

## MINUTES OF THE 14<sup>th</sup> CEOS STRATEGIC IMPLEMENTATION TEAM MEETING

25<sup>th</sup> May 2004  
FAO, Rome

### Participants

BGS:	Stuart Marsh
BNSC :	Paula Freedman, Mark Churchyard
CEAM:	Philippe Ciais
CMA:	Zhang Wenjian
CAMS:	Zhang Xiaoye
CNES:	Carole Deniel
CSA:	Sylvie Béland
ESA:	Stephen Briggs, Josef Aschbacher
EUMETSAT:	Tillmann Mohr, David Williams
FAO	Rio Tanabe, John Latham
GEWEX:	Rick Lawford
JAXA/RESTEC:	Yoji Furuhashi (Chair), Chu Ishida, Satoko Miura, Mariko Kato, Kazuko Misawa, Stephen Ward
MOST/NRSCC:	Li Deren, Liu Dingsheng, Li Mengxue
NASA/JPL:	Paul DiGiacomo
NOAA:	Greg Withee, Brent Smith
USGS:	Jay Feuquay
WCRP:	Gilles Sommeria
WMO:	Donald Hinsman

### **1. Welcome and introduction**

The Chairman, Yoji Furuhashi, opened the meeting and thanked the participants for joining. He made an opening statement containing the following points:

- 1) The intensive schedule of the GEO process has pushed the community involved in SIT and the IGOS Themes beyond capacity - but continued momentum on IGOS Themes is essential during 2004 and 2005 as we promote them as an essential foundation for the GEO implementation plan. This means having solid requirements, and committed implementation partners equipped with a fully-resourced plan.
- 2) The importance of following The IGOS Process Paper needs to be reaffirmed. The Process Paper was developed to provide IGOS Partners with a 'corporate memory' and clear guidelines for the development of well-planned and sustainable Themes. It guides all stages of the Theme process from proposal to implementation.
- 3) There is a risk of pressure on IGOS Partners to approve Theme proposals and reports because IGOS Partner meetings are now just once a year. The SIT Chairman invites all Partners to pay careful attention to the IGOS Process Paper as our reference in making decisions.

## 2. Adoption of agenda

The proposed agenda for the meeting was adopted. The item on the Carbon Theme was re-scheduled to run after the Geo-Hazards Theme, and John Latham of GTOS was confirmed as the presenter for the Land Theme agenda item.

## 3. Minutes of the 13<sup>th</sup> SIT

The previous minutes were adopted as final and the recorded action status was reviewed by Chu Ishida

No.	A/I	Status
13-1	JAXA and NASA to liaise with IGWCO to develop the discussion on the TRMM-GPM gap and on IGWCO input to GPM requirements definition	<b>To be reported at SIT-14</b> JAXA will update on: NASA/JAXA TRMM operation extension study, GPM launch planning, and 3 <sup>rd</sup> International GPM Workshop
13-2	ESA to provide an update on the status of EGPM	<b>To be reported at SIT-14</b>
13-3	ESA and NASA to work with IGWCO to define the expected information products from SMOS and HYDROS and their likely accuracy	<b>To be reported at SIT-14</b>
13-4	IGWCO, in consultation with WMO, to develop a proposal for the study of new water and energy cycle products	<b>To be reported at SIT-14</b>
13-5	IGWCO to distribute the white paper on water quality observation requirements	<b>Completed</b> Sent 1 <sup>st</sup> April
13-6	IGWCO to develop plans for a 'Theme Implementation Workshop' to: better define the Theme observational requirements; validate those requirements with the wider community; better understand space segment capabilities and opportunities; develop a position on GPM requirements.	<b>To be reported at SIT-14</b>
13-7	IGCO to confirm staffing of the Theme team during 2004 (and who is responsible for SIT-14 inputs)	<b>Open</b> The status of IGCO will be discussed at SIT-14
13-8	JAXA and NASA to provide details of GOSAT and OCO to WMO for inclusion in the CEOS Handbook	<b>Open</b> Details to be provided at next update opportunity
13-9	IGCO to further develop their implementation plan, clarifying the implementation framework, responsibilities, timetable, data providers, products, and users	<b>Open</b> The status of IGCO will be discussed at SIT-14

No.	A/I	Status
13-10	JAXA to confirm the Japanese operational agency appropriate for participation in the Geo-hazards Theme	<b>To be reported at SIT-14</b> JAXA in consultation with the Cabinet Office and Asian Disaster Prevention Center in order to conclude this
13-11	NASA to provide SIT with information on the proposed 'international altimetry service'	<b>Open</b>
13-12	JAXA to update SIT on the status of ASTER follow-on mission	<b>To be reported at SIT-14</b> A number of developments are underway, including proposed co-operation between Landsat and ASTER programmes
13-13	Ocean Theme Team to advise SIT Chair on their plans for assessment of the Theme implementation	<b>Open</b>

On action 13-8, Don Hinsman (WMO) confirmed that, for the last database update, NASA had provided inputs for OCO, but no GOSAT information had been provided by JAXA

#### 4. Global Water Cycle Theme implementation

The SIT Chair summarised the context of the IGWCO implementation developments and the conclusions of the last SIT meeting:

- IGWCO was approved at IGOS-P-10bis;
- we heard at SIT-13 about some of the first steps towards development of an implementation plan; the theme team recognised that such details should have been provided before moving to the implementation phase – but have since moved very quickly to set the Theme on the right course;
- the theme leader was asked at SIT-13 to provide a more detailed plan to the next SIT meeting – including final details of the institutional arrangements, and a timetable and concrete actions for Theme implementation;
- he was also asked to address 2 basic concerns: the need for improved understanding of certain space segment contributions by the IGWCO team; the need for improved buy-in of the water cycle community to the IGWCO process.

Rick Lawford (GEWEX) gave a presentation on the Water Cycle Theme implementation status. The discussion and conclusions on each of the main points are summarised below.

##### **Implementation Framework**

As tasked at SIT-13, the theme team has been progressing details of the implementation framework, as shown below:



IGWCO Implementation Framework

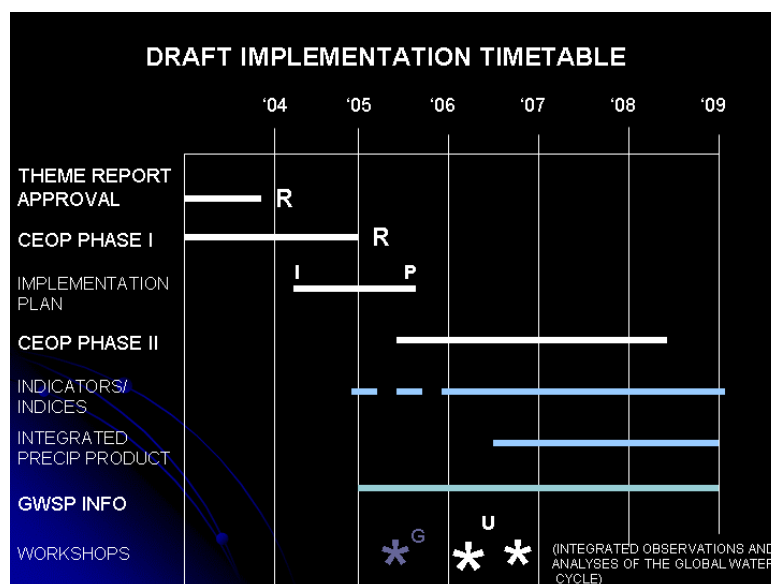
IGWCO Executive membership was confirmed as comprising:

- WCRP (Rick Lawford: Alternate: Gilles Sommeria)
- WMO (Avinash Tyagi: Alternate: Don Hinsman)
- CEOS/JAXA (Tasuku Tanaka: Alternate: Chu Ishida)

The Executive will be responsible for approving new initiatives, overseeing on-going IGWCO activities, reporting on IGWCO to IGOS and CEOS, and responding to requests for information from IGOS Partners. The Scientific Advisory Group will provide guidance to the Executive. Membership of the Committee is still under definition. In addition, the IGWCO will form working groups that will report to the theme. Working groups are planned in the areas of: integrated precipitation products; CEOP; Global Water System Project (GWSP) interactions; indicators, soil moisture, and user needs. The IGWCO Executive invites offers of resources from CEOS Members willing to support the Theme Secretariat and meetings.

**Implementation Timetable**

An outline implementation timetable was shown:



IGWCO Implementation Timetable

The long term goal is for better convergence of research and observations – and CEOP is providing good experience in this regard.

**Progress on main elements**

The main modules of the IGWCO Theme were described, along with the current state of progress on each. The modules are:

- CEOP (Co-ordinated Enhanced Observing Period);
- International Precipitation studies;
- The Global Water System Project (GWSP) – part of the Earth System Science Partnership which brings together four global change research programmes (IGBP, IHDP, WCRP, Diversitas) for integrated studies of the Earth System, the changes that are occurring to the System and the implications of these changes for global sustainability;
- The International Soil Moisture Working Group (ISMWG) which is focused on satellite measurements of soil moisture – including from the planned SMOS and HYDROS missions;
- a number of potential “indicators” projects using satellite and other data;
- a number of regional workshops focusing on capacity building.

Their status was summarised as:

	GOALS	LEADERS	ACTIONS	COMM TO DEADLINES	FUNDING SOURCE
CEOP II	DRAFT	YES	SOME	YES	IN PROC
INT. PRECIP	DRAFT	YES	NO	NO	NO
GWSP	DRAFT	YES	SOME	NO	NO
ISMWG	YES	YES	YES	YES	NASA
INDICATOR	PRELIM	NO	NO	NO	NO
REG WKSH	P. DRAFT	NO	SOME	NO	NO

*Implementation Status of IGWCO Modules*

**Progress on main elements**

Lack of funding is a recurring theme in the IGWCO modules. On the ‘indicators’ projects, Rick Lawford asked that the SIT Chair help interface with CEOS to identify support for a workshop which could: bring together field researchers to assess the feasibility of the different options; identify one or two priority projects; and plan the way ahead with GEWEX.

<b>Action</b>	<b>14-1</b>	<b>SIT Chairman to investigate prospects of CEOS member support for the IGWCO ‘indicators’ workshop</b>	<b>SIT-15</b>
---------------	-------------	---	---------------

**Response to SIT actions**

Rick Lawford responded to each of the main issues and actions regarding IGWCO raised at the last SIT meeting:

- 1) **The need for IGWCO consultation workshops to ensure community ‘buy-in’:** It was confirmed that IGWCO had investigated linking such an event to the meeting of the International Precipitation Working Group of the WMO Commission on Hydrology, in Monterey (USA) in October 2004 – but without success. IGWCO hopes to identify a suitable alternative, but requires one or more hosts/sponsors for the event to be feasible. CEOS agencies are invited to consider hosting such an event.
- 2) **The need for better understanding by IGWCO team of the space system capabilities:** Rick Lawford proposed a series of ‘special technical themed presentations’ during each of the forthcoming SIT meetings to address the main topic areas. IGWCO will bring a specialist to each meeting (or have them contribute written material). The SIT Chairman is asked to secure attendance and review of materials by suitable specialists from within the CEOS Membership. The provisional plan of IGWCO is as follows:

SIT-14: Surface water measurements from space (unfortunately the planned expert – Doug Aldorf was unexpectedly unable to attend)

SIT-15: Sub-surface water measurements from space

SIT-16: Soil moisture measurements from space

SIT-17: Evapotranspiration measurements from space

It was agreed that the IGWCO team would work with the SIT Chairman to ensure effective preparation for each of these activities – starting with surface and sub-surface measurements at the next meeting. This action will address many of the IGWCO recommendations outlined in their presentation.

<b>Action</b>	<b>14-2 SIT Chairman and IGWCO Team to co-operate to prepare analysis of surface and sub-surface water measurement capabilities of space segment</b>	<b>SIT-15</b>
---------------	--	---------------

- 3) **IGWCO requirement for long-term water and energy cycle products:** it was reported that IGWCO will participate in a WCRP initiative for the development of global climate products, involving systematic re-processing and co-ordinated re-analysis of all available observations from various satellite sensors and other data sources over several decades;

**Specific implementation issues**

The status was summarised as follows:

- 1) **TRMM-GPM observation gap:** Chu Ishida reported on JAXA actions since SIT-13. He recalled the main points of SIT-13 on this topic: NASA and JAXA undertook to review options for extension of the TRMM mission; agencies involved in GPM undertook to make best efforts to minimise the measurement gap after TRMM; it was agreed that a primary objective of the Water Theme should be to influence the conclusion of the GPM product planning process.

NASA originally proposed to terminate the operation of TRMM by controlled-re-entry by Sep 2004. Both NASA and JAXA have received letters (from WCRP and GEWEX) requesting extension of TRMM operations. Both agencies are now studying options to extend TRMM operations. If operation funds can be

found, PR data will be available for another 2 years and TMI data for another 4 years. If controlled re-entry is not made, further observation is possible.

Chu Ishida noted that JAXA were aiming to have the DPR sensor ready for 2009, but NASA's FY2005 budget anticipates a 2011 launch; this gap is under study by NASA and JAXA. NASA and JAXA are coordinating to shorten the gap.

Stephen Briggs reported that the E-GPM mission was one of 6 ESA Explorer missions discussed just one month ago at the agency's user consultation meeting. E-GPM is to be considered for implementation in the context of the European GMES activity, as an operational system.

GPM mission objectives and requirements are being coordinated through a series of international GPM workshops:

- #1: May 2001, Maryland USA
- #2: May 2002, Tokyo Japan
- #3: May 2003, ESA-ESTEC
- #4: June 2004, Maryland USA

IGWCO members are encouraged to attend the 4th workshop. Chu Ishida stated that the agencies involved in GPM may adopt a single science team; this is a topic for discussion at the 4<sup>th</sup> workshop.

Carole Deniel noted that the Megha-Tropique mission of CNES and ISRO was currently under development and could make a significant contribution to IGWCO. The mission currently has an in-service date of 2008/9. The SIT Chairman encouraged CNES to work closely with the IGWCO team to ensure that they take full account of Megha-Tropique capabilities.

<b>Action</b>	<b>14-3</b>	<b>CNES and IGWCO Team to discuss role of Megha-Tropique mission in theme implementation</b>	<b>SIT-15</b>
---------------	-------------	--	---------------

**2) Evapotranspiration products:** IGWCO think that an additional sensor (531nm band) on GOES R could provide valuable information.

**3) SORCE follow-on:** No progress to report.

**4) NOAA N' sensor suite and CERES on NPP:** No progress to report. (Later NOAA confirmed that neither NOAA N' nor NPP carry CERES).

**5) AMSR data from ADEOS-II:** Chu Ishida hoped that, following loss of ADEOS-II, best use could be made of the AMSR-E instrument on Aqua. For continuity, JAXA is planning an ADEOS-II follow on mission called GCOM (Global Climate Observing Mission) which has a high priority in the budget request for next FY. GCOM will carry an AMSR type radiometer.

**Discussion**

Stephen Briggs (ESA) observed that the Water Cycle theme appeared rather research-oriented, and hoped that the theme would develop with an emphasis beyond the science community and into the wider world. This is essential to ensure the required support from GEO. He noted that the UNESCO International Hydrology programme and the ESA TIGER project could be of value in this regard. Don Hinsman (WMO) agreed with ESA comments and noted that future development of the theme in this way was one of the objectives of WMO in volunteering for the Executive.

Greg Withee queried how the implementation plan of the Water Cycle theme might change under the GEO implementation framework. There was a discussion on the need for all IGOS Themes, and CEOS participation therein, to take urgent account of the very rapid developments underway in GEO and their forthcoming implementation plan. The SIT Chairman noted that he recognised this need and planned to emphasise this topic in the next SIT meeting. He noted that his report to the IGOS partners meeting would also recommend that the Partners urgently consider the IGOS-P position regarding GEO.

Chu Ishida suggested that JAXA will be able to host the community workshop sought by IGWCO – early in 2005.

<b>Action</b>	<b>14-4</b>	<b>JAXA and IGWCO Team to report on status of Theme workshop planning</b>	<b>SIT-15</b>
---------------	-------------	---	---------------

Rick Lawford noted that there would be an IPCC-GEWEX workshop on trends in water cycle variables on 3<sup>rd</sup>-5<sup>th</sup> November at UNESCO in Paris. SIT is invited to recommend suitable attendees from CEOS.

The relevant slide of the SIT Report to IGOS-P-11 was reviewed and agreed.

## 5. Geo-hazards Theme Implementation

The SIT Chair recalled that, at SIT-13, the Geo-hazards Theme had provided a very clear presentation emphasising a well planned and resourced implementation process. The meeting had asked the Theme team to come to SIT-14 with: specifics on the framework; an updated implementation plan; news of progress on the specific space segment implementation issues which had been identified as priorities.

Stuart Marsh (BGS) gave a presentation on the Geo-Hazards Theme:

### Progress update

- the Theme report was published to schedule (Q1 2004);
- the establishment of the geo-hazards bureau has been delayed (from Q2 2004); the theme launch workshop has been delayed as a result; progress in expected very soon;
- modification of the UNESCO GARS programme (as the proposed framework) is underway; the structure has been established and now awaits necessary recruitment by UNESCO;
- establishment of the proposed steering committee and working groups is also well underway with invitations being issued to the first meeting on 20<sup>th</sup> July in Paris (coincides with COSPAR).

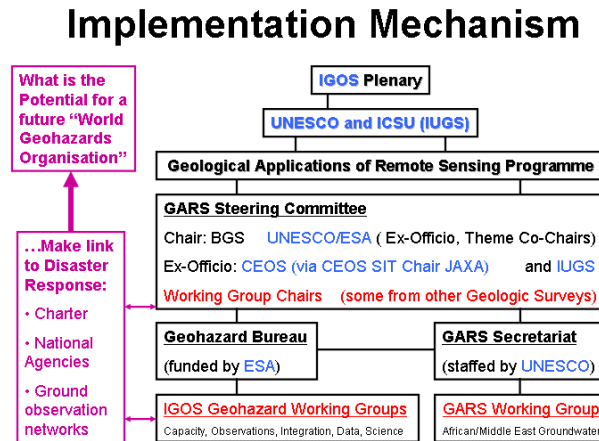
### GEO activities

The Geo-hazards Theme team has been very active in support of the GEO framework, including:

- development of a presentation and poster for the EO Summit II and side event in Tokyo;
- significant inputs to the GEO User Requirement Sub-group;
- significant inputs to the GEO Implementation Plan Task Team (Roz Helz of the Theme Team is leading the writing on Natural Hazards, and Marsh, Paganini, Missotten and Singhroy have all been invited to contribute);
- initial discussions held with Capacity Building Sub-group.

## Implementation framework

The latest progress on the implementation framework and its population was presented:



*Geo-Hazards Theme Implementation Framework*

Stuart Marsh recalled the discussion at SIT-13 regarding the need to strengthen links to disaster response agencies. He noted that the Theme team was building links to the 'Disaster Charter'.

He noted that three Working Groups had been identified as needing to start promptly:

- a Capacity Building Working Group;
- an Observational Requirements Working Group (which will support inputs to the CEOS/WMO Database in co-operation with Don Hinsman);
- a Groundwater Working Group: focused on Africa and the Middle East, and taking advantage of synergies with the ESA TIGER Initiative.

Rick Lawford and Stuart Marsh agreed to develop discussion off-line on mutual interests in the groundwater topic.

## Space segment implementation priorities

Stuart Marsh recalled the 5 space segment implementation priorities presented to SIT-13:

- consistent, global, high resolution topography;
- ASTER & Landsat continuity for geo-science mapping;
- C-Band INSAR consistency for ground displacement;
- L-Band INSAR for vegetated, non-urban environments;
- Data access issues.

There was a discussion on progress on each of these points:

- 1) **consistent, global, high resolution topography:** Jay Feuquay noted that USGS had no plans to release 30m global DEM datasets, but that 90m global data would be available before the end of 2004; Chu Ishida added that JAXA planned to publicly release 500 scenes per year of 10m and 30m DEM data derived from ALOS instruments;
- 2) **ASTER & Landsat continuity for geo-science mapping:** Chu Ishida confirmed that JAXA had held a number of meetings with ERSDAC (ASTER supplier) following SIT-13; the importance of ASTER follow-on missions had been emphasised; the ASTER science team has also visited JAXA and presented a plan for ASTER follow-on missions, including the possibility of a joint programme with

Landsat; this was followed by a joint science team proposal - made to NASA, USGS, and METI; to date there has been no positive response; the current status in Japan is that a FY2006 budget request is expected to initiate an ASTER follow-on mission; Jay Feuquay confirmed that Landsat was still considered to be a national priority.

- 3) **C-Band INSAR consistency for ground displacement:** Stephen Briggs advised that the proposals for ESA Earth Explorer missions included plans for continuity of ESA's C-band radar missions – as well as for a medium-to-high resolution 'Landsat class' imaging mission, to be implemented either independently by ESA or in co-operation with NASA or Rosaviakosmos. The ESA programme will require ministerial approval in June 2005.
- 4) **L-Band INSAR for vegetated, non-urban environments:** ESA is considering an L-band mission. JAXA advised that ALOS (with PALSAR) is now scheduled for launch in early 2005 and is currently undergoing some design changes actioned following the loss of ADEOS-II.
- 5) **Data access issues:** Stuart Marsh highlighted the example of the SRTM 30m DEM global dataset as an example of an existing dataset of extremely high value – including a direct need expressed by a number of IGOS Themes – which has significant potential but is restricted in distribution. He hoped that SIT might investigate whether such cases, and this example in particular, could be re-assessed by the relevant space agencies.

<b>Action</b>	<b>14-5 SIT Chair and Geo-hazards Theme team to explore topography dataset access issues</b>	<b>SIT-15</b>
---------------	--	---------------

The relevant slide of the SIT Report to IGOS-P-11 was reviewed and agreed.

## 6. Global Carbon Theme implementation

The SIT Chairman recalled his recent letter to the Carbon Theme team expressing concern at the lack of progress on implementation since the Theme approval. He thanked Philippe Ciaïs for his positive response to the letter and repeated his clarification that the individual contributions made to the Carbon Theme report development by Dr Ciaïs, Prof Berrien Moore, and Dr Will Steffen are all recognized and much appreciated. He noted that the report is an extremely valuable review of the Global Carbon Cycle science issues and data requirements – but does not include an implementation plan. The IGOS Process Paper insists that Themes should not be approved to move to the implementation phase until a suitable plan (detailing which agencies will lead implementation, details of resources, responsibilities, a timetable, data providers and data users) is in place.

The SIT Chairman noted that, since the IGOS Partners all approved the Carbon Theme, it is now their joint responsibility to identify how to set it on the right course and that a specific and short term plan of action is necessary to produce an implementation plan which is compliant with the IGOS Process Paper.

Philippe Ciaïs (CEAM) gave a presentation on the Global Carbon Theme status:

- the theme team recognises the need to accelerate implementation progress to keep pace with the political mandate set by GEO;
- participation in the core group being proposed to handle IGCO implementation is progressing, including the following roles (confirmed participants are marked by \*):

Institutional: [Steffen], Tschirley, Hood, TBD-UNFCC  
 Links with Research: Cannadell\*, Raupach\*  
 Space observations of Land : Running, Myneni, Schmullius, Plummer, Wickland, Jeanjean, TBD-JAXA  
 Space observations of Ocean : Antoine\*, TBD  
 Space observations of CO<sub>2</sub> : Moore\*, Crisp\*, Chédin\*, TBD -GOSAT  
 Space observations of biomass : Quegan\*, Le Toan

In situ observations of Atmosphere: Inoue, Butler\*, Ciais, Barrie  
 In situ observations of Flux: Valentini\*, Baldocchi  
 In situ observations of Biomass Inventories: Schlamadinger\*, TBD  
 In situ observations of Ocean: Watson, Sabine  
 Algorithms and Models: Rayner\*, Matsuytov, Heimann\*, Le Quéré\*, Hollingsworth\*  
 Requirements, strategy, revisions: core group of scientists  
 Users: scientific community (GCP), C sinks monitoring (UNFCCC)  
 Producers: GTOS/TCO, GOOS, CEOS (2 representatives)  
 In situ observation community: TBD  
 Remote sensing community: TBD

- the implementation framework structure is provisionally envisaged as:

IGCO Central Node: Paris LSCE chair & secretariat;  
 TCO/GTOS node: Rome FAO;  
 GOOS node: Paris UNESCO/IOC SCOR  
 Space agency nodes: (NASA/NOAA, ESA/EUMETSAT, JAXA)  
 Research node: GCP Office Canberra  
 C sink monitoring: with SBSTA, Bonn

- the implementation schedule for the coming year or so was summarized as:

May-Jun 2004: Confirm support for IGCO Team (meetings, travel, organization...);  
 Sep-Nov 2004: Core group meeting / v0 draft of implementation plan;  
 Feb-Mar 2005: v1 implementation plan distributed  
 Sep-Nov 2005: final printed version of implementation plan.  
 Yearly thereafter: periodic revisions.

<b>Action</b>	<b>14-6</b>	<b>IGCO Team to distribute draft implementation plan for information of IGOS Partners</b>	<b>SIT-15</b>
---------------	-------------	---	---------------

Dr Ciais expressed the hope that the IGCO Theme could bring about new levels of co-operation between the scientific community (such as GCP) and those providing systematic observations. He noted that recent spectacular developments in Earth System simulations had resulted in some extremely advanced models which were ready to ingest the observations laid out in the IGCO report. The Theme team has great hopes for the GOSAT and OCO missions - as the first attempts to measure CO<sub>2</sub> from space. The need for other space data products was discussed briefly – including for a ‘burnt area’ product, better characterisation of vegetation architecture and profile, and fire hotspots. It is hoped that an ATSR style instrument will be flown to supply some of these needs.

**Discussion**

Tillmann Mohr noted EUMETSAT’s gratitude for the progress to date and confirmed that they would be pleased for IASI on METOP to be recognised as a data source for space segment implementation.

Stephen Briggs (ESA) noted the enormous intellectual and political challenges which lay ahead for the IGCO Theme. ESA offers to host a first IGCO workshop on carbon observations in Frascati – perhaps in the Sept-Nov timeframe, to be discussed with the IGCO Team.

<b>Action</b>	<b>14-7</b>	<b>ESA and IGCO Team to discuss arrangements for the proposed IGCO workshop</b>	<b>SIT-15</b>
---------------	-------------	---	---------------

Brent Smith (NOAA) noted the lack of a single observing system champion for the implementation of Carbon issues – noting that GCOS has specifically decided to avoid taking responsibility for carbon issues within its mandate.

Zhang Wenjian (CMA) noted that the space segment was still rather weak in providing accurate measurements of atmospheric chemistry, and that in-situ measurements would remain vital. He noted that

CMA gives a high priority to data from the 6 established GAW stations and hopes that they will be further expanded in future to support the IGCO Theme requirements. He also stressed the importance of developing aerosol sensors.

In response to a query from CMA, Philippe Ciais confirmed that the GAW was recognised as the framework for supply of in-situ CO<sub>2</sub> measurements. Such measurements will be even more vital in the era of GOSAT and OCO, since satellite measurements will need both surface and profile measurements for calibration and validation. He hoped that GAW would support more vertical profile measurements. CMA noted that they planned to contribute to this requirement in future.

Carole Deniel confirmed that CNES would be pleased to provide the short term support to move the IGCO theme along the implementation track and fulfill the conditions required for approval. CNES will focus in particular on identifying agencies which would be appropriate to take on the implementation responsibility (Ms Deniel expected that this would not be a space agency). This offer of assistance was welcomed and supported by several agencies.

Chu Ishida (JAXA) reported on a number of relevant initiatives in Japan which might contribute to IGCO implementation:

- the Global Carbon Project (GCP) international office was recently established in NIES, Tsukuba, Japan;
- JAXA is studying development and launch of the GOSAT mission, intended to contribute to policy development within Japan's Ministry of Environment by estimating sources and sinks of Green House Gases (GHGs) at a sub-continental scale and by verifying the reduction of GHG emissions required by the Kyoto Protocol. GOSAT aims to produce 3-month average observations of CO<sub>2</sub> density during the first commitment period (2008 to 2012) of the Kyoto Protocol – with a relative accuracy of 1% (4ppmv) at sub-continental spatial resolution (0.5% when combined with in-situ data); Feb 2008 is the estimated launch date; a GHG sensor and a 'cloud & aerosol' sensor will be the two main payloads;
- in response to questions, Chu Ishida noted that many details of the mission had yet to be confirmed, including the LST and the planned calibration methods;
- JAXA is planning a direct and specific contribution to the IGCO project via their 'ALOS Kyoto and Carbon initiative'; this project aims to support the information needs posed by: the IGOS-P Terrestrial Carbon Observation Theme (TCO); international environmental conventions and agreements on national forest inventories; the UNFCCC Kyoto Protocol (Forest and Land Cover Change); the Ramsar Convention (wetland characteristics and disturbances); and the UN Millennium Declaration. 18 organizations from 13 countries will co-operate in development of systematic observations of forest and land cover based on ALOS mission data. More information is available at <http://www.jaxa.jp/ALOS/>.

The relevant slide of the SIT Report to IGOS-P-11 was reviewed and agreed.

## 7. Atmospheric Chemistry Theme update

The SIT Chair recalled that, at SIT-13, the IGACO Theme had provided a draft report which was comprehensive on the science and requirements sections – but that SIT had asked for more detail on the implementation aspects.

Don Hinsman (WMO) gave a presentation on the IGACO status, including:

- details of the many authors, contributors, and reviewers;
- a reminder of the overall objectives: to define a feasible strategy for deploying a global atmospheric composition observation system with comprehensive coverage of key gases and aerosols; to establish a system for integration of ground-based, airborne and satellite observations using atmospheric models; to

make the integrated observations accessible to sciences for environmental policy development and weather/environmental prediction;

- the activities undertaken in response to comments at the last SIT meeting in February 2004 – including a check of the consistency of the IGACO aerosol requirements with those requirements in the GCOS 2<sup>nd</sup> Adequacy Report.

On the specifics of the leadership, membership, resources, and timetable for implementation, Don Hinsman acknowledged that further details were necessary and that these would be forthcoming once the Executive Council of WMO had approved the project and confirmed the leadership of WMO/GAW on implementation of IGACO (approval is expected in June). It was confirmed that Len Barrie and Don Hinsman would lead the implementation team. Once approved to move to implementation by IGOS Partners, the team expects to engage various arms of CEOS (SIT, WGISS, WGCV) in support of its objectives. An outline timetable for the implementation process was discussed briefly:

SPECIFIC RECOMMENDATIONS	YEARS AFTER INITIATION OF IGACO									
	1	2	3	4	5	6	7	8	9	10
SR1a: Establish IGACO System For Ozone, Aerosol & Water Vapour										
SR1a: Establish IGACO System For Remaining Group 1 Variables										
SR2: Plan and Initiate New Satellite Missions For The Long Term										
SR3: Develop Data Management/Analysis Systems Including WIDACS										
SR4: Upgrade ground -based observations for Group 1										
SR4: Upgrade ground -based observations for Group 2										
SR5a: Begin Instrument Development Programme for IGACO Aircraft Activities										
SR5b: Add new networks to MOSAIC and CARIBIC										
SR6: Improve Available Satellite Data Retrieval										
SR7a: Incorporate Models in IGACO for SR1a										
SR7b: Incorporate Models in IGACO for SR1b										

*IGACO Implementation Timetable*

**Discussion**

In response to a query from CNES regarding how IGACO will ‘fit in’ with the envisaged GEO implementation plan, Stephen Briggs (ESA) noted that many such questions still remain unanswered - since the GEO plan is at an early stage. What is clear is that many IGOS Theme team members are participating in the writing of the GEO materials (including IGACO members) and IGOS Partners should be encouraged that IGOS Themes are likely to map well onto the structure to be proposed by GEO.

Greg Withee advised that NOAA’s next mission in planning is GOES-R, which has a 2012 in-service date. The GIFTS sensor is no longer planned to be featured, but NOAA will employ a very high resolution sounder which can measure certain trace gas and air quality parameters. NOAA hopes that - through CEOS, GEO, and WMO consultative meetings - a more harmonised global approach to atmospheric chemistry measurements can be developed.

Zhang Wenjian (CMA) noted that China was currently planning its next generation of GEO and polar-orbiting satellites and encouraged the IGACO team to communicate their relevant data requirements.

The SIT Chair concluded the discussion by commending the IGACO Theme team on their efforts in developing an excellent Theme team report and by confirming SIT endorsement of the IGACO Theme to move to implementation phase – anticipating confirmation of the membership, roles and responsibilities of the implementation team soon after WMO EC approval.

The relevant slide of the SIT Report to IGOS-P-11 was reviewed and agreed.

## 8. Coastal Theme Update

The SIT Chairman noted that, although originally intending to seek approval to move the Coastal Theme to implementation stage, the Theme report was not yet complete and had not been distributed to IGOS Partners.

Paul DiGiacomo gave an update on the Coastal Theme status and the developments since SIT-13, including:

- a reminder of the overall goal, which is to: “develop a strategy for integrated global observations that will provide improved understanding of Earth system variability and change in the coastal zone, with a particular emphasis on propagation of change and variability across the land-sea-air interface”;
- and of the objectives: support crucial coastal user needs (linking research & applications) and establish a framework and products that will integrate necessary observations, particularly across land-sea-air boundaries; specify user driven requirements for in situ and remote observations in the coastal zone and associated requirements for data management and models; evaluate current and projected observation capabilities in terms of the extent to which they meet these requirements, identify capabilities that need to be continued as well as those that need to be developed to address gaps; incorporate the Coral Reef Sub-Theme;
- a review of the activities since SIT-13;
- the planned report structure;
- a review of the primary space data requirements identified and existing/planned capabilities;
- the access, knowledge, and continuity challenges;
- the immediate way ahead was summarised as:

June/July: Continued revision of draft Coastal Theme Report by Coastal Theme Team

11-13 July: Coastal Theme writing session (either Washington, DC or Los Angeles)

22 July: Presentation on Coastal Theme & requirements at COSPAR meeting, Paris

2 August: Completed version of Report to CEOS-SIT and IGOS-P for review

2004-5: Anticipated approval and publication of IGOS Coastal Theme Report (commitment of publication from IOC); initiation of implementation phase (led by C-GOOS/GTOS)

### Discussion

Greg Withee (NOAA) applauded the rapid and substantial progress by the Coastal Theme team and queried whether it would be possible to get the key elements of the draft report input to the Implementation Plan Task Team (IPTT) of GEO – to ensure that their work could be suitably reflected in the GEO document.

David Williams (EUMETSAT) offered to serve as an interface to the IPTT and noted that the Theme need not wait for IGOS approval to move to implementation; the draft report will be valuable to the IPTT.

<b>Action</b>	<b>14-8 Coastal Theme team to liaise with David Williams to supply the draft theme report to the IPTT of GEO</b>	<b>End July</b>
---------------	--	-----------------

Brent Smith hoped that the Coastal Theme need not wait until the next full Partners meeting in June 2005 for approval to move to implementation. The SIT Chairman noted that, the possibility of a SIT and IGOS-P

meeting in Beijing in November, would allow the Coastal Theme report to be approved at that time - assuming advance submission and content consistent with the IGOS Process Paper. The relevant slide of the SIT Report to IGOS-P-11 was reviewed and agreed.

## 9. Land Theme Proposal

The SIT Chair noted that a proposal for an IGOS Land Theme had been submitted very recently by Prof John Townshend – on behalf of FAO. John Latham from FAO was invited to make a presentation to SIT-14 on the Land Theme proposal. The main points were:

- IGOS-P has not yet considered the observational needs relating to many aspects of the Land: sustainable economic development, natural resources management, conservation and biodiversity, climate change and its impacts, ecosystems etc;
- the stake-holders include: international organizations (such as FAO, UNEP, and WMO); international intergovernmental actions; the scientific community; environmental convention secretariats; and the general public;
- the proposal team, in defining the scope of the proposed Theme has tried to strike a delicate balance between ‘including as many important components as possible’ and ‘the realistic potential of being able to be implemented’ by IGOS and its Partners;
- the main components selected are: land cover and land use; human settlement and population; managed ecosystems; natural ecosystems; soils; biogeochemical cycles; elevation data;
- the measurement of land cover by satellite remote sensing is considered to be central to the Theme;
- roles and responsibilities were explained as:

International co-ordination mechanisms for observations: led by FAO (especially GTOS), UNEP, UNESCO, WMO  
Scientific research: led by IGBP, WCRP, IHDP  
Remotely sensed data and derived products: led by CEOS agencies  
It was noted that in-situ observations will need considerably improved co-ordination mechanisms.

- the immediate work plan is:
  - Jun-Jul: revise proposal following IGOS-P guidance
  - Aug-Sep: initial team meeting;
  - Sep-Nov: Draft statement of requirements
  - Jan 2005: 2<sup>nd</sup> team meeting
  - Feb–Apr 2005: Draft statement of necessary observational enhancements
  - May 2005: Writing Group drafts final report outline
  - May-Jun 2005: First draft of report
  - Aug 2005: Internal review
  - Sep 2005: 3<sup>rd</sup> team meeting to finalise report
  - Oct 2005: External review
  - Nov 2005: Finalise report
  - Dec 2005: Submit Theme report to IGOS partners
- preliminary membership of the team was shown;
- on the issue of resources, it was conceded that the proposal does not identify the donors of the effort estimated as necessary for completion of the Theme report (approx 0.5 X a ‘full time equivalent’ for 18 months, plus meeting and materials costs).

## Discussion

The SIT Chair noted that this lack of committed resources was the only area in which the IGOL Theme proposal was significantly non-compliant with the guidelines in the IGOS Process Paper for adoption of new Themes.

In response, a number of SIT members – including USGS and NRSCC – commented that they would consider providing some level of support or manpower to this activity. Stephen Briggs (ESA) hoped that ESA's support for the GOF/GOLD project office in Germany might also be applied to assist the IGOL report development. He noted that the issue of land and land cover should be a high priority for IGOS and the Theme proposal represents an excellent opportunity. He commented that very few land parameters can be measured directly from space and that the Theme requirements would likely be very complex, facing intellectual and organisational challenges.

Rick Lawford (GEWEX) and Philippe Ciais (CEAM) noted the potential benefits of a Land Theme for the IGWCO and IGCO information needs. Stuart Marsh (BGS) pointed out that the Land Theme also had a strong requirement for the 30m SRTM dataset requested by the Geo-hazards Theme.

It was confirmed that GTOS would be the lead on development of the Land Theme report.

The SIT Chair confirmed SIT endorsement of the proposal for a new Theme. The relevant slide of the SIT Report to IGOS-P-11 was reviewed and agreed.

## 10. Cryosphere Theme Proposal

Gilles Sommeria (WCRP) summarised the main points of the proposal for a new IGOS Cryosphere Theme. The main points were:

- an IGOS Cryosphere theme is required to create a framework for improved co-ordination of cryospheric observations conducted by research, long-term scientific monitoring, and operational programmes, and to generate the data and information needed for both operational services and research;
- three broad streams of cryospheric observation and data applications are envisaged:
  - 1) a comprehensive system of validated remote sensing and *in-situ* observations of land-based cryosphere, capable of providing a complete picture of precipitation (including its solid part), snow reserves, river- and lake- ice, permafrost, and frozen soil characteristics;
  - 2) a system ensuring comprehensive observations of sea-ice characteristics, the efficient exchange of these data, their use in operational services, and subsequent processing for research applications and climate studies;
  - 3) a significantly enhanced ice-sheet, ice-cap, and glacier monitoring system, including measurements of: spatial extent, surface elevation, ice thickness, surface flow rate, calving rate (for tidewater glaciers), equilibrium line elevation, mass balance, albedo, and aerodynamic roughness.
- a number of IGOS Partners were identified as suitable participants;
- an outline work plan was described:

Theme team forms: summer 2004

Outline Theme document and chapter contents: September – October 2004

IGOS-P-11 bis meeting reviews the draft and offers advice on direction: November 2004

CEOS SIT offers initial implementation advice: November 2004

Draft report and initial implementation plan completed: March 2005

CEOS SIT reviews draft and initial implementation plan: end March 2005

ClC science conference gives inputs to Theme draft; and identifies peer reviewers: April 2005

Second draft of the Theme: May-August 2005 (available draft submitted to IGOS-P-12, end May 2005, for advice)

Peer review: September 2005

Adjustments to the document: October 2005

Submission of full Theme document to IGOS-P-12bis: end October 2005

Fall-back position: final draft submitted to IGOS-P-13: end May 2006.

(The presumption of an IGOS-P-12bis meeting was noted)

## Discussion

Chu Ishida referred participants to the matrix prepared by the SIT Secretariat which indicated compliance of the Cryosphere Theme proposal with the IGOS Process Paper. He noted that the proposal was not compliant with the Process Paper in a number of areas, in particular:

- Theme team personnel and commitments of the necessary resources were not included;
- team leadership, role and responsibilities were not included;
- evaluation criteria (to allow IGOS-P to judge progress against each milestone) were not included.

It was clarified that WCRP is the IGOS Partner proposing to lead the Theme development.

A number of agencies commented that, whilst the Theme proposal clearly needed more work in some areas, it was widely recognised that this was an important topic for IGOS-P to address, and would represent a valuable contribution from IGOS-P to GEO implementation in years to come.

Sylvie Béland (CSA) confirmed that CSA would be pleased to provide support to the Theme team, including hosting the first Team meeting in Canada – in association with Environment Canada.

Don Hinsman (WMO) recalled the guidance of the IGOS Process Paper – which suggests that, as a default, one of the Global Observing Systems should be considered as the lead on implementation. This should be considered as the Theme is further developed.

Li Deren (NRSCC) recorded NRSCC support for the new Theme and hoped that the team would give due consideration to the information requirements for regions beyond the poles – such as the Tibetan plateau.

The SIT Chair reviewed the relevant slide of the report to IGOS-P-11 and confirmed:

- SIT endorsement of the proposal for a new Cryosphere Theme for IGOS;
- the SIT recommendation that, in further developing the proposal, the Theme team should seek guidance from the IGOS Secretariat to ensure compliance with the IGOS Process Paper.

## 11. WCRP Space Data Requirements

Gilles Sommeria (WCRP) gave a presentation outlining the WCRP plans for the re-processing of various global observation data for the development of climate products. The project is in response to the widely recognised need for more comprehensive climate data sets. WCRP hopes that the project can help in: development of a reference climate record; the design, evaluation and modifications of observing systems; reconciliation of disparate climate observations and characterisation of analysis uncertainties; establishment of initial conditions for climate predictions.

The plan involves systematic re-processing and co-ordinated re-analysis of all available observations acquired from various satellite sensors and other data sources over several decades. The results will serve as a benchmark to validate climate models and thus improve our ability to forecast climate evolution at all time scales.

WCRP has established a Task Force to define and implement a new strategy called COPES (Co-ordinated Observation and Prediction of the Earth System). The aim is to facilitate prediction of climate/earth system variability and change - for use in an increasing range of practical applications of direct relevance and benefit to society. COPES incorporates a 'Working Group on Observations and Assimilation' which will serve as the focal point for WCRP interactions with other groups and programmes on observational requirements – including satellite observations. WCRP encourages space agency participation in the further development

and implementation of the COPEs strategic framework and invites a CEOS delegate to participate in the Working Group on Observations and Assimilation.

**Discussion**

Don Hinsman (WMO), Tillmann Mohr and David Williams (EUMETSAT) all noted the importance of IGOS (and GEO) working from a single, consistent set of climate data requirements. There is concern as to whether the WCRP and the GCOS requirements are actually consistent with each other. Don Hinsman noted that IGOS Partners had decided not to adopt a ‘Climate Theme’, preferring instead to leave the task of Climate observations to GCOS as a cross-cutting topic which impacted all other Themes. In the absence of a Climate Theme, it is vital for Partners to know that GCOS and WCRP are working from a single set of climate-related observation requirements. Don Hinsman added that the same topic had been debated in CGMS and that WMO had been charged to help resolve the issue. He noted that GCOS had recently validated all of their requirements stated in the CEOS/WMO Database (early in 2004) but that WCRP requirements had not been updated since 1998.

David Williams suggested that WMO be asked to update CEOS Plenary on this important activity at the Beijing meeting in November.

<b>Action</b>	<b>14-9</b>	<b>SIT Chair to liaise with WMO and CEOS Chairman on topic of GCOS-WCRP Climate Requirements for the Plenary agenda</b>	<b>November 2004</b>
---------------	-------------	---	----------------------

Stephen Briggs noted that it would be very positive for CEOS to be presented with a consistent climate community requirement.

**12. GCOS Implementation Plan**

GCOS was unable to provide a representative to the SIT meeting but Don Hinsman (WMO) was able to provide a summary of their Implementation Plan status. He noted that – following agreement on the GCOS 2<sup>nd</sup> Adequacy Report – GCOS had undertaken development of the Implementation Plan. It had undergone several iterations with the GCOS panels, and the draft was now available on the GCOS WWW site for public comment – before 9<sup>th</sup> July 2004. CEOS is encouraged to review and comment on the draft. The SIT Chair undertook to bring the report to the attention of all CEOS Members.

<b>Action</b>	<b>14-10</b>	<b>SIT Chair to advise CEOS members of the importance of review of the GCOS Implementation Plan</b>	<b>End June 2004</b> (review closes 9 <sup>th</sup> July)
---------------	--------------	---	--

David Williams stressed the need for CEOS Members to review the document. He noted that some of the recommendations may need improvement. The draft features 139 different recommendations, with no sense of priority indicated. 20 of these refer to space observations.

**13. Current Issues relating to IGOS-P Themes**

**GEO and EO Summit II**

Chu Ishida gave a brief presentation on the outcomes of the GEO and EO Summit meetings held in Tokyo in April 2004. He noted the necessity for linkage of the IGOS Themes with the GEO process.

Brent Smith stressed the importance of CEOS and IGOS having the necessary influence on the shaping of the GEO implementation plan. He noted that GEO had evolved from a realisation of the limitations of CEOS and IGOS-P – with neither having ministerial level involvement in the observations co-ordination process.

David Williams suggested that GEO will remain focused on the political process and awareness, whilst CEOS and IGOS will retain responsibility for the essential technical foundations. This boundary seems fairly clear – with GEO having no means to derive new analyses or requirements. The GEO Implementation Plan is being structured along 9 socio-economic benefit areas. These match reasonably well with the existing IGOS Themes (or with GCOS/WCRP in the case of climate). Given the membership of the writing teams for these topics – comprising many of the relevant IGOS Theme team members – it seems that IGOS progress and direction will be well represented. David Williams suggested that GEO was unlikely to replace CEOS and IGOS-P, but would evolve from their activities. The Implementation Plan writing team will meet on June 10<sup>th</sup> in Washington DC to progress the document – focusing on the requirements for the 9 topic areas and priorities in the action plan.

Greg Withee urged both CEOS and IGOS to carefully consider the timing of the GEO process of the next 9 months and the need for their inputs to the implementation plan and governance discussions. It was agreed that an IGOS Partners meeting - ahead of the scheduled IGOS-P-12 (June 2005) - would be extremely valuable, as would a discussion by CEOS Members on the CEOS position regarding GEO.

#### **Common data requirements across themes**

The SIT Chair recalled the brief discussion at SIT-13 regarding identifying commonalities in requirements across the different IGOS Themes, with a view to noting high value priority datasets and the supporting satellite missions. Stuart Marsh (BGS) delivered a short presentation on the topic. He illustrated the point by quoting some datasets required by the Geo-hazards Theme which are also requirements of one or more of the other IGOS Themes. These include: volcanic gas emissions (IGACO); high resolution DEM (Coastal, Land); land cover (Land). He highlighted the 30m SRTM data as an obvious example of a high priority dataset required by several IGOS Themes (see action 14-5 above). Don Hinsman suggested that the DEM requirement be highlighted to the User Requirements Sub-Group of GEO.

It was agreed to further develop this topic (of common requirements) for discussion at a future SIT meeting – reflecting progress on such topics within the GEO framework.

#### **14. SIT Report to IGOS-P-11**

The SIT Chair noted that his report to IGOS-P-11 had been agreed at the conclusion of each relevant agenda item during the SIT meeting and that final review and checks would be undertaken at the CEOS SEC meeting the following day.

#### **15. Next meeting**

After some discussion, the 15<sup>th</sup> meeting of the SIT was provisionally arranged to be held in Beijing on Monday 15<sup>th</sup> November 2004. The Chairman stressed that – whilst limited agenda time may be allowed for urgent items (eg approval of the Coastal Theme report) – the SIT-15 meeting would have a special focus: to assemble CEOS principals to consolidate a CEOS position on GEO.

NRSCC confirmed that they would be pleased to accommodate the SIT-15 meeting in Beijing.