
**2009-2011 WORK PLAN
GEO TASK CL-09-03b
Forest Carbon Tracking**

- DRAFT V0.1b (28 Feb 2009) -

1. INTRODUCTION

GEO WP task CL-09-03b will demonstrate that coordinated Earth Observations can provide the basis for reliable information services of suitable consistency, accuracy and continuity to support Forest Carbon Tracking. This task builds upon existing and planned GEO efforts in forest monitoring, associated modelling and use of these tools for timely provision of observations required for their routine use world-wide. In close collaboration with national governments, space agencies, and relevant technical experts, the task will demonstrate this capability initially via establishment of robust methodologies, interoperable satellite acquisition plans and a series of regional pilot studies, which will provide a template for roll-out of a consistent and reliable global carbon monitoring system.

The task is being co-led by a number of agencies and countries, and involves a considerable number of elements and expert communities. This Work Plan has been developed to help communicate internally and externally the various activities, outcomes, milestones, responsibilities and resources – and to assist in the project management of the task and to help ensure delivery of the expected outcomes.

The emphasis in this initial Work Plan is on outcomes for 2009 and 2010 – since the milestones of COP-15 and GEO-VI (2009), and GEO Ministerial (2010) are top priority for the task.

Context and rationale for the task can be found in the official task description document within the GEO Work Plan 2009-2011 and is not duplicated here.

2. KEY OUTCOMES

2009

The following key outcomes will be sought in 2009:

1. Securing a best efforts commitment from the Committee on Earth Observation Satellites (CEOS) - as the coordinating body for the space segment of the GEOSS, and comprising many member agencies with data of value for forest carbon tracking purposes – to data supply on a continuous basis, as a prerequisite to demonstrating to policy makers that continuity of technical capabilities is guaranteed in support of their policy developments in this domain.
2. Development of a document identifying methods for interoperability among the various satellite sensors which may contribute to forest carbon tracking – notably including both optical and Synthetic Aperture Radar (SAR) sensors. This document is

important to avoid debate among technical factions advocating one sensor type over another (which confuses the policy debate unnecessarily) and to ensure future technical methods seek to be inclusive to different data sources.

3. Development of documented methodologies linking wall-to-wall, time series remote sensing data coverage to both ecosystem models and traditional forest inventories – to consistently estimate carbon stocks at project and national scales, as required in support of policy needs.
4. Specification of agreed validation procedures for remote sensing of forest state and carbon estimates.
5. Compelling visualisations of progress and demonstration results will be developed as inputs to the GEO-VI and COP-15 events, making clear the policy implications of the new technical capabilities.

2010

The following key outcomes will be sought in 2010:

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3. WORK PACKAGES

WP1000: DEFINE SATELLITE DATA NEEDS AND SECURE CONTINUITY

WP1100: Secure a CEOS resolution on Forest Carbon data supply from SIT-23

- This activity seeks to highlight the opportunity which this task represents to senior space agency representatives, to initiate the dialogue regarding future data requirements, the political imperative for continuity, and to communicate both internally and externally that CEOS is taking this initiative seriously [Task Co-Leads – led by Australia, Mar 2009].

WP1200: Define satellite data requirements and supporting acquisition strategies

- Develop and establish consensus among contributing space agencies and key technical experts on a requirements document for satellite data for operational forest carbon tracking in support of UNFCCC needs, including REDD. This should include preferred selections of observation modes for both optical and SAR sensors. **As a matter of urgency, this task should first establish consensus on the test-site demonstrations to be studied in 2009 and the data required for these demonstrations** [Task Co-leads will nominate an individual as a Task Data Manager with oversight of the requirements and acquisition strategy development and as liaison with key data donors for their fulfilment, Apr 2009]
- The data requirements document will consider “standardized products” of global relevance. The process will require iteration and consultations with “users” and data “providers”. Definition of observational parameters to be taken into consideration will

include, but not limited to: Spatial Resolution; Wall-to-wall mapping approach vs. sampling of specific areas; Periodic update of the global product; Required sensors. Each of these will be assessed with policy needs foremost in mind.

- Develop a note on required acquisition strategies for key data sources in support of the requirements. This will be used to communicate data requirements in terms familiar to space agency donors [Task Co-leads – led by Task Data Manager, Apr 2009]

WP1300: Secure data commitments from key sources for 2009 outcomes and beyond

- The 2009 efforts will focus on carefully selected test-sites to demonstrate the capabilities and principles to policy makers. This task will engage with donor space agencies to secure the necessary demonstrations focused on these test-sites [Task Co-leads, Apr 2009]
- Long-term engagement of donor space agencies will be required to establish the relationships and rapport necessary for an undertaking of this magnitude. This task will establish a point of contact within the team with the responsibility of overseeing this dialogue, maintaining the necessary relationships, and managing the data flows [TBC].

WP2000: DEFINE AND ESTABLISH REGIONAL REFERENCE TEST-SITES

The test sites will be used to demonstrate technical capabilities in support of climate policy needs (end to end projects at country/regional level, with an emphasis on developing countries). The test sites employed will build on existing inter-governmental programs to establish demonstration projects. They will ensure broad representation by regional participants; ultimately address different types of forests – but with an initial emphasis on tropical forests; test accuracies, validate methodologies/tools and build local capacity. Early progress on test site demonstrations is crucial in order to keep up with the climate policy timetable anticipated in 2009 and 2010.

WP2100: Define test sites

- A number of reference test-sites will be established to demonstrate and develop approaches and methods for using current remote sensing capabilities for long-term, operational forest-cover change and carbon monitoring. Where possible, geographic overlaps and synergies will be chosen with existing sites supported by FAO, GOFCC-GOLD and other players.
- However, to ensure maximum success and long term operation, as well as in-country national involvement, these test-sites additionally need to have key characteristics to qualify and to be endorsed in support of this task, as follows:
 - *Sites should be located in countries with own stated intent to develop national forest carbon monitoring systems, and requiring capacity building support*
 - *Donor countries and/or donor NGO's clearly identified for long-term involvement*
 - *Countries with proposed test-sites and their government institutions having commitment for capability to support ground observations (includes involvement by relevant forest management authorities in host countries)*
 - *Clear management and governance arrangements being outlined*
 - *Resources for the acquisition and analysis of the data clearly identified*

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- *Timely and specified reporting on progress and deliverables, including specific data products, for each site*
 - *Initial focus will be on cloud-affected areas with active forest management, including deforestation – afforestation activities*
 - *Large areas (to demonstrate repetitive, wall-to-wall, accurate wide-area forest mapping capabilities - e.g. Borneo, Congo Basin, Amazon Basin)*
 - *Sites to include representative scientific projects on forest change, with appropriate in-situ observations*
 - *Availability of archived SAR and optical data to demonstrate changes is preferred*
 - *A preliminary short-list of test sites has been identified: Congo Basin, Amazonia (Brazil), Kalimantan (Indonesia); Tanzania, Tasmania, Cameroon, China and Bolivia.*

Involvement of national forest ministry/authorities is essential for each site, - to gain better access to National Forest Inventories, dedicated in situ measurements for validation purposes, and prospects of capacity building. FAO will assist in establishing the necessary links and coordinating regional workshops in participating countries.

[Task Co-leads in cooperation with FAO and GOF-C-GOLD: Feb/Mar 2009]

WP2200: Establish test sites

- A limited number of test sites will be agreed and established from the candidate list; in each case an assessment of existing satellite and field data availability will be made; WP2200 will undertake an acquisition strategy for new data particular to each test site;
- A small coordination team will be established for each test site, comprising local agencies, FAO, capacity-building experts, a data needs coordinator, and the task project management staff provided by the Co-leads.

WP2300: Fulfil data requirements for test sites and manage data

- Test site teams will, under the supervision of the Task Data Manager, coordinate the fulfilment of the data requirements for their particular sites [Task Data Manager, Apr 2009]
- A data status web-site will be created to indicate the status of fulfilment for each test site, the priority requirements and the action in train to fulfil them. This repository will also serve as a guide to prospective data donors, including satellite agencies, as to how they might best assist the project at any given stage [Task Data Manager, Apr 2009]
- Data archive management [who and where? Centralised or distributed? Backup strategies, access means etc]

WP3000: DEFINE SATELLITE DATA INTEROPERABILITY METHODS

It is a core principle of this task to be as inclusive as possible to potential contributing satellite data types. Technical debates of the superiority of one method or another, including optical methods vs SAR, are not helpful to the policy debate. The task will seek to develop improved understanding of interoperability among various satellite data sources – such that both optical and SAR methods can be recognised as having valid

technical contributions. Interoperability of data and methods will increase the likelihood of achieving wall-to-wall global coverage for policy needs, at the required frequency – allowing more data types to be combined effectively. This includes the effective use of the historical record - which is predominantly based on optical data - with current and future satellite sensors, which feature an increasing number of radar instruments.

WP3100: Expert Workshop on Data Interoperability

- Australia will host a workshop 7-9 April 2009 in Canberra to assemble international experts and to kick-start the development of a document on interoperability methods for satellite data for forest carbon tracking, covering both SAR and optical sensors [Australia, 7-9 Apr 2009].

WP3200: Data Interoperability Methods Document

- Develop document on interoperability methods for satellite data for forest carbon tracking, covering both SAR and optical sensors. This will be initiated by WP3100 and developed by volunteer authors with several stages of review among Co-leads and task participants. The technical refinement of this document will no doubt proceed indefinitely as understanding and technology evolves, but some preliminary conclusions are required in 2009 in order to support the COP timetable [TBC, July 2009]
- An ad-hoc follow-up meeting will be held in the margins of the ISRSE meeting in Stresa in early May to review progress since the Canberra kick-off.

WP4000: COORDINATED ASSESSMENT OF ANALYSIS TOOLS AND METHODOLOGIES

A coordinated assessment of available tools and methodologies will be undertaken in conjunction with technical experts, including from GOF-C-GOLD and the Kyoto-Carbon Group. This assessment will seek to: identify current capabilities and limitations; quantify accuracy and uncertainty of sensor systems and mapping methods; identify satellite data processing methods for accurate ortho-rectification and terrain correction for use in multi-year forest-change and trend analyses; define suitable (simple and robust) tools and methodologies to support periodic reporting in support of global carbon accounting needs, including definition of the role of in-situ and remote observations (airborne and satellite based).

WP4100: Tools and Methodologies Workshops in Support of Report

- Utilise the opportunities of: the Canberra Workshop in early April 2009; the Forest and Carbon Workshop at Stresa, Italy, early May 2009; and the 2nd GEO Forest Monitoring Symposium in Chiang Rai, Thailand in early July 2009 to advance the development of the Technical Specification and Methodology Report;
- possible GEO Forest Monitoring Symposium, Thailand, August – September 2009. Workshops to agree on initial data processing approaches (optical + SAR), September 2009.

[Apr – Jul 2009]

WP4200: FCMS Technical Specification and Methodology report

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- for annual, mid-resolution global forest-change monitoring, including satellite data ortho-rectification, correction methods and accuracy assessment, widely agreed and documented through a mid-term task report;
 - identifying processing methods for integration of time-series, medium resolution optical and radar imagery, with in situ data, to produce forest extent, change and trend information, in support of Forest Carbon Monitoring programmes;

The draft report will identify the methodologies to be applied to the test sites for linking wall-to-wall, time series remote sensing data coverage to both ecosystem models and traditional forest inventories – to consistently estimate carbon stocks at project and national scales, as required in support of policy needs.

[Draft: August 2009; Final: Late 2011]

WP5000: REFERENCE DATASET PRODUCTION & VALIDATION

The main output of this activity will be the definition of the Forest Carbon Tracking reference datasets and the coordination of their progressive production.

The Forest Resources Assessments performed and in preparation by FAO will be considered as one of the reference datasets, and their suitability for Forest Carbon tracking will be assessed, in particular considering the potential need to move from a sampling methodology to global wall to wall mapping products.

The implementation and validation of an agreed systematic land cover classification and of land use changes (GEO task DA-07-02), as the reference to apply further carbon tracking specific methodologies will be assessed, also considering the definition and application of standards for collection of key terrestrial observations for climate (GEO task CL-09-02b)) and the use of observations and products coming from Global Ecosystem Observation and Monitoring (EC-07-01).

