GROUP ON EARTH OBSERVATIONS

GEOGLAM Global Agricultural Monitoring

GEOGLAM
Global Agricultural Monitoring

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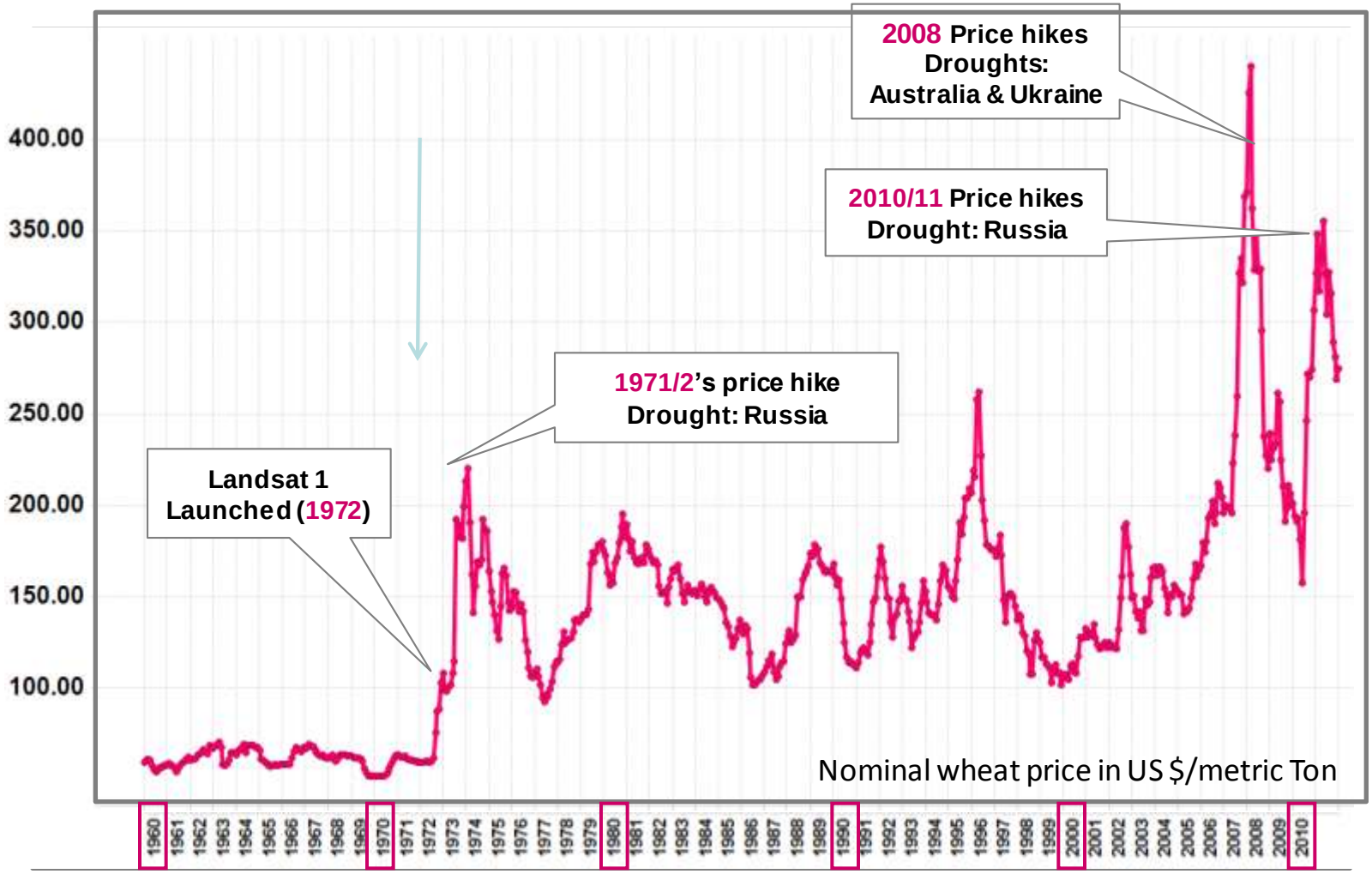
GEOGLAM Global Agricultural Monitoring

Recent volatility of Agricultural Prices *(1/2)*

Monthly Wheat Prices 1960-2011($/Metric Ton)

Source: World Bank



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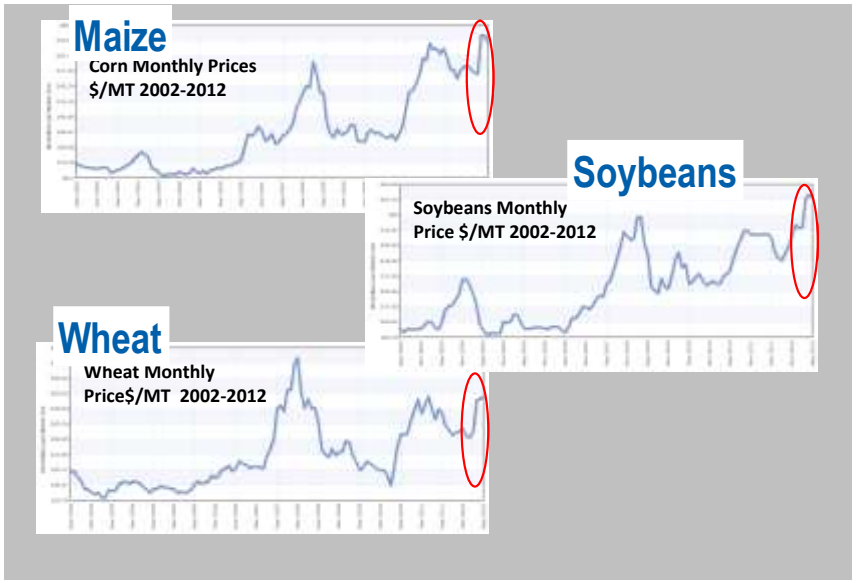
The G20 Agriculture Priority (2011)

Food price dynamics is not crop specific



Societal impact is worldwide

The G20 Agriculture Priority (2011)

G20 Final Declaration – Cannes, November 2011

- *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" (GEOGLAM)** 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…*

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2011: The G20 Agriculture Priority
GEOGLAM & AMIS

- *Two initiatives to increase information availability, quality and transparency :*

GEOGLAM : improve information on supply (GEO)

AMIS : improve information on markets (FAO)

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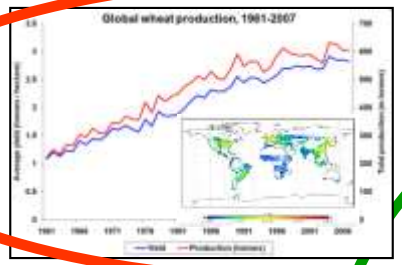
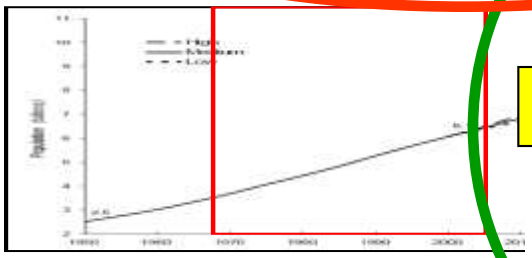
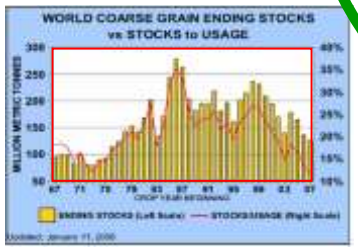
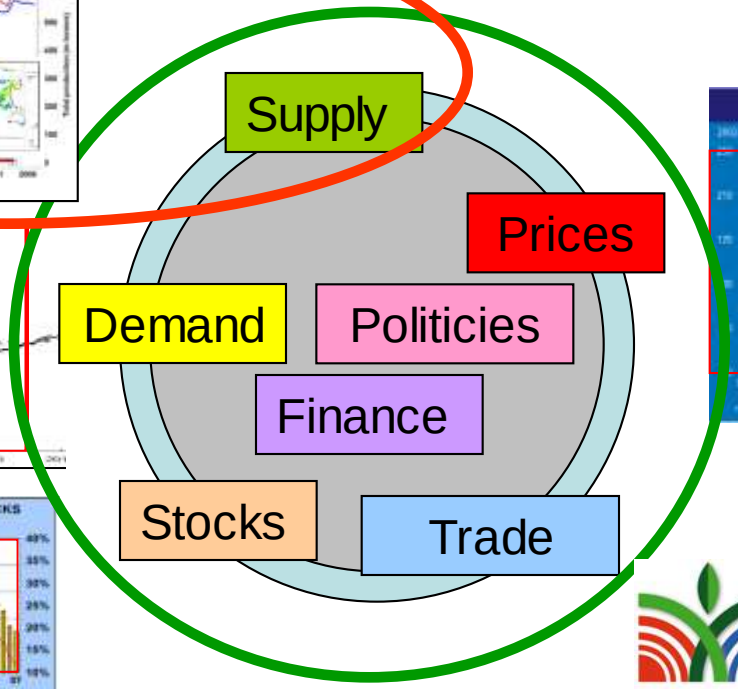








IGC

WFP wfp.org

UNITED NATIONS UNCTAD

UNITED NATIONS HLTF Food Security

IFPRI

AMIS Agricultural Market Information System

FAO

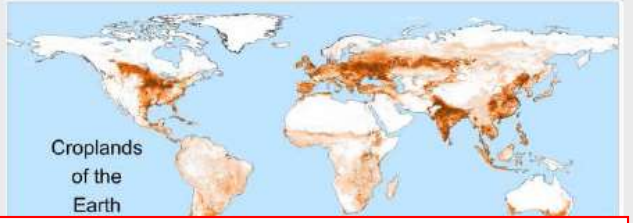
IFAD Enabling poor rural people to overcome poverty

OECD

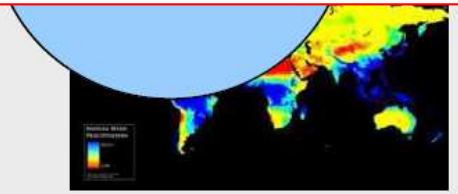
WORLD TRADE ORGANIZATION

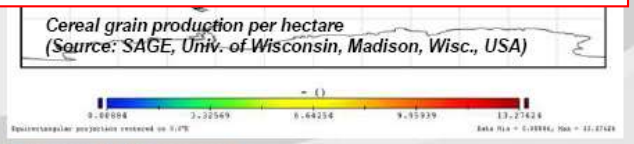
GEOGLAM Objectives

- To strengthen the international community's capacity to **produce & disseminate relevant, timely and accurate** information and forecasts on agricultural production at national, regional and global scales, through reinforced use of Earth Observations



GEOGLAM is a « coordination programme », aiming at
- supporting, strengthening and articulating existing efforts
- developing capacities and awareness at national and global level
- disseminating information





Crop yield forecast

GEOGLAM Initiative Structure

1. Global / Regional Agricultural Monitoring

main producer countries, main commodities

2. National Capacity Building

for agricultural monitoring using earth observation

3. Monitoring countries at risk

food security assessment

4. EO data coordination

5. Method improvement through R&D coordination (eg. JECAM)

6. Data products and information dissemination

GEOGLAM Actors
GEOGLAM Community of Practice

Open Community made up of international and national agencies concerned with agricultural monitoring including Ministries of Ag, space agencies, universities, & industry

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GEOGLAM Global Agricultural Monitoring

GEOGLAM Component #1
Global Agricultural Monitoring

GEOGLAM Crop Monitor as input for AMIS

- **Objective**
  - **to develop a transparent, timely, international, qualitative crop condition assessment in primary agricultural production areas highlighting potential hotspots of stress/bumper crops**
- **GEOGLAM Crop Monitor**:
  - an **international community process,** with **international and national agencies, coordinated by UMD, supported by NASA**
  - based on evidence from **near real time satellite, weather, agromet,** and **national expert assessments**
  - for **synthesizing and reviewing** data and information
  - and **establishing the consensus assessment**
  - **Results: a monthly 2-page synthesis note for AMIS Market Monitor**
    + detailed information and maps on GEOGLAM Crop Monitor Website

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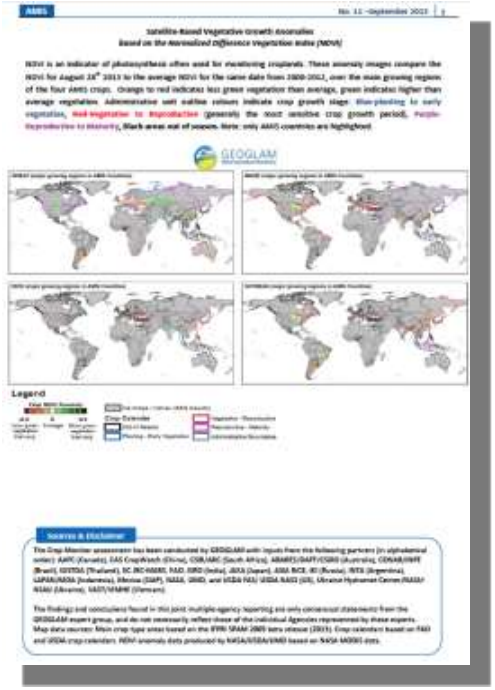
GEOGLAM Global Agricultural Monitoring

GEOGLAM Crop Monitor Current Status

- **June-July 2013**: **Prototyped crop outlooks** for review by AMIS
- **Sept. 2013**: Started **provision of routine Crop Monitor to AMIS**
- **Since Sept. 2013:** Regular **monthly reporting** and **refining tools and processes** for information collection, maps and synthesis



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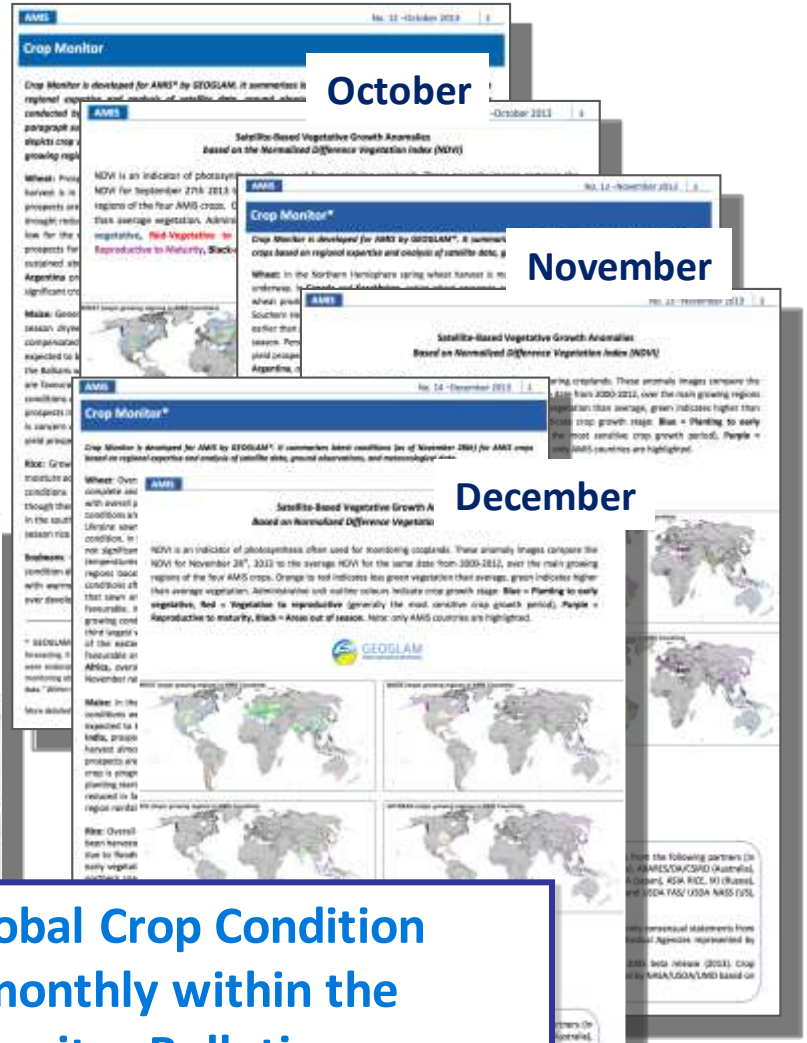
GEOGLAM Global Agricultural Monitoring

GEOGLAM Crop Monitor in AMIS Market Monitor

September 2013



Operational GEOGLAM Global Crop Condition Assessments published monthly within the G-20 AMIS Market Monitor Bulletin

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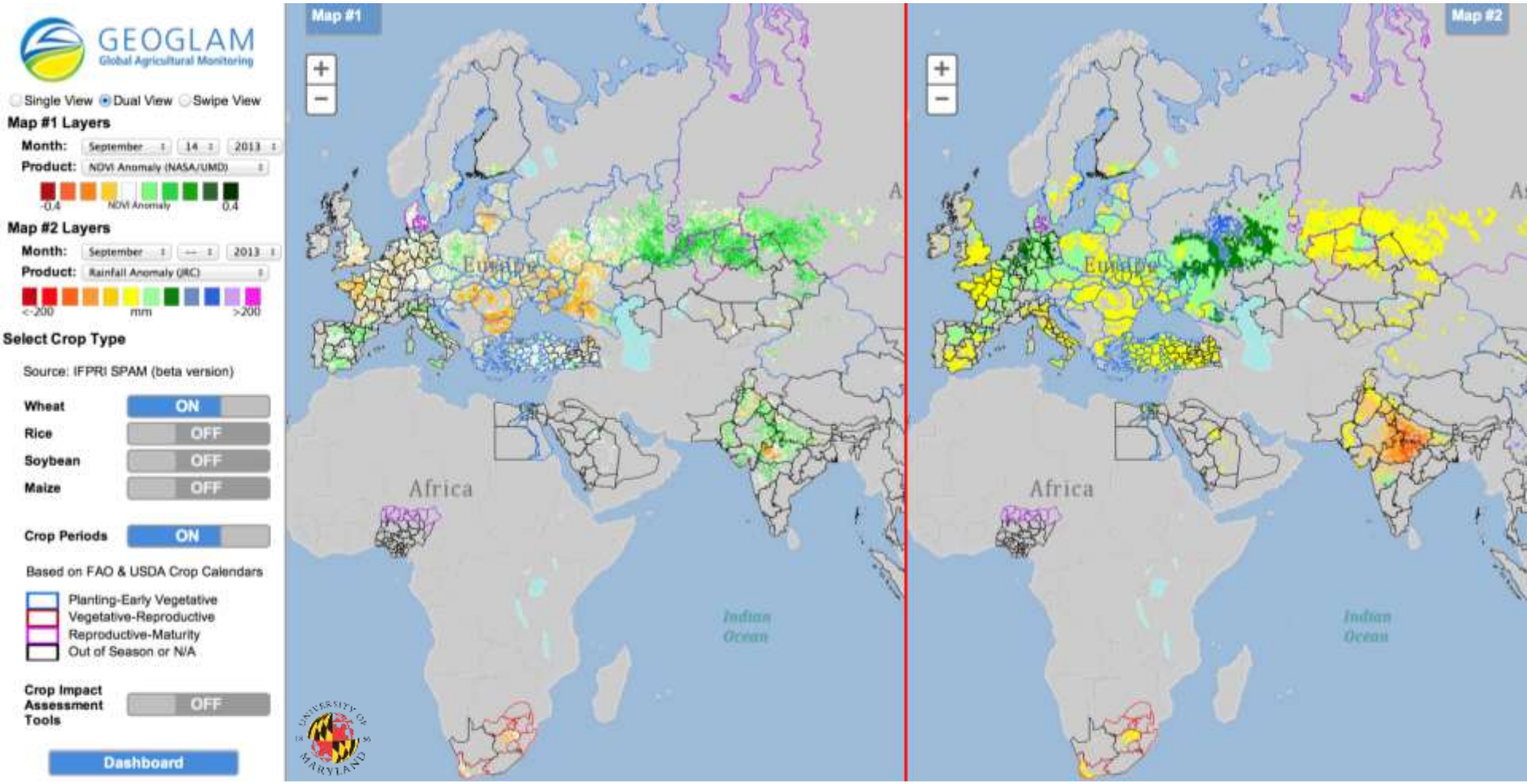
GEOGLAM Crop Monitor Assessment Interface



Enables comparison among relevant datasets (global, regional and national), by crop type and accounting for crop calendars; enables **crop condition labeling** and commenting to reflect **national expert assessments**

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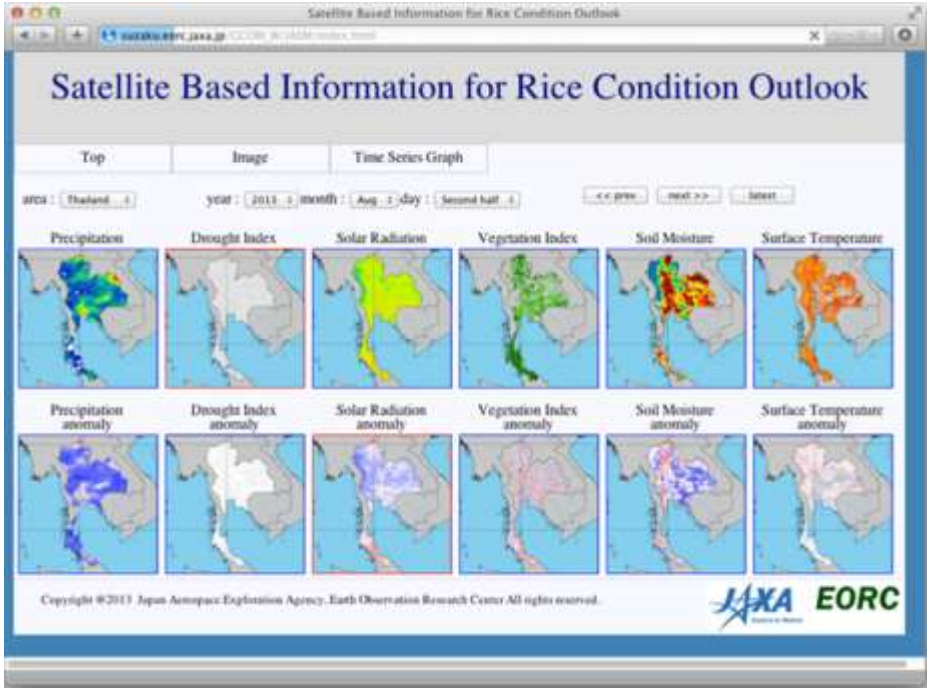
Asia-RiCE

Asia-RiCE – Asian Rice Monitoring

- **A multi-national project** led by Japan (JAXA), with collaborations in ASEAN+3 countries and India
- **A regional view** using agro-meteorological data derived from low resolution optical satellite imagery (MODIS, GCOM-W, TRMM and others)
- **A local view** to estimate rice crop area and production using available radar and other satellite data with ground observation data and statistical information (test-sites in Indonesia, Thailand and Vietnam)



http://www.asia-rice.org

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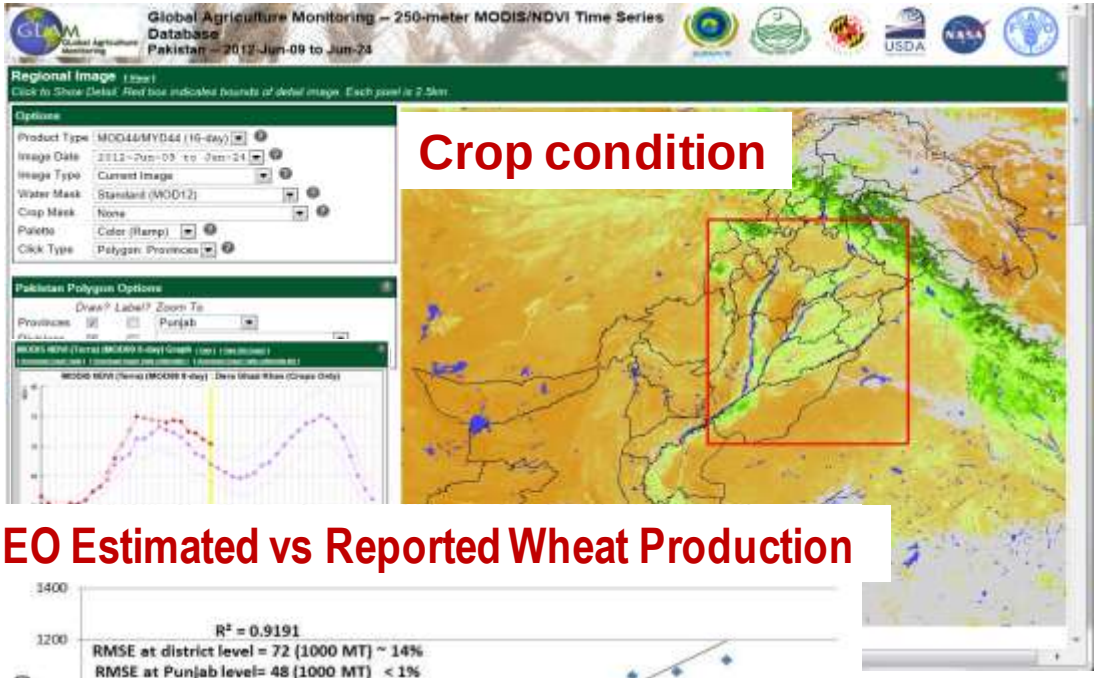
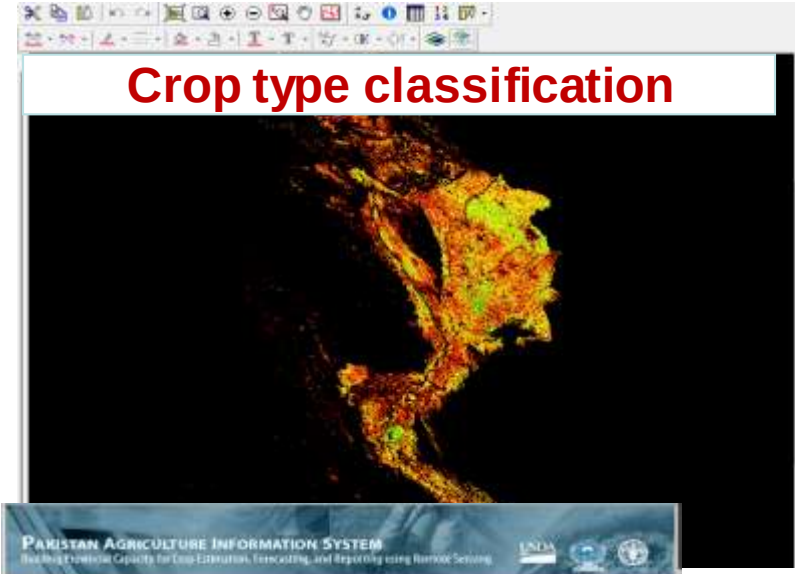
GEOGLAM Component #2
Capacities Building

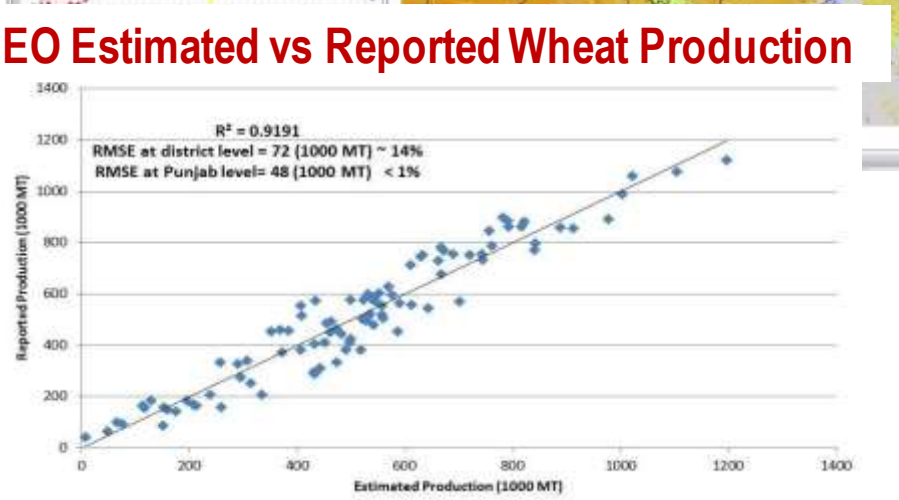
GEOGLAM Capacity Building Component

Ex : Pakistan Agricultural Information System

(Collaboration among CRS, FAO, SUPARCO, UMD & USDA)







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GEOGLAM Component #3
Countries at risk

Countries at risk

- **Subsistence agriculture & Pastoralism**
  - basis of livelihood systems in many countries
  - highly climate-sensitive
- **Climate station networks not well working** (sparse, bad or late reporting)
- **Satellite remote sensing & models can fill the gap**
  - and provide the basis for early detection of agricultural droughts
- ***On all continents:***
  - *Africa* : Senegal, Mauritania, Mali, Burkina, Niger, Chad, Somalia, Sudan, Eritrea, Ethiopia, Djibouti, Somalia, Kenya, Uganda, Rwanda, Tanzania, Zambia, Mozambique, Zimbabwe, Botswana, South Africa, Lesotho, Swaziland…
  - *Central America:* Guatemala, Honduras, El Salvador, Nicaragua
  - *Caribbean:* Haiti
  - *Central Asia:* Afghanistan

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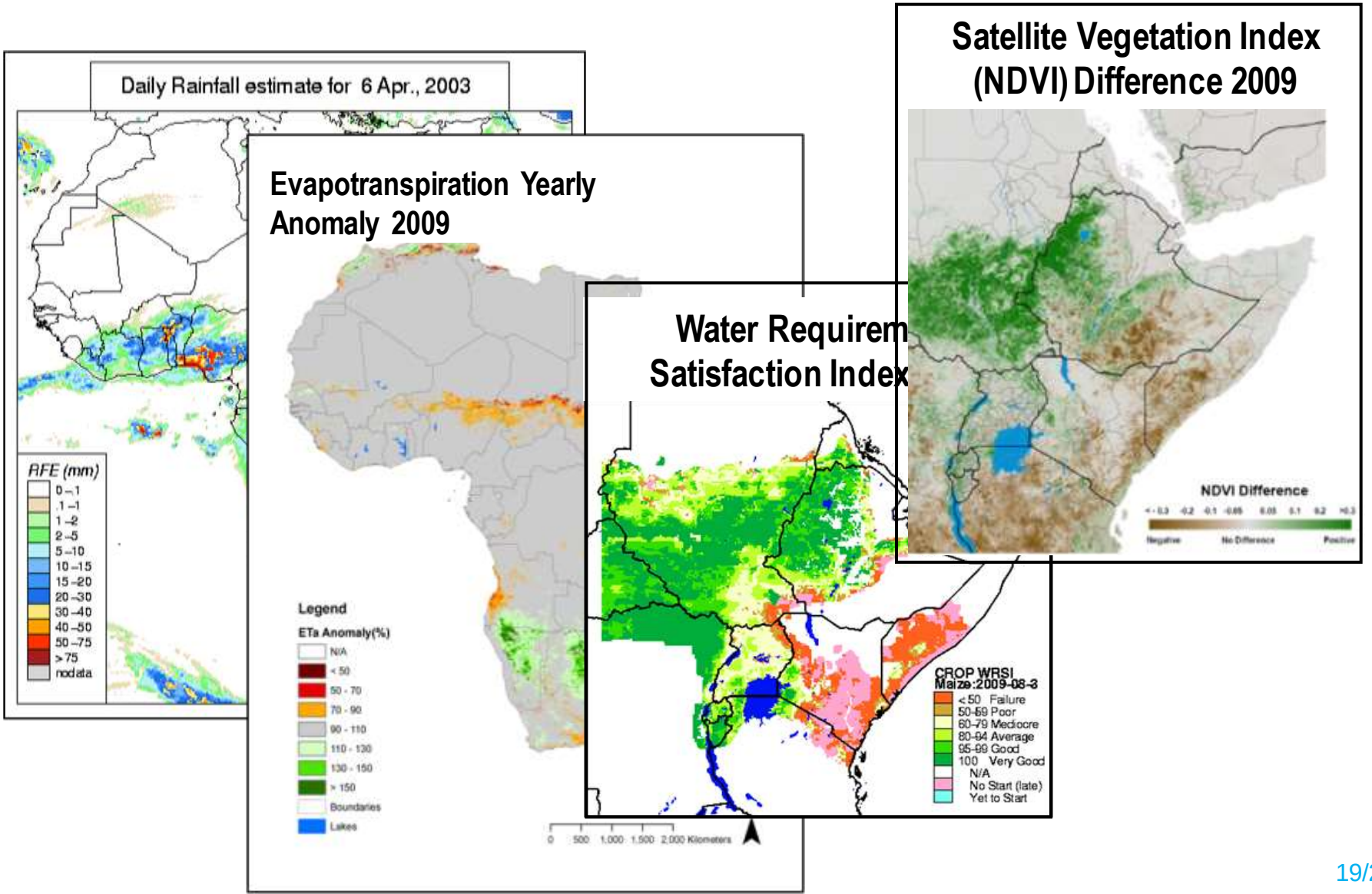
Satellite Information for Crop Monitoring



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GEOGLAM Component #4
Cooperation with Space Agencies

CEOS – Committee on Earth Observation Satellites

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GEOGLAM & CEOS Collaboration

Ag Requirements to EO Requirements

- **Ad-hoc advisory group translating *requirements from science community* →*Earth observation requirements***

Target Products						
Crop Mask	Crop Type Area and Growing Calendar	Crop Condition Indicators	Crop Yield	Crop Biophysical Variables	Environ. Variables	Ag Practices / Cropping Systems

Req#	Spatial Resolution	Spectral Range	Effective observ. frequency (cloud free)*	Sample Type	Field Size
Coarse Resolution Sampling (>100m)					
1	500 - 2000 m	thermal IR + optical	Daily	Wall-to-Wall	All

	Moderate Resolution Sampling (10 to 100m)											
4	10-30m	optical +	Monthly (min 2 out of season + 3 in season).	Cropland Extent	All	X	L/M					X
			Required every 3 years.	small fields								
11	< 5 m	optical	1 to 2 per month	Refined Sample	All (Demo)		X		X			X

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GEOGLAM & CEOS Collaboration

EO Requirements to Data Streams

- Ad-hoc advisory group translating *requirements from science communi →Earth observati requirements*
- **… and converting them into an acquisition strategy by linking *EO requirements → Data streams***

Spatial Resolution	Spectral Range	Sample Type	Field Size	Effective observ. frequency (cloud free)*
500 - 2000 m	thermal IR + optical	Wall-to-Wall	All	Daily

4	Landsat 7/8 (30m)	ResourceSat-2 (56m) / Sentinel-2A (20m)	20-70m	optical + SWIR + TIR	Cropland Extent	season + 3 in season). Required every 3-5 years.	all year

Req#	Proposed Primary Missions	Proposed Secondary Missions	Proposed Potential Missions
	Coarse Resolution Sampling (>100m)		
1	Aqua/Terra (1000m) NPP (750m) Sentinel-3A (500m)	SPOT-5 (1150m) Proba-V (1000m)	

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GEOGLAM Component #5
Research & Development

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JECAM: Joint Experiment for Crop Assessment and Monitoring

- A network of sites representative of the world's cropping systems
- A focus for international satellite data acquisition by CEOS
- R&D to support enhancements for operational agricultural monitoring systems
- JECAM Program Office coordinated by AAFC-Canada and UCL-Belgium
- Developing linkages with AgMIP sites and modeling community

www.jecam.org

JECAM

GEOGLAM Global Agricultural Monitoring

Joint Experiment for Crop Assessment and Monitoring

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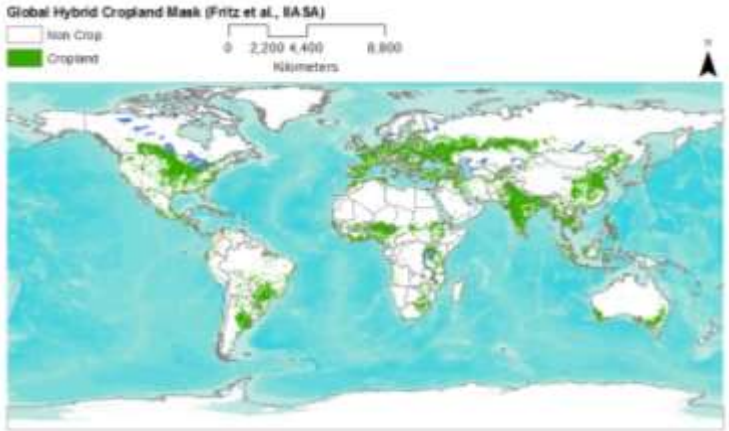
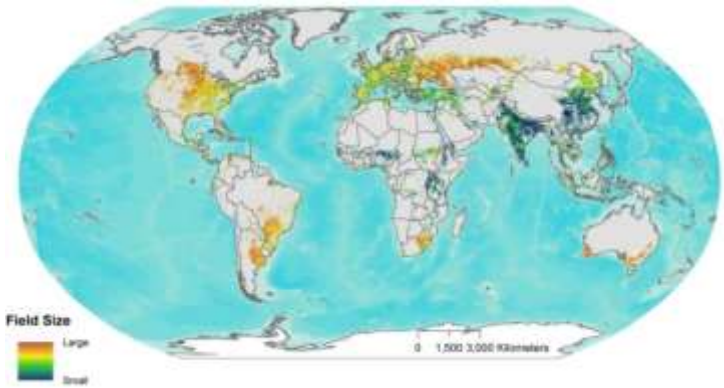
Research Needs & Challenges

Needs for Baseline Datasets as inputs to Agricultural Monitoring Strategy

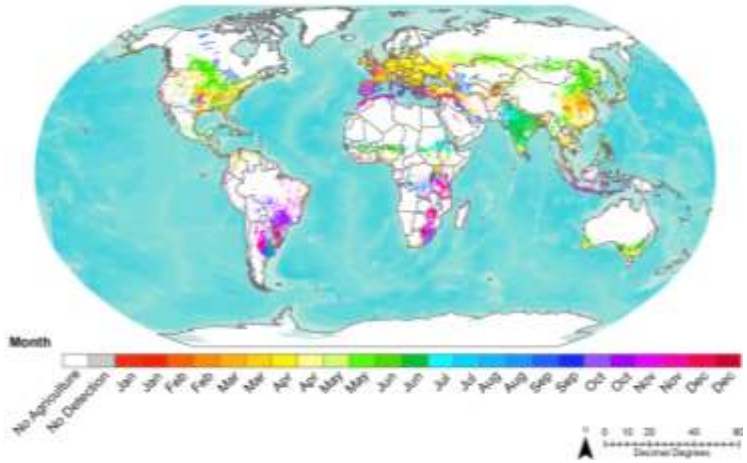
Cropland Distribution
(Fritz et al., IIASA)



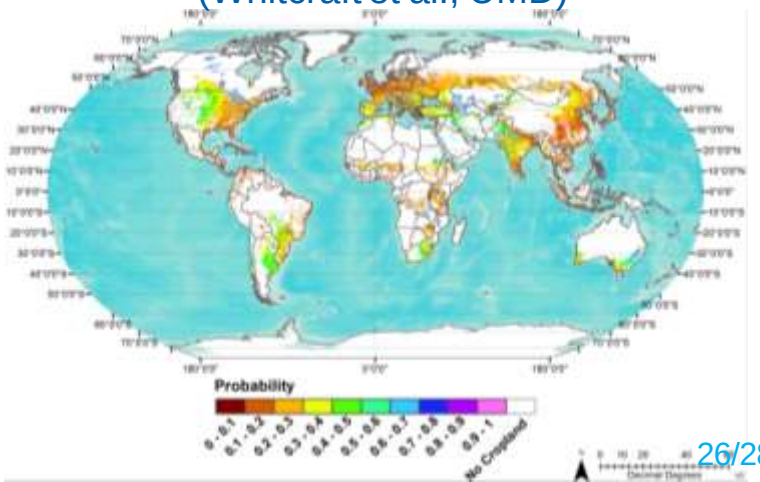
Field Size Distribution
(Fritz et al., IIASA)



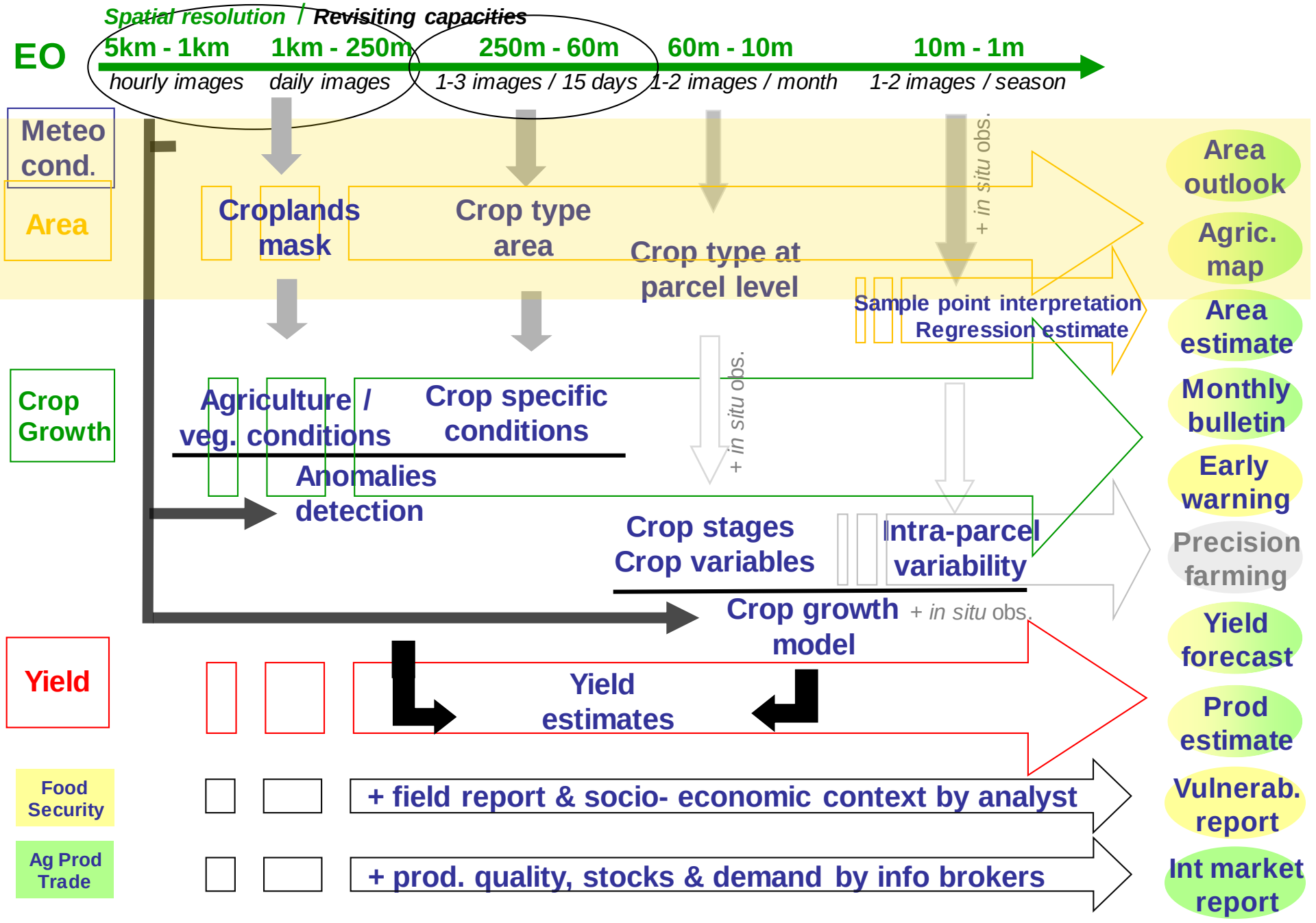
When are the crops growing?
(Whitcraft et al., UMD)



How do clouds impact clear views?
(Whitcraft et al., UMD)



Agricultural Monitoring : EO data and Final products



Research Challenges : Adaptation to Regional Agrosystems

- ex. Mixed crops – Rungbe, Tanzania
- Agroforestry systems based on :
  - Crops: perennial (coffee, banana, cocoa, fruit trees, tea) and annual (corn, rice).
  - Small fields : 0,03-0,15 ha
  - « CBM » : Coffee, Banana, and Maize
- Trends
  - Upper zone : CBM progressing, tea-cropping areas and Afromontane forest regressing.
  - Lower areas : CBM being abandoned, cocoa and rice monoculture progressing, supported by significant investments (irrigation).

C. Lelong
CIRAD

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Implementation Challenges

- Training – Capacity building
  - Need to adjust Tools & Methods to local agrosystems
  - Transfer Research → Min. Agriculture Depts (Statistics, Food)
  - Huge needs in Training / Capacity building in new User-countries (Learning engineering: Skills to be acquired, Pre-requisites, Online-presence.. TurnOver)
  - Prerequisite. Dialog with stakeholders (needs time and expertise)
- Great funding needs
  - GEO overall voluntary nature great, but institutionalizing require firm commitments (research, capacity building)
  - Identification of new funds: an issue in many member countries
  - Need for leadership: member countries** to lead the early phases of GEOGLAM implementation

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http://www.earthobservations.org/geoglam

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