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GEOGLAM
Global Agricultural Monitoring

GEOGLAM,
Global Agricultural Monitoring

Michel Deshayes, GEO, GEOGLAM Coordinator
for the Agricultural Community of Practice

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GEOGLAM Global Agricultural Monitoring

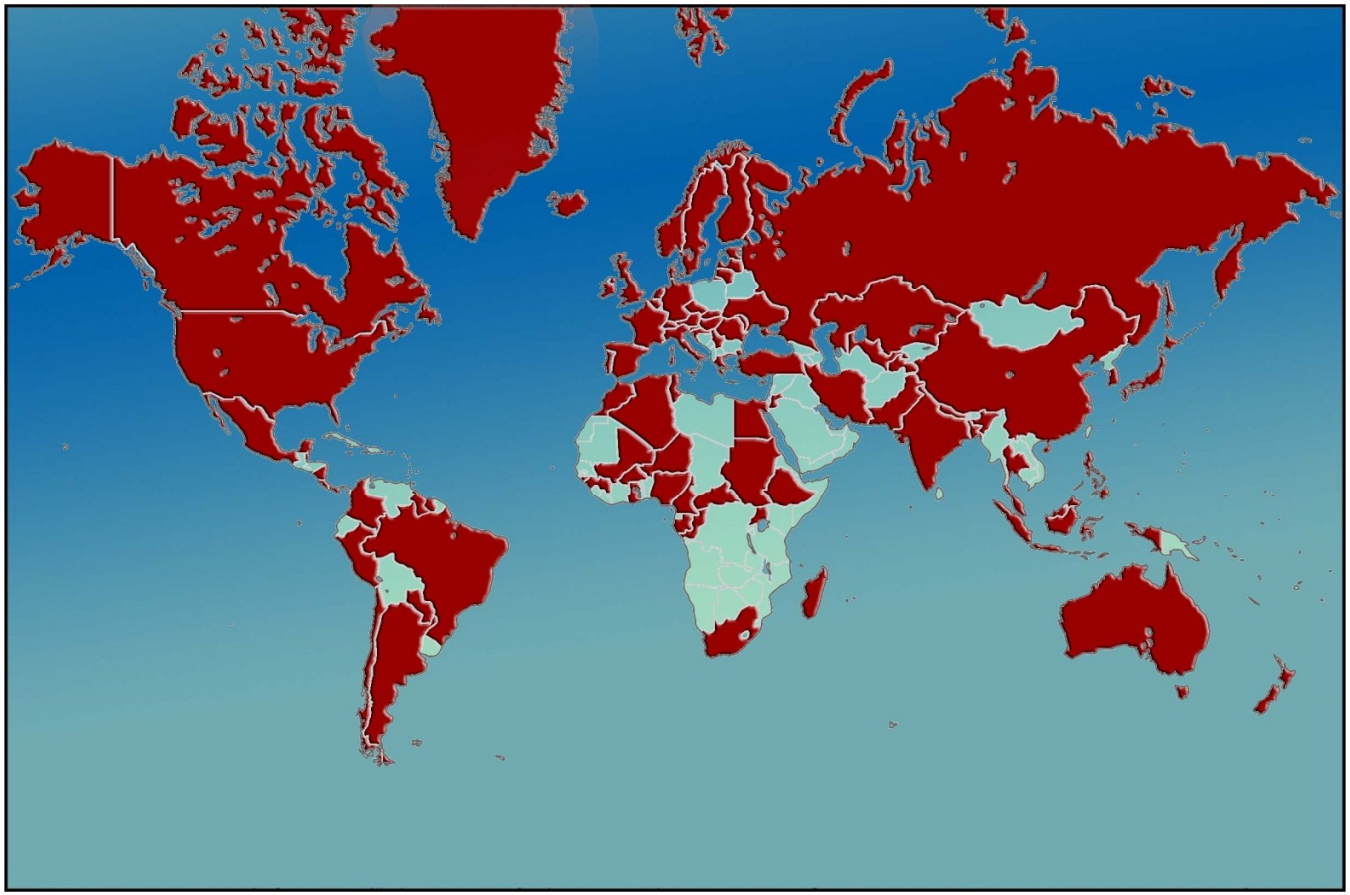
GEO, Group on Earth Observations

Created in 2005, to develop a coordinated and sustained Global Earth Observation System of Systems (GEOSS) to enhance decision making in nine Societal Benefit Areas (SBAs)

GEO today:

- 90 Members

- 67 Participating Organizations



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A Global, Coordinated, Comprehensive and Sustained System of Observing Systems

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GEO Objectives

- Improve and Coordinate Observation Systems
- Foster Increased Use of EO Data & Information
- Build Capacity
- Advance Broad Open Data Policies/Practices

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GEOGLAM - Global Agricultural Monitoring
Why ?

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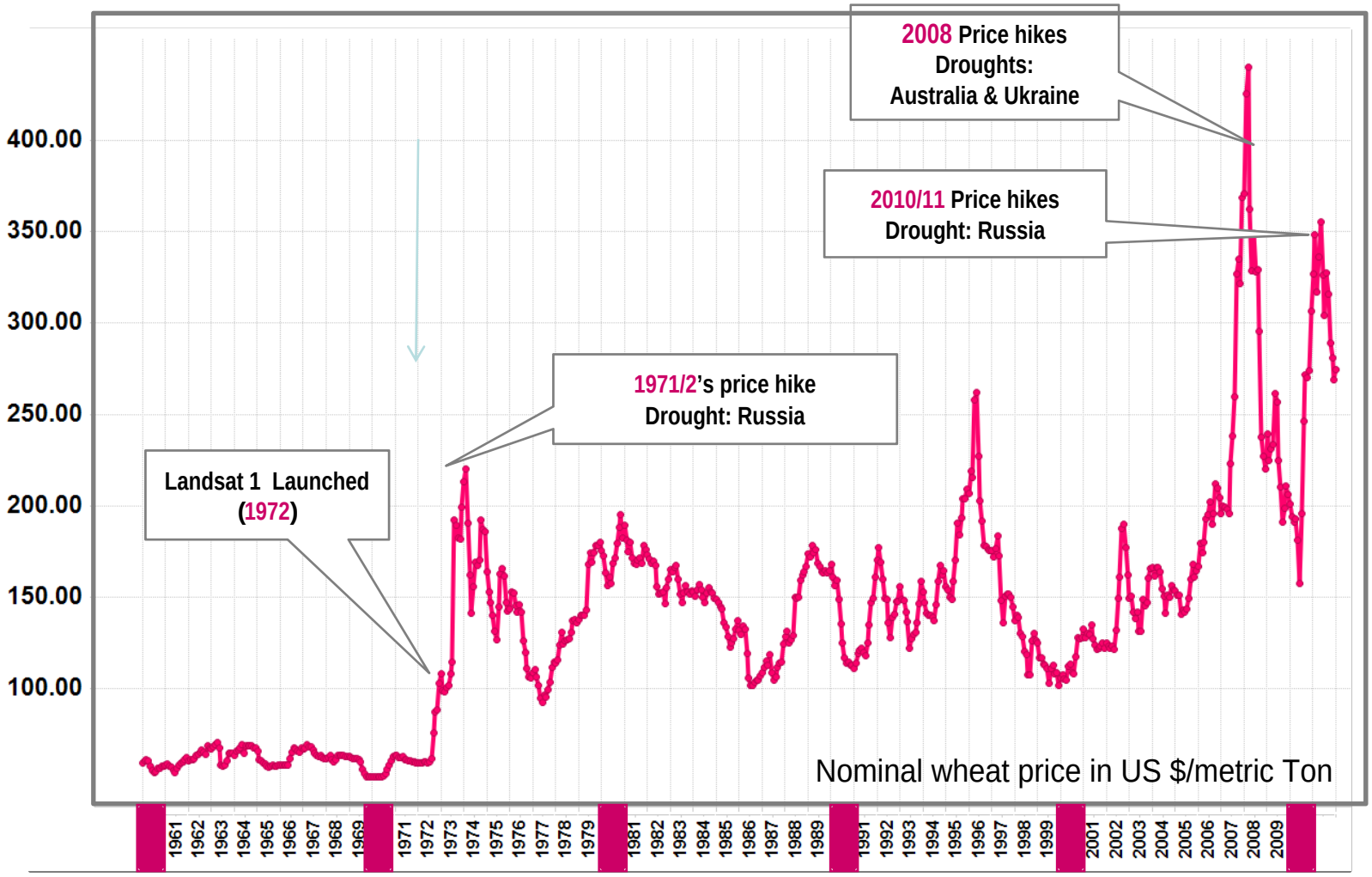
Recent volatility of Agricultural Prices *(1/2)*

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

Source: World Bank



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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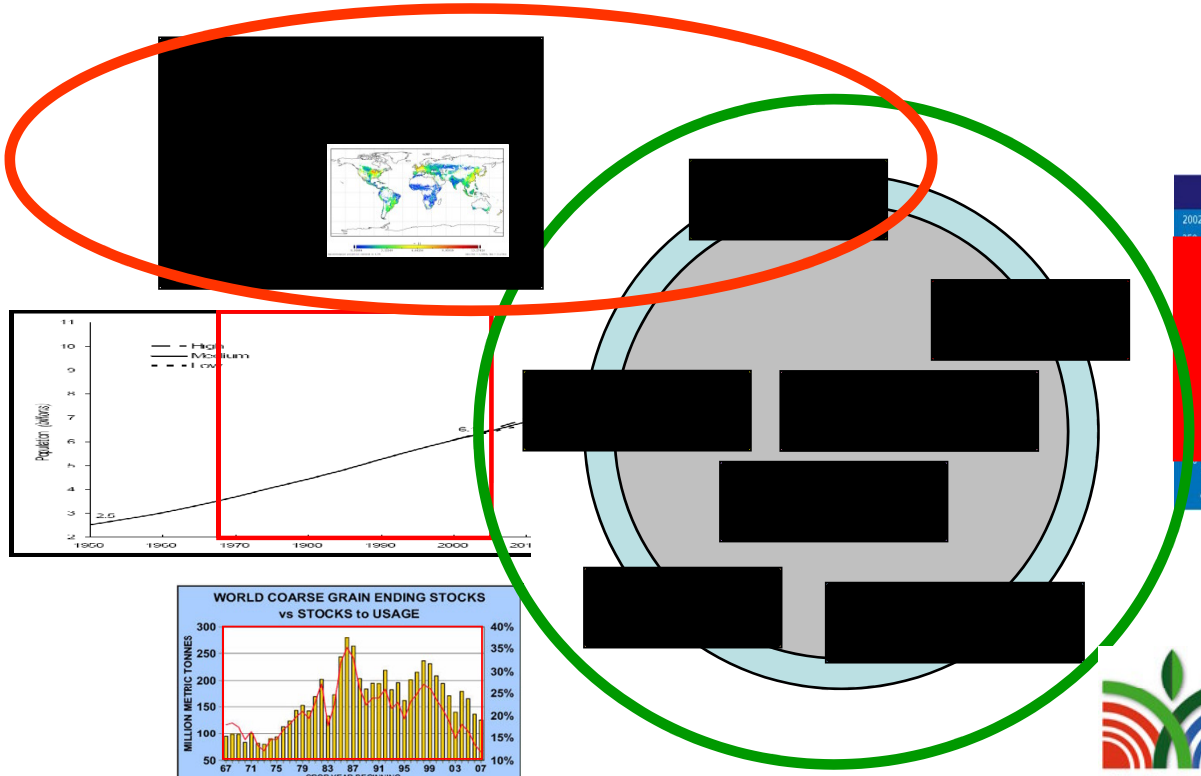

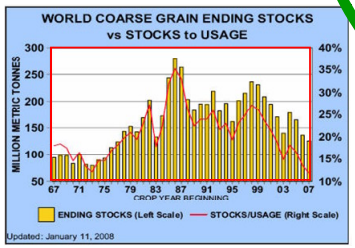

IGC · WFP wfp.org · UNITED NATIONS UNCTAD · UNITED NATIONS HLTF Food Security · IFPRI · FAO · IFAD Enabling poor rural people to overcome poverty · OECD

AMIS Agricultural Market Information System

WORLD TRADE ORGANIZATION

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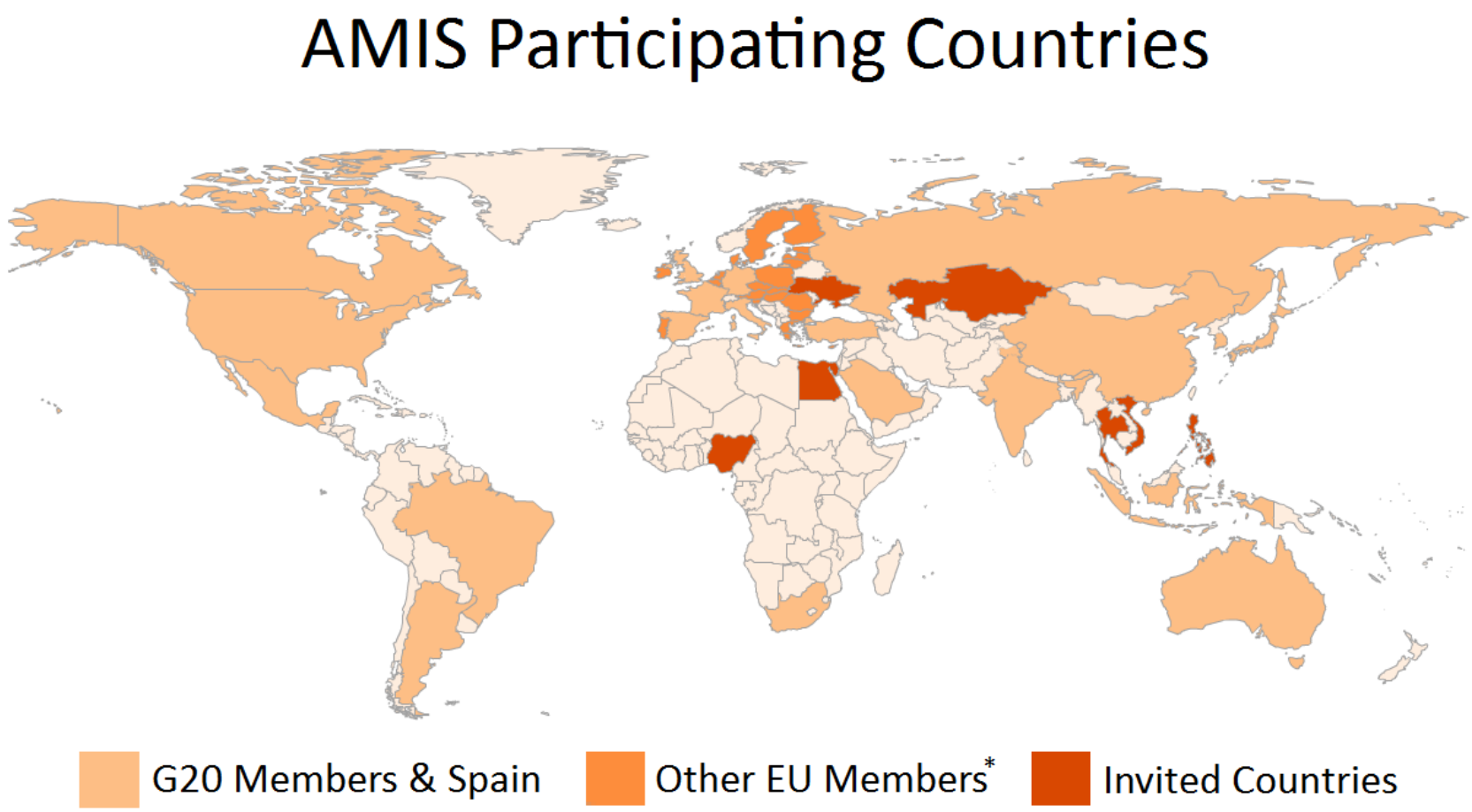
C#1 – Crop Monitor – AMIS countries



* Not participating in AMIS as individual countries, but collectively represented by the European Union

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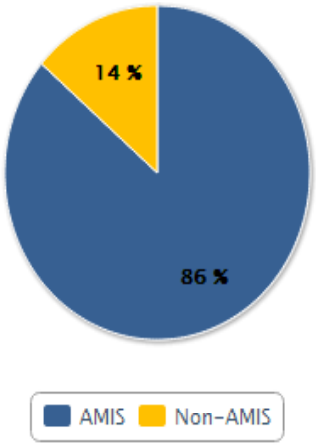
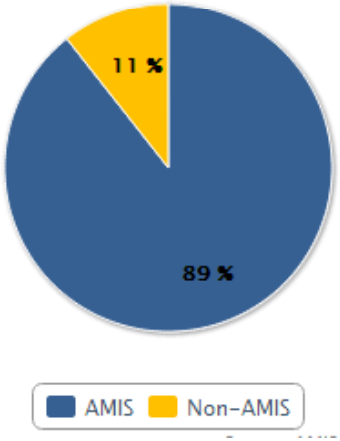
Production & Exports of AMIS members

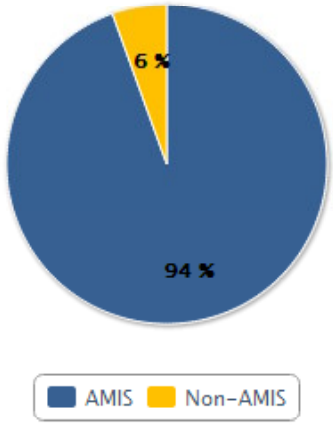
Wheat production
2012 – 2014 average



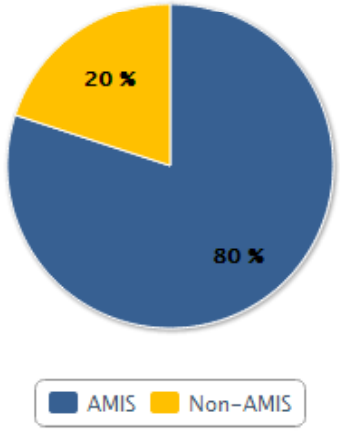
Maize production
2012 – 2014 average



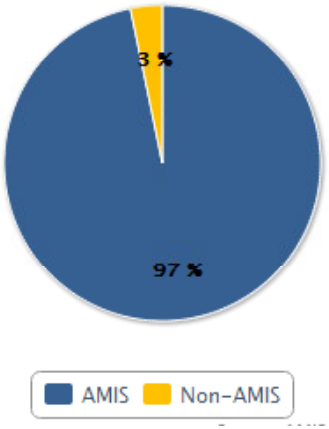
Soybean production
2012 – 2014 average



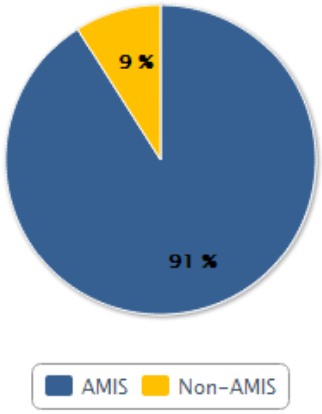
Rice (milled) Production
2012 - 2014 average



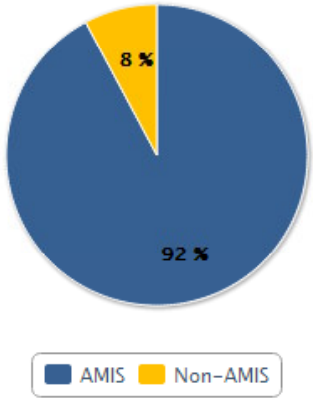
Wheat Exports
2012 – 2014 average



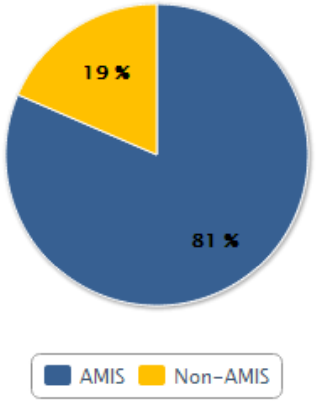
Maize Exports
2012 – 2014 average



Soybean Exports
2012 – 2014 average



Rice (milled) Exports (ITY)
2012 - 2014 average



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GEOGLAM Activities

3 Pillars + 3 Cross Cutting Components

Agricultural Expertise (GEO CoP, FAO)	Meteorological Expertise (WMO)	Earth Observation Expertise (CEOS) Satellite / ground data / models

1. GLOBAL/ REGIONAL SYSTEM OF SYSTEMS	2. NATIONAL CAPACITY DEVELOPMENT	3. MONITORING COUNTRIES AT RISK
Main producer countries, main crops	*for agricultural monitoring using Earth Observation*	*Food security assessment*

4. EO DATA COORDINATION

5. METHOD IMPROVEMENT through R&D coordination (JECAM

6. Data, products and INFORMATION DISSEMINATION

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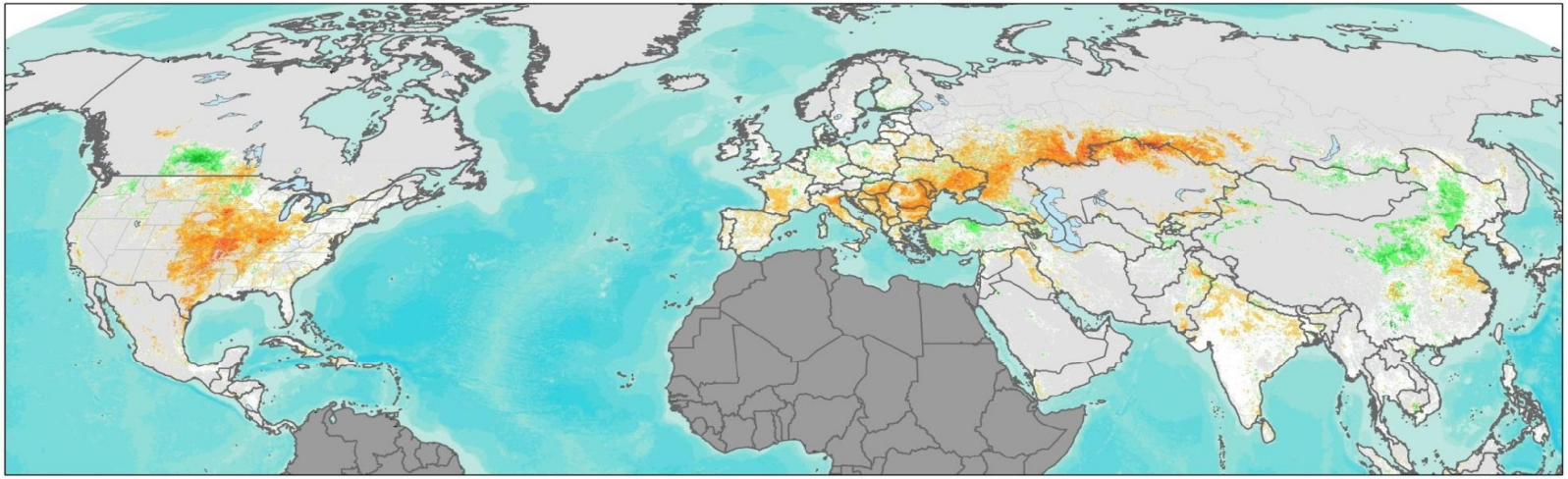
GEOGLAM Component #1
Global Agricultural Monitoring

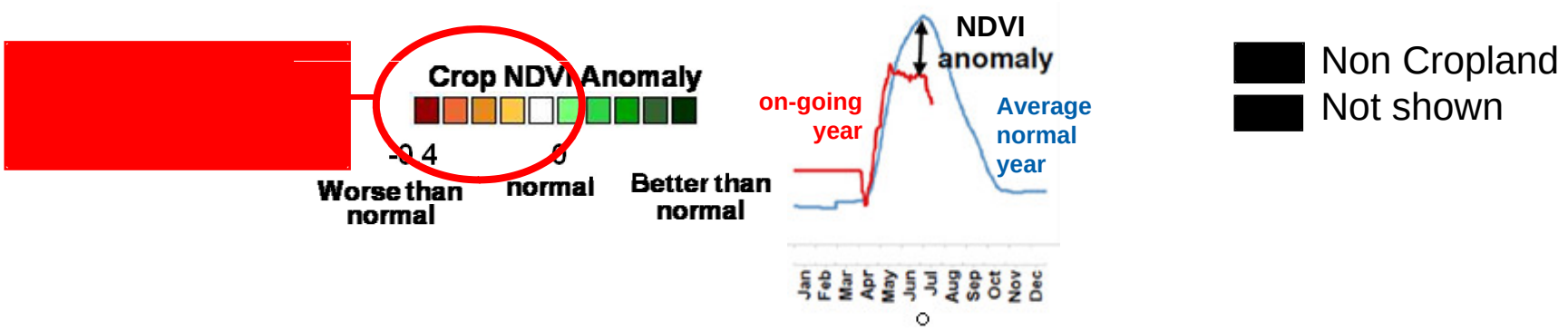
GEOGLAM Activities

- **Main Pillar #1 activities**
  - **Crop Monitor: Coordinated Global Crop Assessments** (4 main crops, ~30 main producers)
    - ***Monthly operational report to AMIS (G-20** Agricultural Market Information System, with secretariat hosted at FAO**)***
    - ***Synthesizes** monitoring activities **and provides consensus global crop assessments** (Coordinated by UMD with NASA support)*
    - ***Participating Agencies** include:*
      - **USDA NASS (***National Agricultural Statistics Service***) & FAS (***Foreign Agricultural Service***)**
      - **EC-JRC MARS (***Monitoring Agricultural Resources***) & Agri4Cast (***Agricultural Forecasts***)**
      - **China: RADI-CAS CropWatch**
      - **Russia IKI-VEGA (***Satellite based service for vegetation monitoring*)
      - **India: NCFC-FASAL (***Forecasting Agriculture using Space, Agro-met. & Land based observations***)** **& NADAMS (***National Agricultural Drought Assessment & Monitoring System*)
      - **Canada: NCMS (***National Crop Monitoring System***)…**
      - **Brazil: CONAB GeoSafras**
      - **Japan + ASEAN + China + India : ASIA-RiCE project**
      - **Other countries: Australia, Mexico, Argentina, South Africa…**

Example of Crop Crisis Situation: 2012 *(1/4)*

2012 Northern Hemisphere Crop NDVI Anomalies (UMD)





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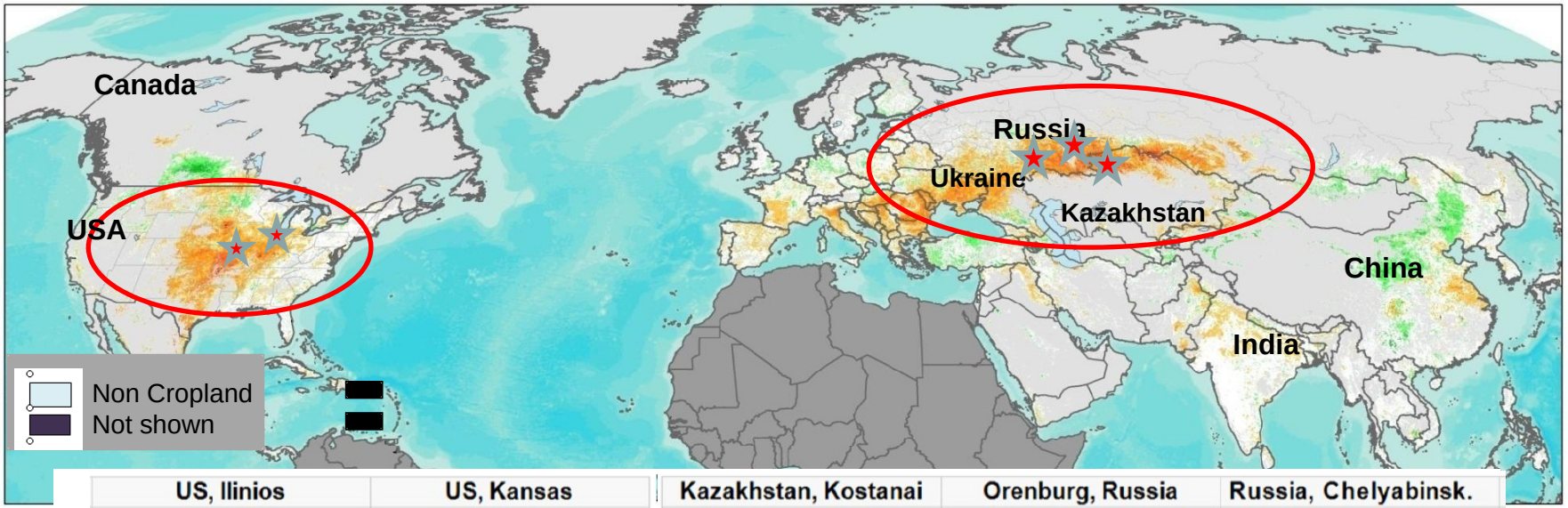
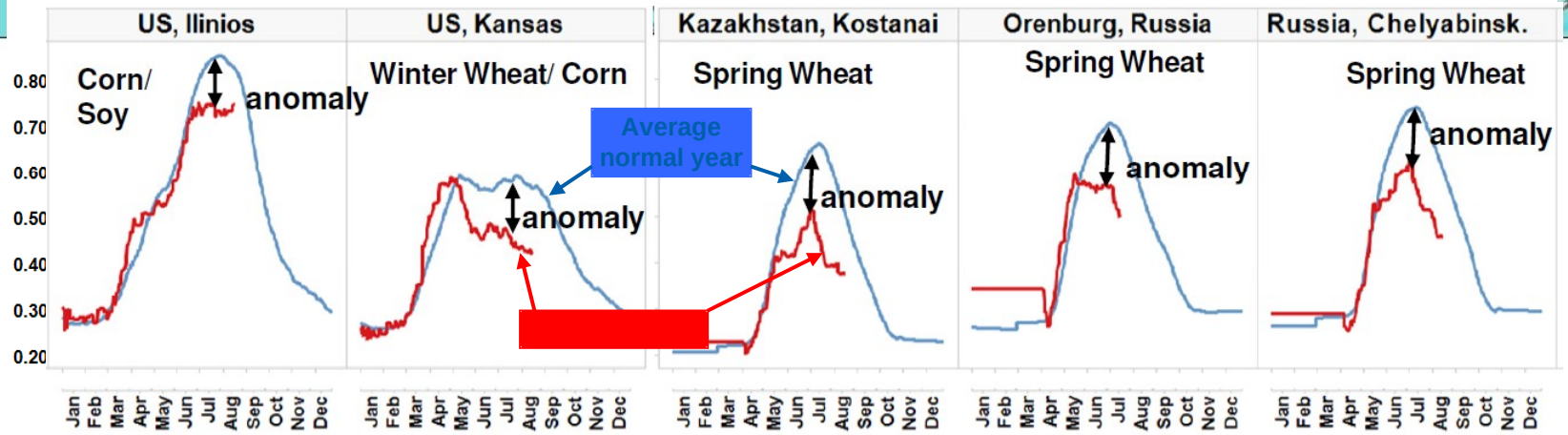
Example of Crop Crisis Situation: 2012 *(3/4)*

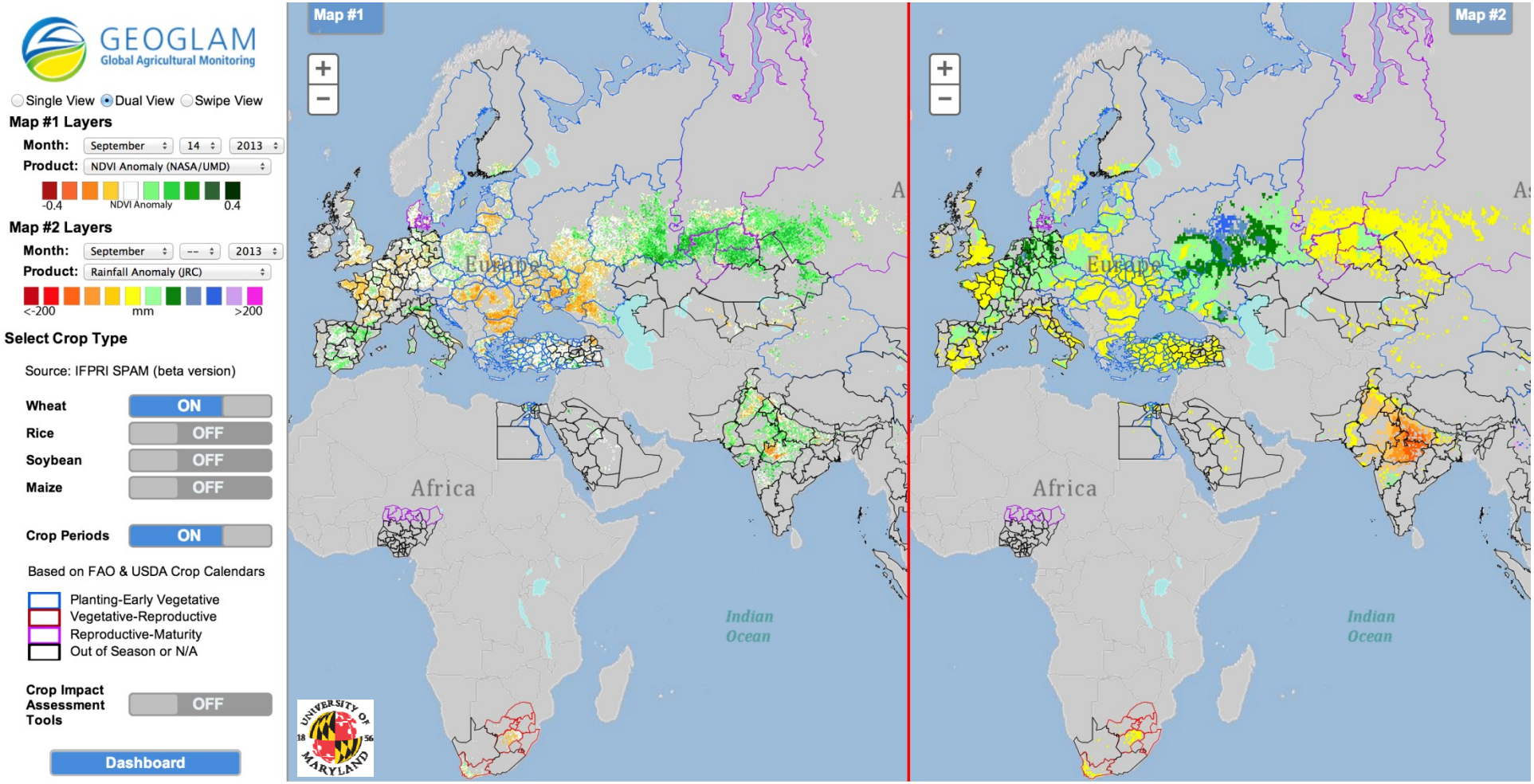
Northern Hemisphere Crop NDVI Anomalies - August 13th 2012





urrent season crop development (2012)
/erage season development (2000-2011)

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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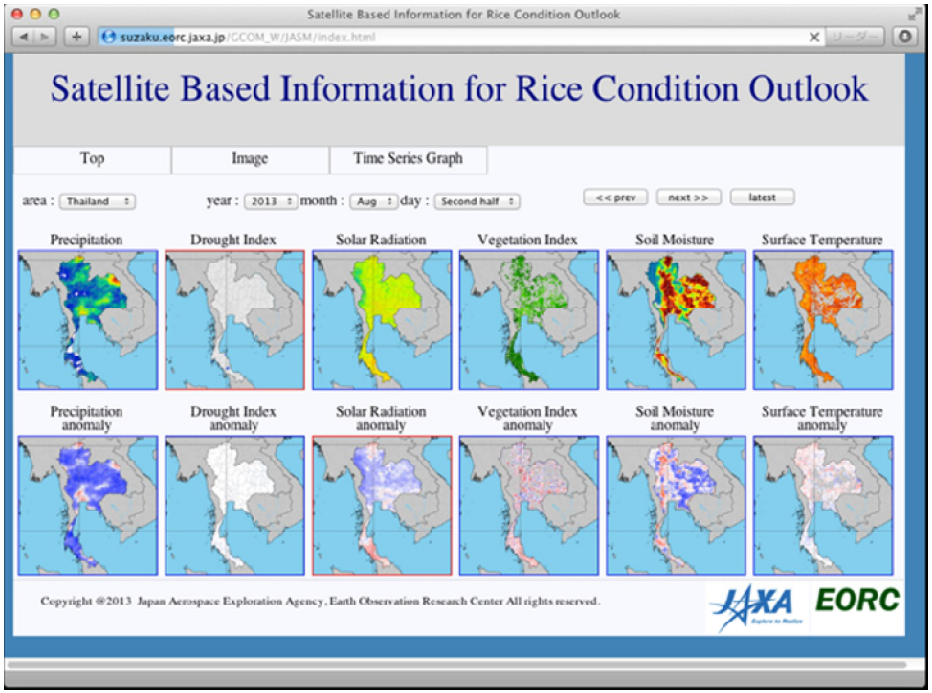
Asia-RiCE Crop Estimation and Monitoring

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 Crop Monitor in AMIS Market Monitor

September

October

November

December

AMIS **Market Monitor**

No.11 – September 2013 www.amis-outlook.org

*The **Market Monitor** is a product of the Agricultural Market Information System (AMIS), a G20 initiative to provide information, analysis and short-term supply and demand forecasts. It covers*

Contents

World Supply-Demand Outlook 1

Crop Monitor *NEW* 2

AMIS No. 11 –September 2013 2

Crop Monitor (As of 28 August)

This is the first GEOGLAM Crop Monitor developed for AMIS*. It summarizes latest crop conditions for AMIS crops based on regional expertise and analysis of satellite data, ground observations, and meteorological data, and was conducted by experts from global, national and regional monitoring systems. For each of the four crops, a paragraph summarizing current conditions is provided, accompanied by a satellite-based indicator map. Each map depicts crop vegetative growth anomalies from August 28th (relative to a 12 year average), over the main crop growing regions within AMIS countries.

Wheat: Prospects are favourable in the Northern Hemisphere. Winter wheat harvest is complete and spring wheat is in late-maturity to harvest stages. In the **US, Canada, Russia** and **Kazakhstan** spring wheat conditions are good though final yields will depend on favourable weather in the coming month. Crops in the Southern Hemisphere are in early-vegetative to reproductive stages and conditions are mostly favourable. In **Australia** overall conditions are average to above-average but rainfall in the next month will be critical as there is some concern over dry conditions in parts of the country. In **Argentina** conditions are good although additional moisture is needed. In **Brazil** frosts caused some significant crop damage and there is some concern over excessive wetness. In **South Africa** winter wheat conditions have improved since July, following widespread precipitation.

Maize: General conditions are good. In the **US** approximately half of the maize is in good to excellent condition and in spite of dry weather and rising temperatures in August, a bumper production is expected largely due to increased planted area. In **Canada**, conditions are favourable and yields are expected to be average to above average. In the **EU**, prospects are good except in northern Italy, Hungary, Austria, Slovenia and Croatia where there is concern due to late sowing and dry and hot conditions. In **Russia**, current yield prospects are favourable despite low soil moisture in the south. In **China, India, Mexico** and **Ukraine** conditions are generally good. In **Brazil** the second maize crop harvest is almost complete and it is expected to be favourable.

Rice: Growing conditions are favourable. The monsoon season in **South** and **Southeast Asia** has maintained good moisture across most of the region. In **India**, conditions are favourable as monsoon rains have been well distributed. In **Thailand**, precipitation has been widespread, though there is some concern over [illegible] favourable conditions were maintained in **Vietnam** and the **Philippines** with some c[illegible] flooding. In **China**, good moisture conditions were maintained in the North China Pl[illegible] over flooding in the northeast and excess moisture in the southwest. Meanwhile, so[illegible] conditions and above normal temperatures raise concern. In **Japan**, conditions are n[illegible] early developing rice.

Soybeans: Growing conditions are favourable. In the **US**, about half of the crop is in [illegible] although prolonged dry conditions in the Midwest are raising concern. In **China**, con[illegible] North China Plain and in the Northeast production regions. In **India**, conditions are f[illegible] concern over excessive moisture.

*GEOGLAM aims at strengthening global agricultural monitoring by improving the use of satellite infor[illegible] forecasting. It is implemented within the framework of the inter-ministerial Group on Earth Observatio[illegible] were endorsed by the G20 Heads of States Declaration (Cannes, November 2011) when GEOGLAM was tasked to "coordinate satellite monitoring observation systems in different regions of the world in order to enhance crop production projections and weather forecasting data." Within this framework, GEOGLAM is providing global crop outlook assessments in support of AMIS market monitoring activities.

More detailed information on the GEOGLAM crop assessments is available on: www.geoglam-crop-monitor.org

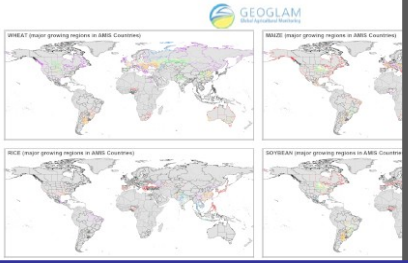
AMIS No. 11 –

Satellite-Based Vegetative Growth Anomalies

based on the Normalized Difference Vegetation Index (NDVI)

NDVI is an indicator of photosynthesis often used for monitoring croplands. These anomaly [illegible] NDVI for August 28th 2013 to the average NDVI for the same date from 2000-2012, over the m[illegible] of the four AMIS crops. Orange to red indicates less green vegetation than average, green i[illegible] average vegetation. Administrative unit outline colours indicate crop growth stage: Blu[illegible] vegetative, Red-Vegetative to Reproductive (generally the most sensitive crop growt[illegible] Reproductive to Maturity, Black-areas out of season. Note: only AMIS countries are highlighte[illegible]

GEOGLAM



The findings and conclusions found in this joint multiple-agency reporting are only consensual stateme[illegible] GEOGLAM expert group, and do not necessarily reflect those of the individual Agencies represented by these experts. Map data sources: Main crop type areas based on the IFPRI SPAM 2005 beta release (2013). Crop calendars based on FA[illegible] and USDA crop calendars. NDVI anomaly data produced by NASA/USDA/UMD based on NASA MODIS data.

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

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GEOGLAM activities

- **Main Pillar #2 – Capacity Building**
  - **On-going national projects**
    - ***Argentina*** *(INTA - UMD - NASA)*
    - ***Pakistan*** *(CRS – SUPARCO – FAO - UMD – NASA)*
    - ***Ukraine*** *(IKD – HydroMet - EC)*
    - ***South Africa*** *(NEOSS – ARS)…*
- **Main Pillar #3 – Countries at Risk**
  - **On-going international monitoring Projects**
    - ***FAO GIEWS (****Global Information & Early Warning System****)***
    - ***US FEWSNET (****Famine Early Warning System****)***
    - ***EC MARS*** *Food Security Bulletins*
    - ***China CropWatch*** *Drought & Food security activities…*
- **Cross Cutting Component R&D – JECAM**
  - **Objective:** to reach a **convergence of approaches**, **develop monitoring** & **reporting protocols** and **best practices** for a variety of global agricultural systems
  - About **40 test-sites** on all continents!

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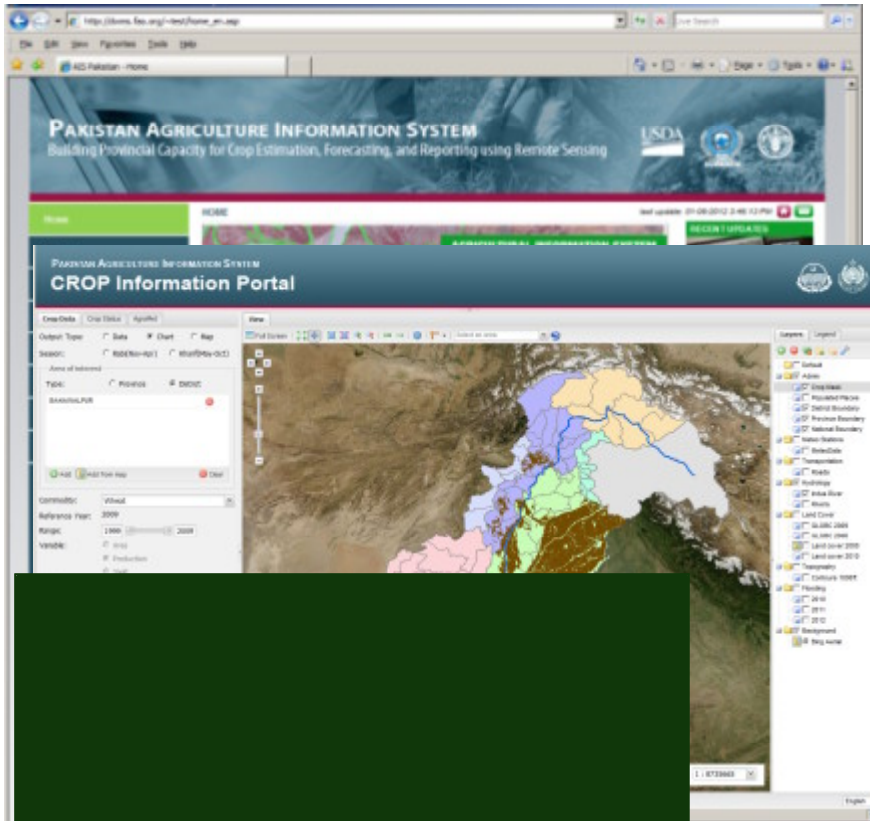
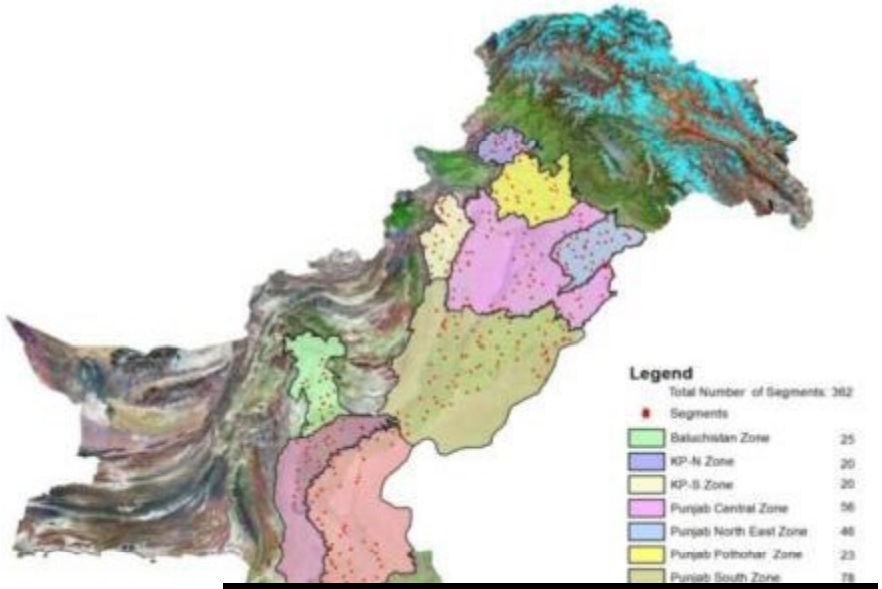
GEOGLAM Component #2
Capacities Building

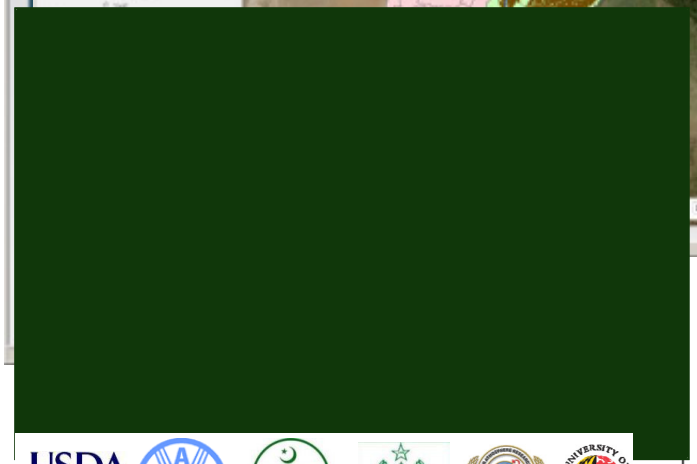
Component#2-Capacity Building

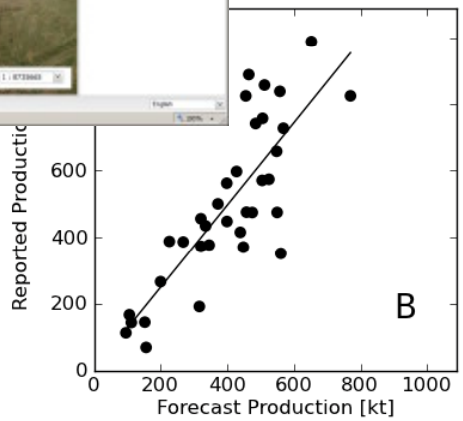
ex. Pakistan: Strengthening Provincial Capacity

(collaboration between USDA, FAO, SUPARCO, CRS Pakistan, & UMD)









USDA FAO SUPARCO UNIVERSITY OF MARYLAND

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GEOGLAM Component #3
Countries at risk

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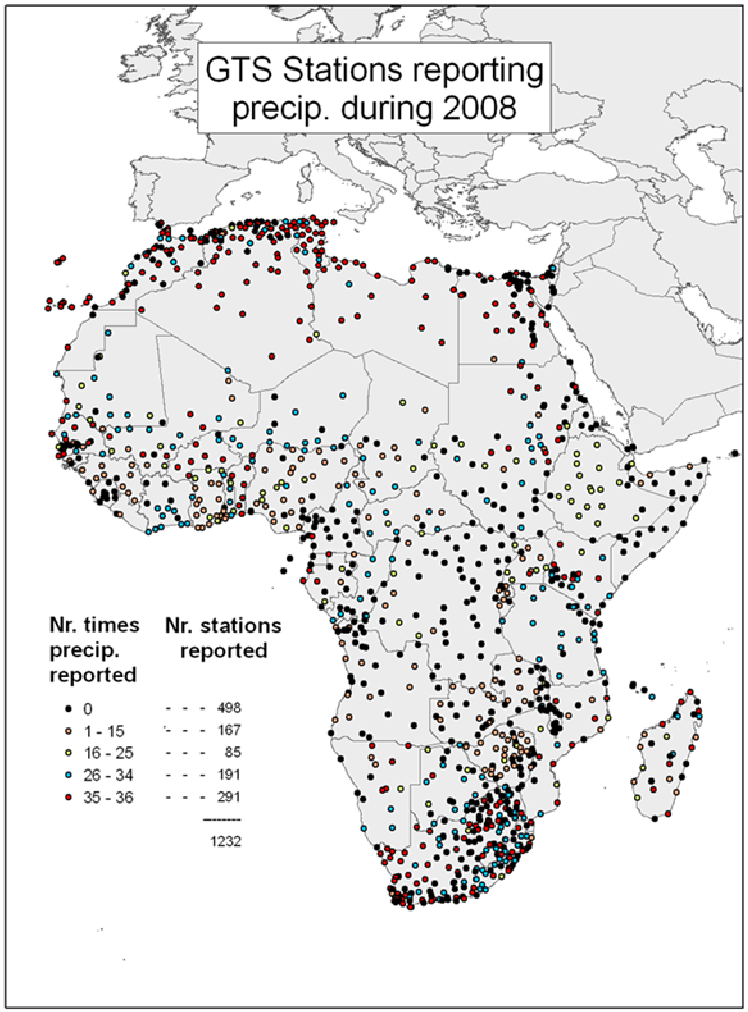
Countries at risk

- **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

Gaps in Rainfall Station Reporting

- **For one year, systematic sample on the 1st, 11th & 21st of month** (3x12=36 samples)
- **1232 African GTS stations:**
  - **–40% did not report on any of the 36 days of the sample**
  - **–only 25% sent all reports or missed only one**

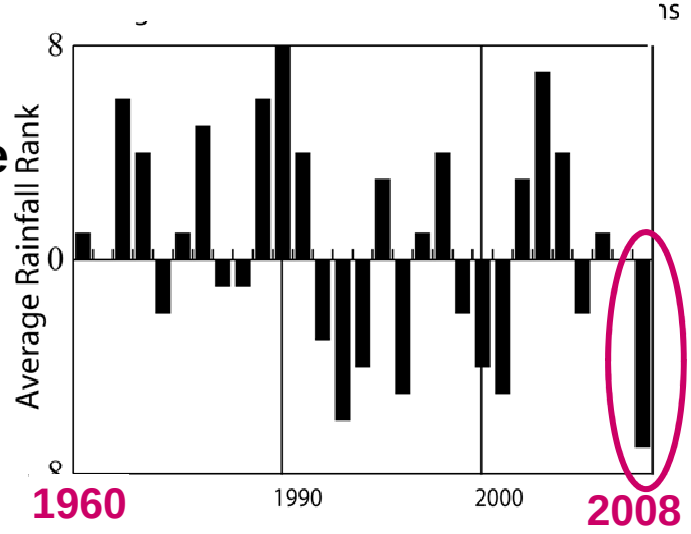


GTS = Global Telecommunication System

Changes in rainfall

Precipitation changes in Kenya, 1980 - 2008

Average Rainfall for 4 consecutive seasons

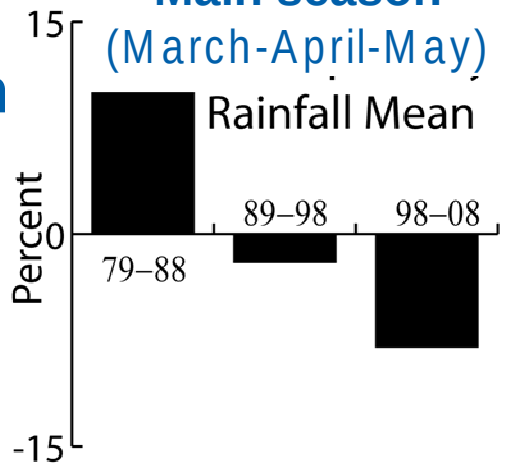


Decrease in Rainfall

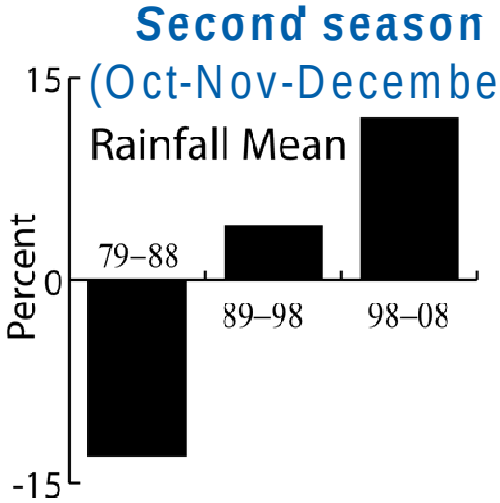
Average of last 4 rainy seasons is ranked lowest

+ Change in distribution of rainfall in year

- Decrease in rainfall of main season
- Increase in rainfall of second season



Since 1980 almost 20% drop in main season rainfall



Rainfall in second season is increasing

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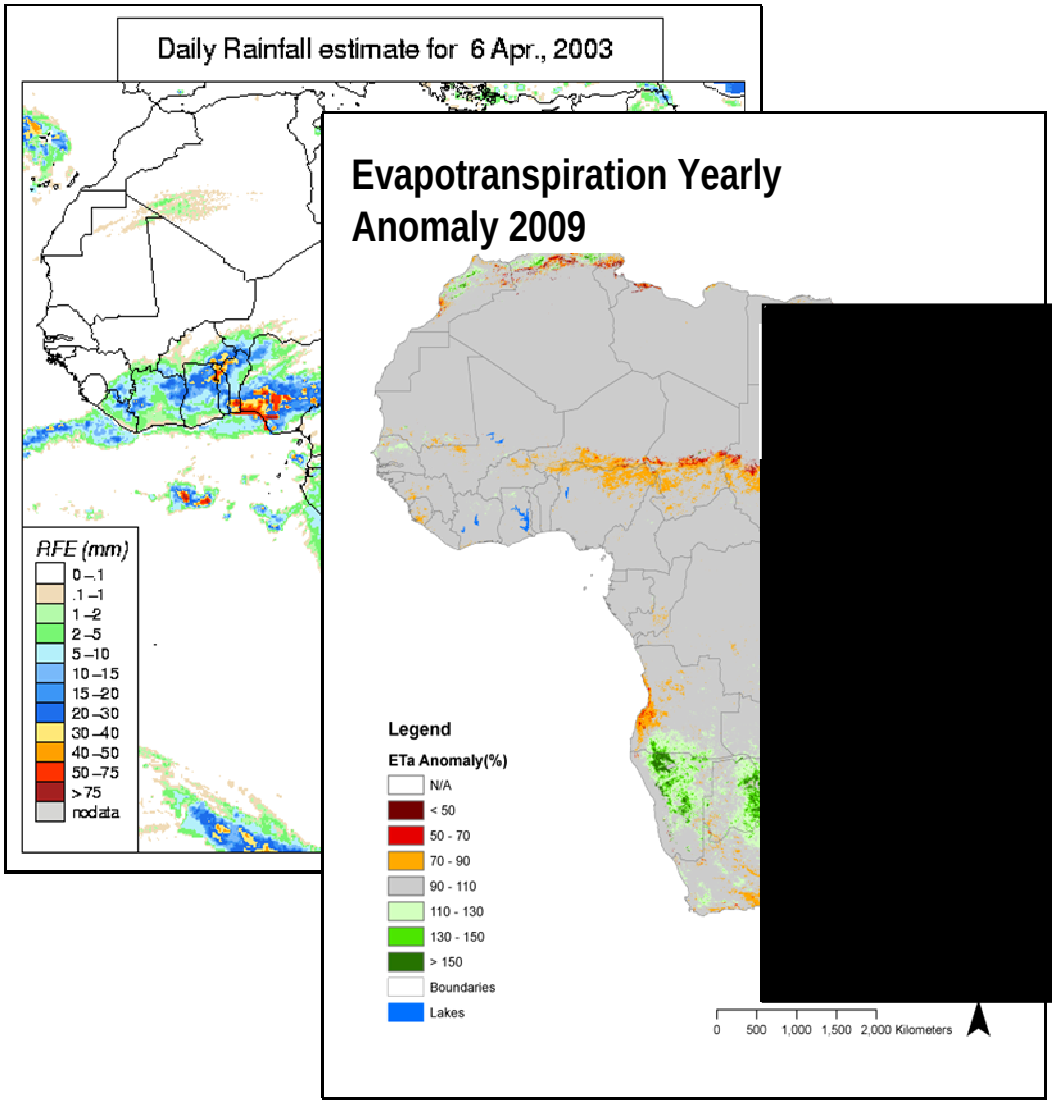
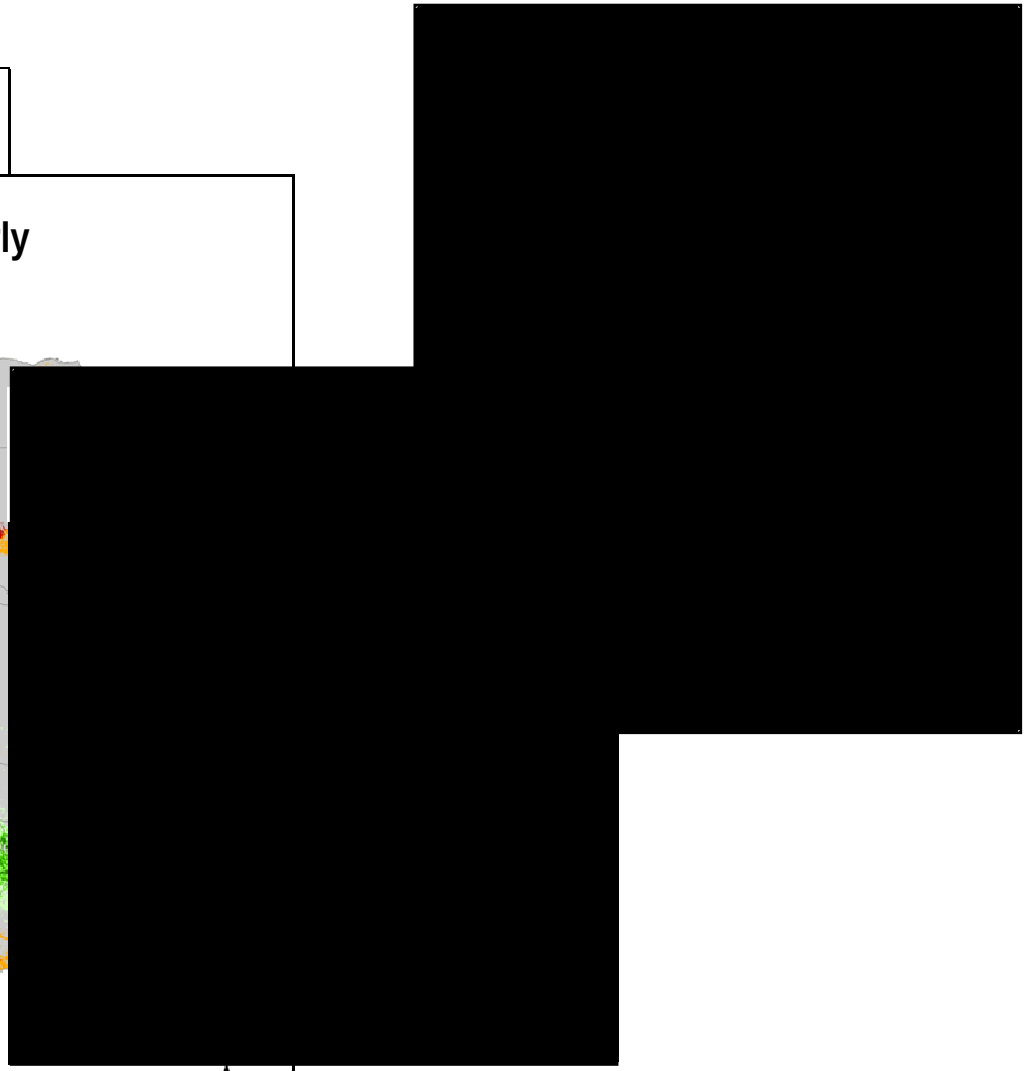
Satellite Information for Crop Monitoring





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GEOGLAM Component #4
R&D - JECAM

GROUP ON EARTH OBSERVATIONS

GEOGLAM Global Agricultural Monitoring

Component #5 – R&D -JECAM

- **JECAM**
  - **Joint Experiment of Crop Assessment and Monitoring**
  - **pre-existing to GEOGLAM, now the R&D compoent of GEOGLAM**
- **Objective:**
  - to reach a **convergence of approaches, develop monitoring & reporting protocols and best practices** for a variety of global agricultural s
- **Present status**
  - **about 40 test-sites on all continents!**
  - **2013 Annual Report just published**
  - **2014 JECAM Science workshop, Ottawa, 21-23 July**

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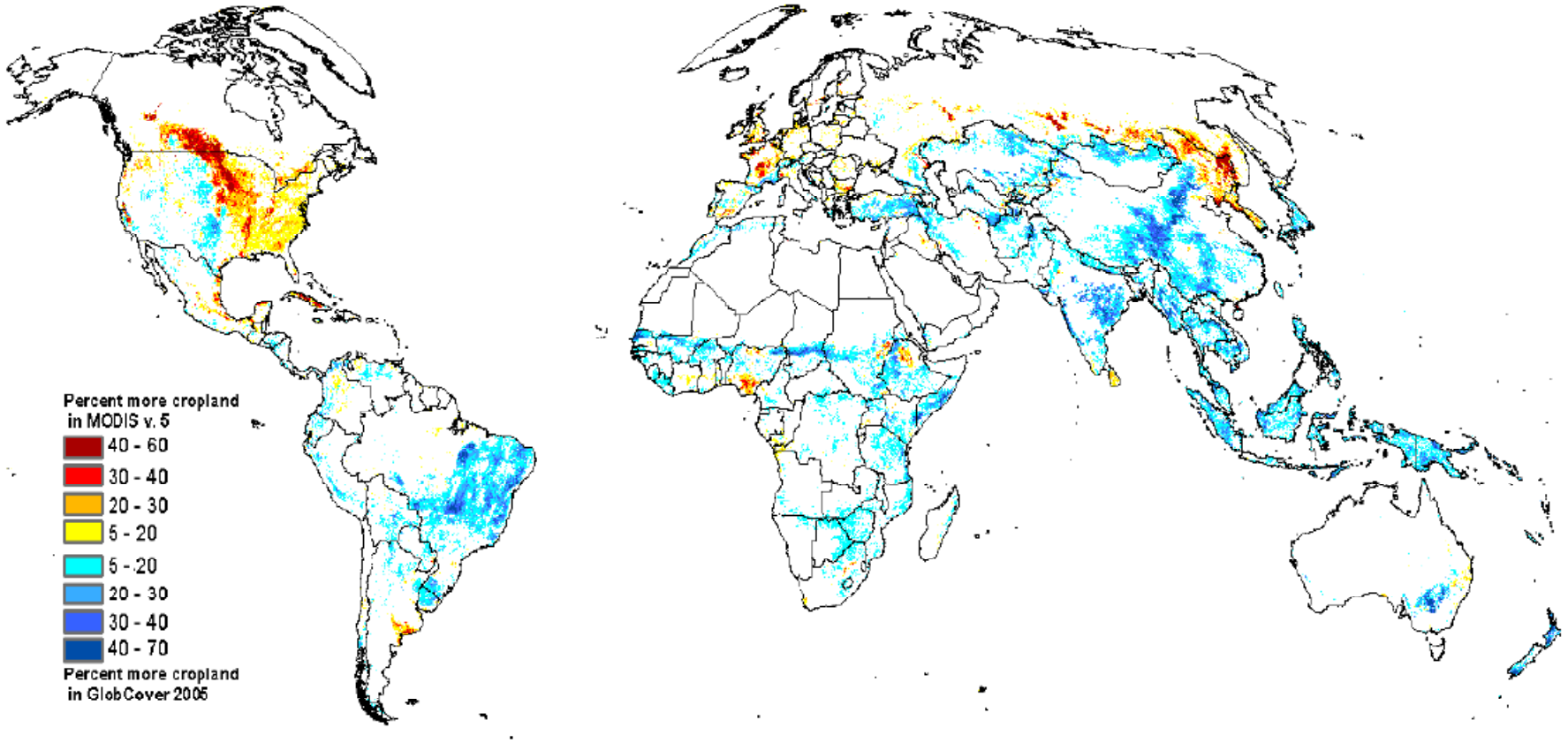
Differences in Cropland Extent MODIS - GlobCover

Reds: More croplands in MODIS
Blues: More croplands in GlobCover



Fritz and See, 2008