National Demonstrators in the GEO Forest Carbon Tracking Task

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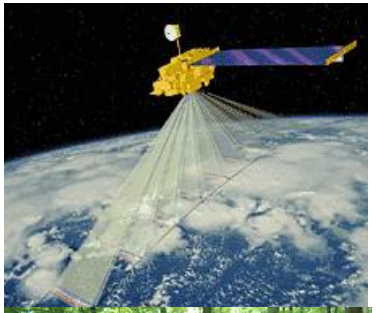
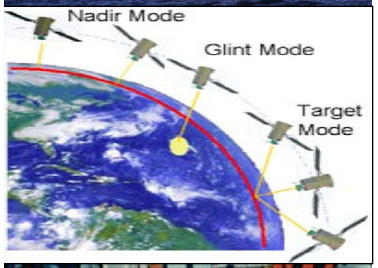
COMIFAC Regional Workshop on Monitoring Carbon Stocks and Fluxes in the Congo Basin

Brazzaville, 2-4 February 2010

GROUP ON EARTH OBSERVATIONS | Forest Carbon Tracking





Carbon Tasks in GEO Work Plan

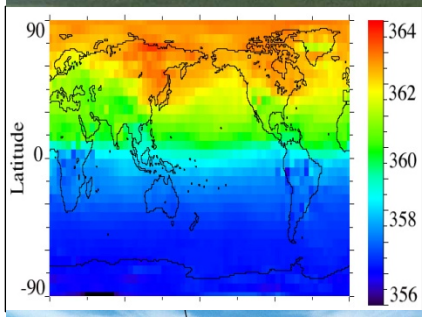
GEO Carbon task goal is to “implement a global carbon observation and analysis system addressing the three components of the carbon system (atmosphere, land and ocean)”

Carbon sub tasks:

CL-09-03a: Develop the GEO Carbon Report, updating the IGCO Theme Report

CL-09-03b: Forest Carbon Tracking

CL-09-03c: GHG measurements from Space



GEO Forest Carbon Tracking Task

(task approved during GEO-V Plenary – Budapest, November 2008)

Objectives

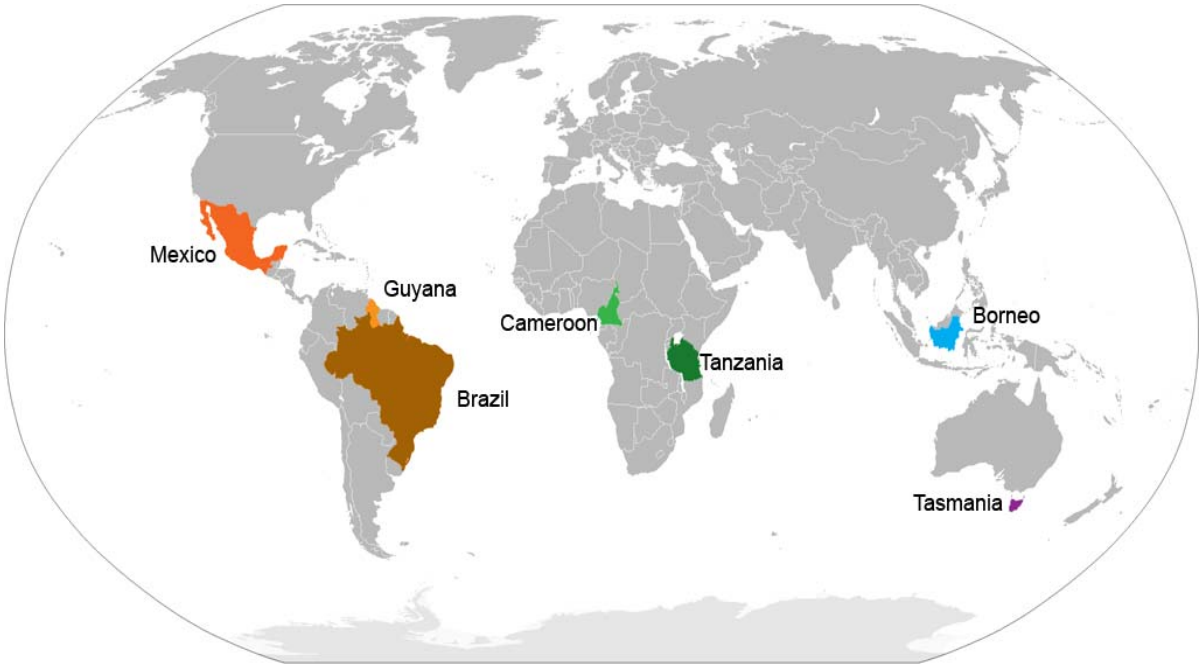
- Consolidation of observational requirements and acquisition of annual, mid-resolution global forest-change monitoring information,
- Demonstrate initial capability in National Demonstrator countries and nested validation-sites
- Coordination of protocols for consistent field measurement and validation
- Coordination of data analysis tools and standard methodologies
- Production of reference documents and datasets
- Improved access to observations, datasets, tools and expertise and associated capacity building activities.

Guidelines for Establishment of National Demonstrators

- Countries with stated intent to develop national forest carbon monitoring systems
- Large areas to demonstrate repetitive, wall-to-wall, accurate wide-area forest mapping capabilities
- Relevant national forest management authorities in ND countries being involved
- Verification sites with appropriate in-situ observations supported by representative scientific studies
- Clear management and governance arrangements being outlined
- Resources for processing and analysis of the satellite and in-situ data clearly identified
- Donor countries and/or NGO's are clearly identified should support be required

FCT National Demonstrators 2009

- Brazil
- Guyana
- Mexico
- Indonesia (Borneo)
- Australia (Tasmania)
- Cameroon
- Tanzania



- In 2010 expand this network of national demonstrators and verification sites
- Utilise synergies where possible with CEOS LSI Constellation regional areas, and countries from UN REDD + World-Bank Forest Partnership

Critical gaps in infrastructure for forest monitoring in Cameroon

- Ecological monitoring system is still embryonic
- The National institute of cartography not equipped with satellite data
- Few specialists in satellite data analyses and in situ measurements
- REDD pilot projects have just started

Coordinated ND Activities

1. Data inventory (ongoing)
2. Delineation of forest area (ongoing)
3. Acquisition of current Earth observation data (ongoing)
4. Identification of verification sites (ongoing)
5. Site description and data collection (initiated)
6. Processing and support (planning)
7. Data dissemination through task portal (ongoing)

ND Data Inventory e.g. Mexico

1. Readiness for National Carbon Accounting and REDD

2. Extensive data available:

Land Use/ Land Cover maps

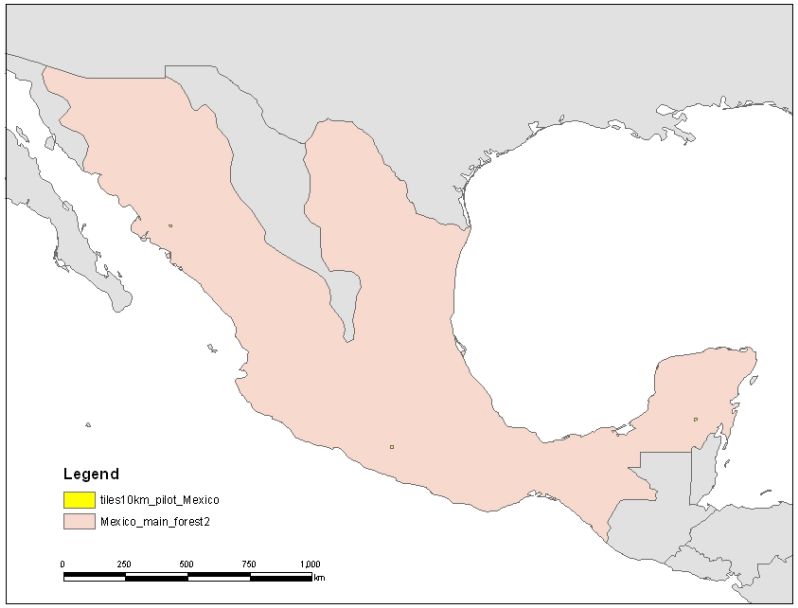
- National LU/LC maps (scale 1:250,000) for 1970s, 1993 and 2002
- Gross forest (based on 1993 and 2002 land-use maps): 66 million hectares
- Other maps available but not consistent
- Change detection through MODIS combined with SPOT (2000-2003; 2003-2005; 2003-2006)

Satellite imagery

- Landsat imagery of 2000 and 2002
- SPOT imagery: unlimited

National Forest Inventory

- Forest inventory (1992-1994) data of 16,000 geo-referenced plots
- More than 22,000 permanent sampling plots established between 2004-2007
- 5-year re-sampling scheme starting 2008



Acquisition of Earth Observation Data

Task document on Satellite Optical/ SAR Data Requirements and systematic acquisitions strategies (June 2009)

CEOS agencies requested to:

- Acquire Optical and SAR data during Summer 09 over all 7 National Demonstrators
- Provide archived data / products for past years

Acquisitions with both Radar and Optical instruments are on-going (see next slides)

2009-10 National Demonstrators

Mexico
500.000

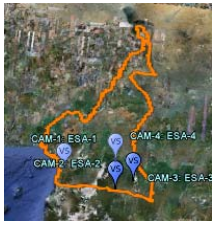
Out of
1.970.000

Borneo
743.000

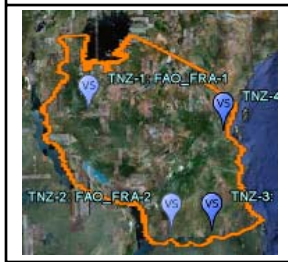
Tasmania
68.000

Brazil
1.400.000

Out of
8.500.000



Cameroon
475.000



Tanzania
945.000

Guyana
215.000

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

National Demonstrator Verification Sites

- Demonstrate verification information needs and activities for RS forest product (activity data)
- Demonstrate CalVal information needs and parameterization for carbon modelling (stocks and fluxes)
- VS locations are requested to be covered on a monthly/bi-monthly basis during the remainder of 2009 and early 2010

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

Verification Site Description

Include range of forest types and land uses (e.g., Mexico VS'):

- El Ocote, Chiapas
- Marques de Comillas, Chiapas
- Lagunas de Pom y Terminos, Campeche
- Bosque Nuboso Tropical de Montaña, Oaxaca
- La Mojonera y Atopixco, Hidalgo
- Matorrales de China, Nuevo León
- Cuenca de Atecuaro, Michoacán

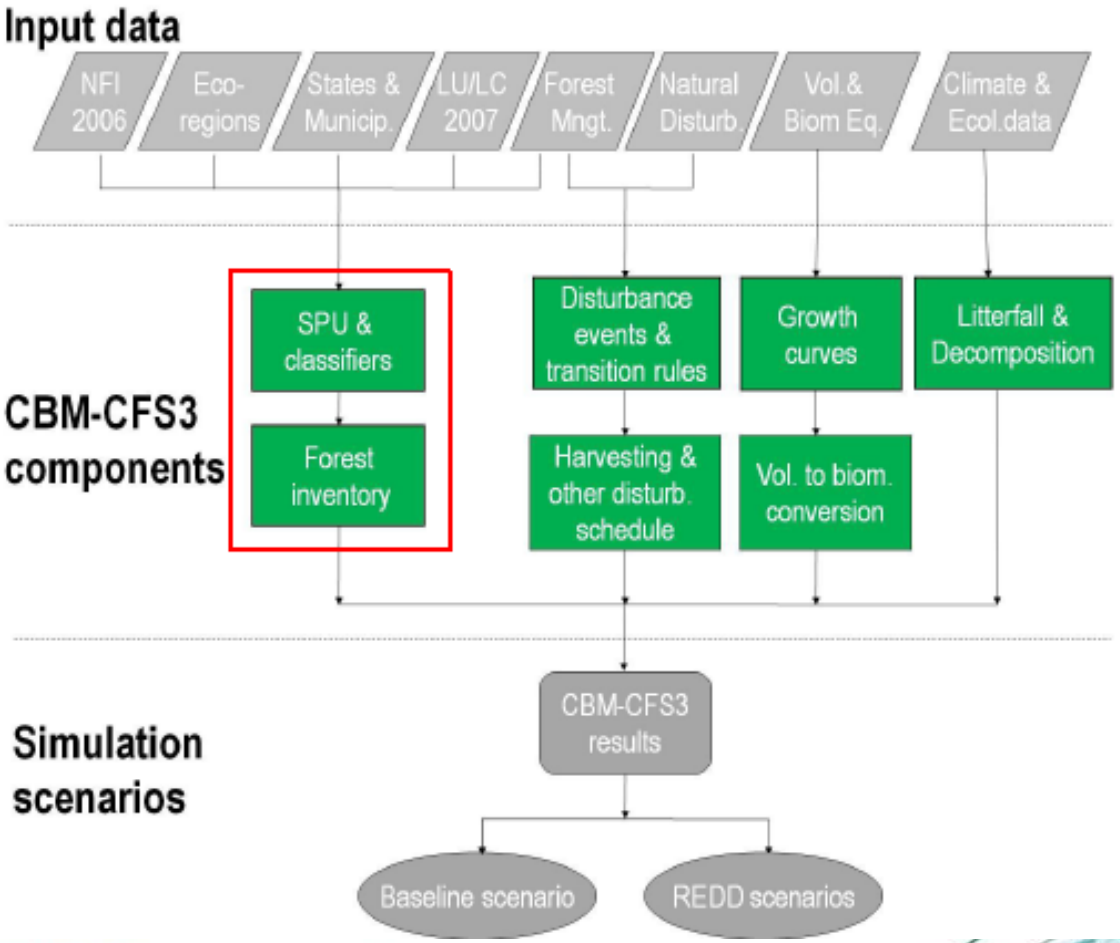
Standard description for each site:

- Study area and land use activities
- Partners working in the area (local, nati and international)
- Field work (by agency)
- Available GIS and RS information
- References

Types of in situ measurements from verification sites e.g. Mexico

Pilot projects	Study site	N.San Juan, Michoacán	Selva El Ocote, Chiapas	Zacualtipán, Hidalgo	State of Chiapas
	Lead Institutes	SFU; NRCan; ECOSUR	ECOSUR, COLPOS	COLPOS	COLPOS, ECOSUR
	Pilot projects				
Input files	Forest inventory	x	x	x	x
	Forest classifiers	x	x	x	x
	Growth curves	x	x	x	??
	Age classes structure	x	x	x	x
	Disturbances types and events	x	?	?	?
	Transition rules	x	?	?	?
Climatic variables	Mean annual temperature	x	x	x	x
	Precipitation	x	x	x	x
Biomass variables	Volume to biomass conversion	x	x	x	x
	Biomass turnover parameters	x	x	?	?
Soil variables	DOM parameters	x	x	x	x
	DOM turnover parameters	x	no	?	no

Verification Sites Provide Input Data for Forest Carbon Estimation



Example from Mexico ND

Data Processing and Dissemination

Two main functional elements, (i) a network of processing support and (ii) the FCT demonstration phase portal (www.geo-fct.org)

Support includes:

- Interfacing with satellite data providers and processing to Level 1
- Scientific analysis of satellite and in situ data
- Development of optimal multi-sensor procedures
- Collaboration with other ND PD teams
- Generation of prototype products over Verification Sites
- Thematic product validation

ND Product Development Teams

ND	ND product development team lead	Organisation	PD team contributing organisations
Brazil	Dalton Valeriano	INPE	INPE, NSC, WHRC, IPAM
Guyana	Dirk Hoekman	Wageningen Univ.	?, WU, NSC
Mexico	Michael Schmidt / Sergio Ojeda	CONABIO / INEGI	CONAFOR, CONABIO, INEGI,SAGARPA, CONANP, PMC, USGS, CSA, FSU-Jena, DLR-DFD Germany, NRCan
Cameroon	Gernot Ramminger	GAF	ESA, GAF?
Tanzania	Jan Petter Pedersen	KSAT	NSC, KSAT
Borneo	Dirk Hoekman	Wageningen Univ.	LAPAN, WU, CSIRO, CRC-SI, JAXA/NIES
Tasmania	Anthony Milne	UNSW	CSIRO, CRC-SI

GEO FCT in 2010

- Produce and promote the 2009 GEO FCT dataset and results
- Repeat annual dataset and results for the existing National Demonstrators
  - test satellite data coordination mechanisms
  - test systems, standards and protocols to provide consistent results for multiple circumstances
- Engagement of further candidate countries

Key FCT Task documents for 2010

1. 2010 Data Requirements for National Demonstrators (Annual Updates)
2. Satellite Forest Information Product Specification
3. Satellite Data Processing and Product Development Plan
4. Satellite Interoperability & Processing Methods
5. In Situ Forest Measurements Standards and Protocol
6. Methods on Validation of Remote Sensing Data Products and Accuracy Metrics
7. Linking of In Situ Forest Measurements, Remote Sensing and Carbon Models
8. National Demonstrator Guidance Document

Proposed New ND's ("living list")

From 2010:

- Colombia,
- Peru,
- DR Congo,
- Cambodia,
- Japan (Hokkaido)
- UN-REDD+WB FP countries

Benefits to NDs

1. Continuous supply of mid-resolution earth observing (satellite) data
2. Satellite-data processing capabilities and best-practice analysis methodologies and standards
3. Regular and in-situ validated land use mapping information
4. Support collection of in-situ forest measurements
5. Forest carbon models parameterised for local conditions
6. Spatial-data infrastructure, GIS and web-delivery systems

Obligations of NDs

- Local personnel
- Establishment of a “Forest Monitoring Unit” (or equivalent) within the appropriate ministry
- Support for local personnel in capacity-building activities
- Share data with FCT and across national agencies
- Implement forest monitoring and carbon accounting systems

Questionnaire for new NDs

A. Contact Details
   - Formal status of country as ND

B. Forest Overview
   - information in numbers and on maps

C. Models, Data and Processing
   - In-country capacity
   - Model/methods in use or planned for MRV

D. FCT Activities, Resources and Plans

Thank you