GEO activities on global land cover observations: task DA-07-02

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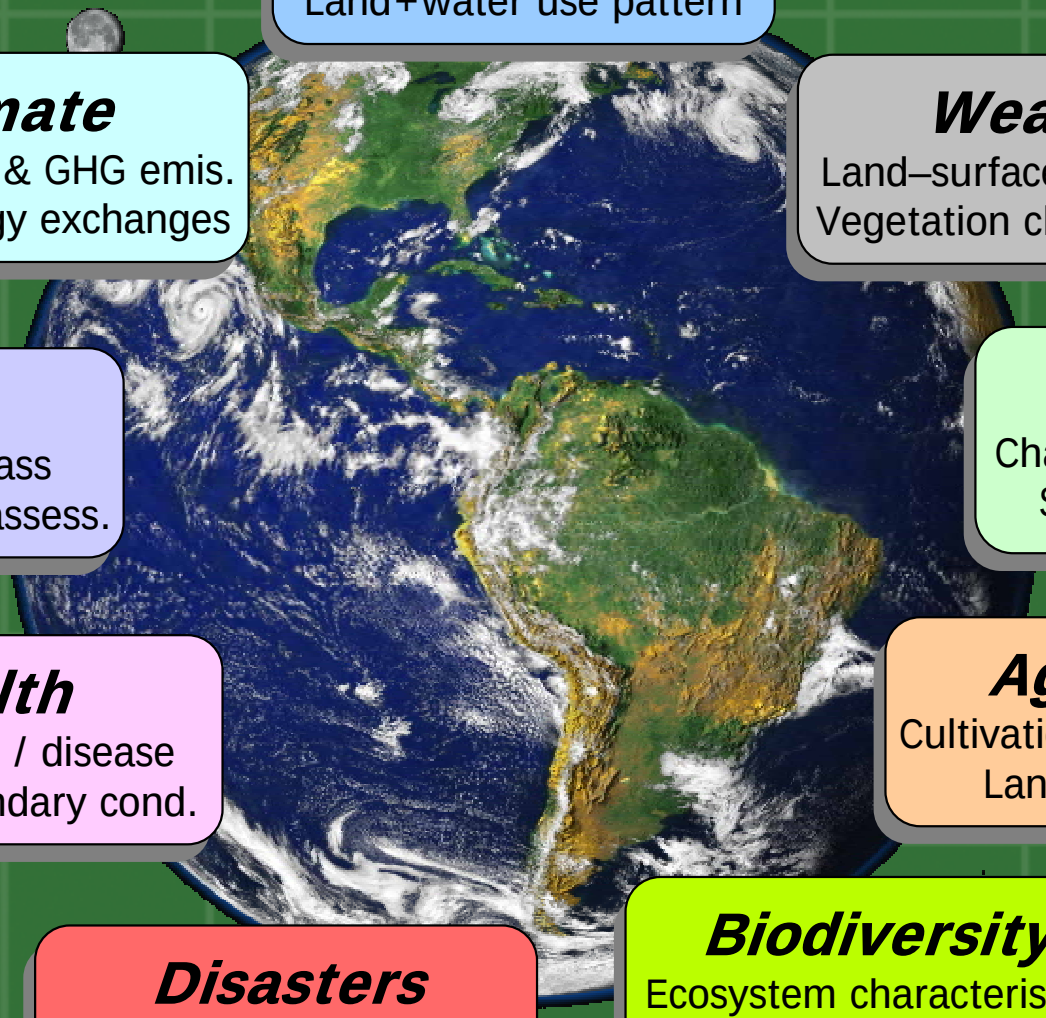
GEO societal benefits and land cover observations



Water
Water resources / quality
Land+water use pattern

Climate
Land change & GHG emis.
Water+energy exchanges

Weather
Land–surface climate int.
Vegetation characteristics

Energy
Bio-energy/biomass
Wind/hydro power assess.

Ecosystems
Change environment cond.
Services + accounting

Health
Land change / disease
vectors / boundary cond.

Agriculture
Cultivation pattern+forestry
Land degradations

Biodiversity
Ecosystem characteristics
Habitats + fragmentation

Disasters
Fire monitoring
Land degradation assess.

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Relevant tasks in the GEO 2007-09 Work Plan

- DA-07-02 (Data and Architecture)

"Provide a suite of global land cover datasets, initially based on improved and validated moderate resolution land cover maps and eventually including land-cover change at high resolution."

- Continuation of 2006 workplan task: AG-06-03
- Hosted under Architecture and Data Committee
- Task lead US/USGS + GOFC-GOLD

Details on GEO task DA-07-02

1. Advocate existing internationally-agreed approaches to systematic land cover characterization) and (LCCS classifiers validation (CEOS protocols)
2. Utilize and validate moderate resolution time series data and land cover data sets (i.e. GLOBCOVER, MODIS500) and earlier 1-km resolution maps (i.e. GLC2000, IGBP-DIS)
3. Formulate specifications and implement production of a global high-resolution land cover and land change data set and report
4. Set up a centralized web-based access to existing land cover data
5. Identify opportunities for applying land cover data in areas related to key societal benefits.
6. Strengthen national level capacities to produce and use these products especially in developing countries

DA-07-02 key activities

Global level

Strategies (IGOS): Integrated Global Observations for land (IGOL)

Integration of IGOL into GEO

Standards: LCCS land cover classifiers and validation procedures

Harmonization: “best” available map

New global products: GLOBCOVER (link to regional level)

Continuity of observations:

Mid-decadal global Landsat survey (MDGLS)

Decadal survey?

Specifications for fine-scale global land cover change dataset (incl. validation framework)

Technical guidance for UNFCCCC/REDD (GOFC-GOLD sourcebook)

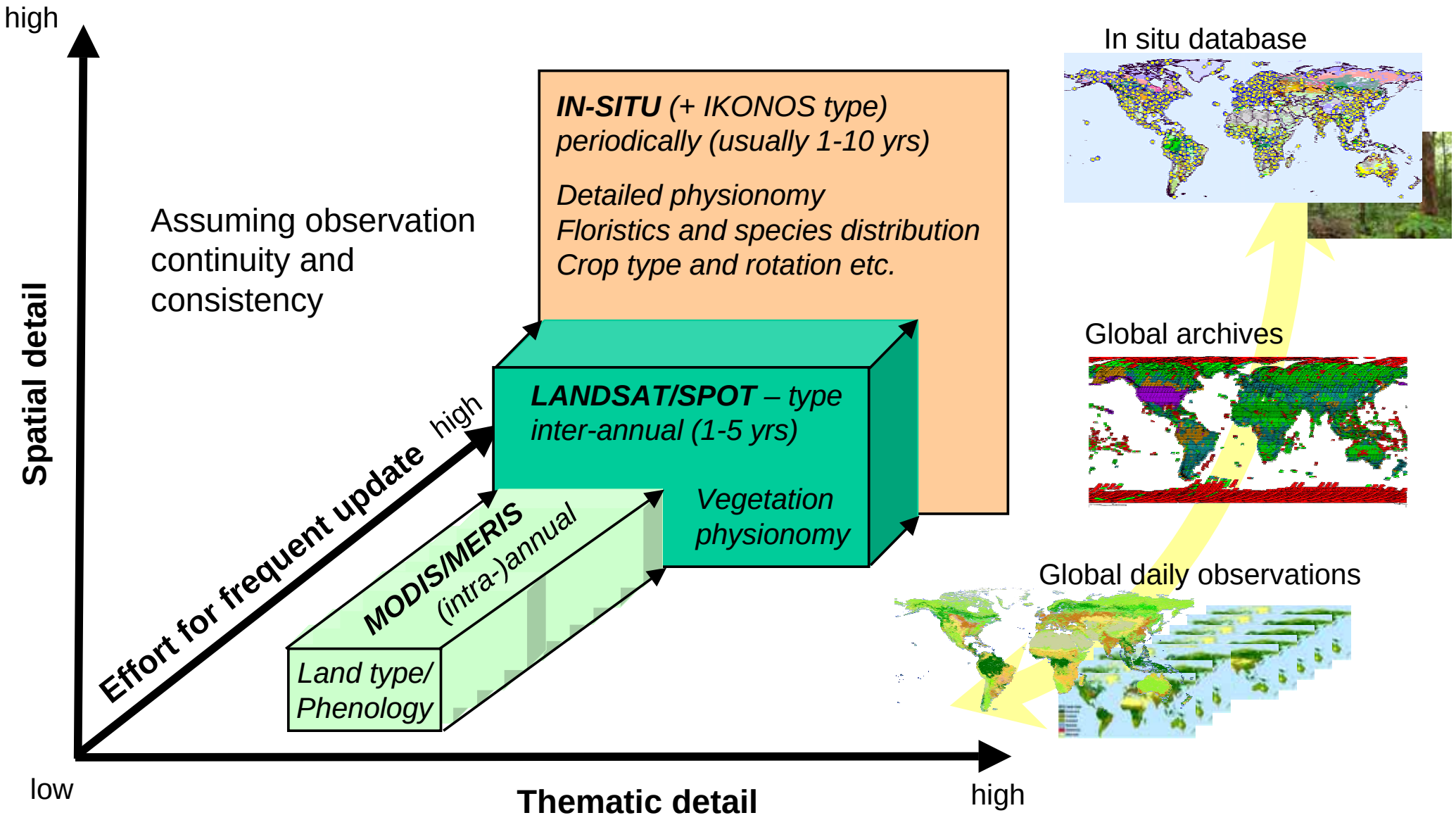
Capacity building and support of global assessments:

GLCN + GOFC-GOLD networks / FAO-FRA global remote sensing survey

National level

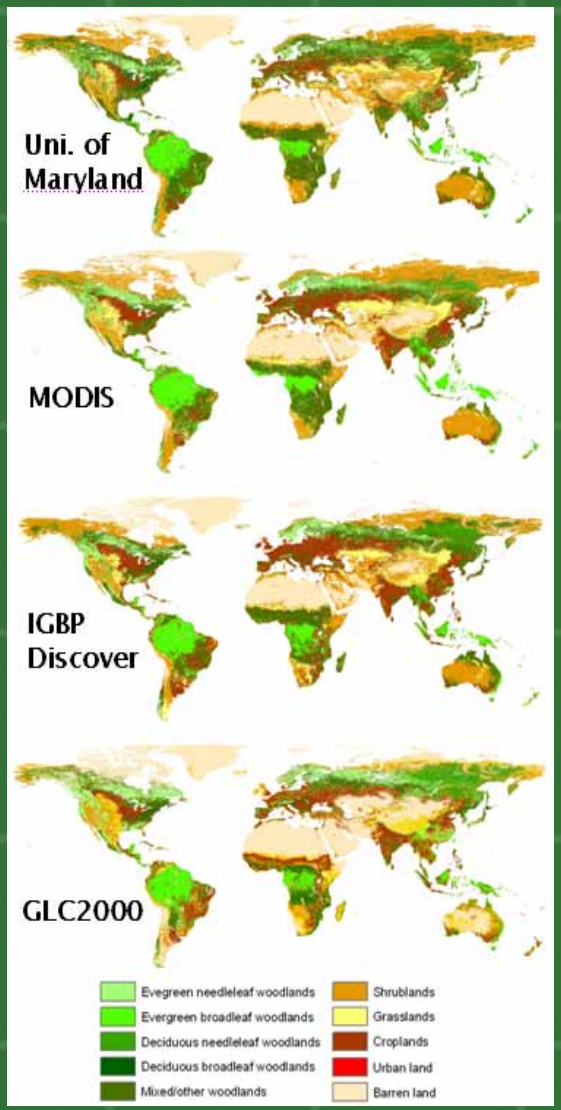
Integrated land cover observations

Completed and endorsed by IGOS partnership and GEO in 2007



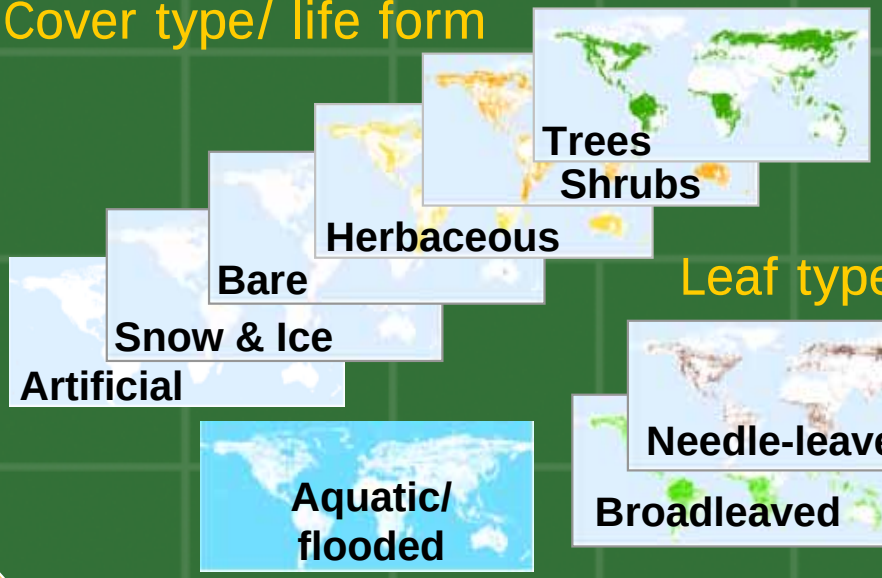
Harmonized land cover characterization

Existing global land cover datasets



Common land cover classifiers (LCCS)

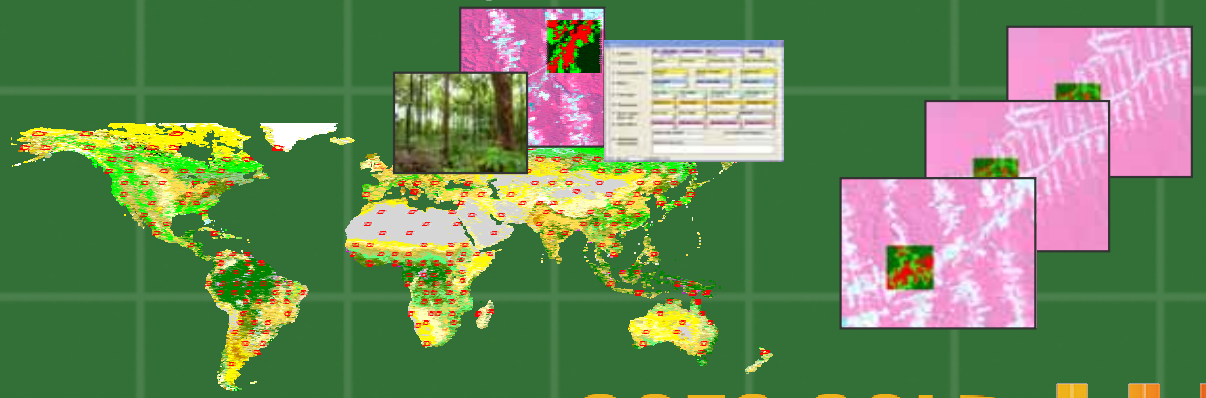
Cover type/ life form



Leaf longevity

Leaf type

"Living" validation database for comparative assessment



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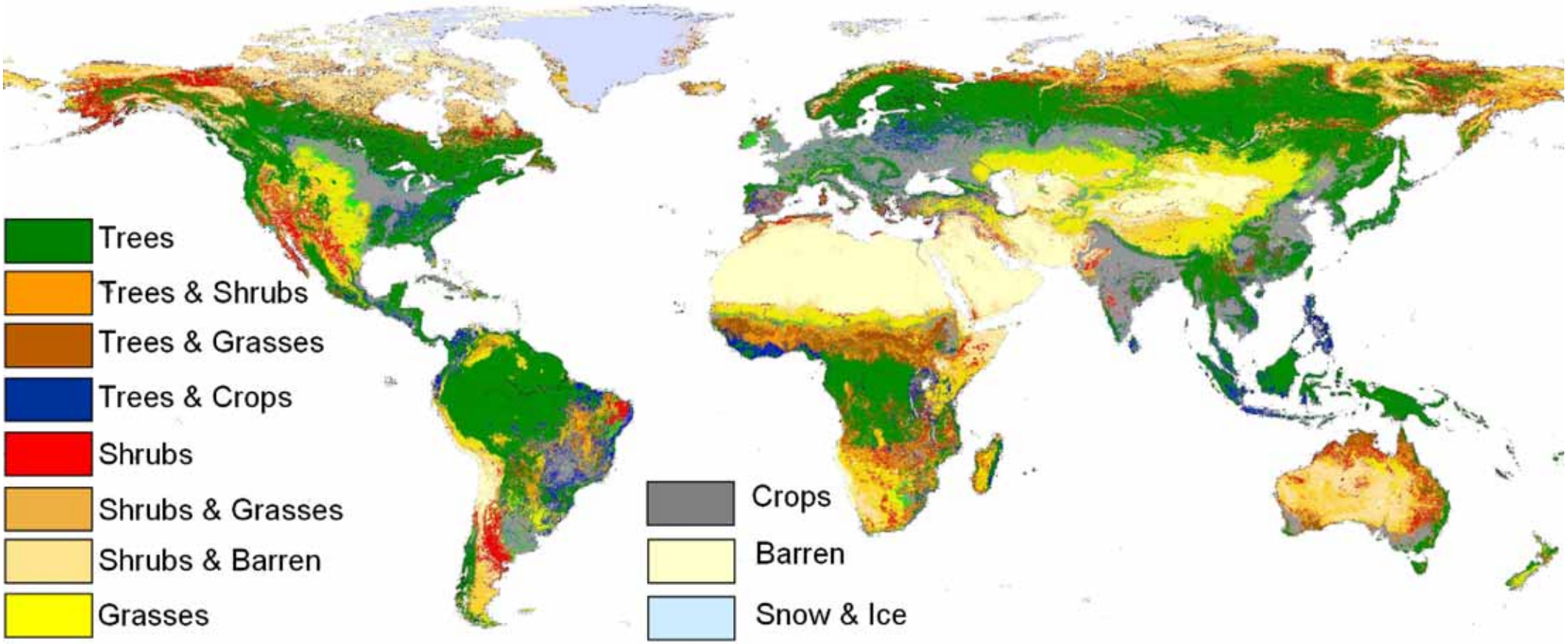
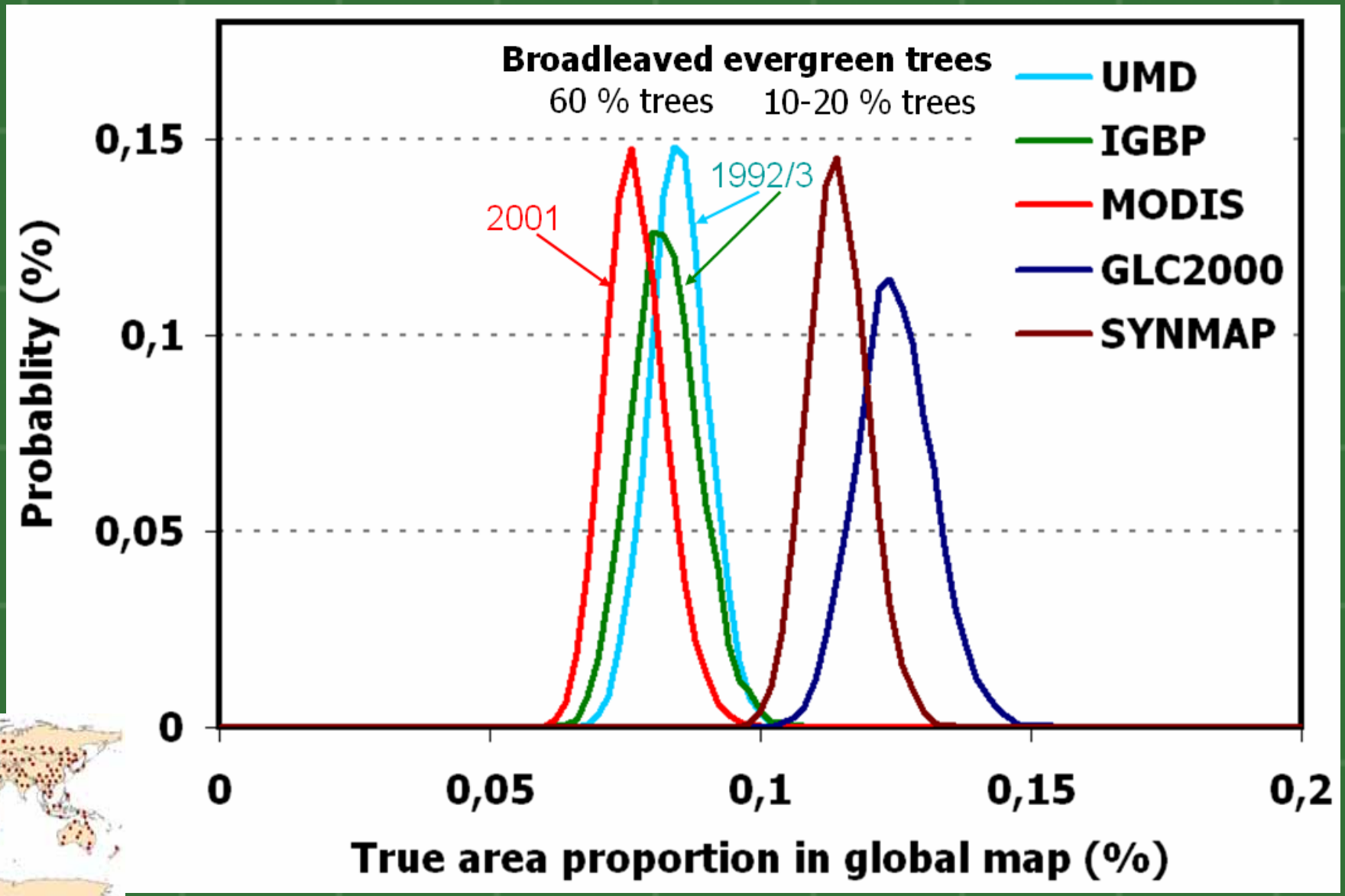
SYNMAP



SYNMAP – a global synthesis product of existing global land cover maps to provide a targeted and improved land cover map for carbon cycle modelling purposes; here shown as life form assemblages (Source: M. Jung et al. 2006, Remote Sensing of Environment).

Improving global estimates



Based on GLC2000 reference database (2000) with 1253 secondary samples world wide interpreted with Landsat data

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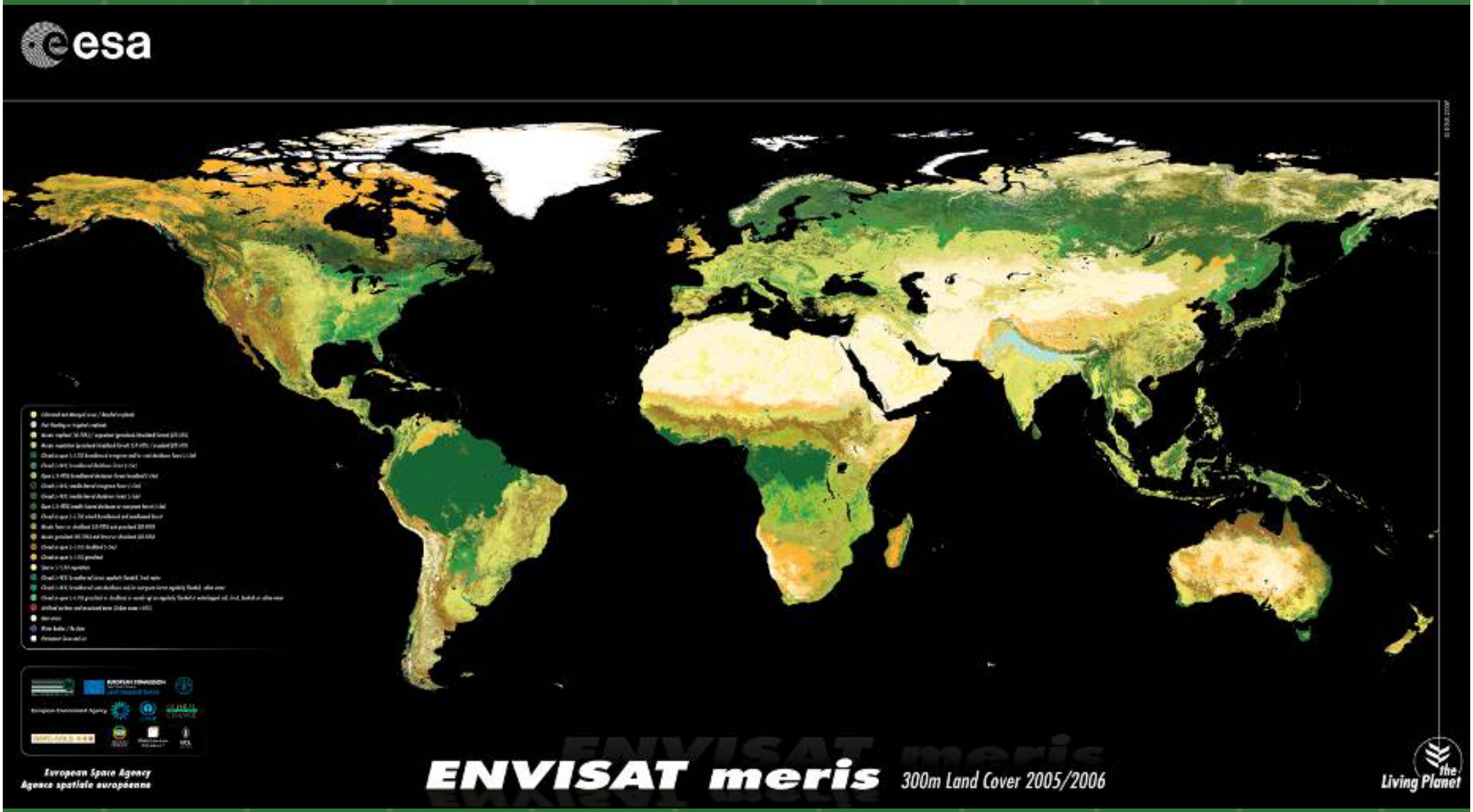
GLOBCOVER (2005/6)



Beta version in review by GEO task team

Dataset release: July 2008

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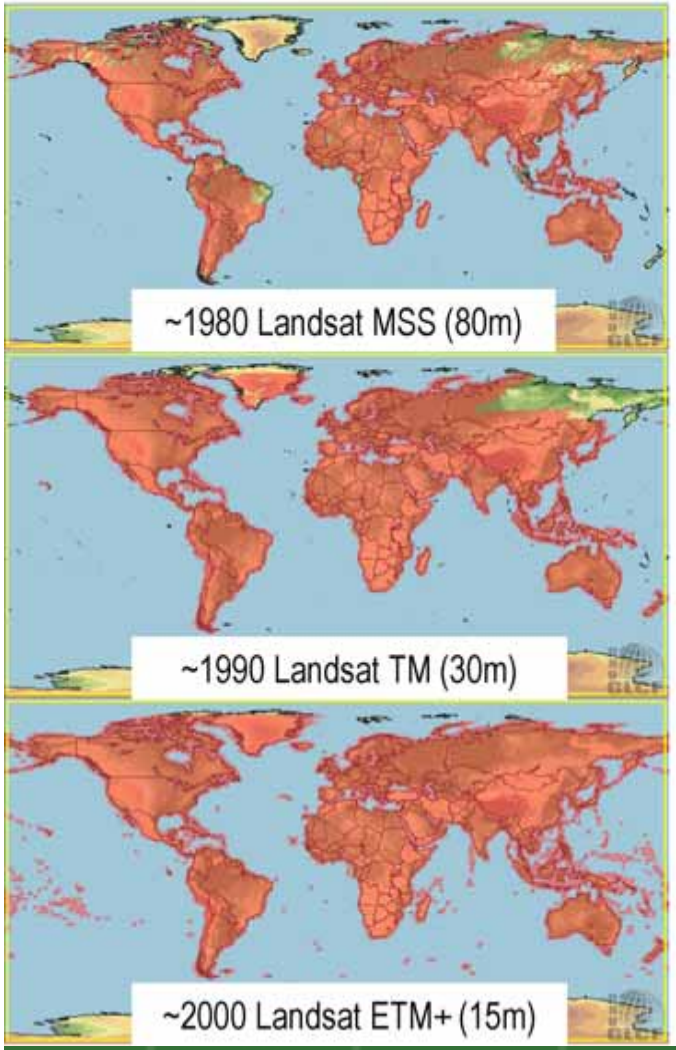
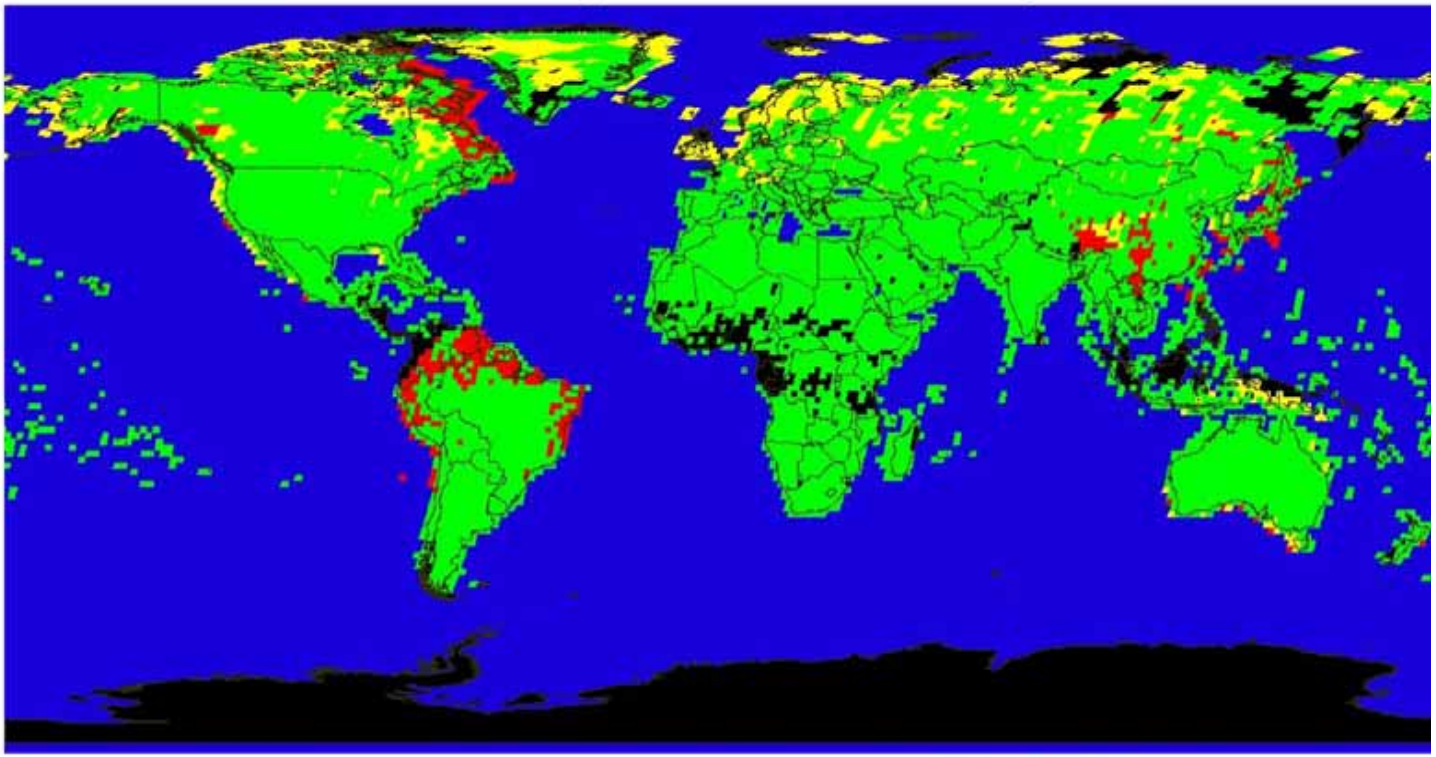
Fine-scale land cover change

- Synthesizing experiences:
  - National/Regional monitoring programs:
    - US, EU, Australia, New Zealand, S. Africa, Canada …
  - Global technical community (guidance, networks)
  - Ongoing programs and initiatives
    - UNFCCC (Kyoto rep./REDD), FAO-FRA 2010
- Formulate specifications based on international agreement (GEO members)
- Importance of baseline observations to implement production

Historical global Landsat data



Mid-decadal global Landsat survey 2005



Blue: Water
Green: Landsat ETM Base image < 5/10% cloud cover
Yellow: Landsat TM archived data < 10 % cloud cover
Red: Landsat TM archived data unknown cloud cover
Black: No suitable Landsat imagery, Fill with alternate
Http://mdgls.umd.edu

USGS NASA

Availability of historical Landsat data as key source of fine-scale global land cover change observations (left, areas covered shown in red). NASA and USGS are currently compiling the next global mosaic for 2005 known as the mid-decadal global Landsat survey – a truly global effort integrating different satellite images from different Landsat sources and other sensors where needed (Source: NASA).

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Development of a 2010 Global Land Survey dataset

- GEO Task DA-07-02 (Global Land Cover) includes the following requirement:
  - *Collect and make openly available high resolution image data for the following time periods: 1990, 1995, 2000, 2004-06, 2009-2011*
- *Proposal: the CEOS Land Surface Imaging (LSI) Constellation (DA-07-03) coordinate the efforts of member nations to collect, process and make openly available a global dataset imagery from a variety of earth observation missions for the 2009-2011 time period*
- *Proposal presented at CEOS meeting in Sanya*

Recent activities & documentation


Global land cover observations

Martin Herold, Global Observation of Forest and Land Cover Dynamics (GOFC-GOLD)

Ministerial summit contributions in the book "The Full Picture", as early success story and poster.

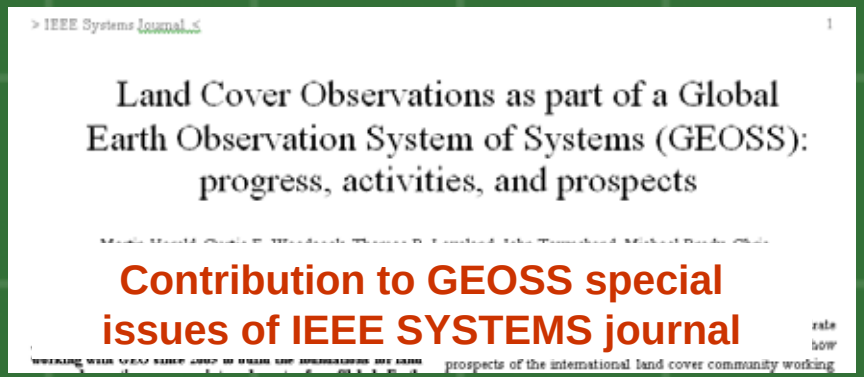

GOFC-GOLD LAND COVER AND CHANGE

REPORT FROM THE GOFC-GOLD SYMPOSIUM ON FOREST AND LAND COVER OBSERVATIONS


GOFC-GOLD esa

Land Cover Implementation Team Project Office

Website and newsletter:
www.gofc-gold.uni-jena.de


IEEE Systems Journal

Land Cover Observations as part of a Global Earth Observation System of Systems (GEOSS): progress, activities, and prospects

Contribution to GEOSS special issues of IEEE SYSTEMS journal

1. Apr 07: Workshop of DA-07-02 working group adjacent to NASA LCLUC science team meeting
2. Jul 07: "Global land cover" accepted as GEO early success story
3. Sep 07: Contribution to GEO publication "The full picture"
4. Oct 07: GOFC-GOLD land cover team meeting to discuss GEO global land cover issues
5. Nov 07 Participation in GEO ministerial summit
6. 13-17 Oct 08: GOFC-GOLD land cover symposium Jena

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GEO Community of Practice for Forest Observations US-06-02

Societal Benefit Area: Agriculture (incl. forests and rangelands)

Second GEOSS Asia-Pacific Symposium,
Session on Mapping Forest and Tracking Carbon
14-16 April 2008, Tokyo

Göran Boberg and Hakan Olsson, Sweden
Erkki Tomppo, Finland
Michael Brady, Canada
Martin Herold and Christiane Schmullius, GOFC-GOLD

Justification

- Combining remote and in situ / NFI type observations is under utilised
  - *Essential for accounting and tracking of forest carbon (nationally and globally)*
- Engage user communities and networks not yet involved in GEO and earth observation
- Lack of co-ordinated long term observation plans
- Earth observation challenges:
  - *varying user requirements*
  - *observation continuity (satellite, in situ)*
  - *move from research to operations*
  - *harmonization of forest information*
  - *data access issues (regional/national data sets, in situ)*
  - *capacity building and outreach*

Objectives

1. Create a community of practice with broad representation of producers and users of forest data and information
2. Advise the User Interface Committee, other CoPs and GEO on matters relating to forest observations and related societal benefits, and on cross-cutting issues of interest
3. Provide GEO with information about organisations and networks that could help carry out forest observation related GEO tasks
4. Identify, gather, and seek agreement on user community requirements for forest observations, their present status and gaps to be filled
5. Support the forest observation community with information about activities and plans in the GEO process

Forest Observation User Communities

Membership determined by range of uses for forest observations and information

(1) Global Change Science

(2) Timber, Fuel and Fiber

(3) Watershed Protection

(4) Biodiversity and Conservation

(5) FCCC and other Environmental Agreements

(6) Recreation and Tourism

(7) Sustainable Forest Management

(8) Forest Perturbations and Protection (fire, insects, disease)

Work to Date

Define initial focus of FCoP:

integrating in-situ and space based forest observations
Involvement in planning process for upcoming global forest assessment (FRA 2010)

Identify and contact key forest organizations for involvement:

- *UN Org, FAO Forestry Program, Forest Resource Assessment, UNFCCC, CBD*
- *Regional processes, MCPFE, Montreal process*
- *National Forest Inventories, ENFIN, NAFC, COST E43*
- *Regional (EC/ESA GMES, i.e. GSE forest monitoring)*
- *NGOs*

Work to Date

Identify direct requirements for forest observations in GEO 2007/09 work plan tasks by eight communities of users:

- *24 tasks identified with need for forest observations*
- *Tasks in all SBAs*
- *Tasks linked to all user communities:*
  - *Global Change Science – 10 tasks*
  - *Timber, Fuel and Fiber – 4 tasks*
  - *Watershed Protection - 2 tasks*
  - *Biodiversity and Conservation - 8 tasks*
  - *FCCC and other Environmental Agreements - 5 tasks*
  - *Recreation and Tourism - 1 task*
  - *Sustainable Forest Management - 3 tasks*
  - *Forest Perturbations and Protection (fire, insects, disease) - 10 tasks*

Direct requirements for forest observations in GEO work plan tasks by 8 communities of users

			Predominant forest observation (R-remotely sensed, I-in situ measurement, M-mixed remote and in situ)							
Area	Task #	Task Short Title	Global Change Science	Timber, Fuel and Fiber	Watershed Protection	Biodiversity and Conservation	FCCC and other Environmental Agreements	Recreation and Tourism	Sustainable Forest Management	Forest Perturbations and Protection (fire, insects, disease)
Agriculture	AG-06-02	Data Utilization in Aquaculture			R					
Agriculture	AG-06-04	Forest Mapping and Change Monitoring	R	M	R	M	R	M	M	M
Agriculture	AG-06-07	Training Modules for Agriculture		M	R				M	R
Agriculture	AG-07-01	Improving Measurements of Biomass		M	R					
Agriculture	AG-07-02	Agricultural Risk Management		M						
Agriculture	AG-07-03	Operational Agricultural Monitoring System		M						M
Biodiversity	BI-06-02	Biodiversity Requirements in Earth Observation				M	M			
Biodiversity	BI-06-03	Capturing Historical Biodiversity Data				M				
Biodiversity	BI-07-01	Biodiversity Observation and Monitoring Network				M				
Biodiversity	BI-07-02	Invasive Species Monitoring System				M			R	M
Climate	CL-06-02	Key Climate Data from Satellite Systems	R				R			M
Climate	CL-06-03	Key Terrestrial Observations for Climate	R				R			
Climate	CL-06-05	GEOSS IPY Contribution	R			M				M
Climate	CL-07-01	Seamless Weather and Climate Prediction System	R							
Data Management	DA-06-04	Data, Metadata and Products Harmonisation	R				R			R
Data Management	DA-07-02	Global Land Cover	M							M
Data Management	DA-07-03	Virtual Constellations	M	R		R	R			R
Disasters	DI-06-03	Integration of InSAR Technology								R
Disasters	DI-07-01	Risk Management for Floods			R					R
Ecosystems	EC-06-01	Integrated Global Carbon Observation (IGCO)	M							
Ecosystems	EC-06-02	Ecosystem Classification				M				
Ecosystems	EC-07-01	Global Ecosystem Observation and Monitoring Network	M			M				
Health	HE-06-03	Forecast Health Hazards		M						M
Water	WA-06-02	Forecast Models for Drought and Water Resource Management	R	R						R

UIC Process

- During the August 2007 meeting of the UIC a 2-year process was agreed to identify user priorities and gaps in EO.
- The process is to identify critical Earth observation priorities common to many GEOSS SBAs:
  - involving scientific and technical experts,
  - taking account of socio-economic factors, and
  - building on the results of existing systems' requirements development processes.
- Forest CoP is leading the Initiation of an Advisory Group for the Agriculture and Forestry SBA (AAG)

9-Step UIC Process

1. For each of the nine GEO SBAs, UIC Members identify Advisory Groups & Analysts who identify/develop the following
2. Scope of topics for the current priority-setting activity
3. Existing documents on observation priorities
4. Analytic methods and priority-setting criteria
5. Priority observational needs from documents & interviews
6. Combine the information & develop a preliminary priorities report
7. Gather feedback on the preliminary report
8. Perform any additional analysis
9. Complete the report on Earth observation priorities

Current Activities

- Canadian Forest Service, as a contribution to the FCoP has provided an analyst for an initial period of 4 months (January to April 2008) to help initiate and then work with the AAG.
- Initiation of the AAG: The AAG analyst and the FCoP are recruiting members for the AAG.
- Workshop with users: The FCoP and GEO Secretariat are seeking opportunities to hold a workshop to further the UIC Process. It would be ideal to hold the workshop with a GEO regional body such as GEOSS in the Americas, or GEO in Asia Pacific.

Priority observational needs from documents & interviews: Examples

- GOFC-GOLD Strategy Document, 2005
- IGOL Report, 2007
- GEO Agricultural Monitoring Report, 2007
- UNFCCC requirements (reporting guidelines and standards)
- FRA 2010 Global Survey Document, 2008
- GEOSS Reference Document, 2006
- Land Cover User Assessment Project Report, Canada, 2008
- Globcover User Needs Report, 2008
- GSE Forest monitoring user assessment
- …

Developing a Strategy for Global Agricultural Monitoring in the Framework of Group on Earth Observations (GEO) Workshop Report

GROUP ON EARTH OBSERVATIONS

16-18 July 2007, FAO, Rome

IGOL

Next Steps

- Continue with UIC Process
- Expand participation in Forest CoP
- Address task activities in new 2009-2011 GEO Workplan
- Present preliminary results at UIC meeting at Toronto in May 2008

Questions?

Point of contact:

Michael Brady, Canadian Forest Service
(mbrady@nrcan.gc.ca)

What is GEO going to do?

GEOSS will build on and add value to existing Earth-observation systems by coordinating their efforts, addressing critical gaps, supporting their interoperability, sharing information, reaching a common understanding of user requirements, and improving delivery of information to users.

A role for GEO - general

- Link earth observations and areas of societal benefits
- Awareness for terrestrial monitoring (one loud voice)
- May (or perhaps should) change the way we do Earth Observation:
- GEO is not (really) a funding mechanism
- Built upon existing activities with emphasizing were GEO can make a direct contribution

A role for GEO – land cover examples

- Engage user communities previously not or less involved in Earth Observation:
  - Communities of Practice (Forest observations)
- Addressing critical gaps needing facilitation:
  - Decadal Landsat-type survey (DA-07-03, DA-07-02)
  - GEO will not reduce observation costs but benefits
- Develop international consensus for implementation
  - Specifications for fine-scale land cover change (DA-07-02)
- Linking global monitoring activities and national level implementation:
  - FAO-FRA 2010 RS survey (AG-06-04)
  - Technical guidance for UNFCCC (i.e. DA-07-02)
  - Related capacity building activities
- Data integration: in-situ and forest observations
  - AG-06-04 and Forest CoP

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