



GEO Agricultural Monitoring Task and the G20 GEO-GLAM Initiative

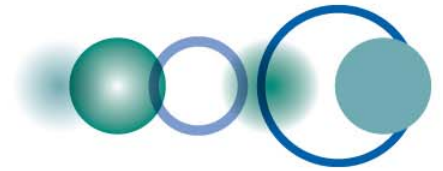
Chris Justice

GEO AG-07-03 Task Co-Lead

University of Maryland

Sept 22 2011

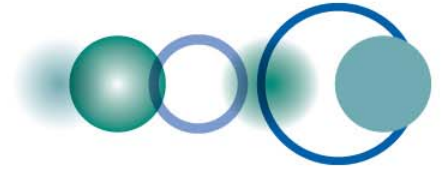




GEO, the Group on Earth Observations

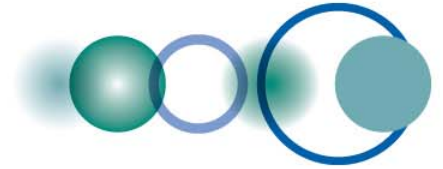
An Intergovernmental Organization with 87 Members
and 61 Participating Organizations



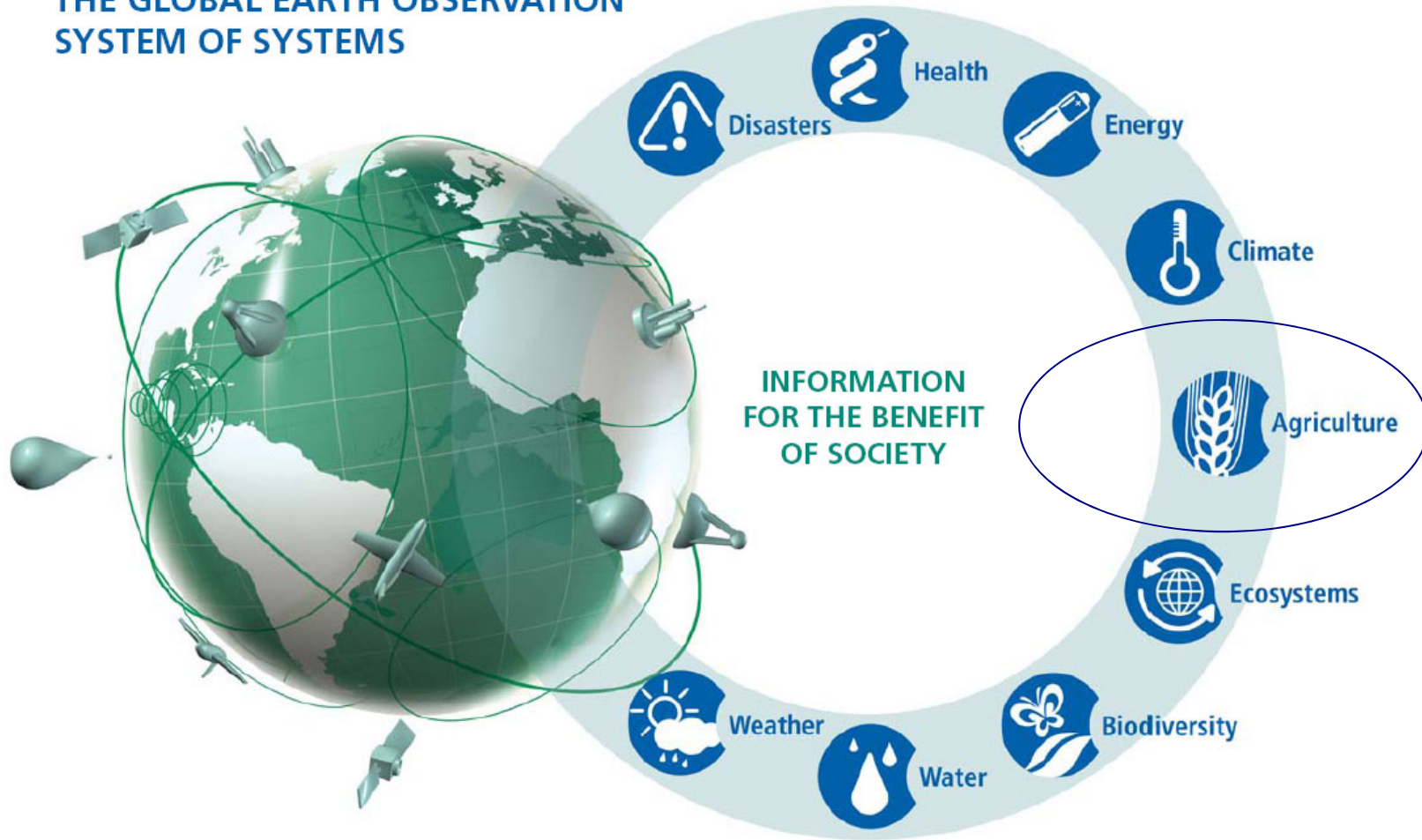


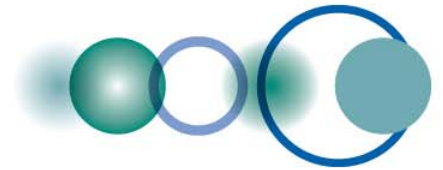
The Vision for GEOSS...

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



THE GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS





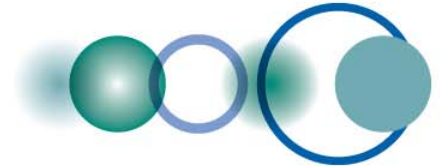
The GEO Agriculture Task– established in 2007

Fostering increased communication, sharing of experience and engaging institutions in building capacity around the world... through a coordinated Community of Practice (COP)

A multilevel approach:

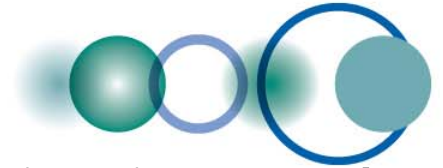
- **Enhance current monitoring capabilities**
- **Help build national monitoring capacity where none is available or improvement is required**
- **Advocating and ensuring free access to reliable, relevant and spatialized data (space and ground)**

The major challenge...creating an operational global monitoring system of systems and ensuring its sustained operation



GEO Ag 1 Task Organization

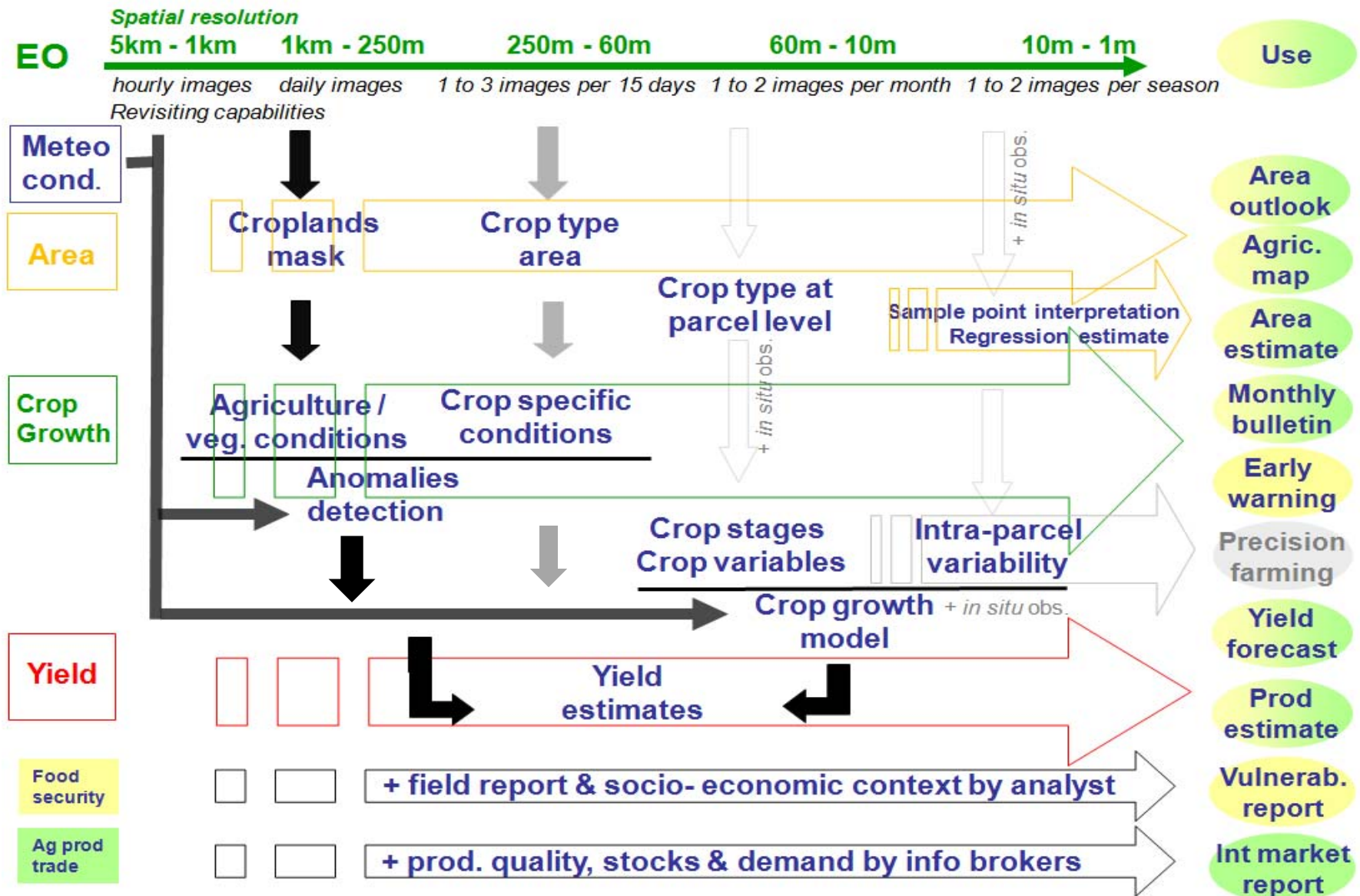
- **GEO Secretariat AG 1 POC** – Joao Soares (Geo Sec, Brazil, INPE)
- **Task Co-Chairs** – Chris Justice (USA, UMD), Olivier Leo (EU, JRC), Wu Bingfang (China, IRSA), Derrick Williams (USA, USDA FAS)
- **Task Secretariat** – Jai Singh Parihar (India, ISRO)
- **Major Sub-task Leads:**
 - JECAM - Ian Jarvis (Canada, Agric and Agrifood) and Pierre Defourny, (Belgium UCL)
 - Production Acreage and Yield Database – Inbal Becker-Reshef (USA, UMD), Meng Jihua (China, IRSA)
 - Global Agricultural Land Use Mapping – Steffen Fritz (Austria, IIASA)
 - Rangeland Production – Mike Grundy (Australia, CSIRO)



The AG01 Task: Global Agricultural Monitoring and Early Warning

- Major Focus Areas of the Task:
 - A global operational monitoring system of systems for Agricultural Production (e.g. USDA FAS, EU MARS, China Cropwatch, FAO GIEWS)
 - Famine Early-Warning Systems and Food Security (e.g. USAID FEWSNet, JRC MARS, FAO GIEWS)
 - GEO African Ag Capacity Building for Ag. Monitoring
 - **Agricultural Land-use Change and Climate (w. GOFC/GOLD)**

Crop Monitoring and Famine Early Warning



Defourny et al 2010

JECAM: Joint Experiments on Crop Assessment and Monitoring



JECAM initiated at the GEO Task Workshop in Beijing 2009

Further developed at Kananaskis Workshop 2009 – Canada JECAM Leadership: Ian Jarvis (Ag Canada)

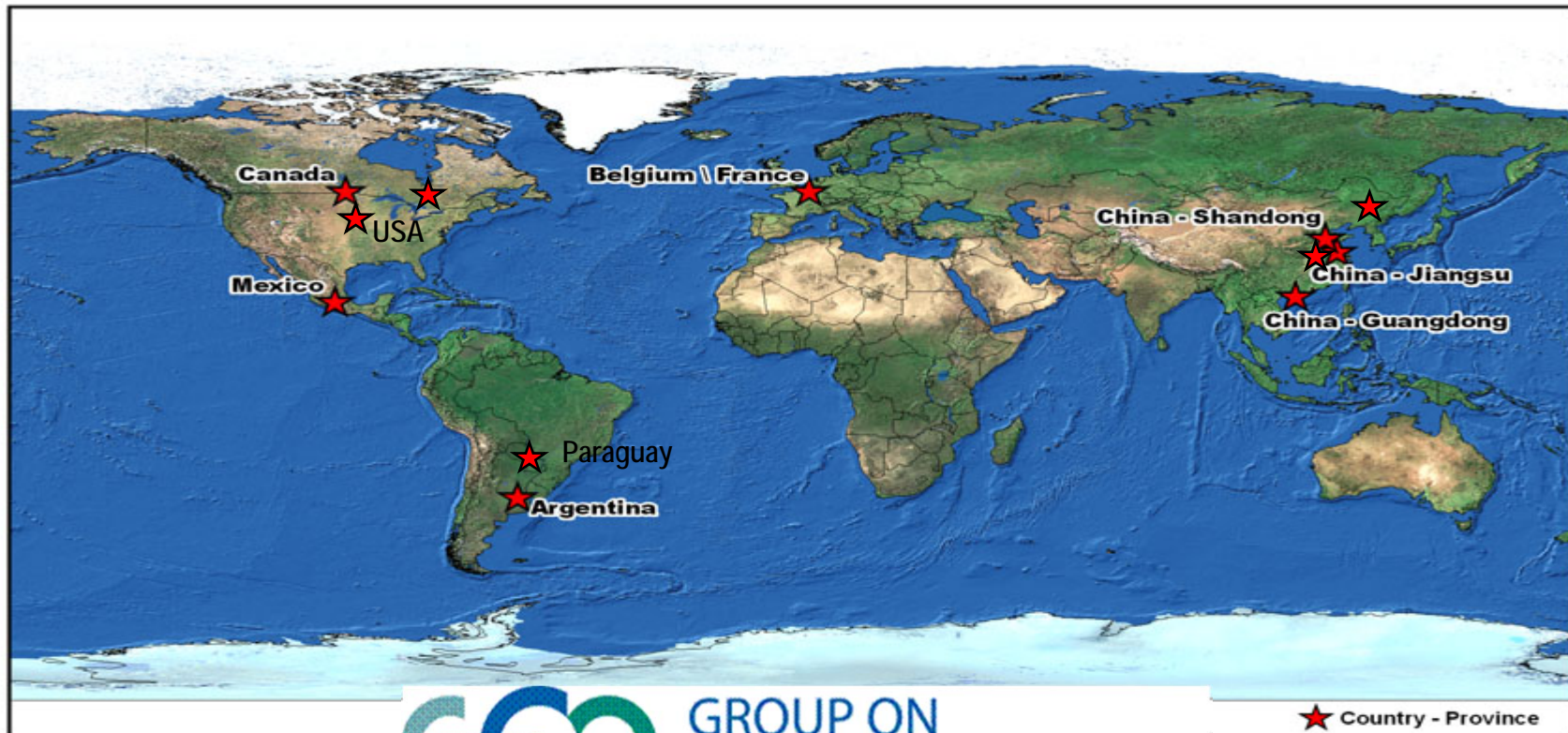
Concept: a series of research supersites over a range of different cropping systems to focus data acquisition and sharing and method testing and comparison

- GOAL: to facilitate the inter-comparison of monitoring and modeling methods, development of new satellite products, accuracy assessments, data fusion and product integration for agricultural monitoring
- Exercise the GEO Data Policy through CEOS
- Synthesis of the results from JECAM will enable:
 - development of international standards for monitoring and reporting protocols
 - a convergence of the approaches to define best practices for different agricultural systems
 - identify requirements for future EO systems for agricultural monitoring.

JECAM

Joint Experiment for Crop Assessment and Monitoring

- JECAM activities are being undertaken at a series of study sites which represent the world's main cropping systems and agricultural practices.
- 12 sites currently exist. Additional sites will be added to meet science objectives and ensure all major crop systems are addressed.



GROUP ON
EARTH OBSERVATIONS

JECAM

Joint Experiment for Crop Assessment and Monitoring

Example of
Radar Data
Requested
From
Space
Agencies
for each
Study Site

Mission Instrument: Type:	Polar.	Mode (Viewing Angle Range)	Swath(k m)	Spatial Resol.
Radarsat-2 Inst: SAR Active: C-Band Note (1)	Single	Ultra-Fine	20	3 m
	Single	Wide Ultra-Fine	50	3 m
	Single	Multi-Look Fine	50	8 m
	Single	Wide Multi-Look Fine	90	8 m
	Single or Dual	Fine	50	8 m
	Single or Dual	Wide Fine	150	8 m
	Single or Dual	Standard	100	25 m
	Single (HH only)	Extended High	75	25 m
	Single (HH only)	Extended Low	170	25 m
	Single or Dual	Wide	150	30 m
	Single or Dual	ScanSAR Narrow	300	50 m
	Single or Dual	ScanSAR Wide	500	100 m
	Quad	Fine Quad-Pol	25	8 m
Quad	Wide Fine Quad-Pol	50	8 m	



PAY:

The Production Area Yield
Common Online Database
(Inbal Becker Reshef, Meng
Jihua)

PAY Web Interface

The screenshot displays the PAY (Production Area Yield) Web Interface. The browser address bar shows the URL: <http://www...>. The page title is "THE PAY - Production Area Yield Database".

Navigation and Search: The top navigation bar includes "File", "Edit", "View", "Favorites", "Tools", and "Help". A search bar with the Google logo and a "Search" button is present.

Database Overview: The page features a banner with the GEO logo and the text "THE PAY - Production Area Yield Database" and "A GEO Global Agriculture Community of Practice Initiative". Below the banner are several small images related to agriculture.

Navigation Links: "About The PAY Initiative", "About PAY Data Sources", and "Contact Us" are visible.

Section: PAY: Production Area Yield Database -- About PAY

[Back to PAY Database](#)

PAY - a Production, Acreage, Yield multi-source online database Initiative

PAY, is a Group on Earth Observations (GEO) Agriculture Community of Practice (CoP) in comparing between production, area and yield crop statistics generated by various agencies.

At present four different groups generate agricultural statistics on a regular basis for multiple Research Center - Ispra MARS (Monitoring Agricultural Resources) Unit, IRSA (Institute of the UN FAO (Food and Agricultural Organization) Global GIEWS (Global Information and Early Warning System) these programs are a critical factor in determining global commodity prices and identifying trends. Comparisons between crop statistics generated by these agencies, the participants decided to create a database of Production, Area, and Yield (PAY). This PAY database will enable identification of level crop statistics, providing a convergence of evidence for similar statistics and helping to identify where statistics differ significantly. Initially the database will be populated with national statistics and will later be expanded to include statistics from individual countries.

The Group on Earth Observations (GEO) Agricultural Monitoring Community of Practice

The GEO Agricultural Monitoring Community of Practice (CoP) is comprised of representatives from the world that are involved in agricultural monitoring. The CoP includes producers and/or users of crop location, crop area and crop growth conditions, all with a common interest in cost-effective access, data and products which adhere to predefined standard and validation procedures.

The primary task for the community of practice is to identify priorities for improving global agricultural monitoring and for the member organizations to implement these improvements. The Community of Practice will develop strategies and approaches for realizing a Global Earth Observing System of Systems. A number of near-term tasks have been identified and are organized under four initiatives on Production, Area, and Yield (PAY) online database. The other initiatives are:

- The JECAM - Joint Experiments on Crop Assessment and Monitoring Initiative
- The CDIGAM Initiative - Coordinated Data Initiatives for Global Agricultural Monitoring
- The GTWS - a Global Agricultural Monitoring system of Systems (GLAMSS) Thematic Initiative

[Back to PAY Database](#)

Links:
[GEO Agriculture CoP](#)
[GEO](#)

Logos: GEO GROUP ON EARTH OBSERVATIONS, UNIVERSITY OF MARYLAND, GLAM Global Agriculture Monitoring.

Query Options:

Agency/Unit: (ALL), CAS CropWatch, EUROSTAT, FAO, JRC MARS, USDA

Commodity: (ALL), Corn, Oilseed, Soybean, Rice, Paddy, Wheat

Country: (ALL), Afghanistan, Albania, Algeria, Angola, Antigua And Barbuda, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bangladesh

Market Year: (ALL), 2005-2006, 2006-2007, 2007-2008, 2008-2009, 2009-2010, 2010-2011, 2011-2012

Date of Forecast: (ALL), January, February, March, April, May, June, July, August, September, October, November, December

Data Type: (ALL), FORECAST, REPORTED

*Tip: Hold down **ctrl** to select more than one item in a box.*

Order Rows By: Country (asc), Commodity (asc), Market Year (asc), Date of Forecast (asc), Agency (asc), (Not Set)

Show Agencies Side-by-side? No

Include Columns: Production , Area , Yield

Buttons: Perform Query (Text), Perform Query (Graph), Reset Query

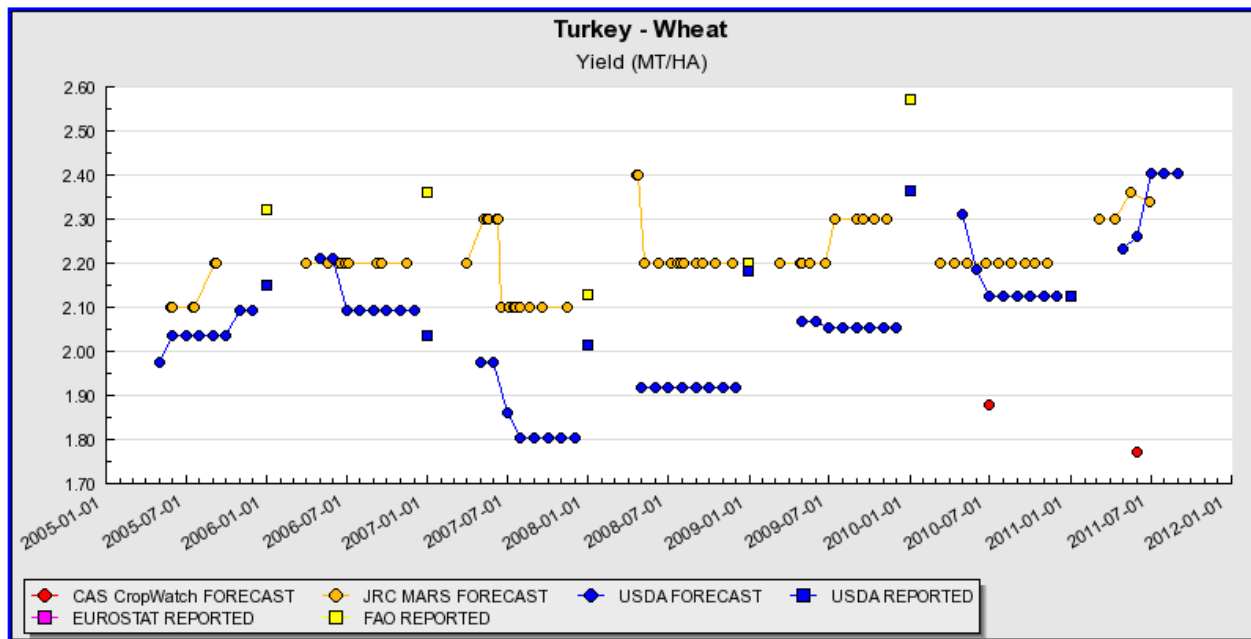
Query Results

Important Note: This is a preliminary, unofficial version of the PAY website. All numbers published on this website are unofficial. It is requested that users [read about the data sources](#) before using the data.

Graphing functionality

- Squares indicate official statistics
- Circles indicate in-season estimates

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Links:

[GEO Agriculture CoP](#)
[GEO](#)

GEO Ag 0703 CoP Brochure

Global Agriculture Monitoring

Seguimiento global de la Agricultura

شاملة زراعة مونتيتور

Globales Landwirtschaftliches Monitoring

ग्लोबल एग्रिकल्चरल मॉनिटरिंग

Monitoramento global da Agricultura

ניסור חקלאות גלובלי



Surveillance globale de l'Agriculture

Глобальный сельскохозяйственный мониторинг

全球农业监测

Σφαιρική Αγροτική Παρακολούθηση

Monitoraggio Globale dell'Agricoltura

Global Agricultural Monitoring Community of Practice (GEO Task AG-07-03a)



to provide an overview of the GEO Global Agricultural Monitoring Community of Practice (GEO AG-07-03). The Monitoring Task addresses four primary themes: crop production, early warning, agricultural land use change, and impact assessment. It also addresses directly the applications at the individual farmer level for monitoring for precision farming or controls in various purposes.

The monitoring systems presented in this brochure are a part of the GEO Agricultural Monitoring Community of Practice. Many organizations, not mentioned in this brochure, have set up systems for crop monitoring and production forecasting. For example, AGRHYMET in west Africa and SADC in Southern Africa have set up systems for Early Warning.

A number of private companies offer various services concerning Agricultural Monitoring in Europe and North America.

G20 Agriculture and Price Volatility



Ministerial Declaration

ACTION PLAN ON FOOD PRICE VOLATILITY AND AGRICULTURE

Meeting of G20 Agriculture Ministers
Paris, 22 and 23 June 2011

1. We, the G20 Agriculture Ministers, meet today to address the issue of food price volatility with the ultimate objective to improve food security and agree on an "Action Plan on food price volatility and agriculture" that will be submitted to our Leaders at their Summit in November 2011.

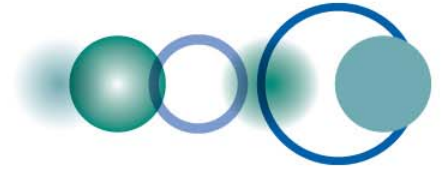
2. Food security will remain a critical issue for the international community. In order to tackle the food security challenge, important commitments and actions have been taken, in particular at the L'Aquila Summit, the 2009 World Food Summit in Rome and the G20 Summits. All countries have stressed the need for improved and more effective agricultural policies at the global and national levels, better international coordination and concrete implementation of political commitments to promote food security and sustainable agricultural production. They have achieved a wide consensus and made progress in reforming the Committee on World Food Security (CFS), implementing the Global Partnership for Agriculture, Food Security and Nutrition and, for those involved, carrying out the L'Aquila Food Security Initiative.

3. The situation is still worrying, especially in developing countries, and many challenges remain. World population is projected to reach more than 9 billion by the middle of this century. Much of this increase is projected to occur in developing countries which currently face the greatest level of food insecurity. In this regard, we recall our commitments to support the Five Rome Principles for Sustainable Global Food Security presented at the World Summit on Food Security in November 2009.

4. We reaffirm the right of everyone to have access to safe, sufficient and nutritious food, consistent with the progressive realization of the right to adequate food in the context of national food security. To strengthen global food security, steps must be taken to improve access and availability of safe and nutritious food for the most vulnerable, particularly women and children in developing countries, through for instance national food security programs.

1/24

- A detailed Action Plan, incl. 2 initiatives to increase market transparency
 - *Agricultural Market Information System (AMIS) by FAO + WB, IFPRI and all*
 - *Global Agriculture Monitoring (GEO GLAM) by GEO Community of Practice*



G20 Agricultural Monitoring Initiative

“ We, the G20 Agriculture Ministers, meet today to address the issue of food price volatility with the ultimate objective to improve food security and agree on an “Action Plan on food price volatility and agriculture” that will be submitted to our Leaders at their Summit in November 2011.”
(introduction of the “G20 Agriculture Action Plan”, June 2011)

our response prompted by the French Ministry of Agriculture was a proposal to implement the GEO Agricultural Production Monitoring Task

GEO GLAM

the proposal was accepted with a partner proposal from FAO addressing stocks, markets and prices with a focus on reducing market volatility

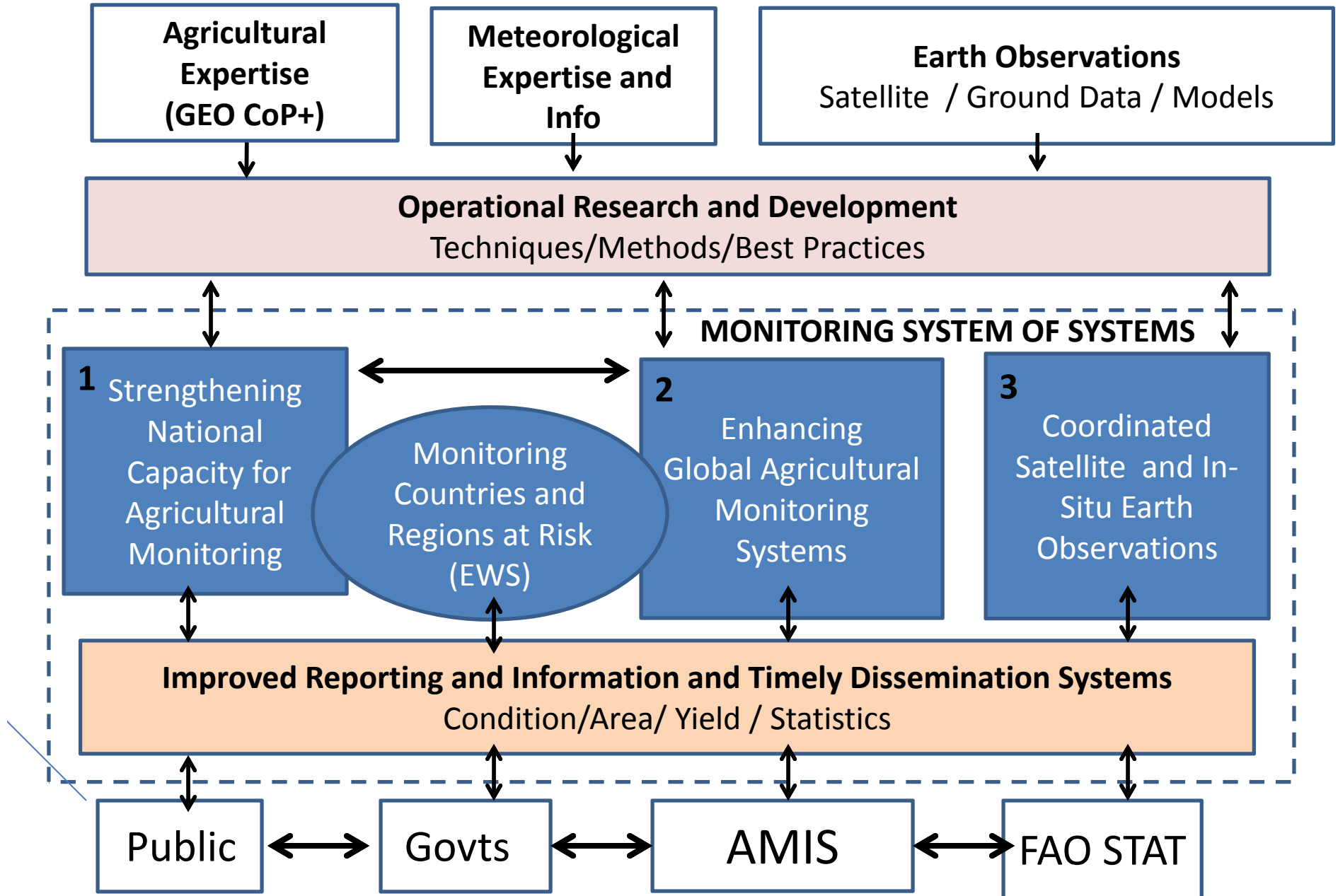
Agricultural Market Information System (AMIS)

GEO-GLAM Components

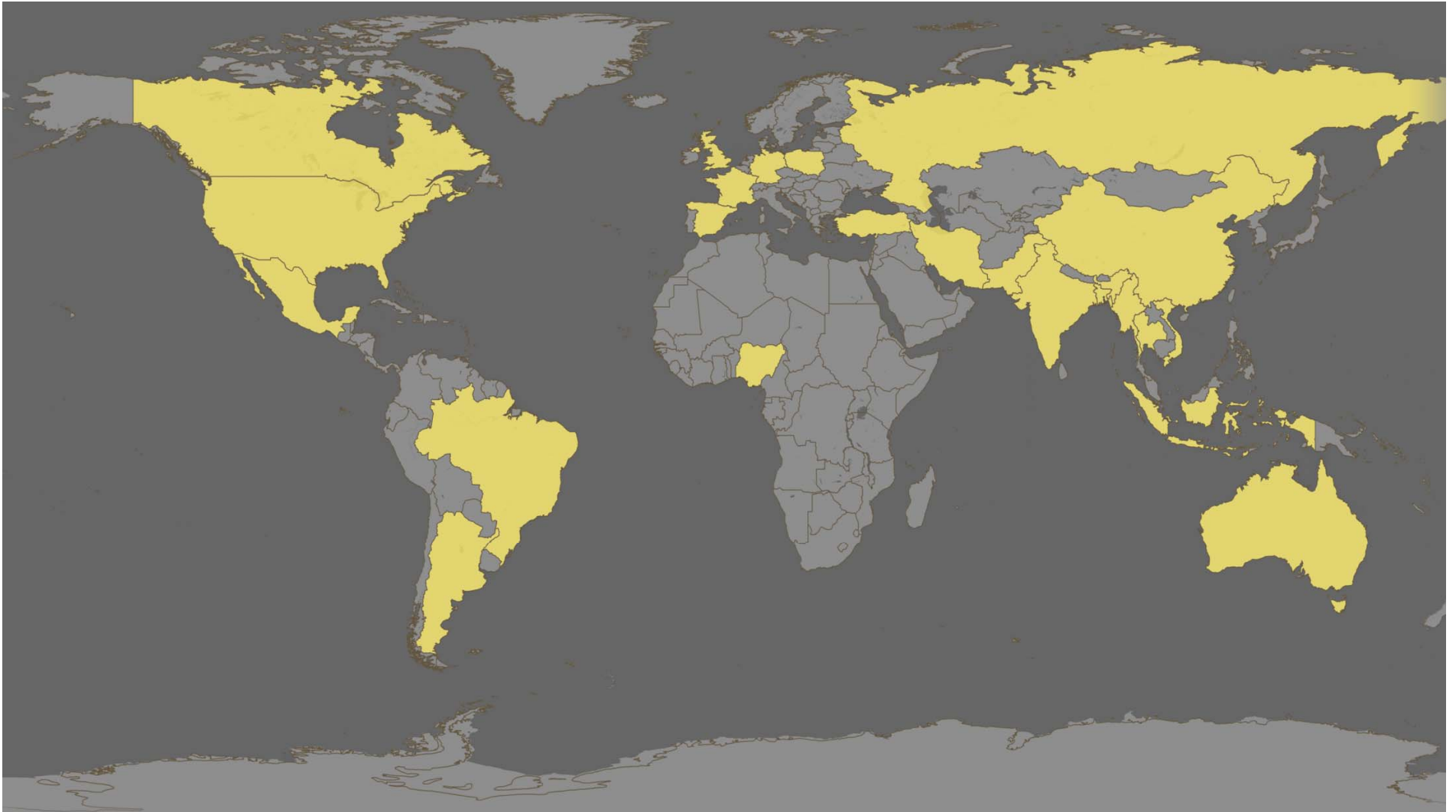
Four components are envisioned for GEO-GLAM:

- 1. Improving Global Agricultural Monitoring Systems with a focus on :**
 - a) Large Producer/Exporter Countries**
 - and**
 - b) Countries at Risk**
- 2 Enhancing National and Regional Capacity for Agricultural Monitoring and the timely dissemination of monitoring results**
- 3 Improving availability, access to, timeliness and use of EO data for agricultural monitoring (Satellite, In-situ and EO parameterized Models)**
- 4 Undertaking innovative Research and Development in support of Operational Monitoring Systems**

GEO-GLAM Components



25 Countries producing over 80% of world crops

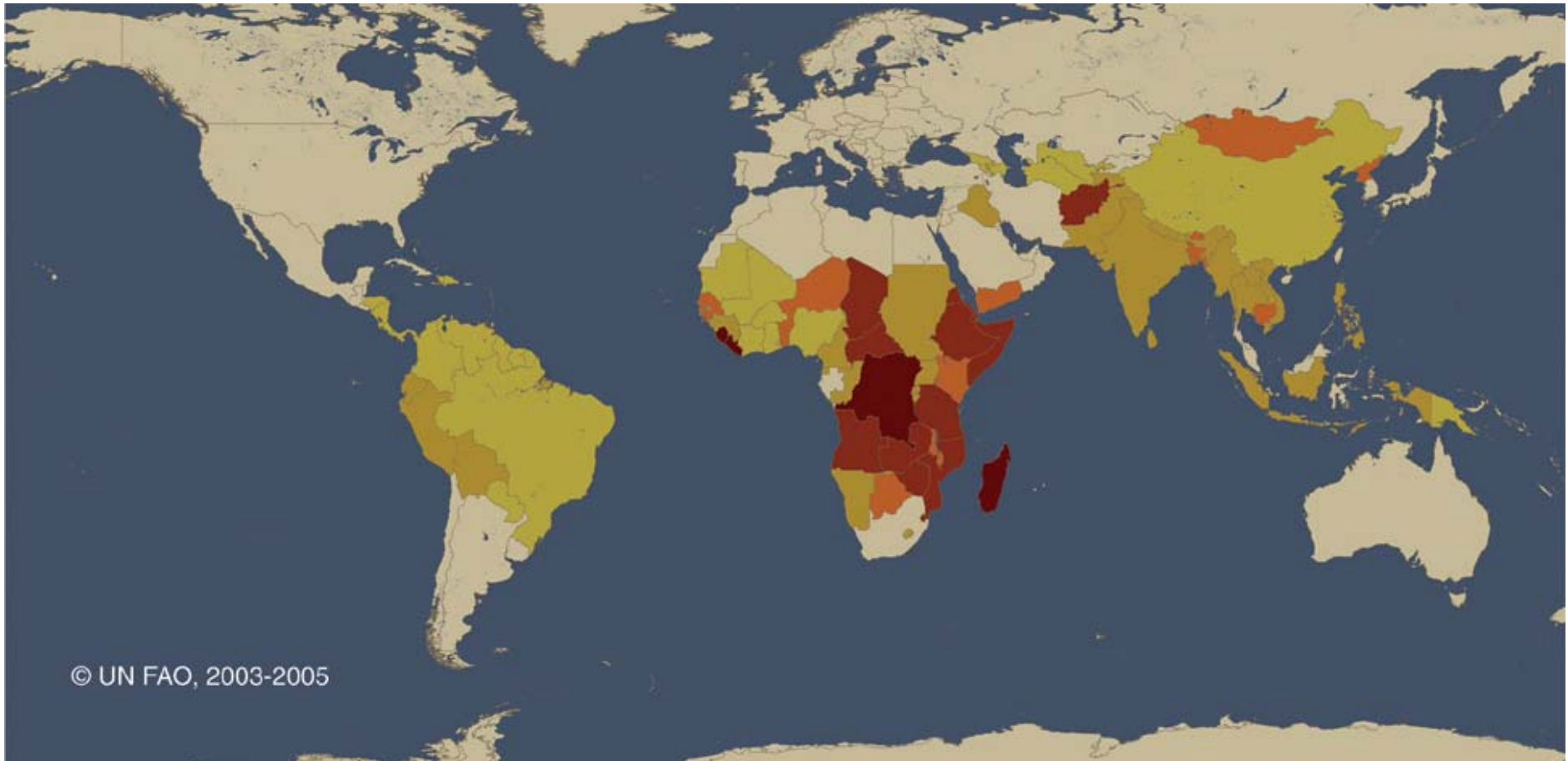


Improving Global Agricultural Monitoring Systems

- For Major Producer/Exporter * Countries
 - Better input data: cropland area, crop type area
 - Improved seasonal forecasting
 - Improved area estimates
 - Better rainfall, soil moisture, crop condition info
 - Improved area estimation
 - Improved crop growth models
 - More timely and improved yield forecasts
 - Timely dissemination, traceability and transparency of information

* Focus on major crops – Corn, Wheat, Soybean, Rice

22 Countries in protracted food crisis



0 5 15 25 35 50 100

Percent of Population by Country with insufficient Food

Improving Global Agricultural Monitoring Systems

- For Countries at Risk
 - Improved rainfall and soil moisture information
 - Improved information on crop condition
 - Timely access to satellite and ground observations
 - Near real-time monitoring of disasters (drought, flooding, pests)
 - Improved field reporting and vulnerability mapping (including current socio- economic conditions)

Enhancing National Capacity for Agricultural Monitoring

- For priority targeted * countries (TBD) and
 - Up-to-date cropland area mapping
 - Robust area frame sampling design
 - Improved rainfall estimation and soil moisture conditions
 - Improved estimation of area planted
 - Crop type and condition monitoring
 - Improved yield estimation
 - The timely and transparent dissemination of monitoring results and statistics
- For interested national entities - capacity building by request

* e.g. countries with poor reporting system and countries with larger year-to-year fluctuation in cropped area and/or production – feasibility,

Improving availability, access to, timeliness and use of EO data for agricultural monitoring

- **Satellite observations** (working with CEOS and Private Industry)
 - **Examples of coordination activities**
 - Coordinated International Moderate Resolution acquisition strategy
 - Coordinated International Fine-resolution sampling strategy
 - Coordinated global network of Geostationary sensing systems
 - **Examples of improved products and services**
 - Global crop type mapping
 - Global irrigated systems data suite
 - Timely global information on crop condition
 - Improved rainfall, soil moisture, reservoir height data
 - Improved Near Real-Time data access
 - Improved Inter-use of multi-source data
 - Standardization of pre-processing and products
- ***Free and open data policies for GEO-GLAM data***

Improving availability, access to, timeliness and use of EO data for agricultural monitoring

- **Ground Information**

- Improved distribution of rainfall data collection and improved data access
 - Expanded rain gauge network in sub-saharan Africa
 - especially focusing on countries at risk
- Robust area- frame sample designs
- Improved availability and distribution of field information on
 - Area planted + yield (statistics year n-1),
 - Fertilizers and Inputs
 - NRT network on crop condition, diseases and pest

Improving availability, access to, timeliness and use of EO data for agricultural monitoring

- **EO-Driven Models: improved:**
 - seasonal and weather forecasting for agricultural areas
 - models of evapo-transpiration and water availability
 - yield estimation models (inc. EO parameters)
 - use of EO in Agrometeo Models,
 - EO indicators/predictors

CANNES SUMMIT FINAL DECLARATION

- **"BUILDING OUR COMMON FUTURE: RENEWED COLLECTIVE ACTION FOR THE BENEFIT OF ALL"**
- 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. It will enhance the quality, reliability, accuracy, timeliness and comparability of food market outlook information. As a first step, AMIS will focus its work on four major crops: wheat, maize, rice and soybeans. AMIS involves G20 countries and, at this stage, Egypt, Vietnam, Thailand, the Philippines, Nigeria, Ukraine and Kazakhstan. It will be managed by a secretariat located in FAO;
 - The "Global Agricultural Geo-monitoring Initiative" 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.

Current Status of GEOGLAM

- GEO Plenary - Program Launch (Istanbul next week)
- Developing the Implementation Plan (Nov/Dec)
- Broadening institutional participation (>June 12)
 - National Input and Review
 - Strategic Partnerships – FAO, WMO
- Developing the funding (> June 12)
- Program Outreach and Feedback Workshops (2012) - early implementation activities

GEO GLAM SE Asia

- China (engaged), Japan (interested in participating)
- **Need for greater SEA regional participation (identify potential interest)**
 - **Research Community**
 - Agricultural Land Use Change Expertise
 - Agricultural Remote Sensing Expertise
 - Crop Modeling Research Community
 - **Operational Agencies**
 - National Agricultural Ministries
 - Provincial Ministries
 - Land Use Mapping Agencies
- **SEA involvement in JECAM**
 - Additional JECAM Study Sites in SEA
 - Long term agricultural field sites
- **GEOGLAM Regional Workshops on Agricultural Monitoring**
 - Identify the community and national priorities