GOFC-GOLD

Global Observation of Forest and Land Cover Dynamics

The Land and Vegetation Direct Readout Workshop - was formulated under the GOFC-GOLD Program

Chris Justice
Land and Vegetation Direct Readout Workshop
Mexico City, Oct 10-11 2007

GTOS

What is GOFC-GOLD?

- GOFC-GOLD is a coordinated international effort to ensure a continuous program of space-based and on-the-ground forest and land cover observations for global monitoring of terrestrial resources and the study of global change.
- A network of participants implementing coordinated research, demonstration and operational projects
- A vision to share data, information and knowledge, leading to informed action and decision support
- A long term process of building an improved match between Observations, Data Products and User Needs

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Functions of GOFC-GOLD

1999 Strategy revisited in 2005 to ensure the global systematic collection of observations of land cover and fire

1. Specifying requirements for products
2. Assessing algorithms and data assimilation procedures
3. Ensuring the availability of observations
4. Harmonization and the development of protocols and standards
5. Ensuring that operational products meet accuracy requirements
6. Capacity building through the role of regional networks
7. Creating GOFC-GOLD products and services
8. Providing information to support international assessments
9. Advocacy role, especially in relation to the continuity of observations and validation

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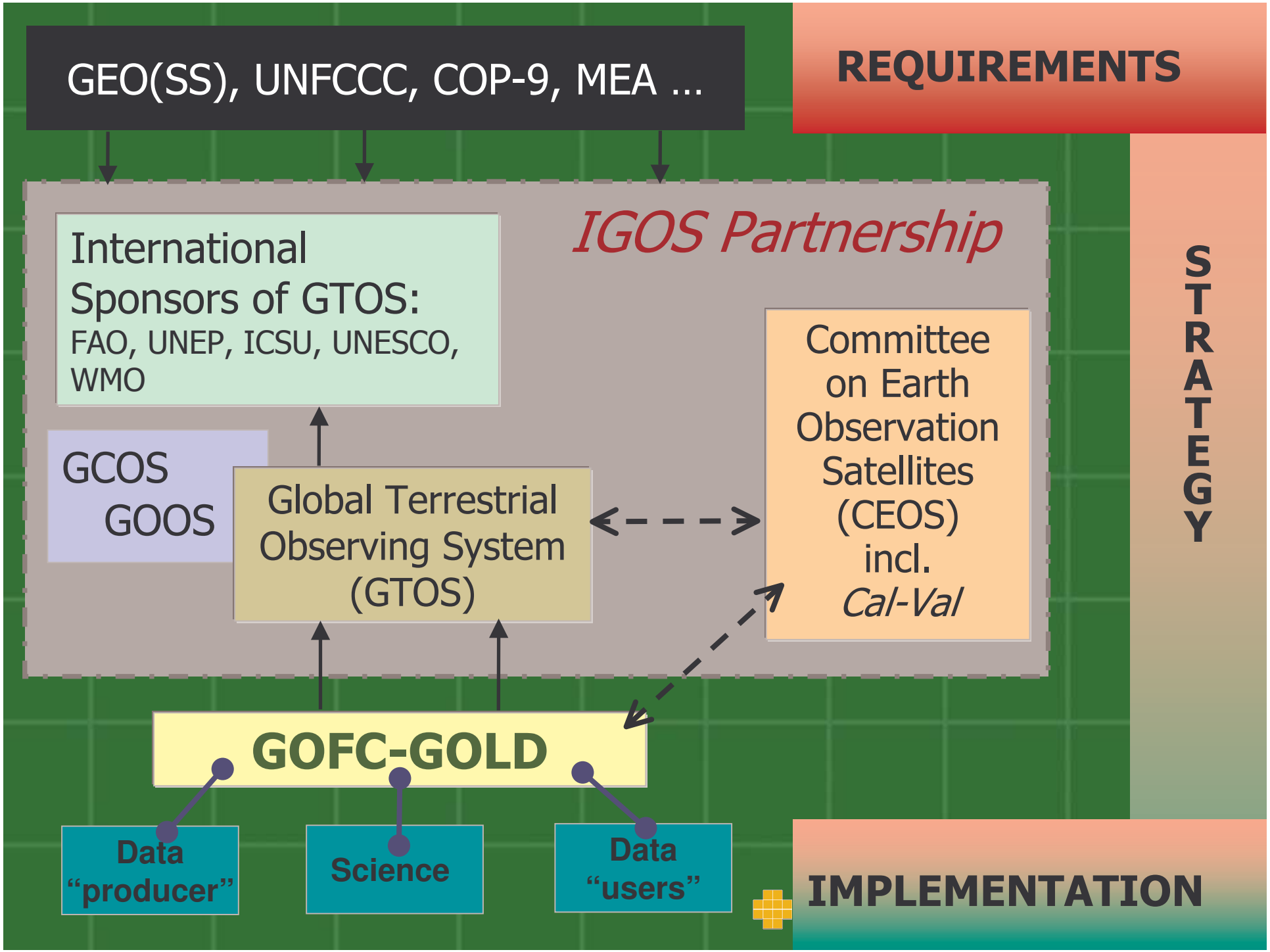
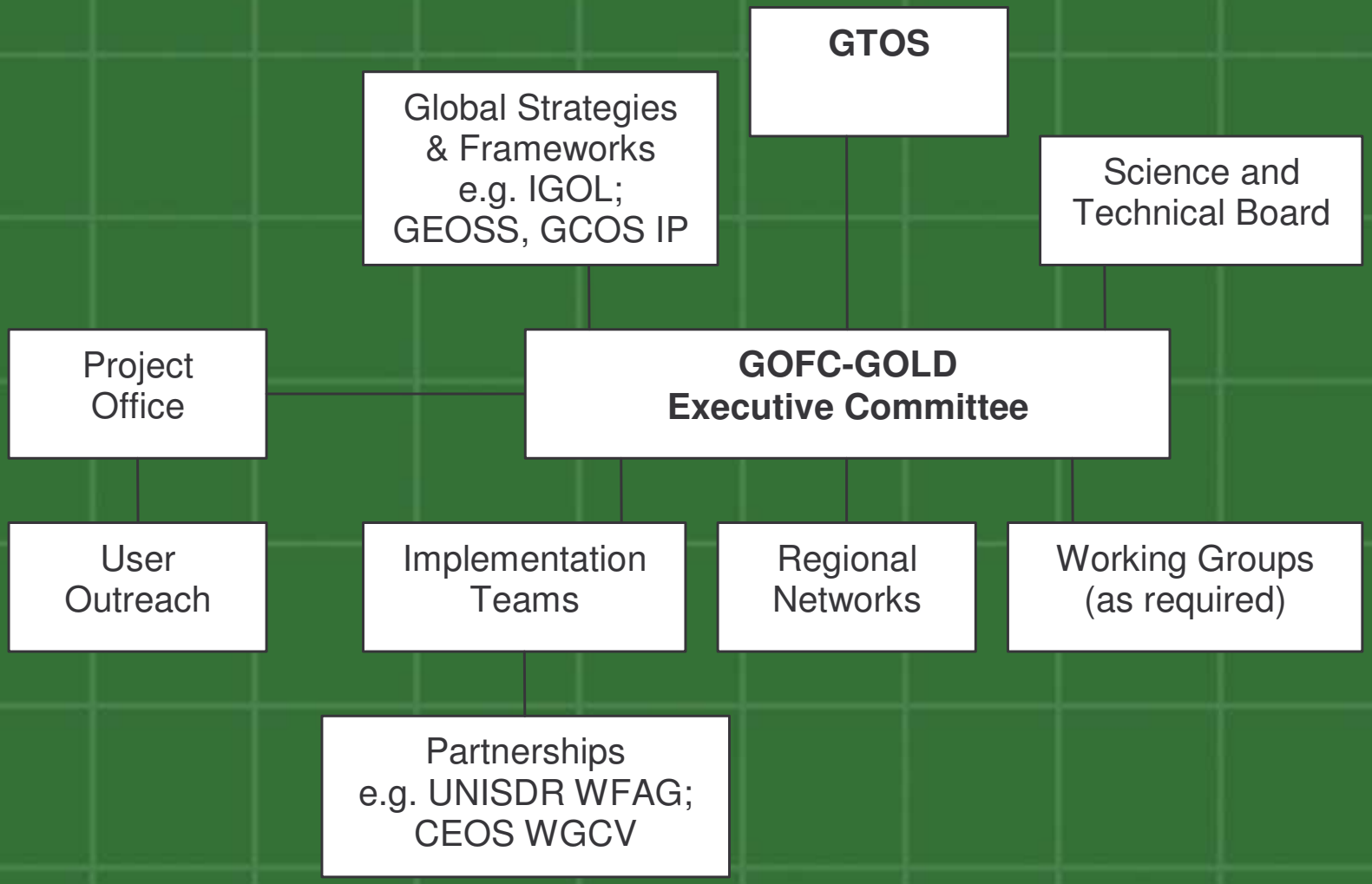
GOFC-GOLD Origins

- One of first IGOS prototype activities
- Strategy and Implementation Plans established in the late 1990s
- Became Panel of GTOS
- Decided to extend beyond forests to all land cover
- Hence Global Observations of Landcover Dynamics


GEO(SS), UNFCCC, COP-9, MEA ...
REQUIREMENTS
IGOS Partnership
International Sponsors of GTOS:
FAO, UNEP, ICSU, UNESCO, WMO
GCOS
GOOS
Global Terrestrial Observing System (GTOS)
Committee on Earth Observation Satellites (CEOS) incl. Cal-Val
STRATEGY
GOFC-GOLD
Data "producer"
Science
Data "users"
IMPLEMENTATION

GOFC-GOLD Structure



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Regional Networks needs

- Training and capacity building
- Standardization of monitoring mechanisms and systems used in the region
- Improved access to EO data
- Improved dissemination of data to national and sub national levels
- Improve product validation based on standardized protocols
- Improved internet access and capacity
- Better understanding of other EO projects in the region.
- Stronger programme and scientific coordination with implementation teams.
- Adequate funding for administration and programmes

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Background Regional Networks

1. ***Miombo network:*** founded in 1995 under the auspices of the IGBP, LUCC and START. More than 40 scientists and natural resources managers involved. Focus on land cover activities
2. ***SAFNet:*** initiated in 2000 during a GOFC-GOLD regional network meeting. More than 60 members from 12 southern African countries. Activities on fire.
3. ***SEARRIN:*** initiated during the Manila workshop in 2000. Activities have involved more than 60 scientists and natural resources managers. Has both fire and land cover.
4. ***NERIN:*** initiated at the GOFC-GOLD Boreal Forest workshop in Novosibirsk, Russia in 2000. Has over 50 scientists and natural resources managers involved. Activities in both fire and land cover.
5. ***REDLATIF:*** in Latin America based around regional interest in land cover and fire
6. ***West Africa:*** initial network discussions focused on land cover, now discussing joint collaboration with fire (initial workshop 2005).
7. ***OSFAC (Central Africa):*** initiated at the GOFC-GOLD regional workshop in 2000. Linked to the GIS/RS lab at the University of Kinshasa. Focused on land cover with some work on fire.
8. ***East Asia:*** focus on both land cover and fire, (initial workshop in 2005, with follow up meeting in Mongolia in June 2006).

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Land Cover Characteristics and Change

The Land Cover Characteristics and Change theme promotes the use and refinement of land cover data and information products for resource managers, policy makers, and scientists studying the global carbon cycle and biodiversity loss.

GOFC-GOLD has proposed a program of coarse resolution earth observations, fine-scale land cover mapping, and integration with in-situ observations on global scales.

The Land Cover theme is carried out by an implementation team that works with the GOFC-GOLD regional networks to secure acquisition of quality land cover data and interacts with users and regional experts for the development and implementation of mapping standards, data assimilation, and product dissemination.

http://www.gofc-gold.uni-jena.de

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Fire Mapping and Monitoring

The Fire Mapping and Monitoring theme focuses on refining international requirements for fire-related observations and making the best possible use of fire products from existing and future satellite observing systems to support fire management, policy decision-making, and global change research.

Key goals are to ensure enhanced operational fire monitoring from space and ground measurements, better access and use of data, and standard products of known accuracy.

The Fire theme is carried out by an implementation team that works with the GOFC-GOLD regional networks to bring together fire data providers and users to exchange information on capabilities and needs and to promote strengthening of regional and national fire activities.

http://gofc-fire.umd.edu

GOFC-GOLD-Fire Goals

- **Increase user awareness and data use**
  - develop an increased understanding of the utility of satellite fire products and their use for global change research, resource management and policy (UN, Regional, National, Local)
- **Establish a geostationary global fire network**
  - providing operational high temporal resolution standard fire products of known accuracy
- **Secure *operational* polar orbiters with adequate fire monitoring capability**
  - providing operational moderate resolution long-term global fire products to meet user requirements and serving a network of distributed ground stations
  - providing operational high resolution acquisition allowing active fire, burned area, fire characterization and post-fire assessments
  - improving access to near real-time polar orbiting active fire data and information
  - providing improved fire products (fuel moisture content/active fire/burned area/ fire characterization) in a timely fashion
- **Determine product accuracies**
  - operational network of fire validation sites and protocols established providing accuracy assessment for operational products and a test bed for new or enhanced products – leading to standard products of known accuracy

GOFC-GOLD-Fire Goals (Cont'd)

- Develop a set of global fire danger / early warning products
  - combining meteorological data, remote sensing, and ground based information
  - timely web based access
- Develop fire emissions product suites
  - providing annual global and regional emission estimates of known accuracy with the associated input data
- Develop consistent Long-Term fire data records
  - combining data from multiple satellite sources to identify trends and monitor changes in fire regimes
- Establish enhanced user products and improved data access
  - operational multi-source fire / GIS products, Web based data access
  - improved national fire reporting, fire characterization
- Promote experimental fire observation systems and related research
  - in new areas focused on meeting current information gaps

New drivers for GOFC-GOLD

- International environmental conventions:
  - UNFCC, UNCCD, CBD, Ramsar, etc.
- GCOS implementation plan:
  - Establish international standards for land-cover characterization
  - Reliable methods for land-cover map accuracy assessment
  - Develop an in situ reference network and apply validation protocols
  - Generate annual products documenting global land-cover characteristics
- FAO Global Forest Resource Assessment 2010
- IGOS-P Land Theme (IGOL)
- GEO & GEOSS work plan tasks:
  - 8 tasks related to land cover, fire and regional networks

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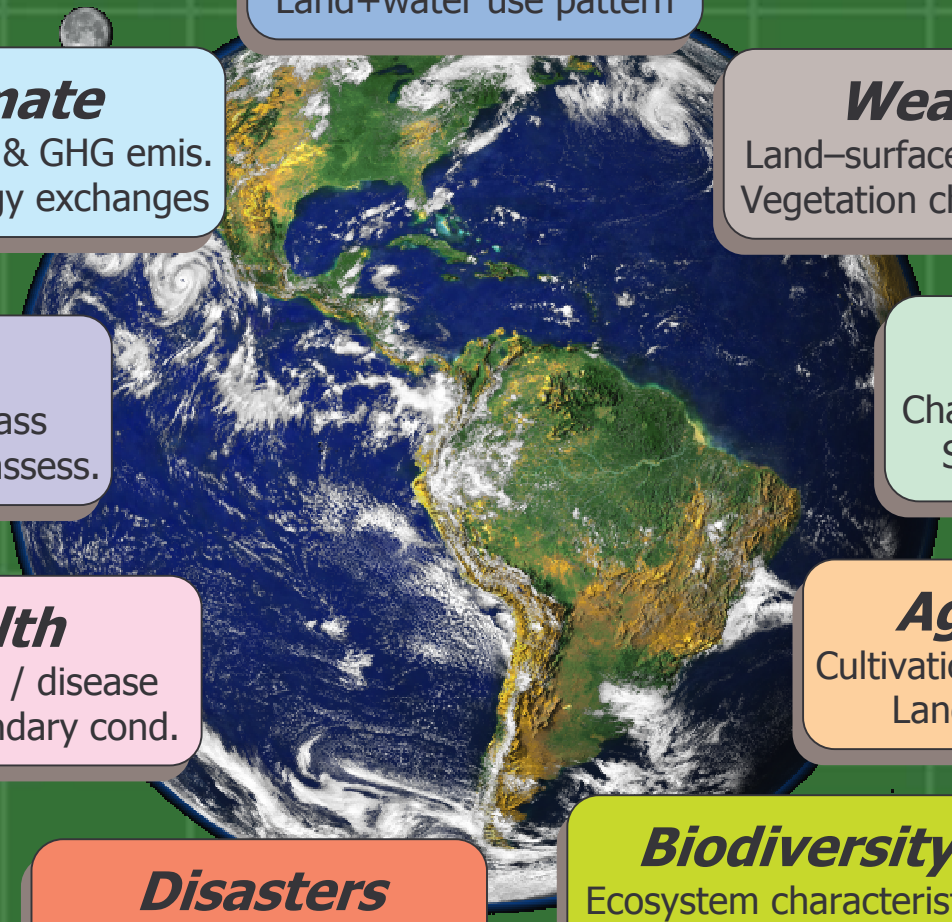
GEO societal benefits and land cover observations



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.

GEO task
DA-07-02

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GOFC-GOLD and Direct Readout

- Little Attention to the DR Community to date

However

- DR stations can play an important role for the regional networks
  - Providing Near Real Time data to the applications community
- Provide a good opportunity for developing multi-source products (data fusion)
- Provide an opportunity for regional validation coordination (are accuracy requirements being met)
  - international protocols (CEOS Land Product Validation WG) will mean that the validation will serve multiple communities

Direct Readout 'Land' Community

- For the Land Community AVHRR and Landsat have had long standing DB capabilities and community interaction (e.g. POES User Workshops, IGBP 1km Project, World Fire Web and LGSWG)
- Stations often have similar land goals and needs
  - rapid generation and distribution of products
- Often little communication between DR stations
  - Sharing code, Sharing experience, Shared development agenda
  - Some apparent duplication of effort
- Only a partial picture exists as to the extent of the DR community and which satellite systems are being used for land applications
- Can the space agencies do more re. the DR land community?
- Can the DR land community better self organize?

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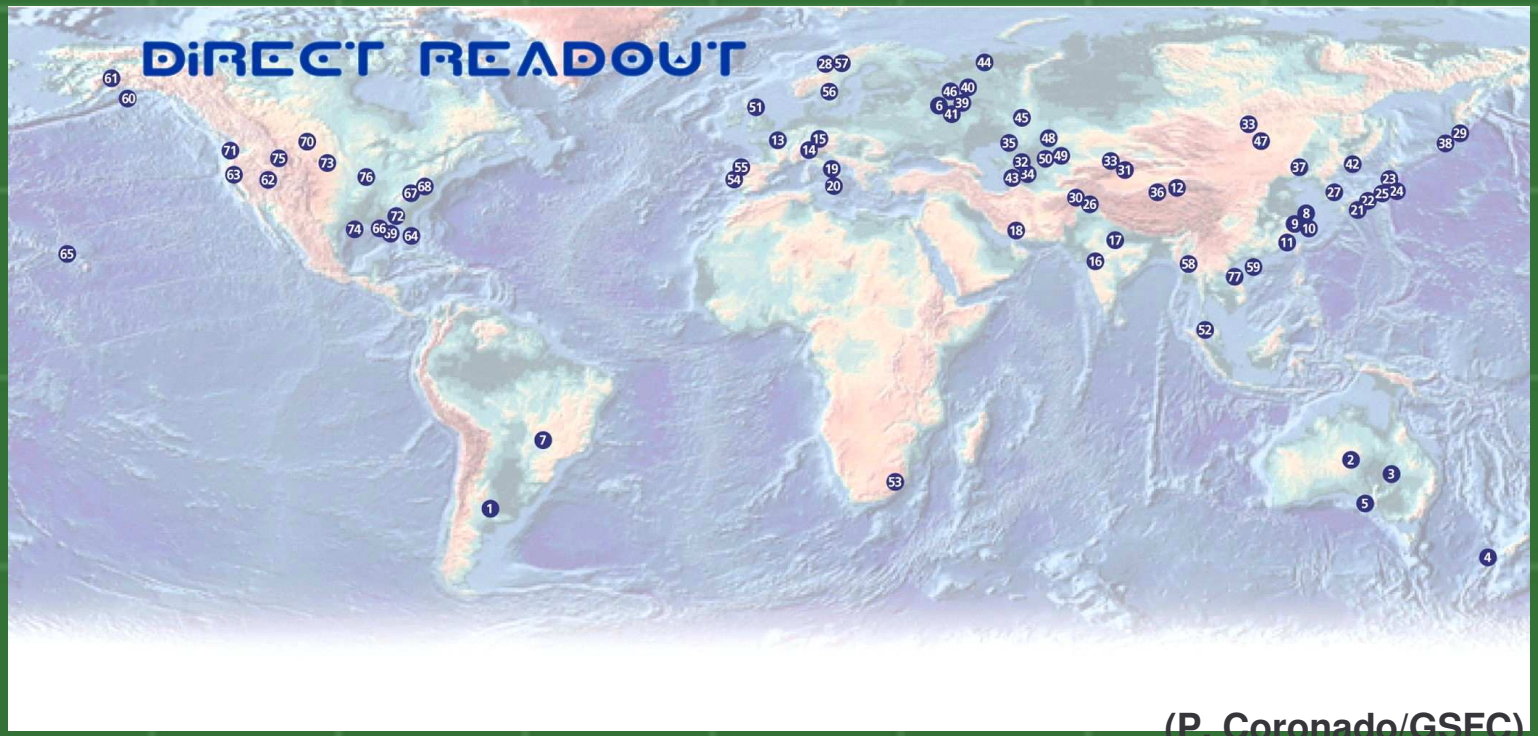
Increasing Number of MODIS Direct Broadcast Sites



(P. Coronado/GSFC)

- 82 plus Direct Readout sites around the world for Terra/Aqua DB downlink
- List is located on the Direct Readout Portal
- Web based MODIS fire servers in Australia, Africa, Brazil, Mexico, Europe, Russia

– recent requests for support from India, Mongolia, Malaysia

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MODLand and DIRECT READOUT

- DB was at best a secondary consideration for NASA EOS MODIS
  - Little focus on land products and land community DB initiatives
  - The land group of the MODIS ST mainly focused on standard products and their validation
- MODIS Algorithm Technical Background Documents and Standard Processing Code made openly available
  - Standard product code - Not suited to DR environment (ECS overhead)
- Initial cooperation with USFS (RSAC) in 2000 led to the use of the MODIS Fire Code in the DB context
- A large number of stations now receiving data from MODIS
  - Generating land products to meet national / local needs
  - Mixed reports on operational status of some of the stations
- Often little communication with the science team
  - Team web sites exist but may not be so useful to the DR community
  - Recent modifications to Land algorithms (Collection 5), instrument status
  - Are there new products and algorithms in the DR community ?
- Pat Coronado (NASA GSFC) supporting the NASA DB functions (MODIS and recently NPP VIIRS) - coordinates the International DR Workshops
  - Access to MODIS Standard product code and DB versions of code for selected products
- Liam Gumley (U. Wisconsin) developing MODIS DB code
  - Initial emphasis on Atmospheric Products

NPOESS Preparatory Project

Visible/Infrared Imager Radiometer Suite (VIIRS)

- VIIRS instrument will extend the MODIS land record (2009/2010)
- Plans in place for the Direct Broadcast capability
- Land Environmental Data Records (EDR's) being developed by NGST
  - Specs Developed by IPO, Operational Code delivered - some changes being made
  - Not designed to meet the science community needs - with known limitations for land science use
- NASA Land Production System (PEATE) established, collocated with the MODIS Land production system – for VIIRS evaluation
- Limited number of VIIRS Land EDR's (low priority for the IPO)
  - VI, Albedo, Fire, Snow cover, LST, Surface Type, (S. Ref IP)
  - Some current MODIS products not EDR's – LAI, BA, GPP
- NASA/NOAA discussing additional data records to meet science data needs (NASA ESDR's / NOAA CDR's)
- Time to start considering the DB community needs for VIIRS land products
  - How can the land DR community contribute to the development of the VIIRS land products for DR use

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Objectives of the Workshop

- Opportunity for the Direct Readout community to come together with a Land Focus
  - To develop improved cooperation
  - To hear about recent developments re. sensors
    - Emphasis in this meeting on MODIS and VIIRS
    - Future meetings could highlight other land sensing systems
- Opportunity to learn more about diverse DR land applications and developments in the DR community
- Opportunity to better understand community needs for VIIRS and explore opportunities for shared development of VIIRS DR Land Products

Anticipated Outcome from the Workshop

- Breakout deliberations addressing
  - Current Land Community needs and near-term plans
  - Areas and opportunities for cooperation and data/code exchange
  - Areas needing additional R and D
  - Plans for Future Systems and
  - Recommendations from the Workshop
- Meeting report
  - To be completed in one month
  - Recommendations to be presented at the next international DR conference in 2008
    - Opportunity for follow up meeting of the land DR community