

GEO Forest Carbon Tracking

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GEO, the Group on Earth Observations

An Intergovernmental Organization with
81 Members and 56 Participating Organizations



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

Group on Earth Observations (GEO)

THE GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS

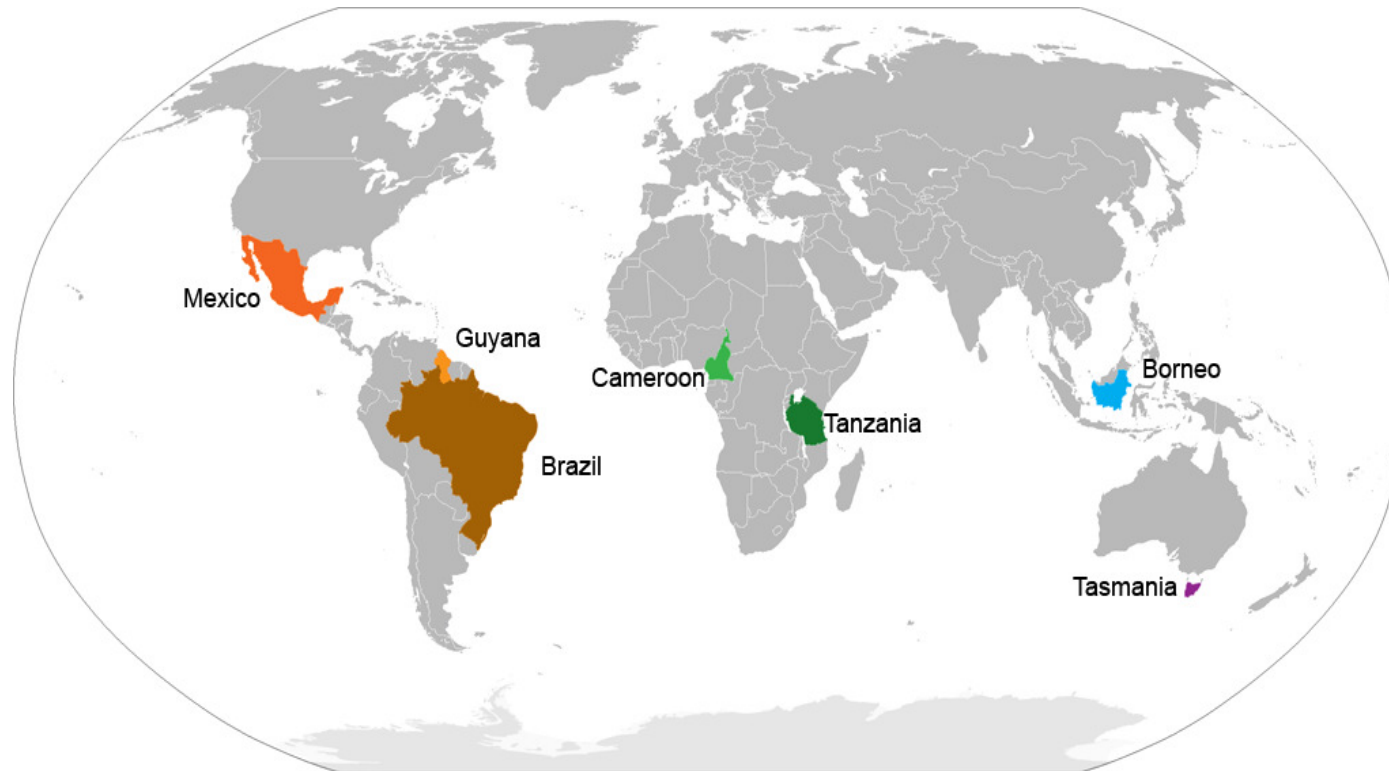


GEO FCT task deliverables

- Establish **guidelines** for annual, mid-resolution global forest-change monitoring program
- **Optical + SAR data acquisition strategy** agreed and established via CEOS agencies
- Identifying future missions under development vital in **securing data continuity**
- Satellite data processing, accuracy assessment and correction **methods widely agreed and documented**
- Consistent **field measurement guidelines and protocols implemented** across National Demonstrators
- **National Demonstrators and Verification Sites** established in consultation with national governments, NGO's and expert teams
- **Forest reference datasets and change products** agreed and routinely **produced** by national/regional activities
- Provision of **in-country access** to observations, datasets, tools and expertise and associated capacity building activities

2009 National Demonstrators

- 7 National Demonstrators selected
- Acquisition time window: June-Sept, 2009



2009 Space Data acquisition status

National Demonstrators

- 2009 ND campaign successfully performed by CEOS agencies, despite short notice.

Multiple wall-to-wall data acquired by both SAR and Optical sensors

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 the June-Sept 2009 time window



GEO FCT 2010 Space Data Requirements

National Demonstrators

- SAR:
 - Jan/Feb 2010 second ND coordinated acquisition campaign
 - **Objective:** Provision of dual-season data for semi-annual time-series analysis and improved thematic interpretation
 - Defined in detail in **2010 Data Requirement document v1.0 [Dec. 2009]**
 - Jun/Aug 2010 third ND coverage
 - **Objective:** Building an archive of time-series over all National Demonstrators
 - Defined in detail in **2010 Data Requirement document v2.0 [May 2010]**
- Optical:
 - Preferred time window: July/Aug 2010 – but window open from January - December to mitigate cloud cover impact
 - **Objective:** Annual minimum-cloud composite coverage of all ND
 - Defined in detail in **2010 Data Requirement document v1.0 [Dec. 2009]**



GEO FCT 2010 Space Data Requirements

Archived data

- Archive search for full tropical belt coverage for
 - 1990, 1995, 2000 (+/- 1 year) and
 - annually from 2005 onwards
- Deliverable: spread sheet with corner coordinates of scenes by 31 March 2010 (report at SIT-26 in April 2010)



2009 Space Data acquisition status

Verification Sites

Verification Sites are small areas within the National Demonstrators (20 km radius), where *in situ* and intensive satellite data collection are being undertaken for:

- Development of algorithms, methods and strategies for validation and verification of observations at national level
- Ecosystem/carbon model parameterisation
- Assessment of data synergy, interoperability and compatibility issues (optimal use of SAR/Optical, L/C/X-band SAR data)



2009 Space Data acquisition status

Verification Sites

Verification Sites not yet defined in the 2009 Data Requirement Document provided in May 2009

Definition of VS for 2009 only finalized in October, 2009

Request to CEOS agencies and commercial satellite owners to commence acquisitions over VS locations

All VS have been covered at least once by Optical, L-band, C-band, and in some cases X-band SAR, during the ND acquisition campaign.



National Demonstrators

Verification Sites

- Currently: 30 sites, circular with 20 km radius
 - Demonstrating interoperability of different sensors
 - Priority for very high resolution data
- Priority sites 10 -15 VS
 - Processing results before April 2010
 - Availability of ground truth data
 - Definition of specific acquisition plan for individual sensor types
- Additional 25 – 30 VS
 - CEOS agencies are invited to contribute EO acquisitions



FCT Verification Sites (1/2)

Ref	ND	VS	lat	long	radius
BRA-1	Brazil	INPE_IFT	S03.74	W48.34	20 km
BRA-2		INPE_Tapajos	S03.20	W55.50	20 km
BRA-3		INPE_Marcelandia	S11.30	W54.75	20 km
BRA-4		INPE_Braganca	S00.85	W46.65	20 km
BRA-5		WHRC_Xingu-1	S11.91	W52.58	20 km
BRA-6		WHRC_Xingu-2	S13.06	W52.38	20 km
GUY-1	Guyana	WUR_FRASAR-1	N05.00	W59.00	20 km
GUY-2		WUR_FRASAR-2	N03.00	W59.00	20 km
MEX-1	Mexico	Ocote-Chiapas	N17.00	W93.55	20 km
MEX-2		Comillas-Chiapas	N16.33	W90.65	20 km
MEX-3		Campeche	N18.52	W92.25	20 km
MEX-4		Oaxaca	N17.58	W96.46	20 km
MEX-5		Hidalgo	N20.62	W98.62	20 km
MEX-6		Nuevo León	N25.43	W98.52	20 km
MEX-7		Michoacán	N19.57	W101.18	20 km

Orange: Priority 1



FCT Verification Sites (2/2)

Ref	ND	VS	lat	long	radius
CAM-1	Cameroon	ESA-1	N04.03	E10.23	20 km
CAM-2		ESA-2	N03.22	E13.68	20 km
CAM-3		ESA-3	N03.87	E14.78	20 km
CAM-4		ESA-4	N05.00	E13.51	20 km
TNZ-1	Tanzania	FAO_FRA-1	S04.00	E032.00	20 km
TNZ-2		FAO_FRA-2	S10.00	E036.00	20 km
TNZ-3		FAO_FRA-3	S10.00	E038.00	20 km
TNZ-4		Nilo Forest Reserve	S04.92	E038.66	20 km
BOR-1	Borneo	WUR_E-Kalim/Sabah	N04.33	E117.01	20 km
BOR-2		WUR_SW-Kalimantan	S01.82	E111.61	20 km
BOR-3		WUR_SE-Kalimantan	S02.24	E114.41	20 km
BOR-4		WUR_C-Kalim/Sarawak	N02.55	E115.08	20 km
AU-1	Tasmania	Mathinna	S41.37	E147.76	20 km
AU-2		Takone	S41.19	E145.60	20 km
AU-3		Warra	S43.11	E146.90	20 km

Orange: Priority 1



First FCT Science & Data Summit

- Venue: Woods Hole Research Center (Boston, USA)
- Dates (preliminary):
9-13 May 2010
- Assessment of multi-sensor data over Verification Sites and review of 2009 lessons learned
- Scientific evaluation of the various sensors (modes, synergy and complementarities, cost effectiveness)
- Guidelines for the development of a long-term systematic data acquisition strategy by 2013 for global forest monitoring.



GEO FCT 2010 Space Data Requirements

- 2010 Data Requirement document v1.0
December 2009 (before COP-15)
- v2.0 based on lessons learned 2009 and
results from Science and Data Summit mid
May 2010



Data Access issues

Participating CEOS Agency to clarify procedures for further acquisition and for access to EO data acquired

Urgent: Provision of (small number of) scenes for scientific analysis and algorithm development. Start by Dec. 2009. Results to be presented at Science & Data Summit in May 2010



Outlook

2010 priorities:

- Continue GEO FCT demonstration phase
- Demonstrate expansion in scope – on the trajectory towards a global and operational framework
- Repeat annual dataset and results for existing 7 NDs and for additional ND
- Engagement of verification sites and in-situ data in support of cal/val – with active local agency support
- Consolidate/evolve the processing hubs concept
- Consider long term arrangements and funding



Institutional framework

Data access and institutional arrangements and funding 2010

- Satellite data from CEOS and commercial satellite owners
- Ground measurements by NFI or FCT projects. Institutional in country or donor funding
- Airborne campaigns (lidar) through special funding
- Processing hub's through ad-hoc arrangements
- Production of national forest products. Institutional in country or donor funding

2011-2014

- Consolidate and evolve above arrangements and funding
- Satellite data access: primary scenario and back-up scenarios
- Building institutional capacity in ND countries

2014 and onwards

- Operational satellite data and processing hub's available and funded
- Production of national forest products funded through compensation mechanisms



National Demonstrators

The Task has established a number of reference demonstration areas, “National Demonstrators” for :

- developing and testing approaches and methods
- demonstrating the use of current Earth observation capabilities
- assessing long-term, operational forest-cover change and carbon monitoring.

National Demonstrators are defined as areas large enough to demonstrate the wall-to-wall capability and to contain several verification sites

The verification sites will serve:

- as a “classical” Calibration/Validation sites for the moderate resolution information products
- as “intensive observational sites” where higher resolution/higher temporal frequency satellite data will be acquired.