



GEOSS Progress in Seven Years. Achievements and Challenges

**Jose Achache
Executive Director**

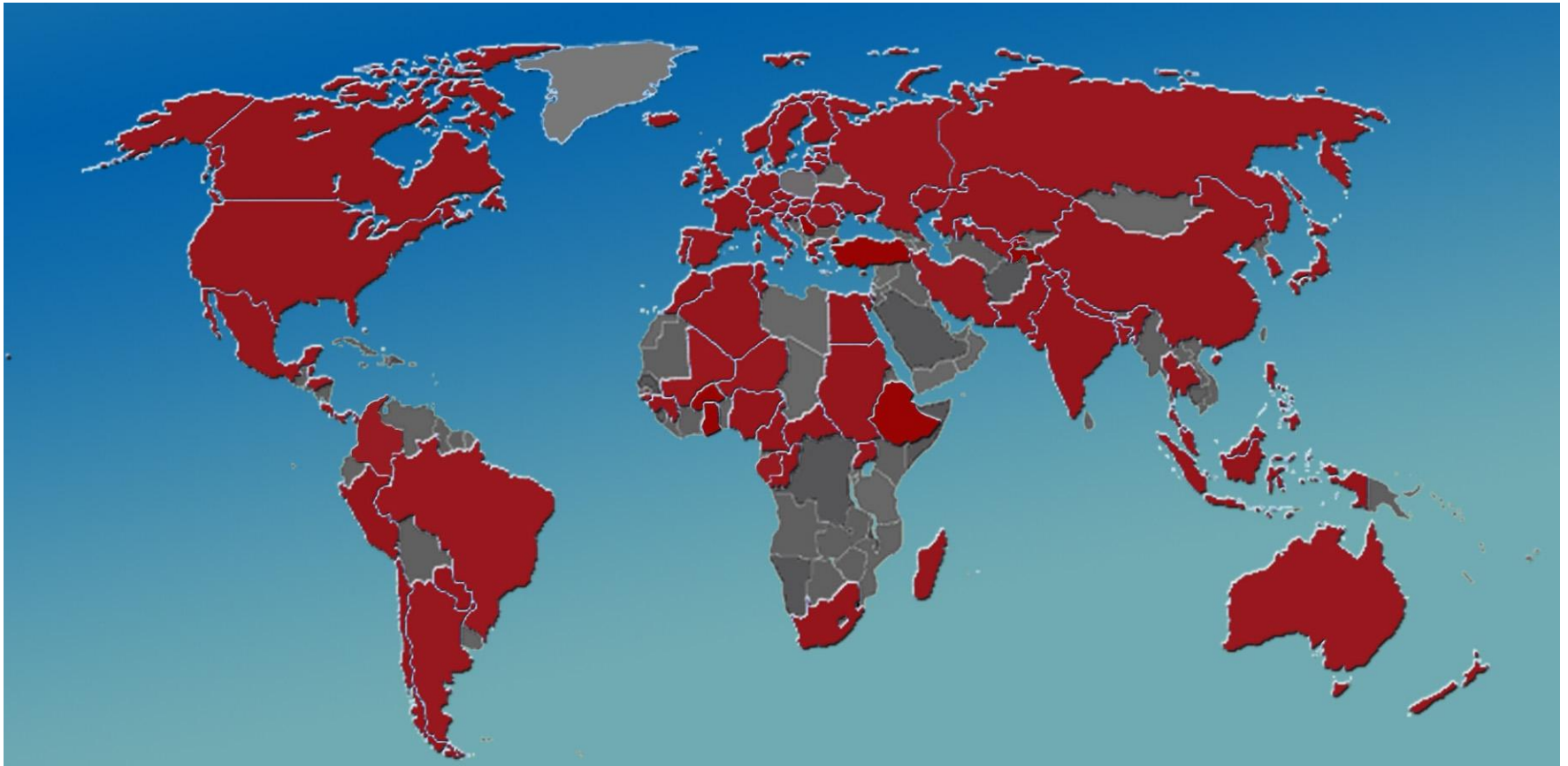
**The 5th Asia-Pacific Symposium
Tokyo, Japan**

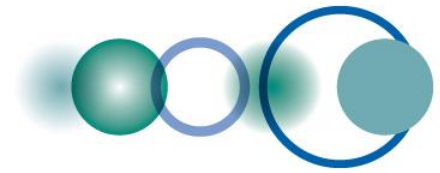




GEO, the Group on Earth Observations

An Intergovernmental Organization now with **89**
Members and **64** Participating Organizations

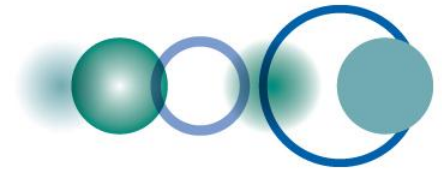




GEOSS has been building-up on 3 Pillars

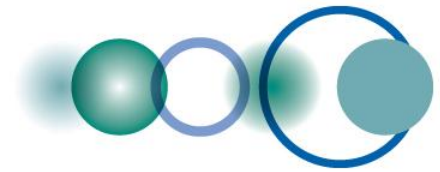
1. Coordinated Data Access
2. Open Data Policy
3. Political Visibility





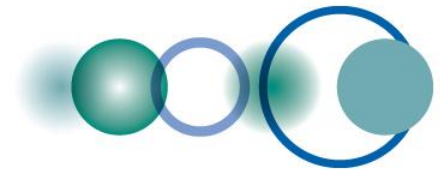
What Have we Achieved Ten Years After Johannesburg?

...to create a world where decisions and actions are informed by coordinated, comprehensive and sustained Earth observations.

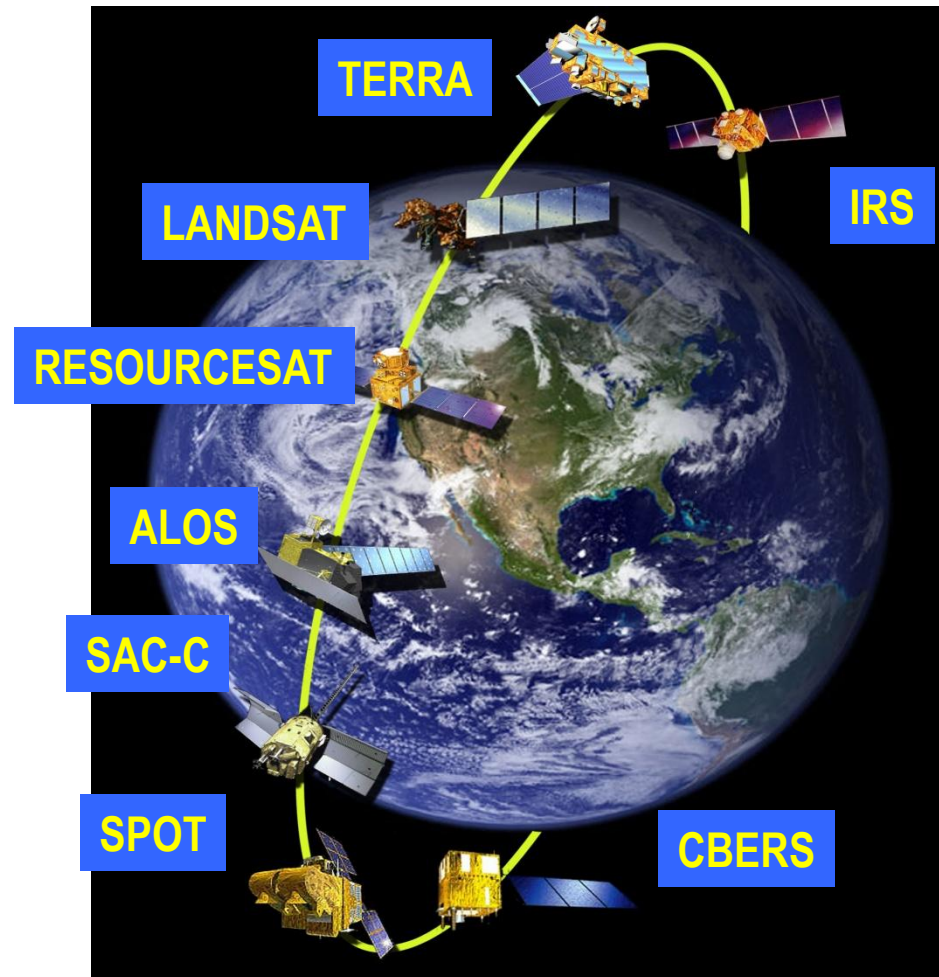


GEOSS Provides Coordinated Access to Information from a Growing Number of Sources





GEOSS has Achieved Coordinated Access to Space Data (with CEOS)





METEOSAT

MSG

MTG

EPS Metop

Post EPS

SMOS

Cryosat-2

ALOS-2

ALOS

OSTM/Jason 2

Jason

Aqua

GCOM-W

ADM-Aeolus

TRMM

SMAP

GCOM-C

Terra

GRACE

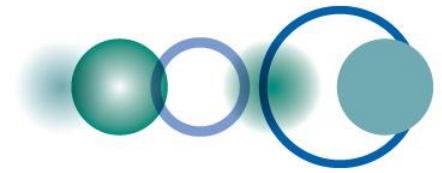
CALIPSO

CloudSat

EarthCARE

GPM

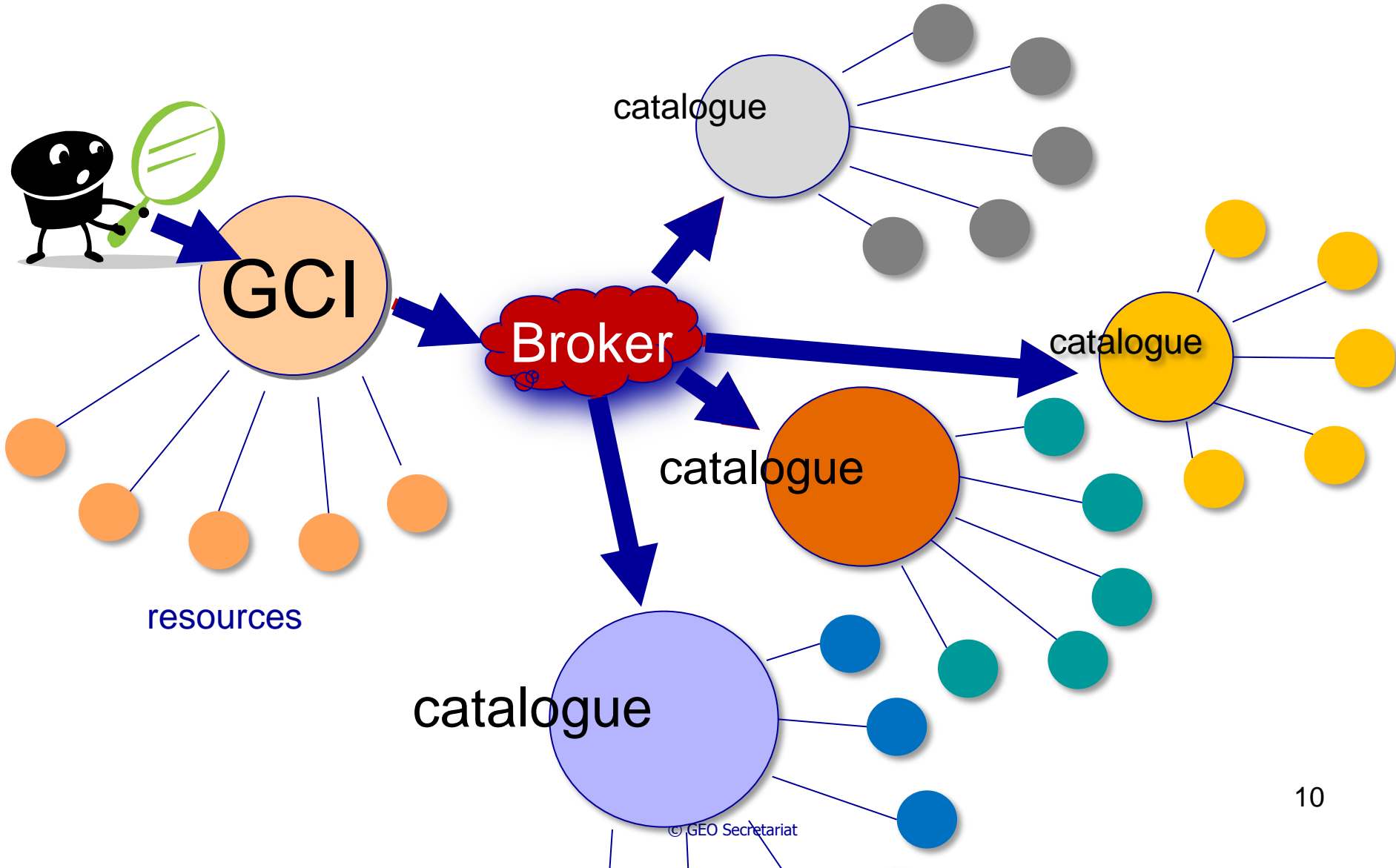
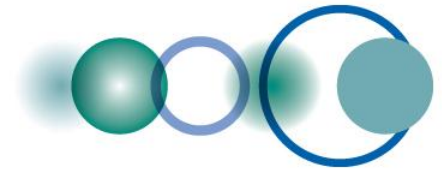
Aura

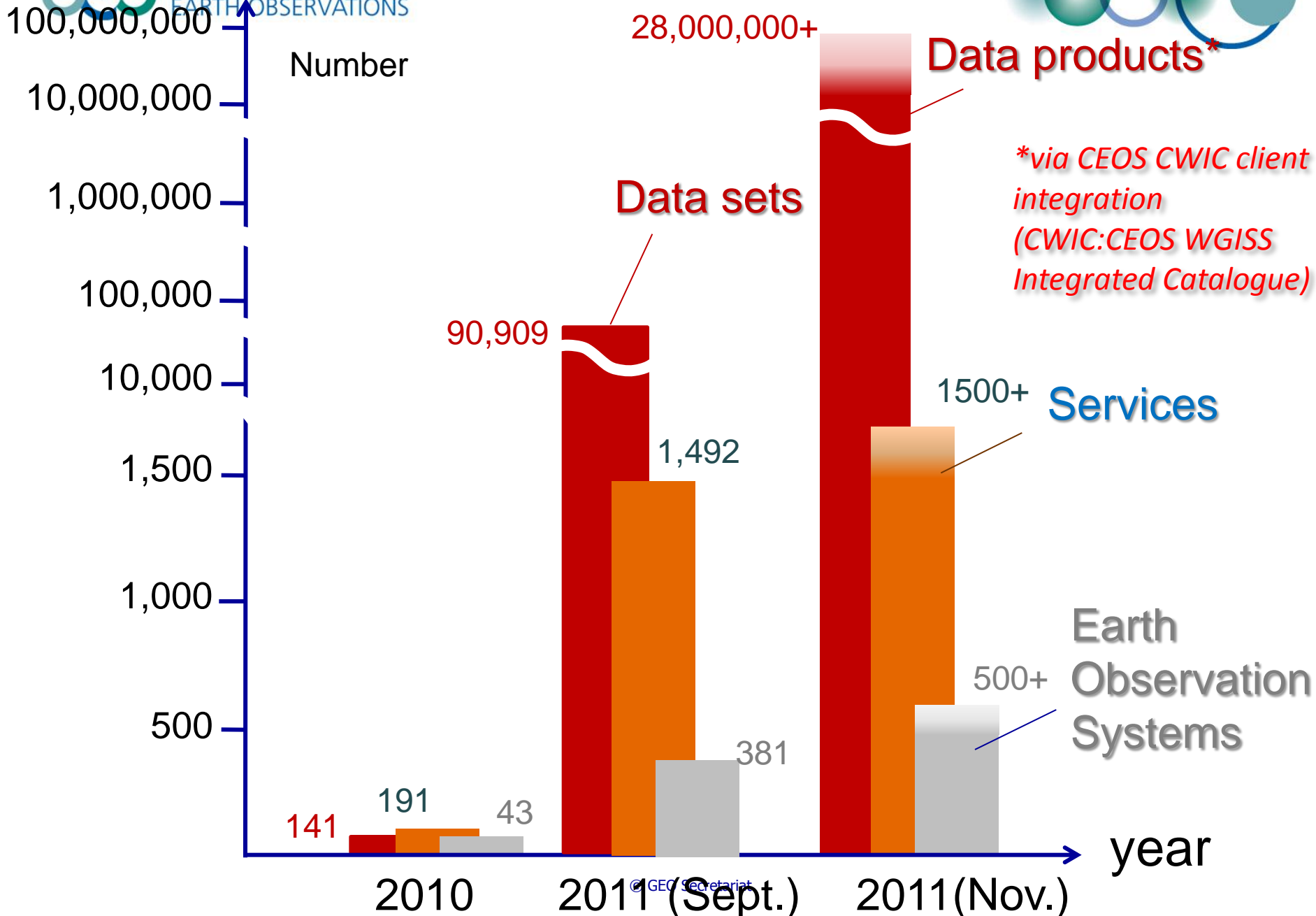


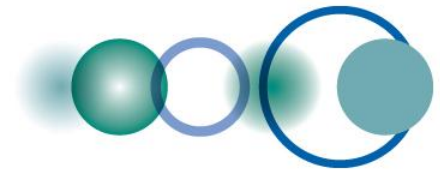
...and Improved Coordination with In-situ Data











GFOI for National Reporting of Reduced Deforestation

Provide observations of suitable consistency, accuracy and continuity, and methodologies to support forest carbon Monitoring, Reporting and Verification (MRV)



Brazil

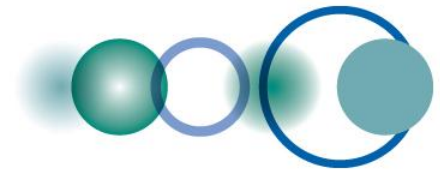
[Brazil](#) [Cameroon](#) [Guyana](#) [Mexico](#) [Tanzania](#) [Tasmania](#)

2009: 55
2009: 1888 (301)
2009: 2475
2009: 561

Opacity percent: 100
Show borders:

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2009 DigitalGlobe
Image © 2009 TerraMetrics

22°18'49.12" S 63°51'01.54" W elev 1703 m Eye alt 8148.48 km



Outcomes of the 3rd FCT Science and Data Summit

- This 3rd SDS meeting was held on 6-10 February 2012 in Arusha, hosted by the Tanzanian MNRT, with support of the NSC and was attended by almost 90 participants, representing institutions from about 25 countries, out of which 15 developing countries, 8 in Africa).
- Several prototype “products”, including forest and forest change mapping and initial carbon assessments, were produced with the support of dedicated Product Development Teams (one per country) that the GEO FCT task has established.
- The preliminary results show quite a different level of progress in the different ND countries, both for what concerns overall readiness for REDD+ implementation and for advancement of FCT activities. The end-to-end process (from observations to carbon assessment) is covered in few countries, while for others intermediate products have been produced.

Brazil



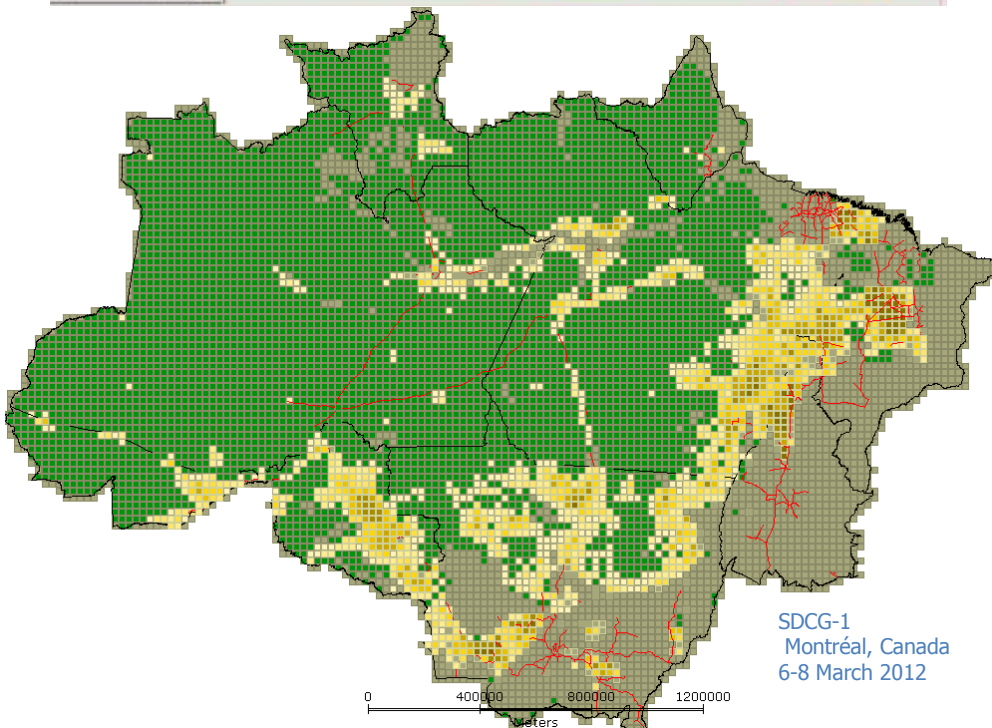
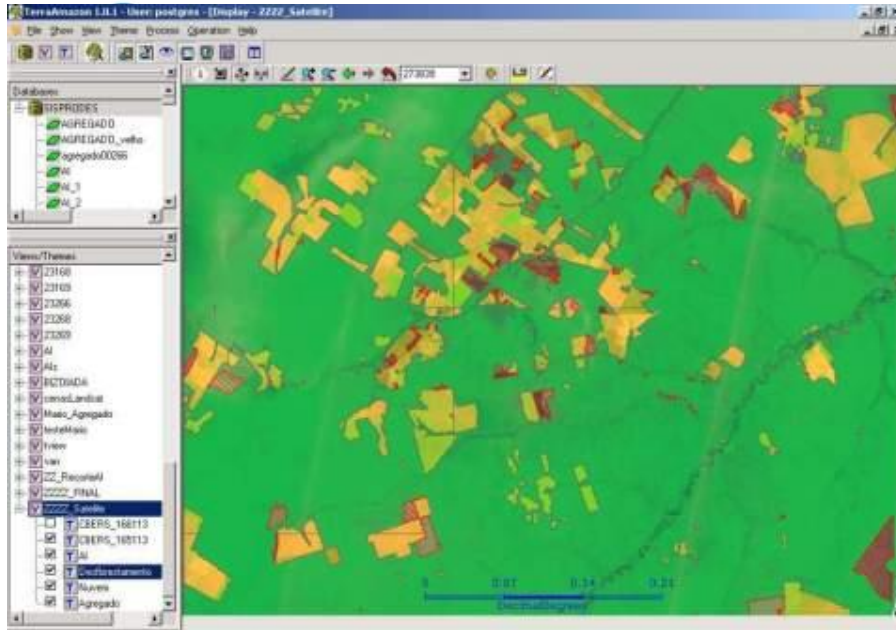
Horizon 1a & 1b

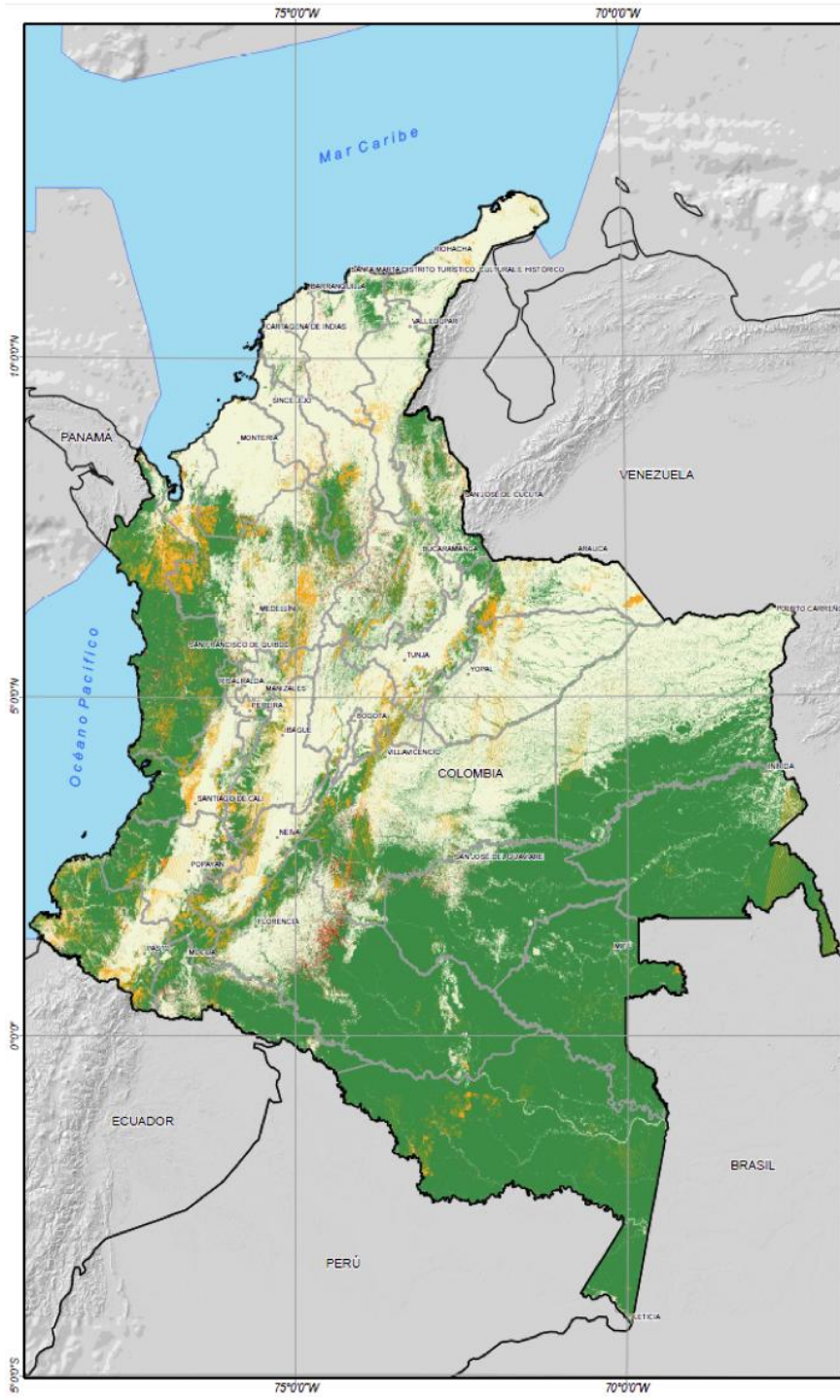
Forest cover &
forest cover change

PRODES – Brazilian Amazon
(w2w) annual forest
change. Operational system
since 1988.

Minimum mapping unit
6.25 ha.

A range of different optical
sensors have been used
(Landsat 5, 7, CBERS, DMC,
IRS)





REPÚBLICA DE COLOMBIA
 INSTITUTO DE HIDROLOGÍA,
 METEOROLOGÍA Y ESTUDIOS
 AMBIENTALES

Capacidad Institucional Técnica
 Científica para Apoyar
 Proyectos REDD
 en Colombia

Cambios en la Cobertura de
 Bosque en los
 Periodos 2005 y 2010

2011

Leyenda y Convenciones

Leyenda

- Bosque Estable
- No Bosque Estable
- Deforestación
- Regeneración
- Sin información

Convenciones

- Límite Nacional
- Límite Departamental

Mapa de Localización

Escala
 1:8.500.000

Información de Referencia

Proyección: UTM
 Datum: WGS - 84
 Zona: 18 N
 Coordenadas Geográficas: 75° 00' 00" Longitud Oeste
 Coordenadas UTM: 800.000 metros Norte
 0 metros Este
 Fuente: IDEAM, MAUDIT, F. Natura, F. Moore 2010.
 Cartografía Base: IGAC, 2010.
 Tipo de imágenes: LANDSAT

Salida Gráfica: Edwin Coronado
 Proyecto REDD - IDEAM
 Revisor: Catherine Cabezas
 Proyecto REDD - IDEAM

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Colombia

Horizon 1a & 1b

Forest cover & forest cover change

National-scale (w2w) Horizon 1a and 1b product - (combined) forest cover and change - derived from Landsat data.



2006 ASAR APP

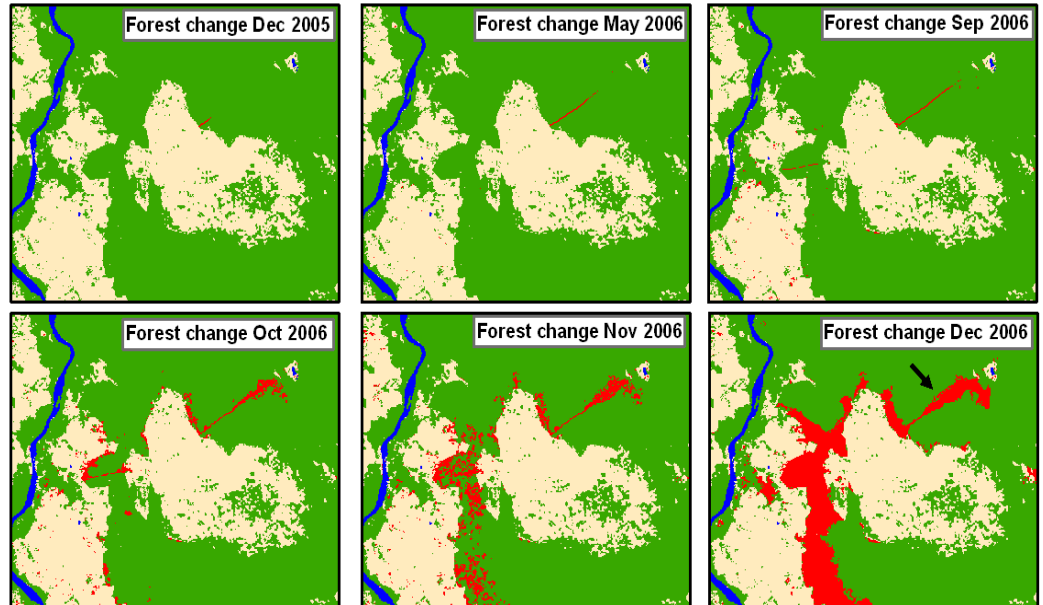


2007 ASAR APP

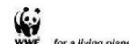
elite data courtesy ESA, processed by SarVision

ENVISAT ASAR APP has been demonstrated in Borneo as a **fast and reliable tool for operational deforestation monitoring**

Feasible to use optical (or L-band SAR) to generate forest/non-forest mask and monthly/bi-monthly time-series of C-band SAR to monitor tropical deforestation

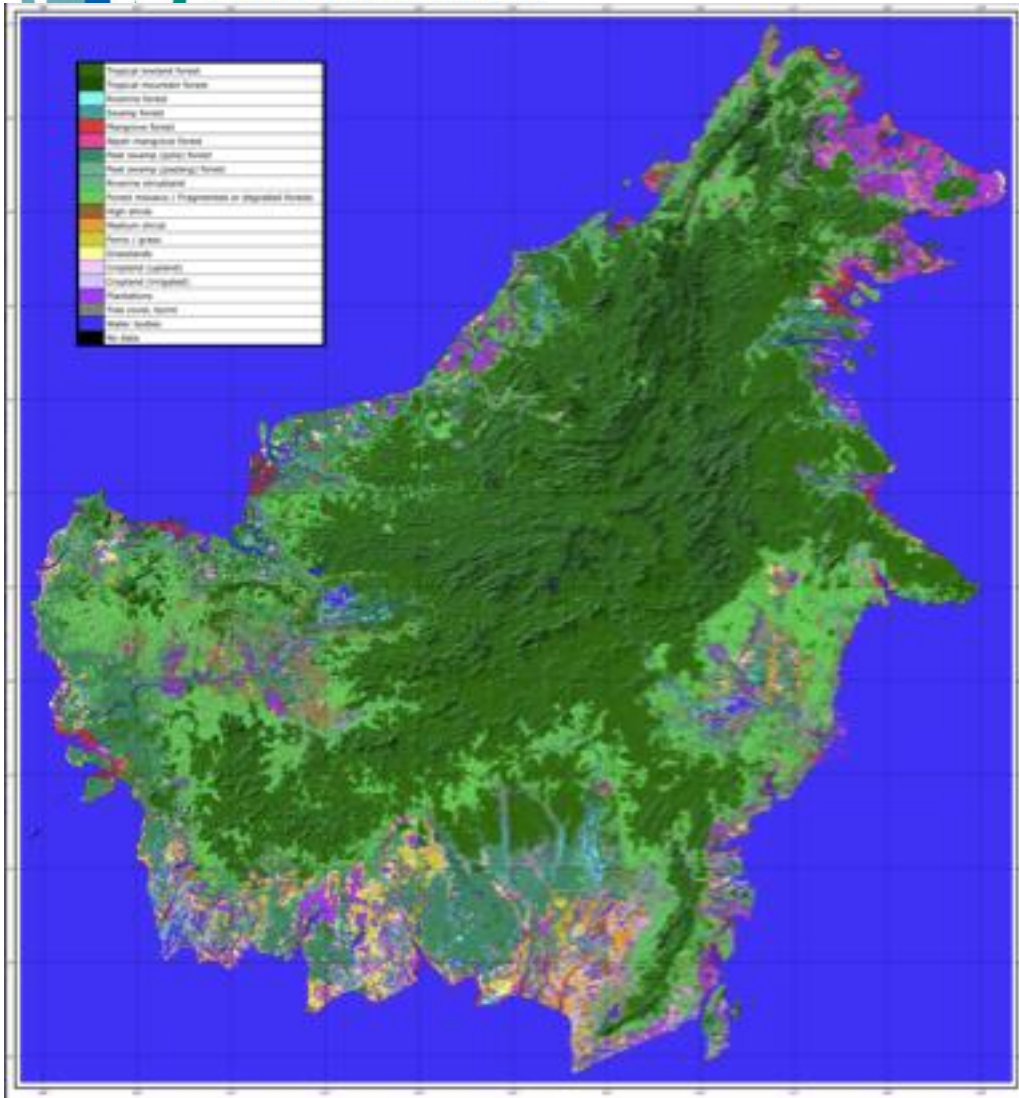


Optimising information extraction from C-band SAR





Borneo
Horizon 1c
Land cover



Subnational-scale
 (w2w) Horizon 1c product
 derived from dual-season
 ALOS (L-band) data.

Multi-seasonal (2 obs/yr wet/dry)
 image pairs improve distinction
 between certain classes compared
 to only one acquisition per year.

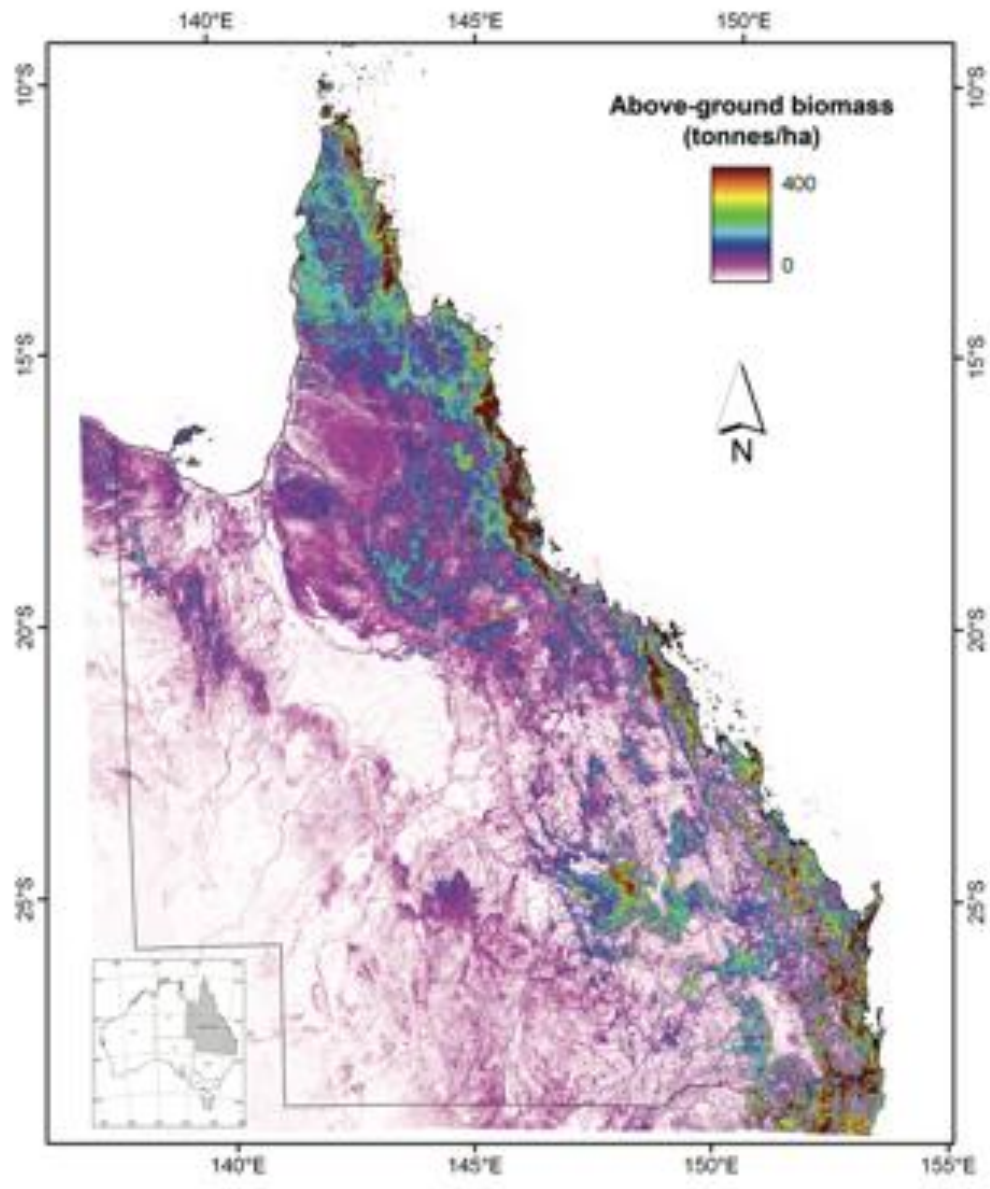


Australia (QL)

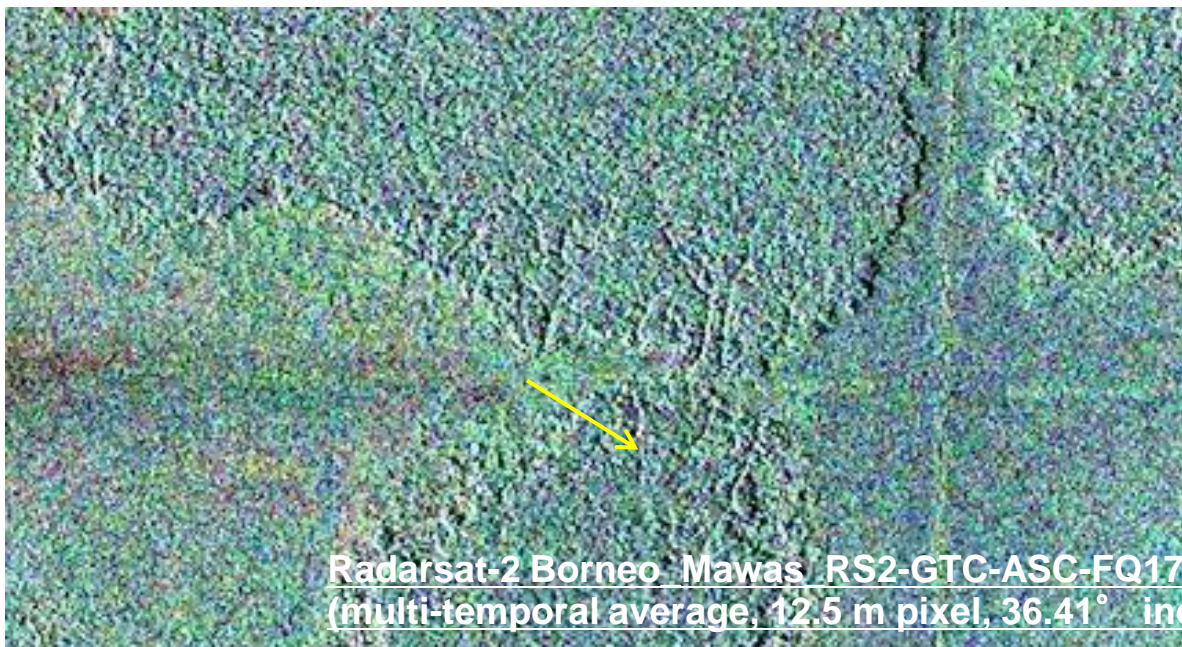
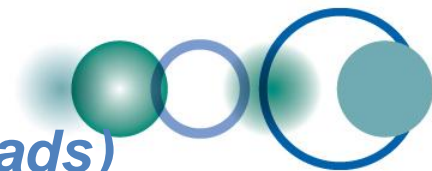
Horizon 2

Above-ground biomass

Subnational-scale
(w2w)ABG map derived
from a combination of
Landsat and ALOS (L-band)
data.

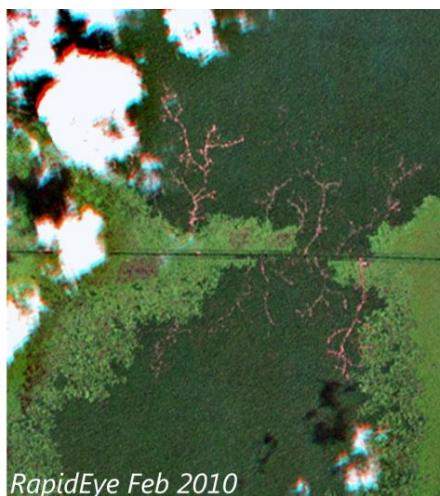


Degradation (detection of logging roads)



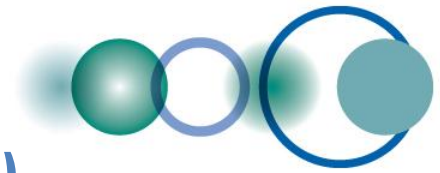
Dense time series
(monthly/bi-monthly)
of
Radarsat-2 (C-band)

Multi-temporal filtering
improves radiometric
quality (speckle reduction)
while maintaining spatial
resolution

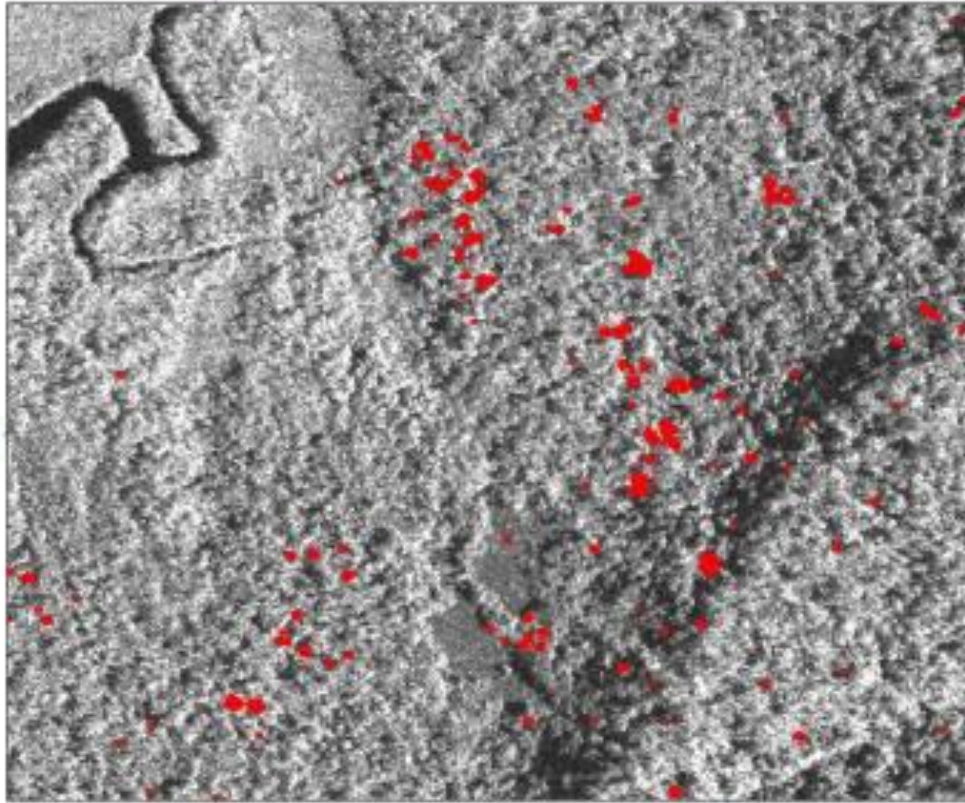


Logging roads
remain visible longer
in Radarsat-2 than
in RapidEye

Degradation (selective logging)



Change Map - Tribuga, Colombia



TerraSAR-X
SpotLight Acquisition

Location of Scene: Tribuga (Colombia)



Legend

Changes — Tree Loss (Tribuga)

Satellite Image Information

Acquisition Date	2011-03-08
Scene ID	1101001001
Acquisition Mode	SpotLight
Orbiting Plane Inclination	98.6°
Polarization	VV
Resolution (m)	3.7
Product Name	1101001001
Product Type	Single Look Complex Spotlight
Manufacturer	ESA
Manufacturer Order Number	1101001001

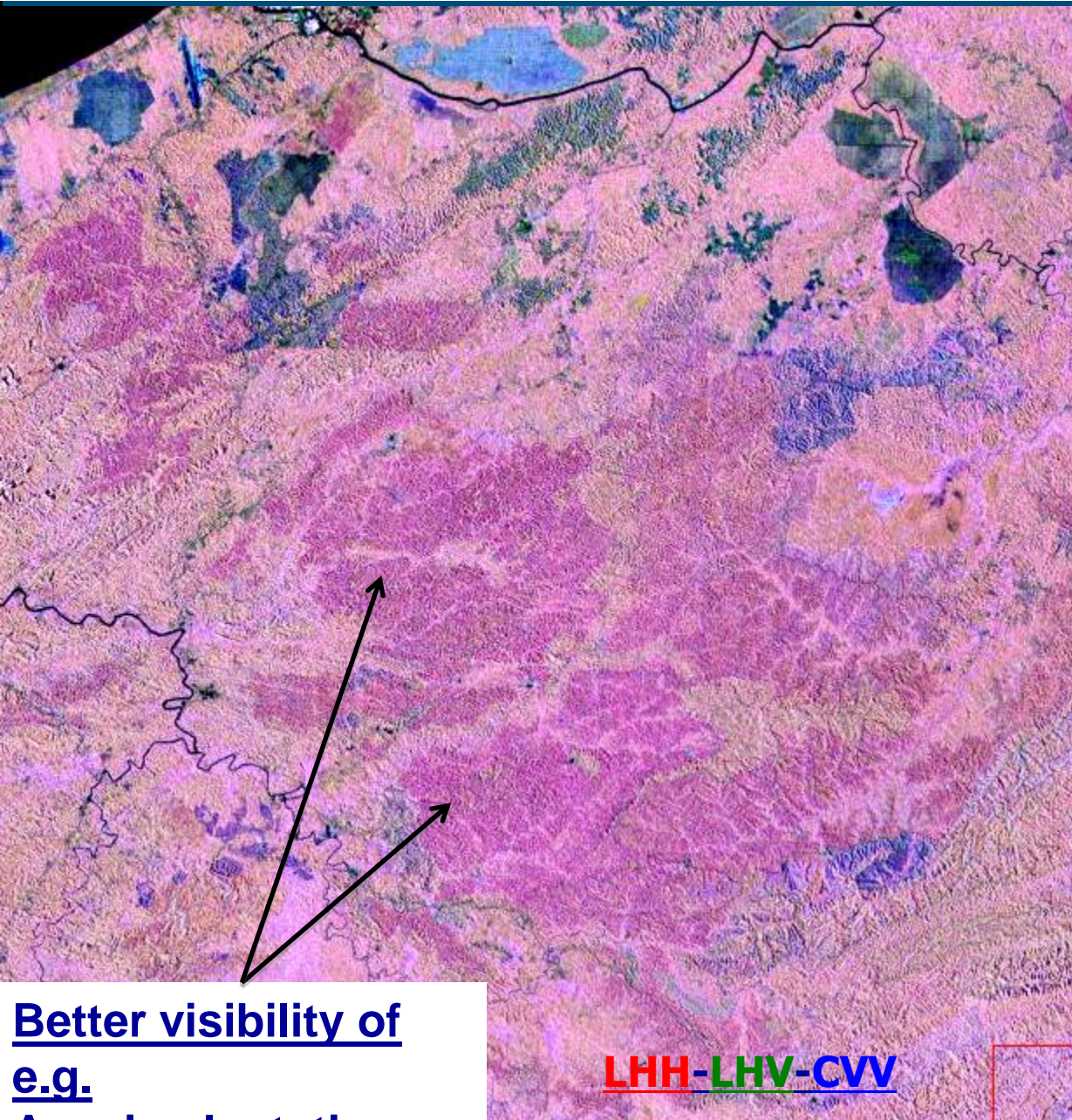
Scale: 1:4,400 300 x 300 meters

Map Progress
Geographic: Universal Transverse Mercator
EPSG: 31433
Datum: WGS 84
Units: Meter
Zone: 18N



Local scale
Detection of the
removal of
individual trees
detected in
TerraSAR-X
(spotlight mode)

Improved distinction of Forest types



L-band/C-band
complementarity

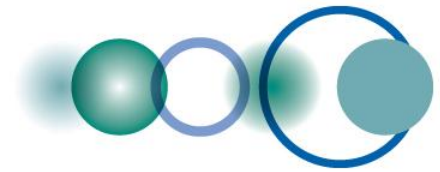
Radarsat-2 WB C-band
PALSAR FB L-band
LHH-LHV-CVV

Sarawak, Malaysia

L-band/C-band
combination improves
contrast between forest
and Acacia plantations
and
between (medium
biomass level) forest
types and within forest
(biomass) variation

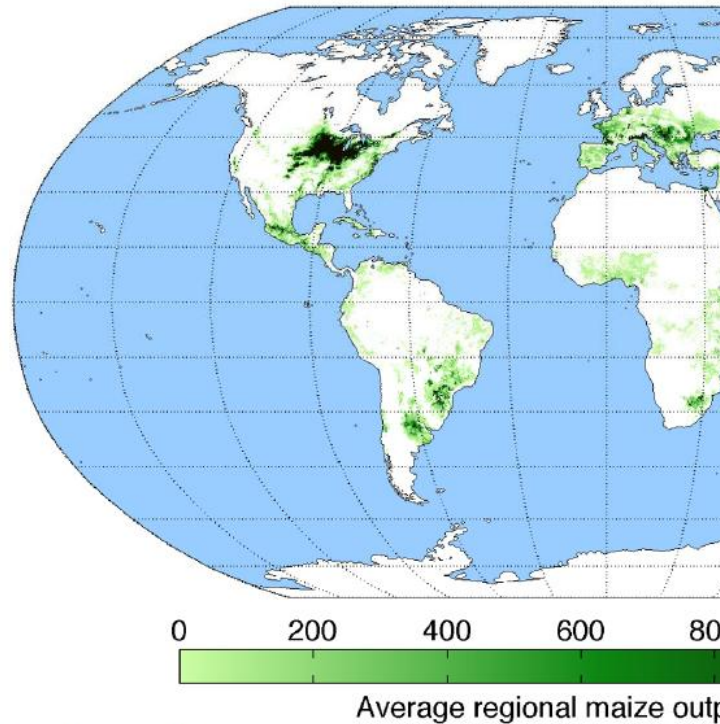
Better visibility of
e.g.

LHH-LHV-CVV



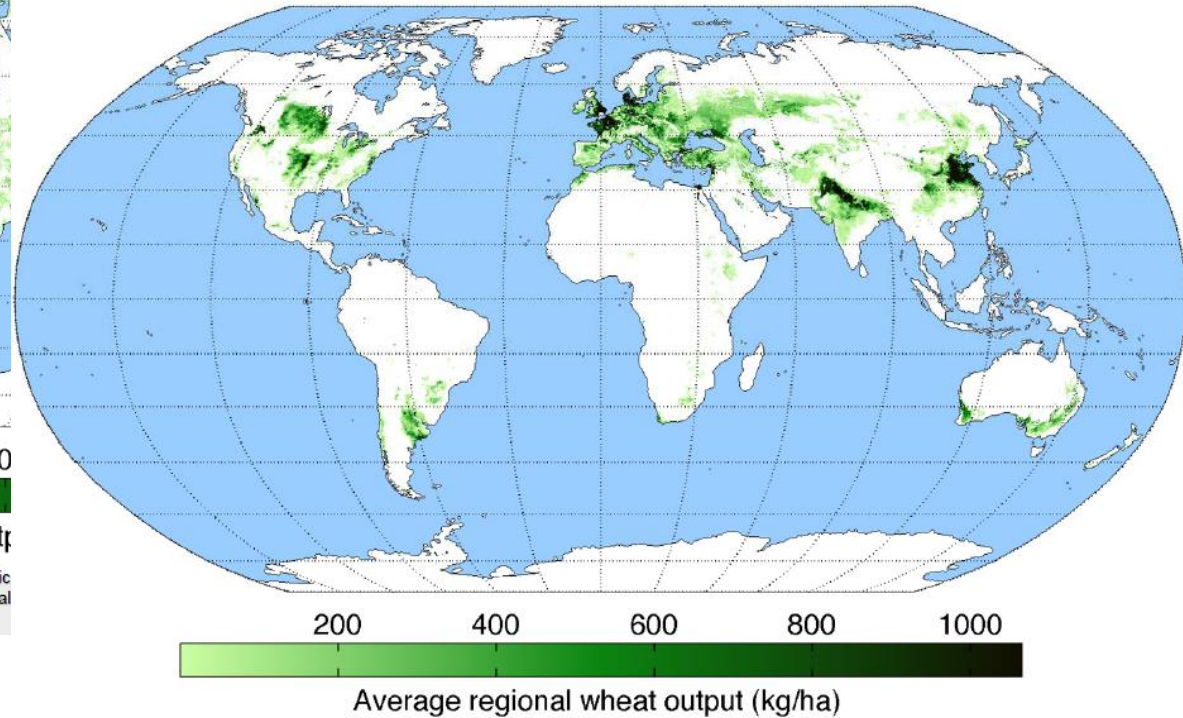
Food Security

Global Corn Yields



Source: Monfreda, C., N. Ramankutty, and J.A. Foley. 2008. Farming the planet: 2. Geographic yields, physiological types, and net primary production in the year 2000. Global Biogeochemical Cycles 22: GB1022
October 13, 2010
USDA/FAS/OGA

Global Wheat Yields

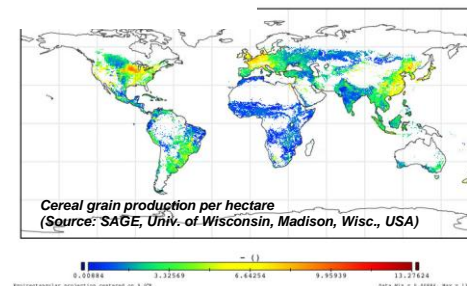


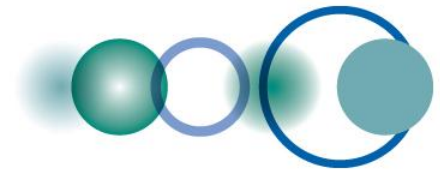
Source: Monfreda, C., N. Ramankutty, and J.A. Foley. 2008. Farming the planet: 2. Geographic distribution of crop areas, yields, physiological types, and net primary production in the year 2000. Global Biogeochemical Cycles 22: GB1022

October 13, 2010

USDA/FAS/OGA

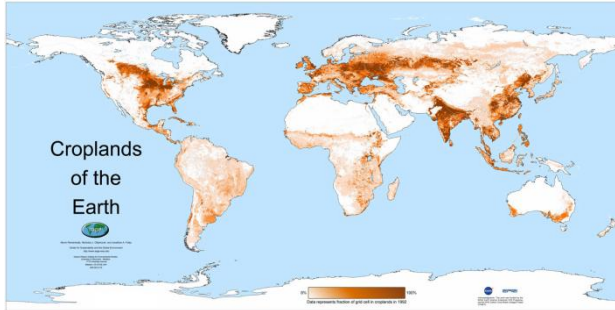
GEO-GLAM
The GEO led Initiative for GLOBAL AGRICULTURAL MONITORING



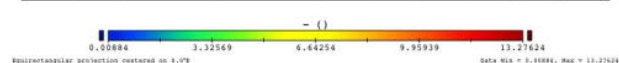
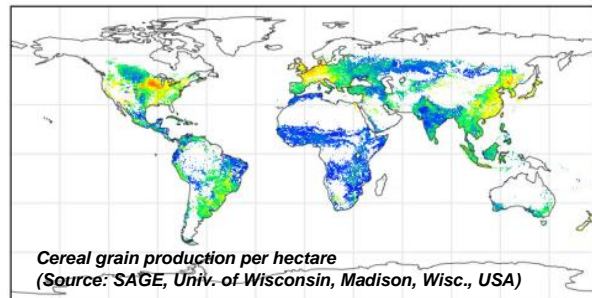


The GEO-GLAM Initiative : Objectives

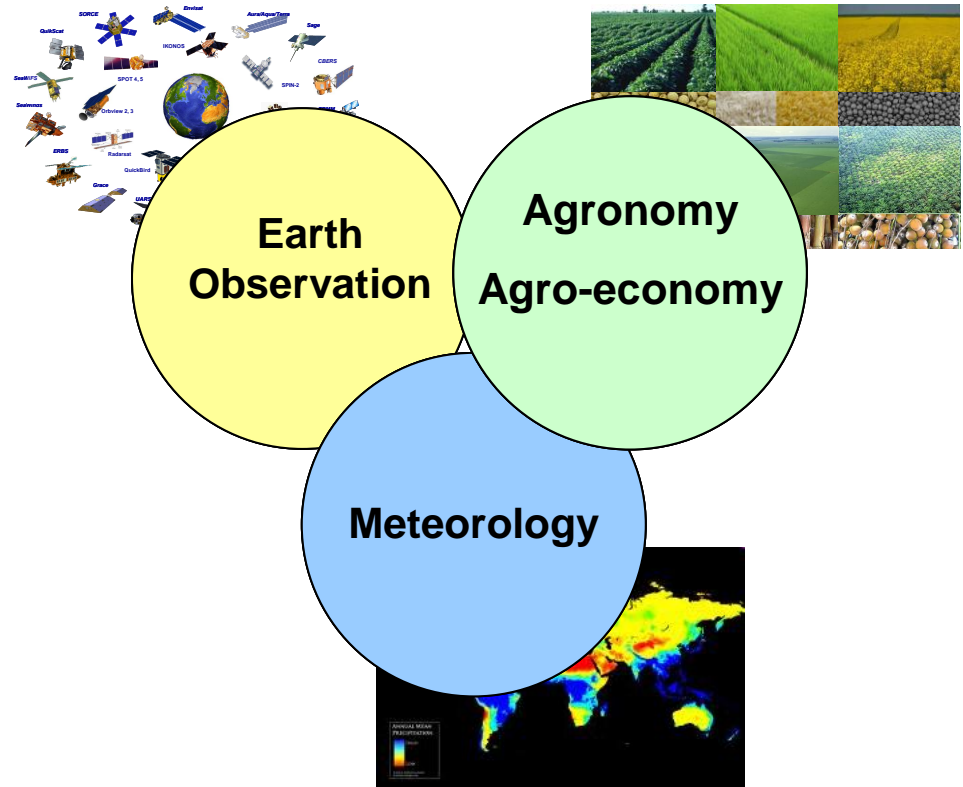
To reinforce the international community's capacity to produce and disseminate relevant, timely and accurate forecasts of agricultural production at national, regional and global scales.

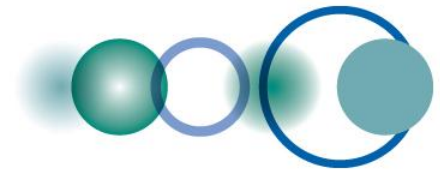


Cultivated area / crop type area



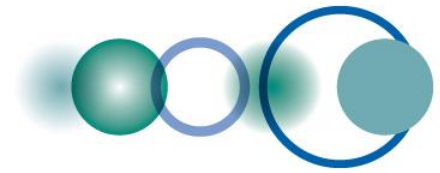
Crop yield forecast



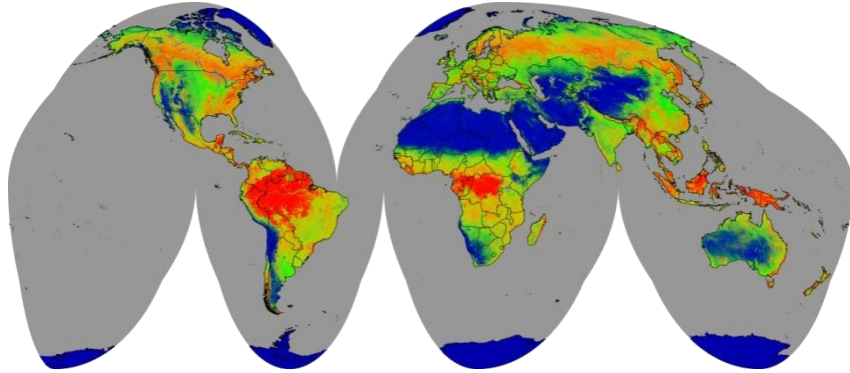


2. The GEO-GLAM Initiative : Deliverables

- Deliverable 1 : Access to Earth Observation data for agriculture monitoring
- Deliverable 2 : Access to Meteorological data and forecasts
- Deliverable 3 : Cultivated areas, crop-type distribution, crop yield forecasts
- Deliverable 4 : Improved monitoring methods
- Deliverable 5 : Strengthened national agricultural monitoring capacities
- Deliverable 6 : Dissemination of data to stakeholders;
- Deliverable 7 : A sustained Earth observation system of systems for agricultural monitoring,

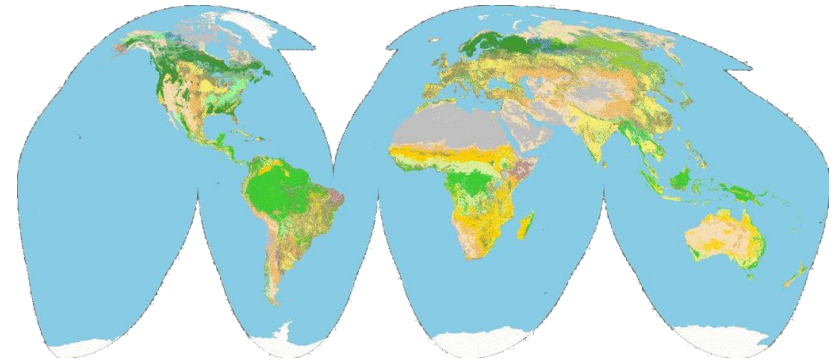


GEO Global 30m Land Cover Products



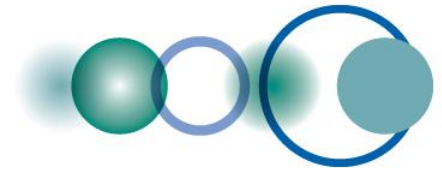
Annual land cover continuous variables

- Quantitative annual continuous measures of per pixel percent tree, shrub, herbaceous, water, snow/ice, and barren cover.
- Change products



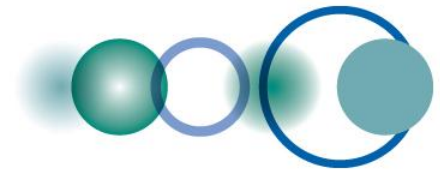
Mid-decadal year land cover types

- Land cover categories (TBD) consistent with FAO Land Cover Classification System (LCCS)
- Maps and statistical estimates of major land cover types
- Complementary with other global land cover products (e.g., MODIS land cover, Globecover)



Global Land Use 2010-2030





Water Cycle Management: A complex problem requiring Coordinated Access to Heterogeneous Data Streams



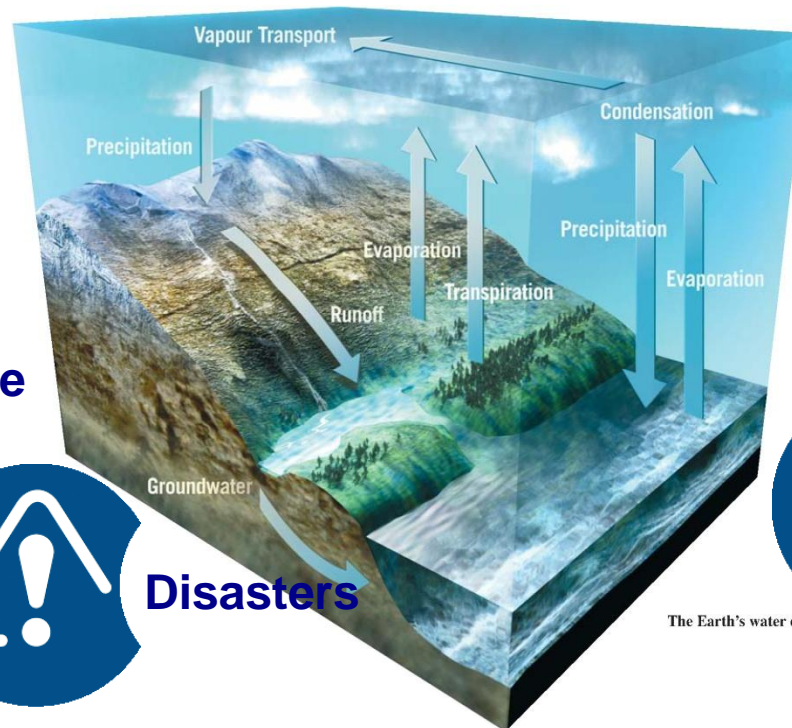
Energy



Climate



Disasters



Health



Agriculture

The Earth's water cycle

Numerical Weather Prediction

Seasonal Prediction

Climate Prediction

Satellite

MODIS

Land Use

AMSR-E

SSM/I

TRMM

GSMaP

Geostational Satellites

GRACE

Hydrological Model
(eg. WEB-DHM)

LDAS

Evaluation
Bias Correction

Surface Flux

Soil Moisture

River Flow

Ground Water

Seasonal Prediction

Monitoring

Drought Index

Integrated Water Resources Management (IWRM)

Optimization Scheme

Climate Change Assessment Adaptation

Rain Gauge

River Discharge

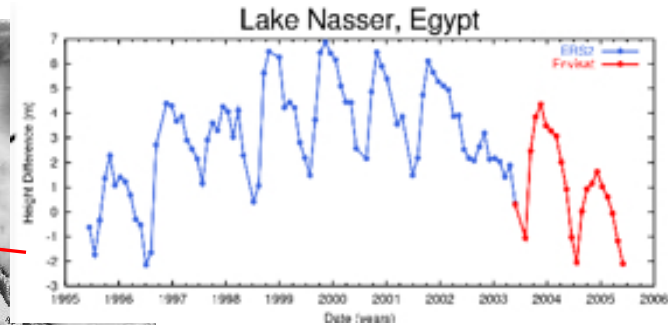
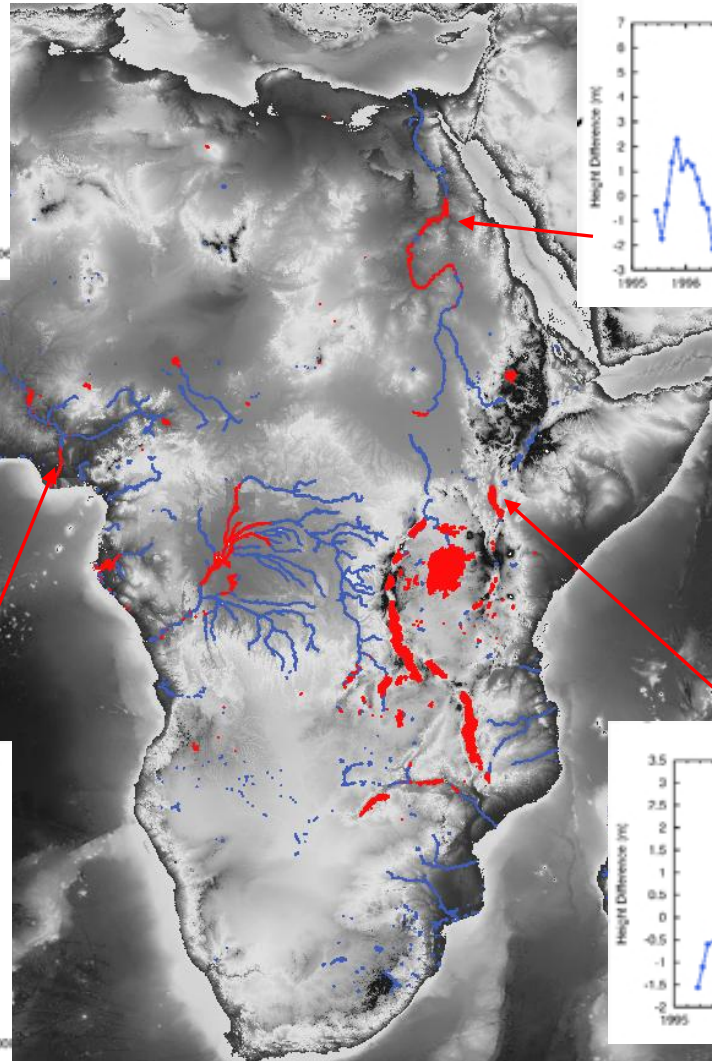
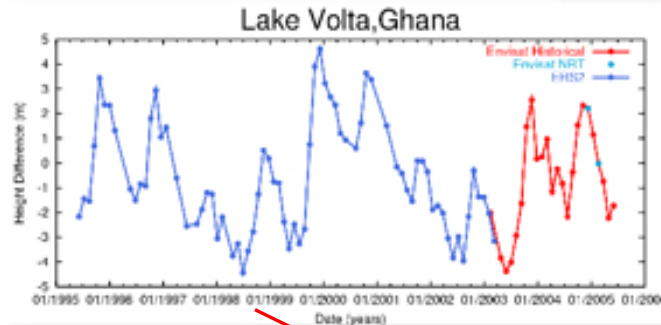
Soil Moisture

Ground Water

In-situ Observation

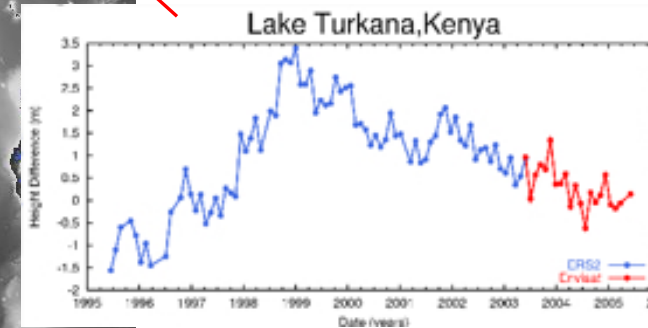


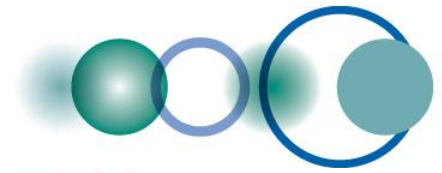
To combine space observations...



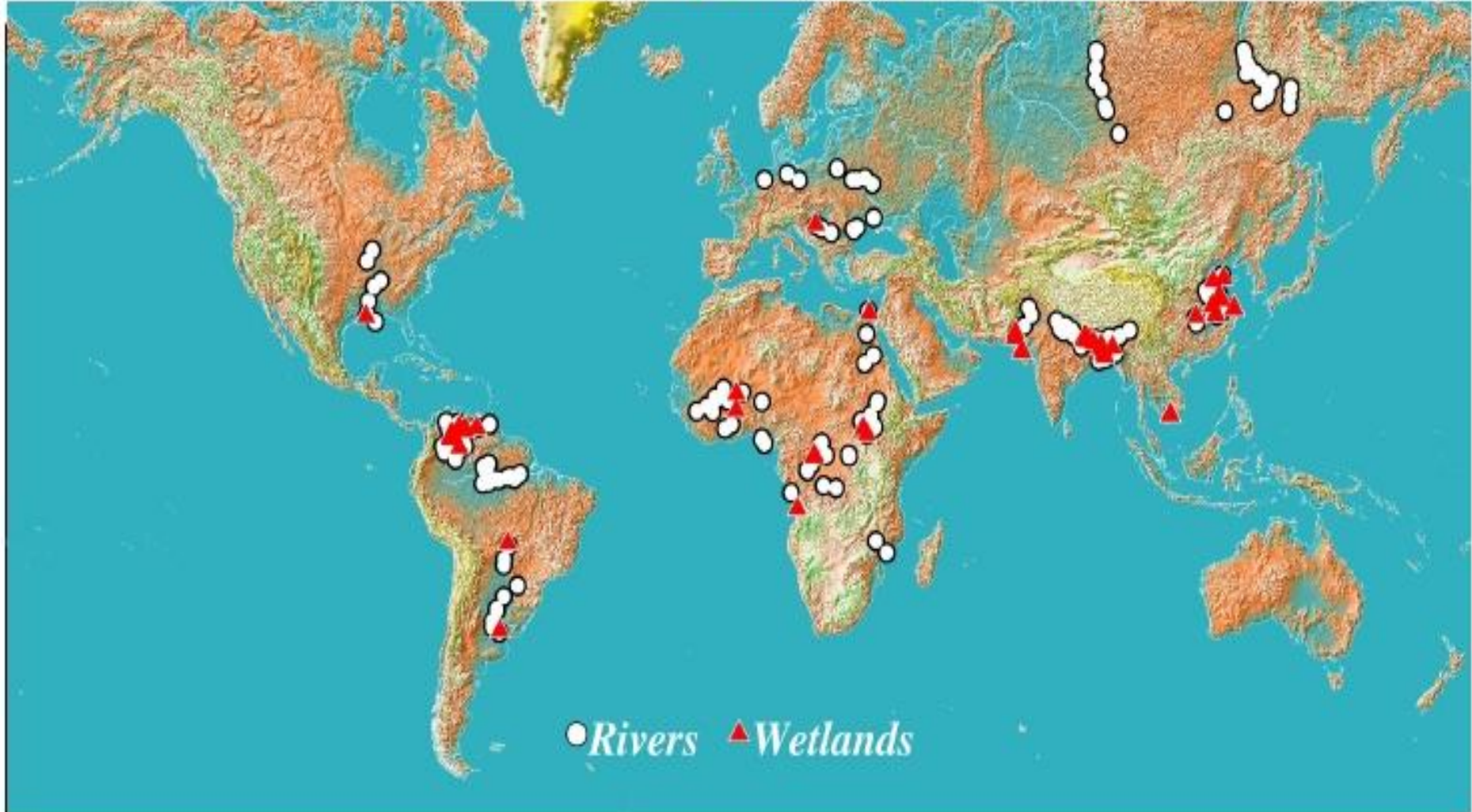
Red indicates area where NRT products are currently generated

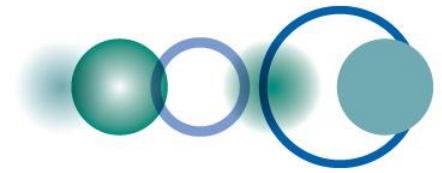
Blue indicates area where products may be generated in the future.



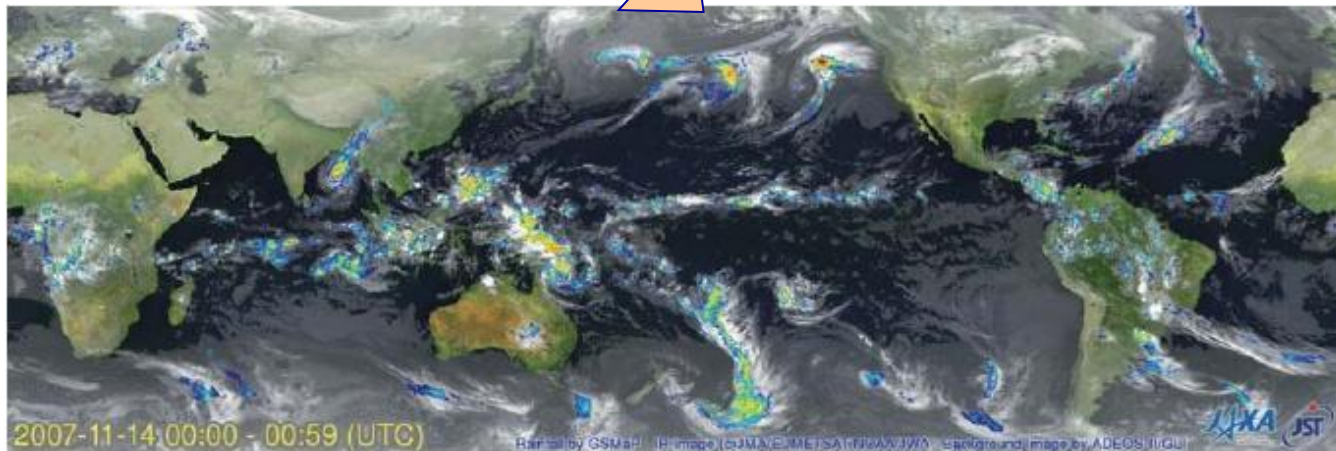
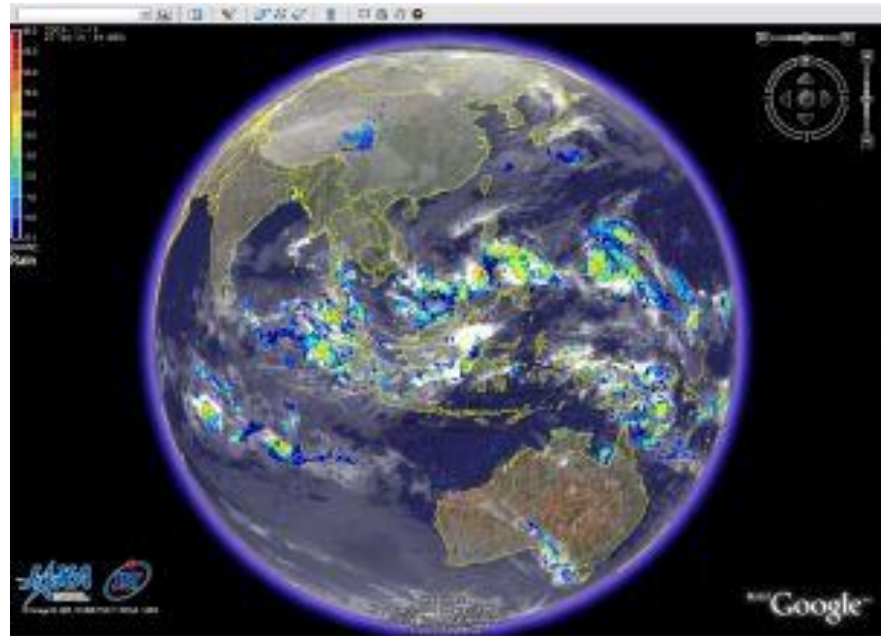
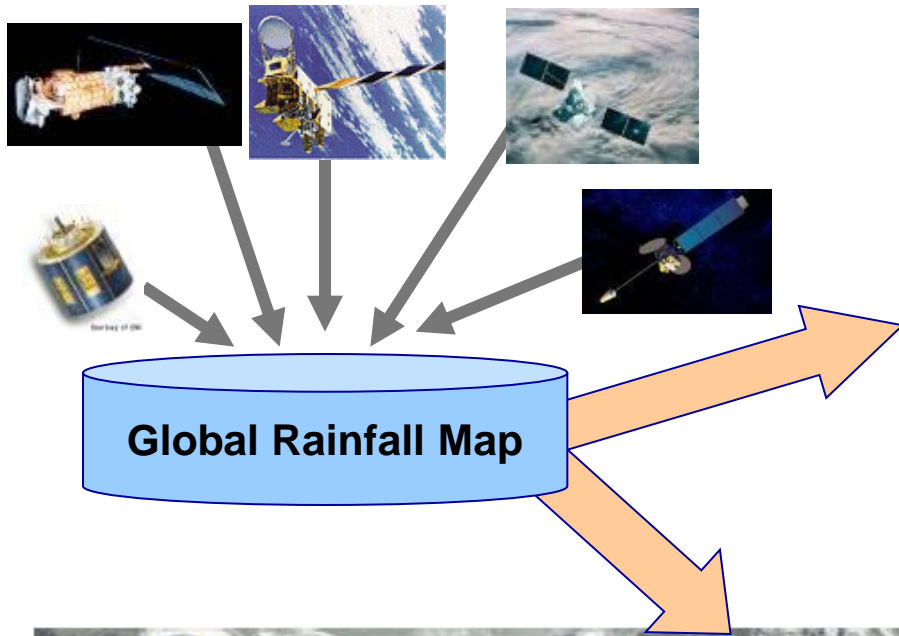


Map of virtual stations over large rivers and wetlands in «Hydroweb»

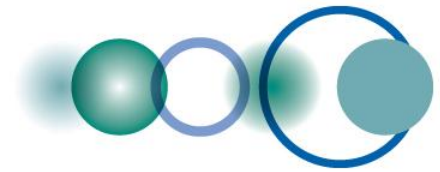




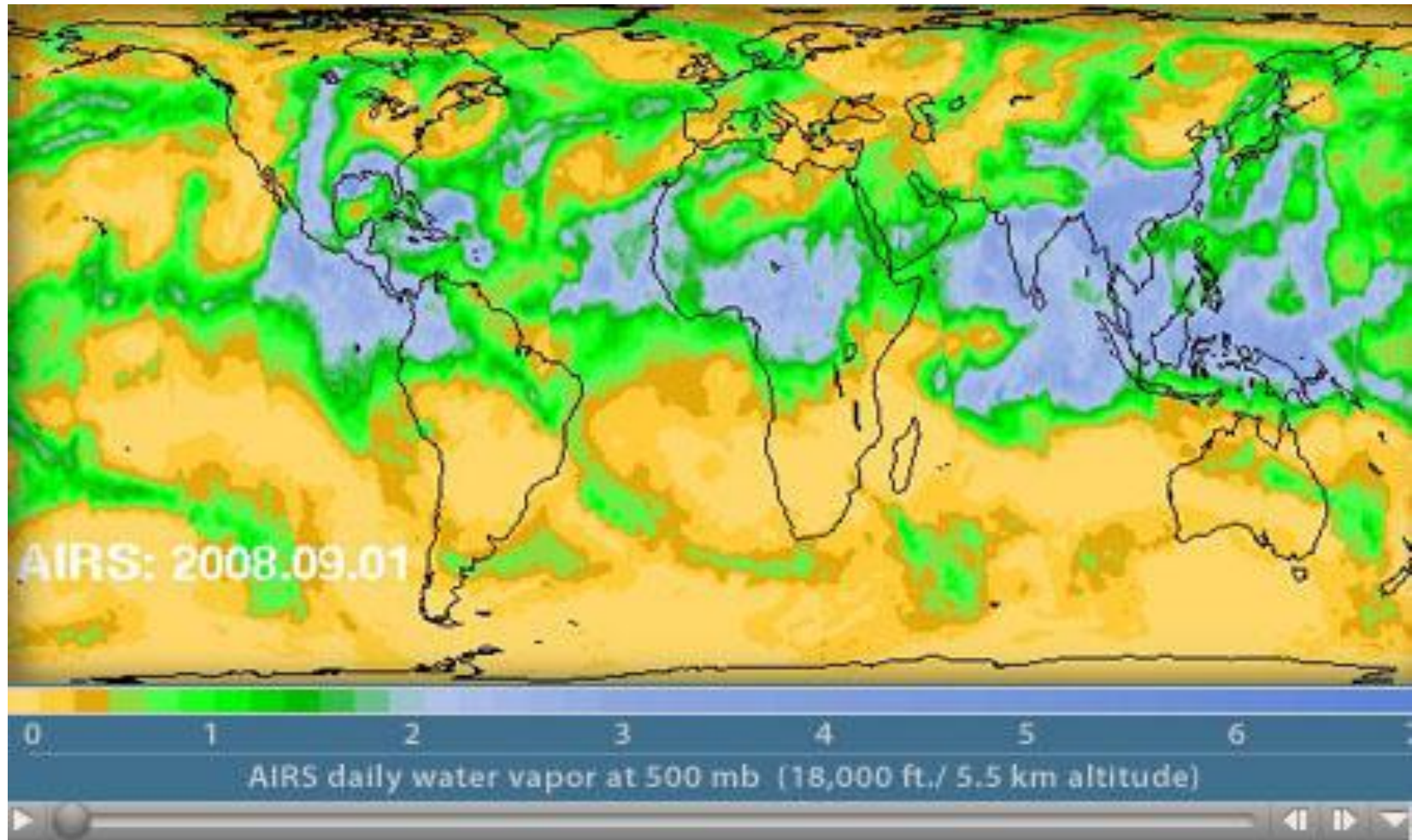
Global Rainfall Maps from Satellites

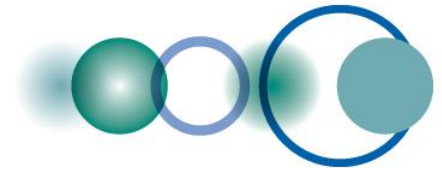


produced **4 hours**
after observation and
updated every hour
and accessible on
internet as google
files

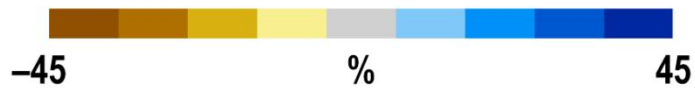
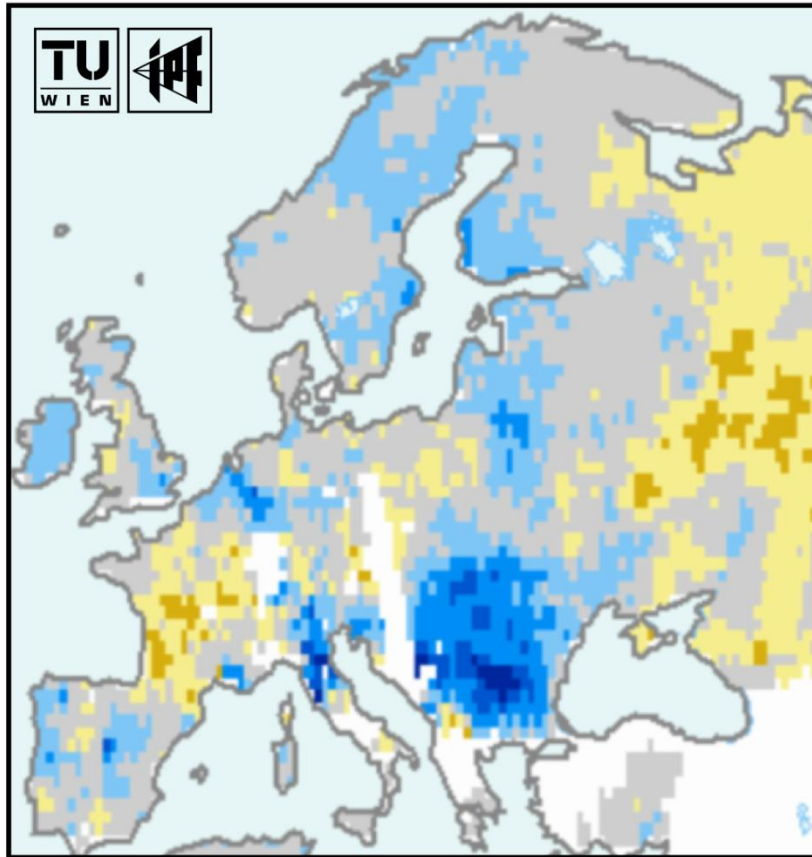


Atmospheric Water Vapor

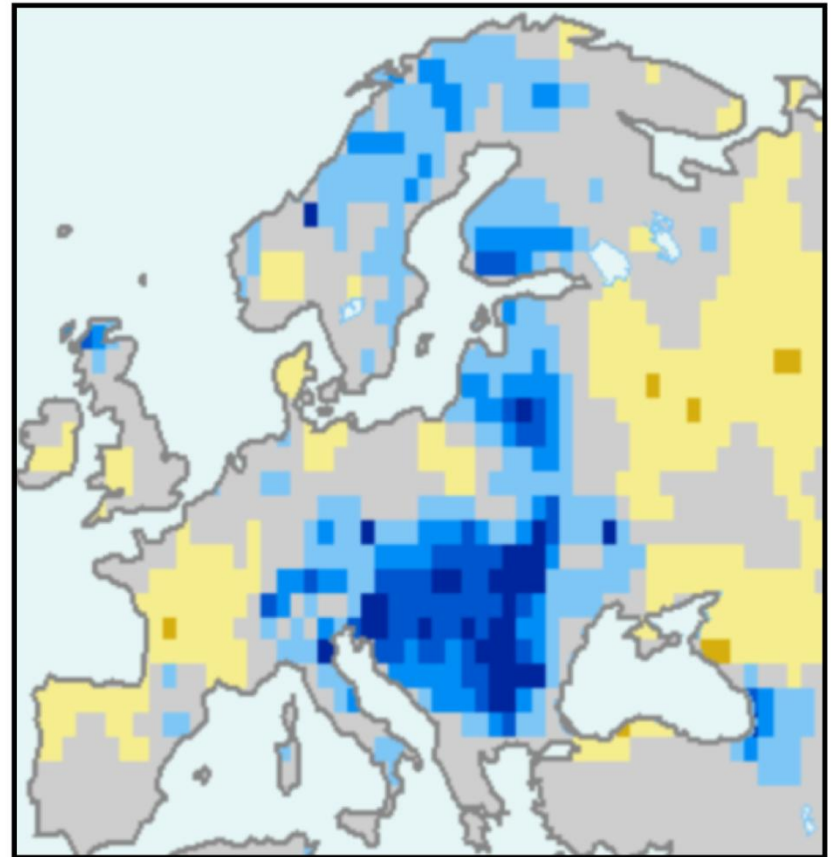




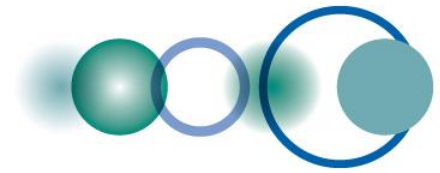
Soil moisture



Soil moisture from ERS scatterometer

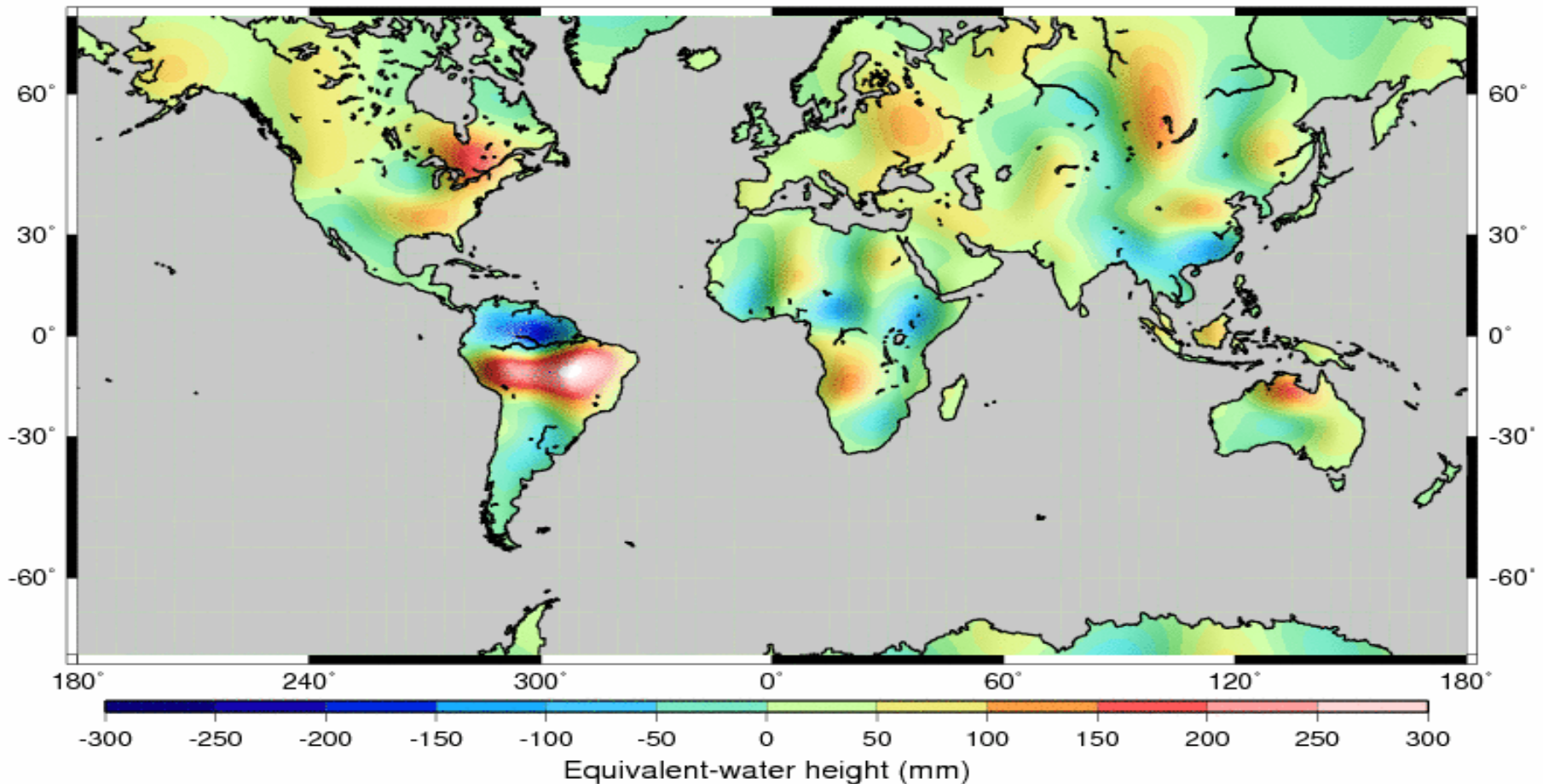


© GEO Secretariat **Soil moisture from SMOS**



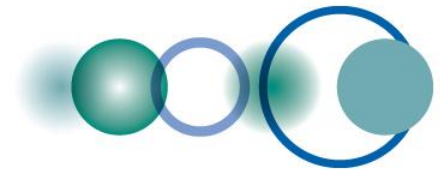
GRACE subsurface water estimates

GRACE LW SOLUTION --- FEB 2004 --- DEG=25-30 --- 5 ITERATIONS



A vertical white water level gauge is positioned in a river. The gauge has numerical markings from 17 to 29. The water level is approximately at the 24.5 mark. In the foreground, the corner of a boat with a blue trim and a bamboo pole is visible. The background shows a dense line of tropical vegetation, including banana trees, along the riverbank.

29
28
27
26
25
24
23
22
21
20
19
18
17



GEO BON

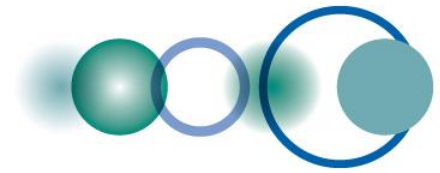
GEO Biodiversity Observation Network

Recent Accomplishments:

GEO BON submitted an "Assessment of the Adequacy of Existing Observation Capabilities for the CBD 2020 Targets" to the CBD's Ad Technical Expert Group Meeting on Indicators for the Strategic Plan for Biodiversity 2011-2020.

GEO BON is preparing a list of Essential Biodiversity Variables (EBV's) required for meeting the 2020 Targets.

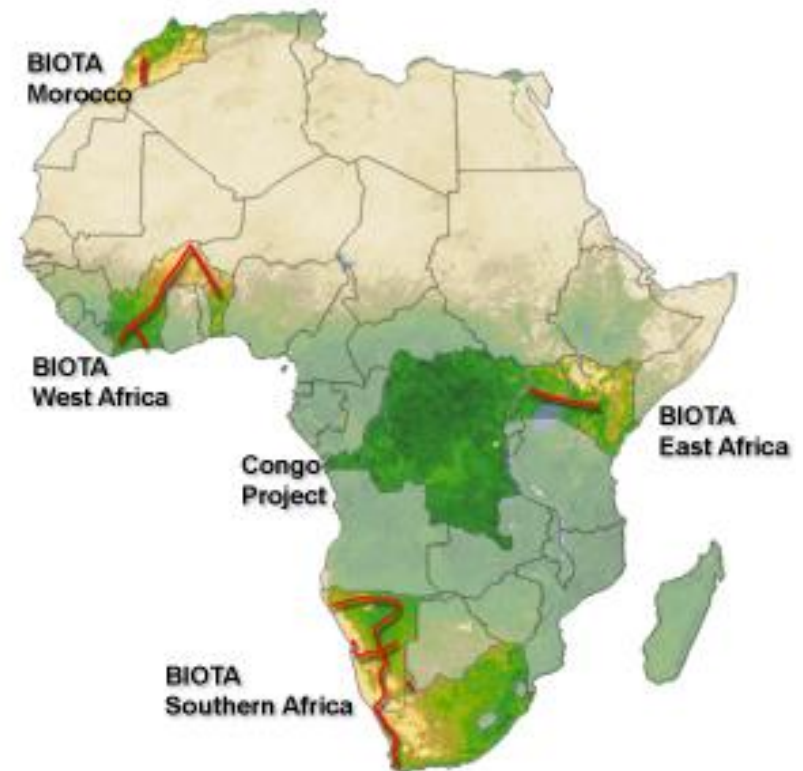


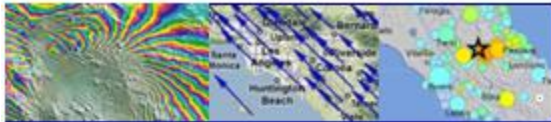
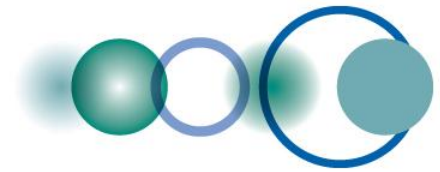


BIOTA AFRICA

A Contribution to GEOBON

BIOdiversity
monitoring
Transect analysis
in **Africa**





SUPERSITES

Welcome to the Supersites



New Event [Van, Turkey, earthquake of 23 October 2011](#)

The Supersites have data for the study of natural hazards in geologically active regions, including information from Synthetic Aperture Radar (SAR), GPS crustal deformation measurements, and earthquakes. The data are provided in the following formats:

50.000 ESA SAR scenes in the Cloud → Virtual Archive (ESA processed data & repatriated data with a recent upload of up to 2500 products a day)

Web portal managed by UNAVCO → has proven in particular for Haiti and Japan Earthquake to become the science reference point



SUPERSITES



SUPERSITES
EVENT SUPERSITES
OTHER EVENTS



main

new event

news

documents

apply for
access

contributors

publications

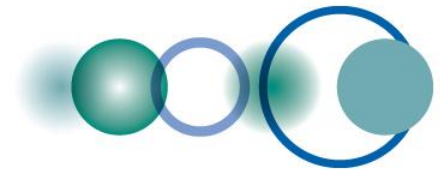
reports to
space
agencies

links

contacts &
mailing list

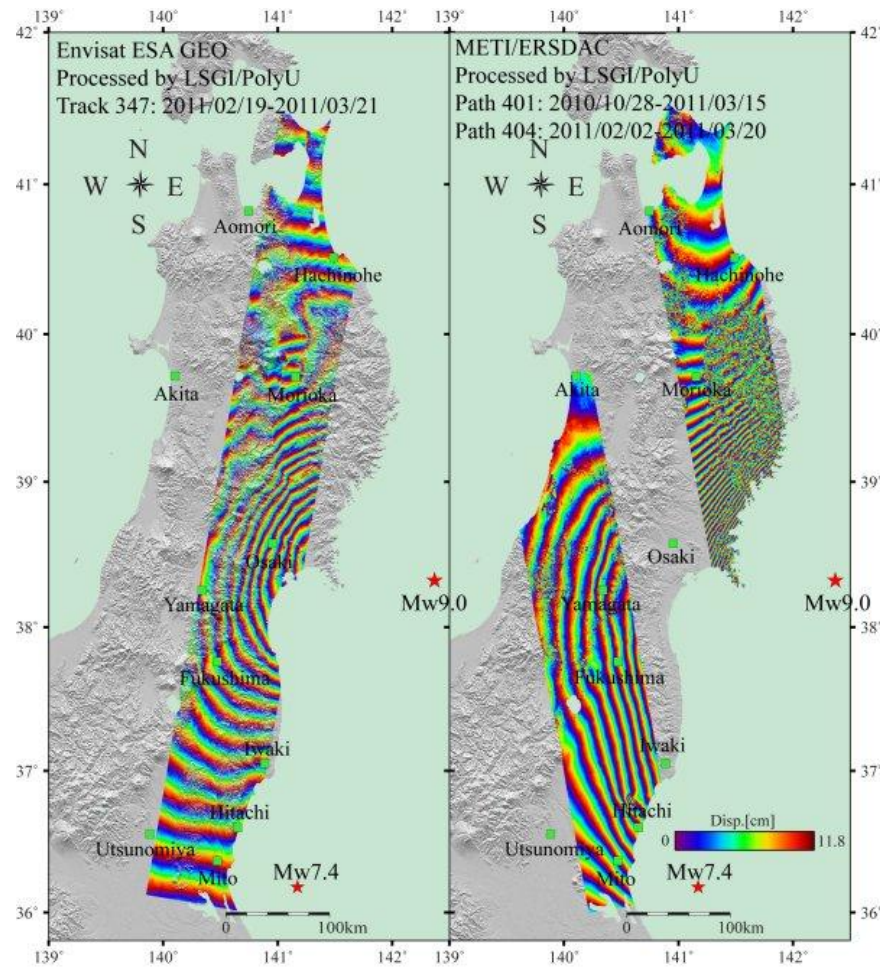
Los Angeles

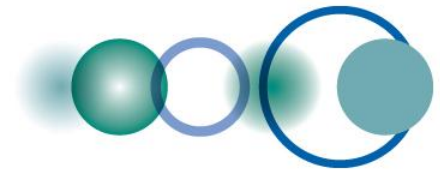
Seattle-
Vancouver



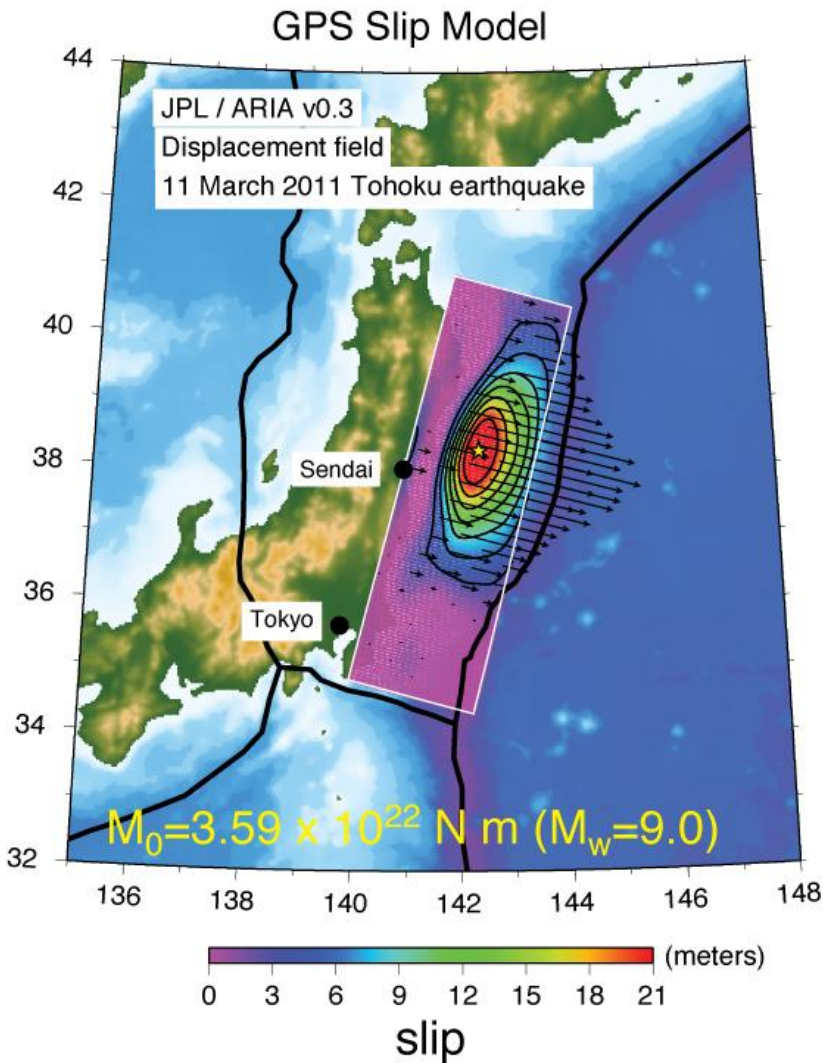
1. Coordinate Data Collection and Access

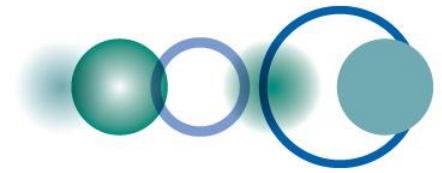
2. Develop and Share Products





The Tohoku-Oki Supersite

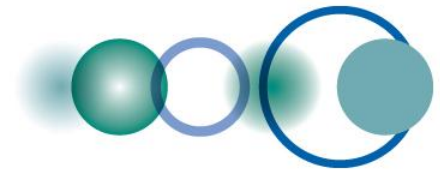




Pillar #1: Coordinated Data and Information Access, the Challenges for GEO

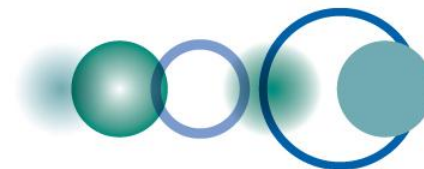
THE GLOBAL EARTH OBSERVATION
SYSTEM OF SYSTEMS





Consolidate GFOI and GEO-GLAM

- Establish the proper management structures
- Strengthen/establish relationships with international organizations (Users / Capacity building / Donors)
- Build capacity in countries at need
- Develop Research and Development Plans
- Ensure Data availability through CEOS, commercial data providers, and data processing providers
- Prepare updated Implementation Plans for submission to the GEO-IX Plenary
- Identify Resources



Strengthen GEOSS for Coastal and Oceans Ecosystems and Processes

ChloroGIN Africa - Microsoft Internet Explorer provided by Plymouth Marine Laboratory

http://www.npm.ac.uk/tsg/projects/chlorogin/index.php?map.x=171&map.y=20

File Edit View Favorites Tools Help

ChloroGIN Africa

ChloroGIN Africa

Home Contact

The Chlorophyll Global Integrated Network (ChloroGIN) project aims to promote in situ measurement of chlorophyll in combination with satellite derived estimates. The project was initiated following recommendations of the "Plymouth Chlorophyll Meeting and Workshops (Extended Antares Network)" sponsored by GOOS, GEO, IOCCG, PML and POGO 18 - 22 Sept 2006.

This portal provides a simple interface to ocean colour and sea-surface temperature satellite data over Africa processed by the University Of Cape Town, EC Joint Research Centre and Plymouth Marine Laboratory. The portal was inspired by the Antares network that provides satellite coverage over South America.

Areas selected:
Choose date (YYYY-MM-DD) and press 'Apply':

2007 04 10 Apply

[Select today]

Name:	Provider:	Boundary:	
West Mediterranean	PML	44.9N, -8E, 34N, 10E	View
Cape Verde Large 4km	PML	18.9N, -27E, 13N, -21E	View
JRC full	JRC	-30W, -50S, 60E, 40N	View

[\[Reset selection\]](#)

About date selection:
Data availability for preferred date selected is dependant on the individual data provider. Please verify that the data actually viewed is for the preferred date selected.

Done Local intranet 100%



Develop Water-borne Diseases Monitoring and Forecasting

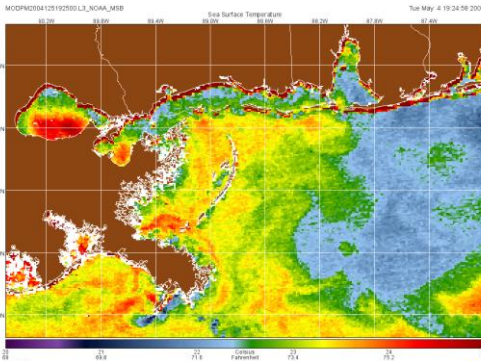
- Satellites, computers and molecular biology have made public health forecasting a reality
- Sea surface temperature, sea surface height, color and other products can be used to predict the presence of harmful microbes in water and seafood



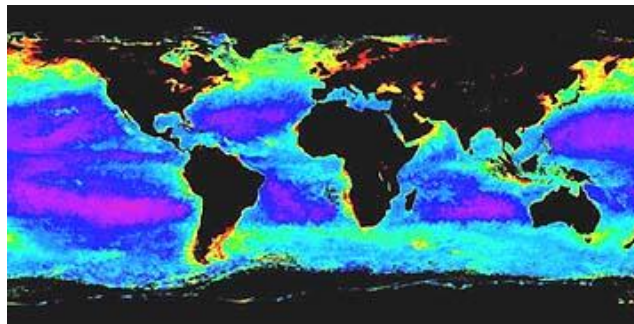
NASA Aqua w/ MODIS

Harmful microbes

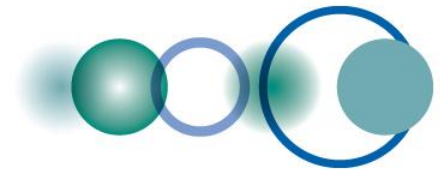
- Toxic algae
- Dinoflagellates
- Bacteria
 - *V. cholerae*
 - *V. parahaemolyticus*
 - *V. vulnificus*
 - Fecal indicators



MODIS SST (NRL, & USM)



Color (NASA SeaWiFS)



Expand from Supersites to National Laboratories (SNL)

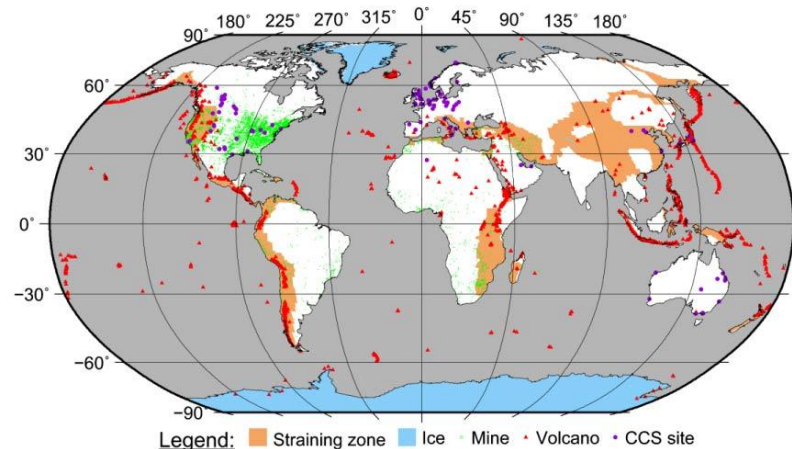
Pooling Satellite imagery and terrestrial in-situ data for earthquake and volcano studies.

There are 3 different level of sites:

- **Supersite** → all data
- **Event Supersite** → all data in case of large scale event
- **Natural Laboratories** → Global Network of Natural Laboratories.

Providing online access to historic multi-sensor SAR data sets (digital heritage of Earth Observation for geohazards).

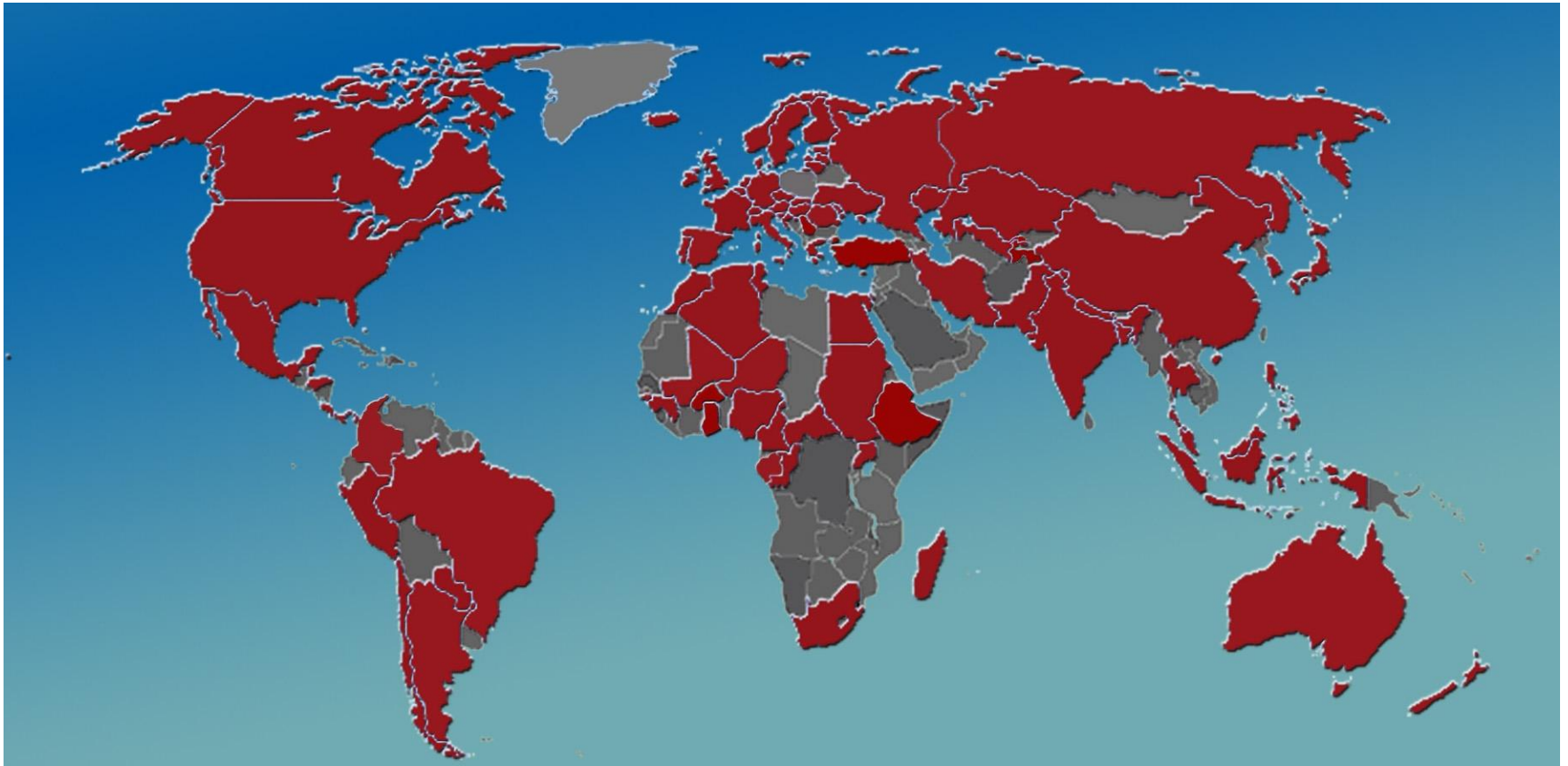
1 Million ERS/Envisat frames, under investigation.

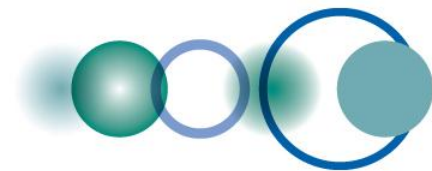




GEO, the Group on Earth Observations

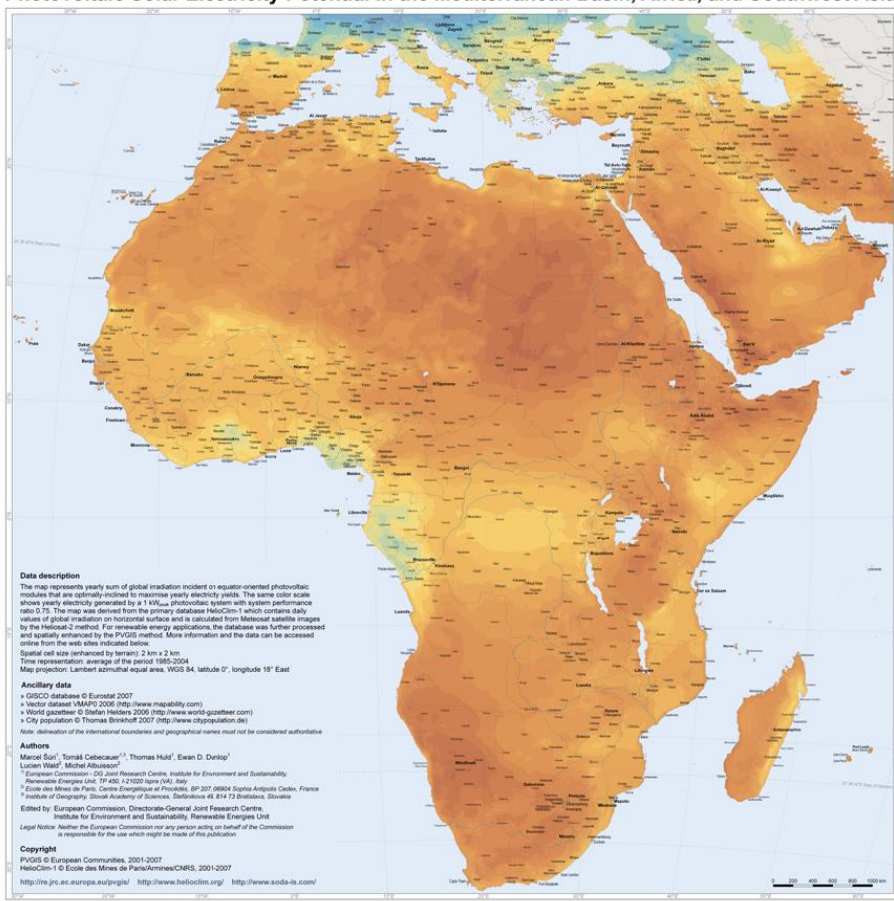
An Intergovernmental Organization now with **89**
Members and **64** Participating Organizations





AfriGEOSS: GEOSS in and for AFRICA

Photovoltaic Solar Electricity Potential in the Mediterranean Basin, Africa, and Southwest Asia



GEONETCast, CBERS, SERVIR, Sand and Dust Storm Warning System, AEGOS, Wildland Fire Early Warning System, Puma, AMESD and GMES Africa, BIOTA, TIGER, SoDa, MERIT, African Protected Areas, ClimDev Africa, ChlorOGIN, GeoAFRICA



SEAS-Gabon



Polynésie, 2004



Guyane, 1998



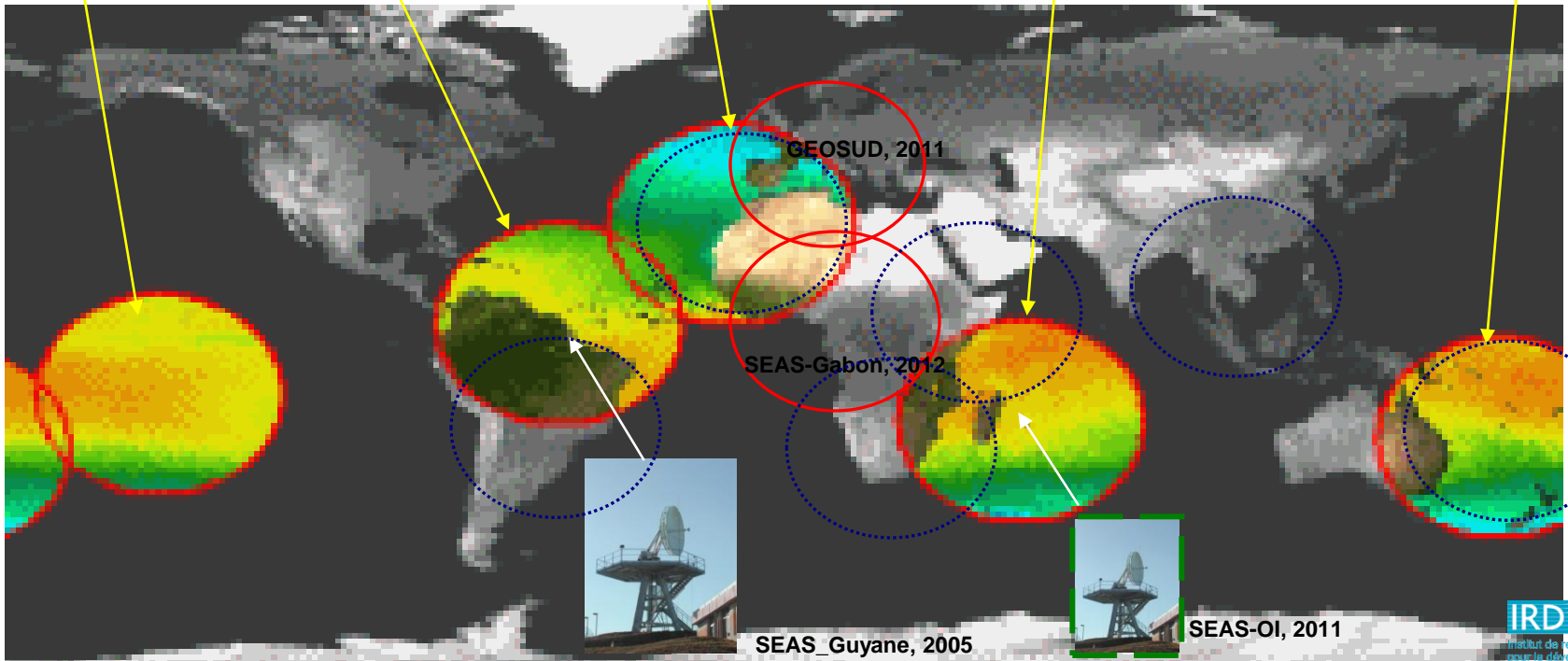
Canaries, 1996



Réunion, 1991

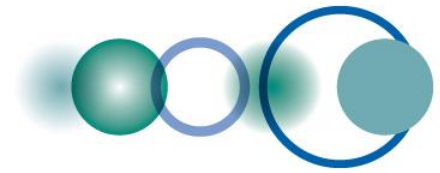


Nlle Calédonie, 1997



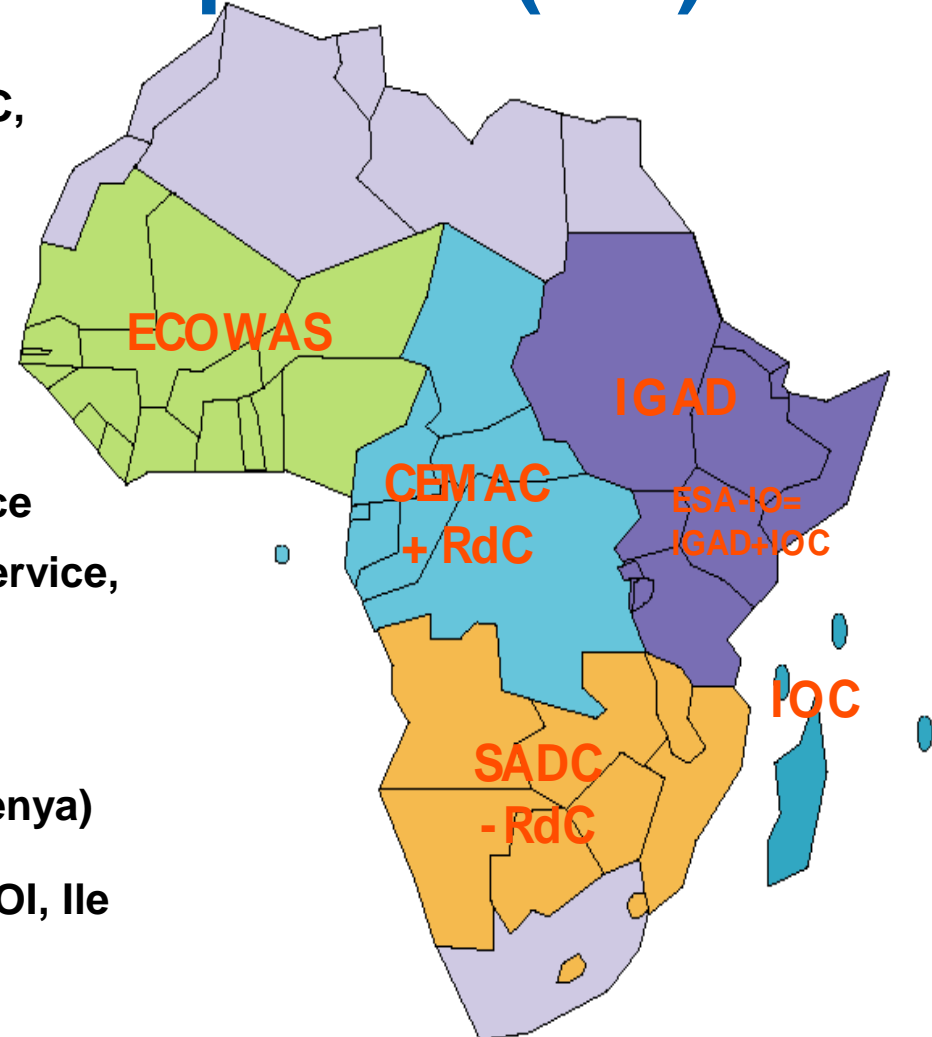
SEAS_Guyane, 2005
(SPOT 2, 4, 5, ENVISAT)

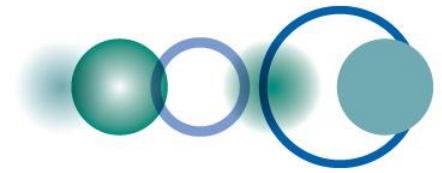
SEAS-OI, 2011



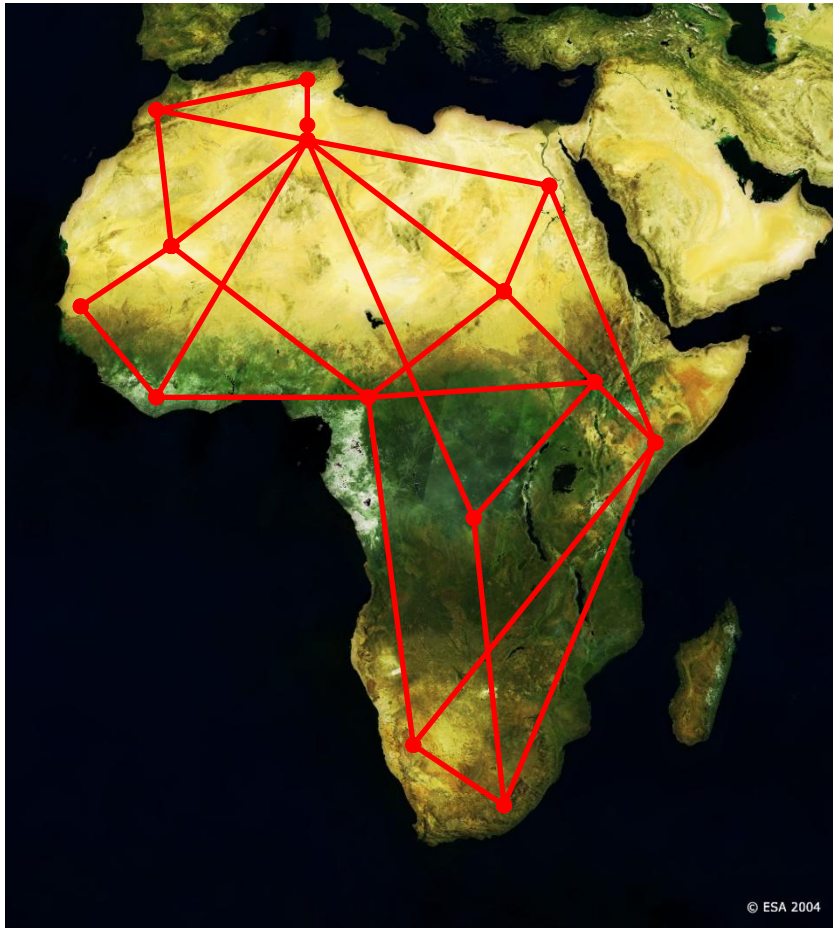
African Monitoring for Environment and Sustainable Development (EC)

- **Water Resource Management, (CEMAC, CICOS, RDC)**
- **Water Management for Cropland and Rangeland Management (ECOWAS, AGRHYMET, Niger)**
- **Agricultural & Environmental Resource Management (SADC, Meteorological Service, Botswana),**
- **Land Degradation, Mitigation & Natural Habitat Conservation (IGAD, ICPAC, Kenya)**
- **Marine & Coastal Management (IOC, MOI, Ile Maurice)**





TIGER: Water Information & Knowledge Network



TIGER involves more than 200 African experts (universities, technical centers, water authorities)

Actions dedicated to:

- Facilitate sharing of water knowledge, information and data;
- Support the development of common water research programs;
- Identify and promote best practices;



SERVIR-Africa and SERVIR-Himalaya

Firefox
 http://www.servir.net/africa/

SERVIR

HOME | DATA & SERVICES | TOOLS & MODELS | LIBRARY | COMMUNITY | ABOUT US

The SERVIR-Africa website is under development.
 Over the next few weeks, we will continue to add new content and functionality. Please check back soon or [subscribe](#) to receive notification of changes.

Coming Soon - Online Map Tools

Featured Map: **SERVIR-Viz Climate Mapper**
 Eclunze: SERVIR
 Date: Future decadal scenarios

Latitude: 0.0000, Longitude: 35.0000

Average Annual Change in Precipitation (DJF) = +13.9
 Average Annual Change in Precipitation (JFM) = -2.1
 Average Annual Change in Precipitation (JFMJ) = +16.7

Average Change in Precipitation for 2011 (data by Month)

SLRVIR Mission
 Enabling the use of Earth observations and predictive models for timely decision making to benefit society

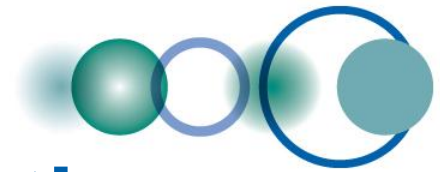
Latest Community News

- [United States Approves Disaster Relief for 2012](#)
- [Launch of a Global Soil Information Service \(GSIS\)](#)
- [Value of the Earth Observations for Agricultural Decision Making](#)
- [Africa's High-Speed Rail Line: Implications for Local Needs](#)
- [Uganda's New Constitution: Servir Supports Gender Equality Provisions](#)

Latest SERVIR News

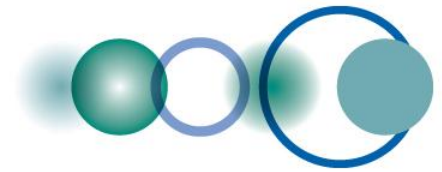
- [Introduction to SERVIR-Africa Tool](#)
- [SERVIR-Africa Launches at EARTS](#)
- [East and Southern African and Southern Asia Regional Hub](#)
- [SERVIR-Africa: A New Era of Earth Observations](#)
- [SERVIR-Africa News: Members in Virtual Africa 2012](#)





AfriGEOSS: Priority Objectives

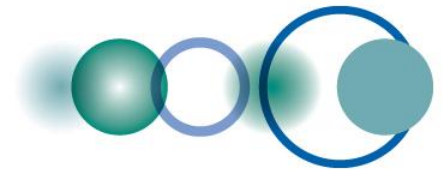
- **Coordinate infrastructure pilot projects**
 - African Resources and Environmental Management Constellation (ARMC)
 - AfricaGeoSat-1 Project
 - African Monitoring of the Environment for Sustainable Development (AMESD) and Monitoring of Environment and Security in Africa (MESA)
- **Coordinate application pilot projects**
 - African Water Cycle Initiative
 - Global Forest Observations Initiatives (GFOI)
 - The Meningitis Risk and Information Technology project (MERIT)
 - GEO-GLAM
 - Bio-Energy Atlas for Africa
- **Promote data democracy and data sharing**



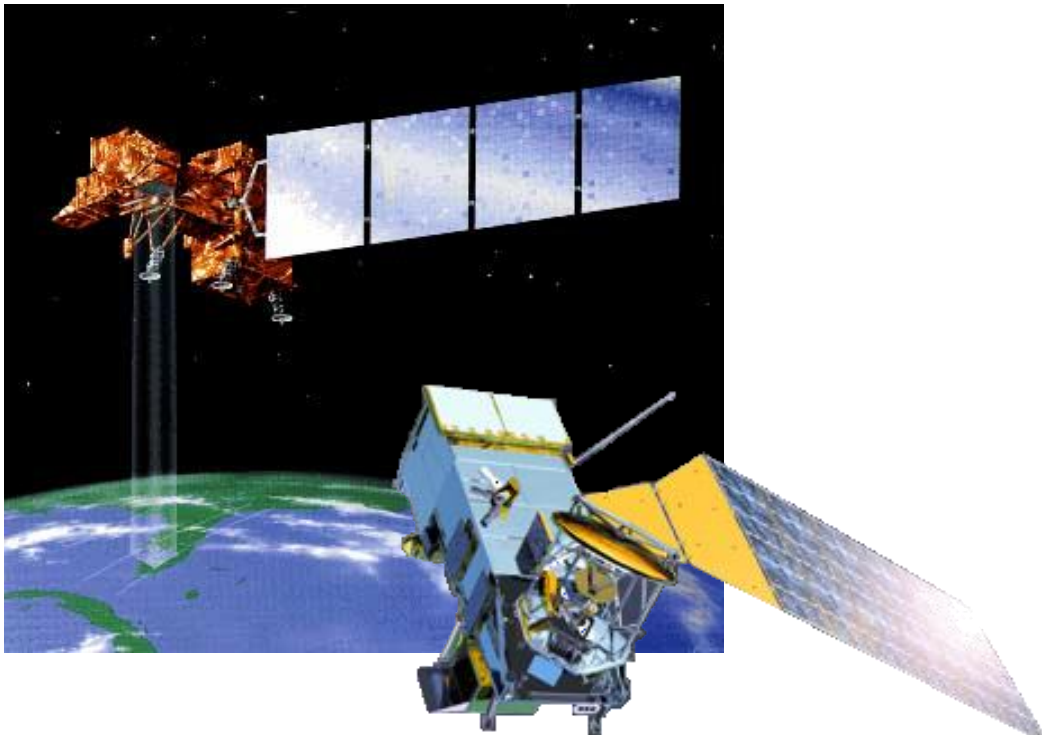
Pillar #2: Open Data Access, the Challenges for GEO

- Full and Open Exchange of Data, recognizing Relevant International Instruments and National Policies
- Data and Products at Minimum Time delay and Minimum Cost
- Free of Charge or minimal Cost for Research and Education

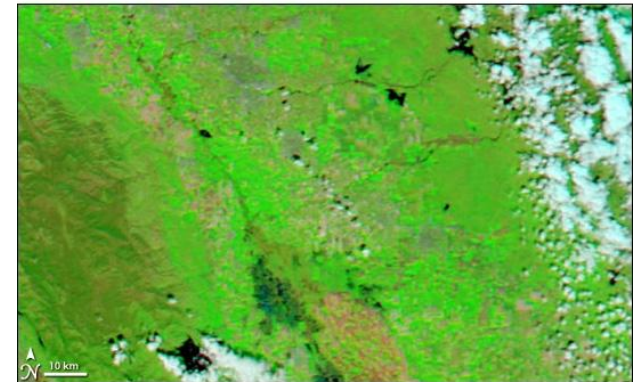




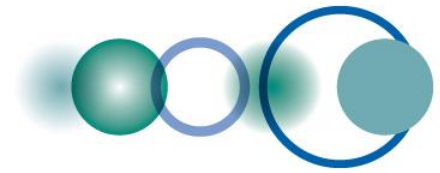
Preserve Free and Open Access to Satellite Observations



April 13, 2006



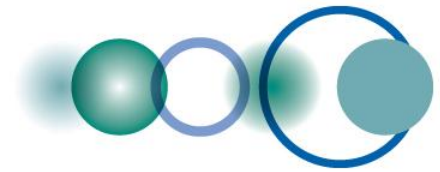
March 19, 2006



Pillar #3: Political Visibility, the Challenges for GEO



▲第2回地球観測サミット参加者集合写真



G8-2008



“...we will accelerate efforts within the Global Earth Observation System of Systems (GEOSS), ... in priority areas, inter alia, climate change and water resources management, by strengthening observation, prediction and data sharing. ... capacity building for developing countries ... interoperability and linkage ...”

The G20 Agriculture Priority (2011)



G20 Final Declaration

44. We commit to improve market information and transparency in order to make international markets for agricultural commodities more effective. To that end, we launched:
- The "Agricultural Market Information System" (AMIS) in Rome on September 15, 2011, to improve information on markets ...;
 - The "**Global Agricultural Geo-monitoring Initiative**" (**GEO-GLAM**) in Geneva on September 22-23, 2011. This initiative will coordinate satellite monitoring observation systems in different regions of the world in order to enhance crop production projections and weather forecasting data.

**Ensure GEOSS
Presence
at RIO+20!!!**

