E114.41
	BOR-4	WUR_C-Kalim/Srwk	N2.55	E115.08
Tasmania	AU-1	Mathinna	S41.37	E147.76
	AU-2	Takone	S41.19	E145.60
	AU-3	Warra	S43.11	E146.90