1. Global Agricultural Monitoring (GEOGLAM): an international GEO initiative

Chris Justice (GEO-AG Task Co-Chair)
Inbal Becker-Reshef
University of Maryland

GROUP ON EARTH OBSERVATIONS

GEO is focused on societal benefit

Agriculture is one of the GEO societal benefit areas

NASA Applied Sciences Program continues to be a strong supporter of GEO

Looking Forward

Agriculture Faces Major Challenges in this Century

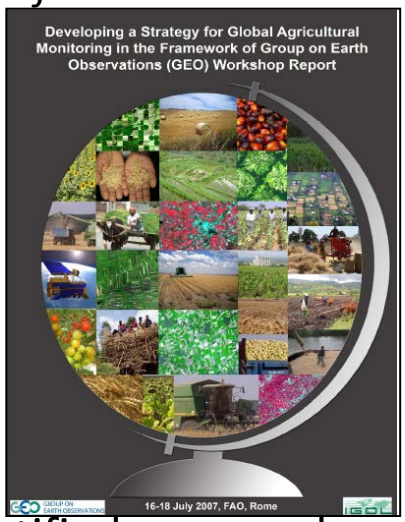
- Increasing pressures on agricultural land and production from:
  - Increased severe weather events and climate change
  - Population growth & changing diets
  - Fuel vs. Food vs. Feed
  - Limited water and suitable arable land
- Higher price volatility for major grains
- Crop yield variability is a main driver of short term changes in market equilibrium
  - Weather/climatic effects on production are triggers for price hikes
- Commodity markets are increasingly linked (good and bad)
- Rising fuel prices impact food prices (transport, fertilizer)

- **NEED TO INCREASE GLOBAL PRODUCTION BY 70% BY 2050 TO MEET DEMAND (FAO)**

→ Tools for monitoring and reliably forecasting production are essential for anticipating market imbalances and enhancing policy responses

Initial GEOSS/IGOL Agricultural Monitoring Workshop July 2007, UN-FAO

- Workshop to develop a strategy for global agricultural monitoring in the framework of GEO
- 47 participants representing 25 national and international organizations attended and established the *'GEOSS/IGOL Agricultural Monitoring Community of Practice'*



- Reviewed the current state of agricultural monitoring identified gaps and developed a set of priorities and recommendations
- ISRO agreed to establish Task Secretariat (J.S. Parihar)

Today the CoP has over 300 members representing over 40 countries and organizations

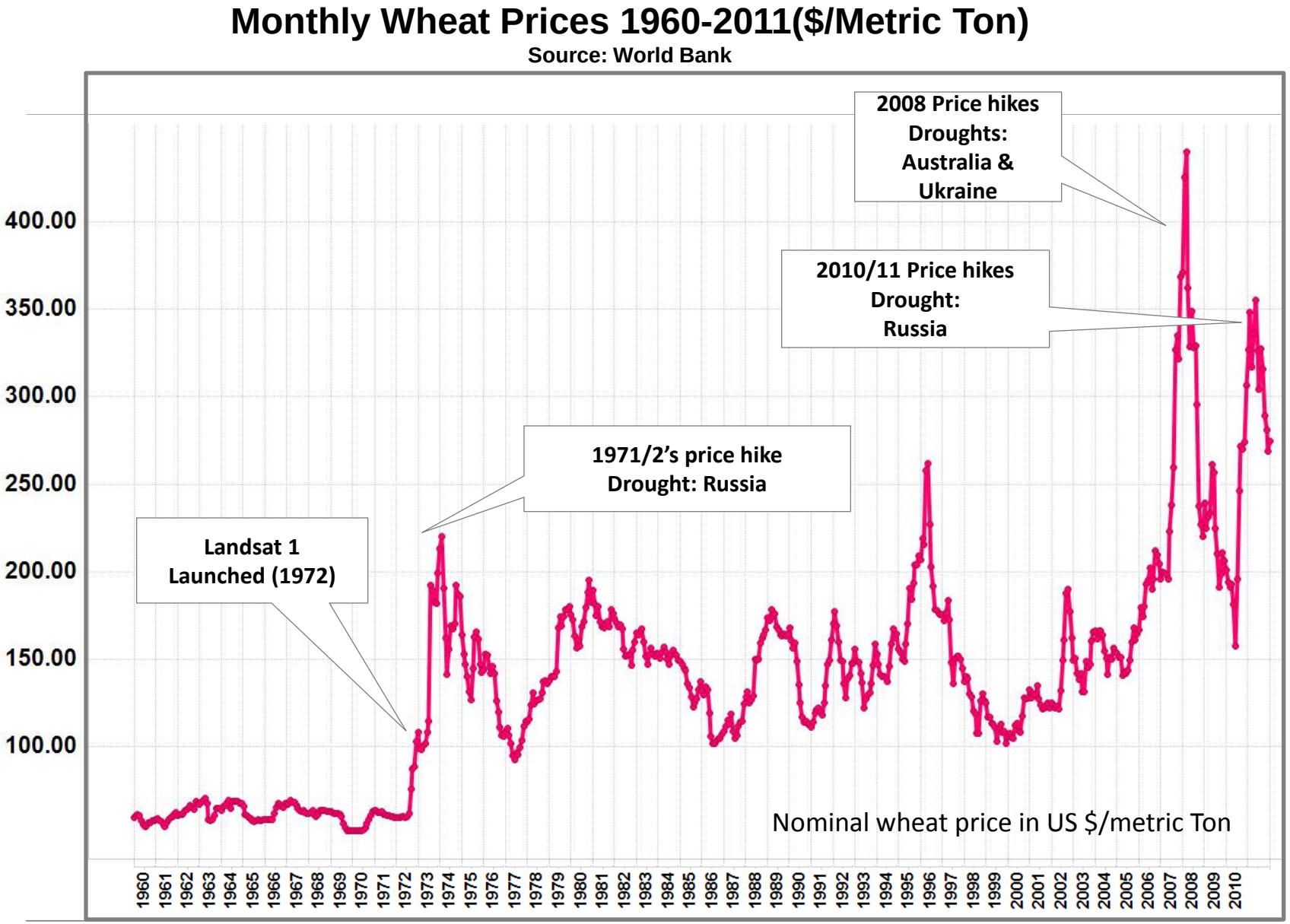
GEO Agriculture Monitoring Community of Practice
(an open community of Data Providers, Brokers and Users)

- Several global/regional scale systems in place – with common data needs, few common standards and protocols and inconsistent results
- Most countries have a national agricultural monitoring system

USDA Foreign Agricultural Service: an operational global monitoring program

GLAM GLobal Agriculture Monitoring

Context for GEOGLAM



Need for Improved Agricultural Intelligence

International recognition of critical need for improved information including at the World Summit on Food Security 2009, G20 Action Plan on Food Price Volatility and Agriculture, 2011

official statement of The Extraordinary Joint Intersessional meeting of the Intergovernmental Group (IGG/FAO) on Grains, Rome 2010:

"Unexpected price hikes and volatility are amongst major threats to food security and their root causes need to be addressed, in particular regarding ***the lack of reliable and up-to-date information on crop supply and demand and export availability****…."*

The G20 Initiative: GEO-GLAM

G20 FRANCE 2011 NEW WORLD NEW IDEAS

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.

- The G20 Cannes Summit (November 2011) Action Plan on Food Price Volatility and Agriculture
- Reaffirmed GEOGLAM commitment at the 2012 G-20 Los Cabos Declaration & in Agriculture Ministers Report

G20 GEOGLAM Goal:

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

Outcome: an improved and more harmonized systems of systems taking advantage of new satellite assets and methods and a higher level of international coordination

- GEO-GLAM will be implemented in the framework of GEO

The GEOGLAM Initiative: Project Elements

1. GLOBAL/ REGIONAL SYSTEM OF SYSTEMS

Main producer countries, main crops

2. NATIONAL CAPACITY DEVELOPMENT

for agricultural monitoring using Earth Observation

3. MONITORING COUNTRIES AT RISK

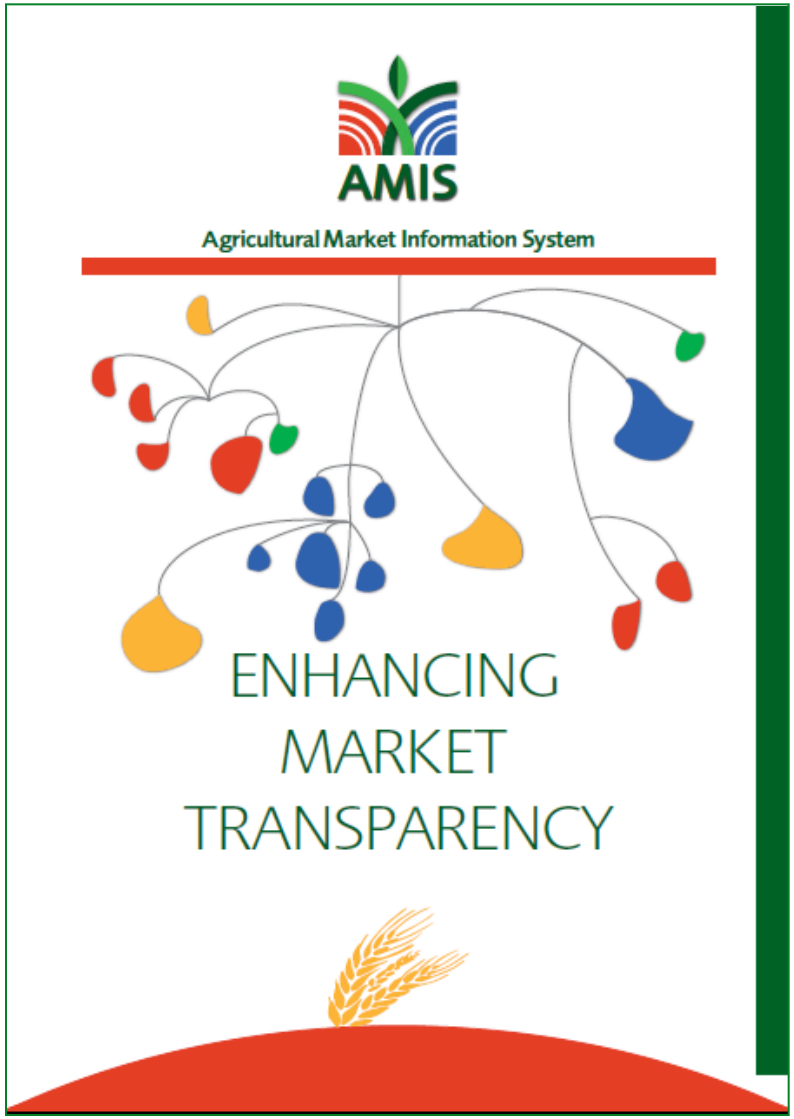
Food security assessment

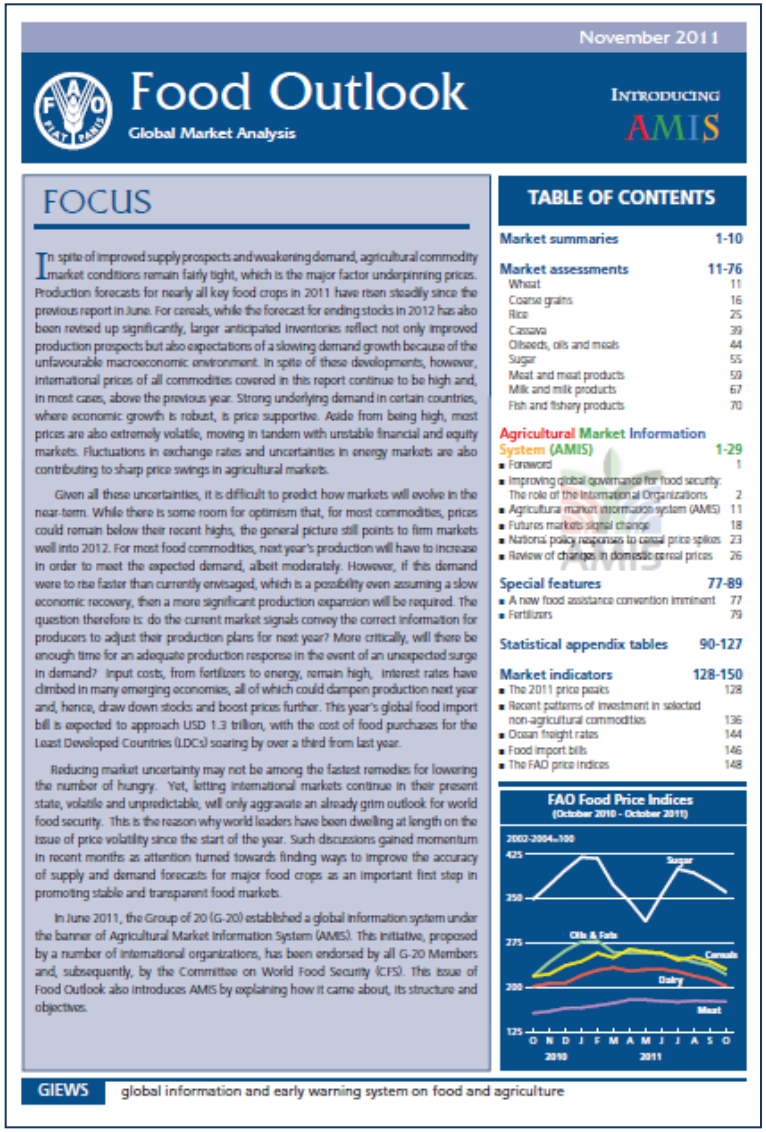
4. EO DATA COORDINATION (acquisition, availability, access)

5. METHOD IMPROVEMENT through R&D coordination

6. INFORMATION DISSEMINATION of Data and Products

Agricultural Market Information System (AMIS) hosted at the UN FAO focused on food producer countries





November 2011

Food Outlook
Global Market Analysis

INTRODUCING AMIS

FOCUS

In spite of improved supply prospects and weakening demand, agricultural commodity market conditions remain fairly tight, which is the major factor underpinning prices. Production forecasts for nearly all key food crops in 2011 have risen steadily since the previous report in June. For cereals, while the forecast for ending stocks in 2012 has also been revised up significantly, larger anticipated inventories reflect not only improved production prospects but also expectations of a slowing demand growth because of the unfavourable macroeconomic environment. In spite of these developments, however, international prices of all commodities covered in this report continue to be high and, in most cases, above the previous year. Strong underlying demand in certain countries, where economic growth is robust, is price supportive. Aside from being high, most prices are also extremely volatile, moving in tandem with unstable financial and equity markets. Fluctuations in exchange rates and uncertainties in energy markets are also contributing to sharp price swings in agricultural markets.

Given all these uncertainties, it is difficult to predict how markets will evolve in the near-term. While there is some room for optimism that, for most commodities, prices could remain below their recent highs, the general picture still points to firm markets well into 2012. For most food commodities, next year's production will have to increase in order to meet the expected demand, albeit moderately. However, if this demand were to rise faster than currently envisaged, which is a possibility even assuming a slow economic recovery, then a more significant production expansion will be required. The question therefore is: do the current market signals convey the correct information for producers to adjust their production plans for next year? More critically, will there be enough time for an adequate production response in the event of an unexpected surge in demand? Input costs, from fertilizers to energy, remain high. Interest rates have climbed in many emerging economies, all of which could dampen production next year and, hence, draw down stocks and boost prices further. This year's global food import bill is expected to approach USD 1.3 trillion, with the cost of food purchases for the Least Developed Countries (LDCs) soaring by over a third from last year.

Reducing market uncertainty may not be among the fastest remedies for lowering the number of hungry. Yet, letting international markets continue in their present state, volatile and unpredictable, will only aggravate an already grim outlook for world food security. This is the reason why world leaders have been dwelling at length on the issue of price volatility since the start of the year. Such discussions gained momentum in recent months as attention turned towards finding ways to improve the accuracy of supply and demand forecasts for major food crops as an important first step in promoting stable and transparent food markets.

In June 2011, the Group of 20 (G-20) established a global information system under the banner of Agricultural Market Information System (AMIS). This initiative, proposed by a number of international organizations, has been endorsed by all G-20 Members and, subsequently, by the Committee on World Food Security (CFS). This issue of Food Outlook also introduces AMIS by explaining how it came about, its structure and objectives.

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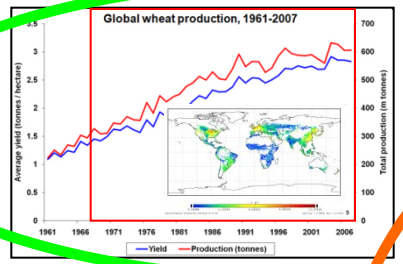
FAO Food Price Indices
(October 2010 - October 2011)

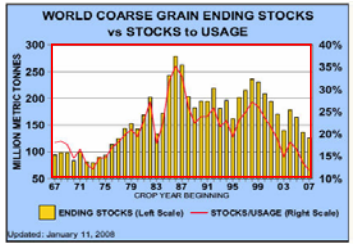
GIEWS global information and early warning system on food and agriculture

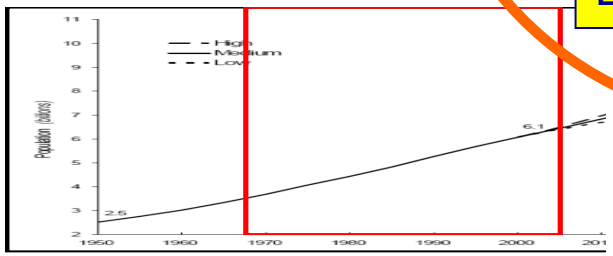
1. Background : The G20 Agriculture Priority (2011)

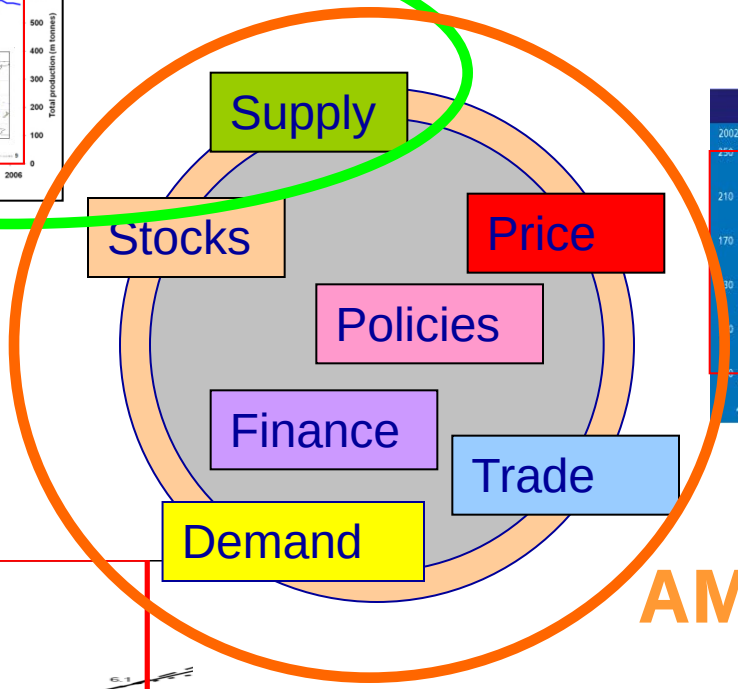
GEO-GLAM

2 initiatives to increase information availability, quality and transparency









AMIS

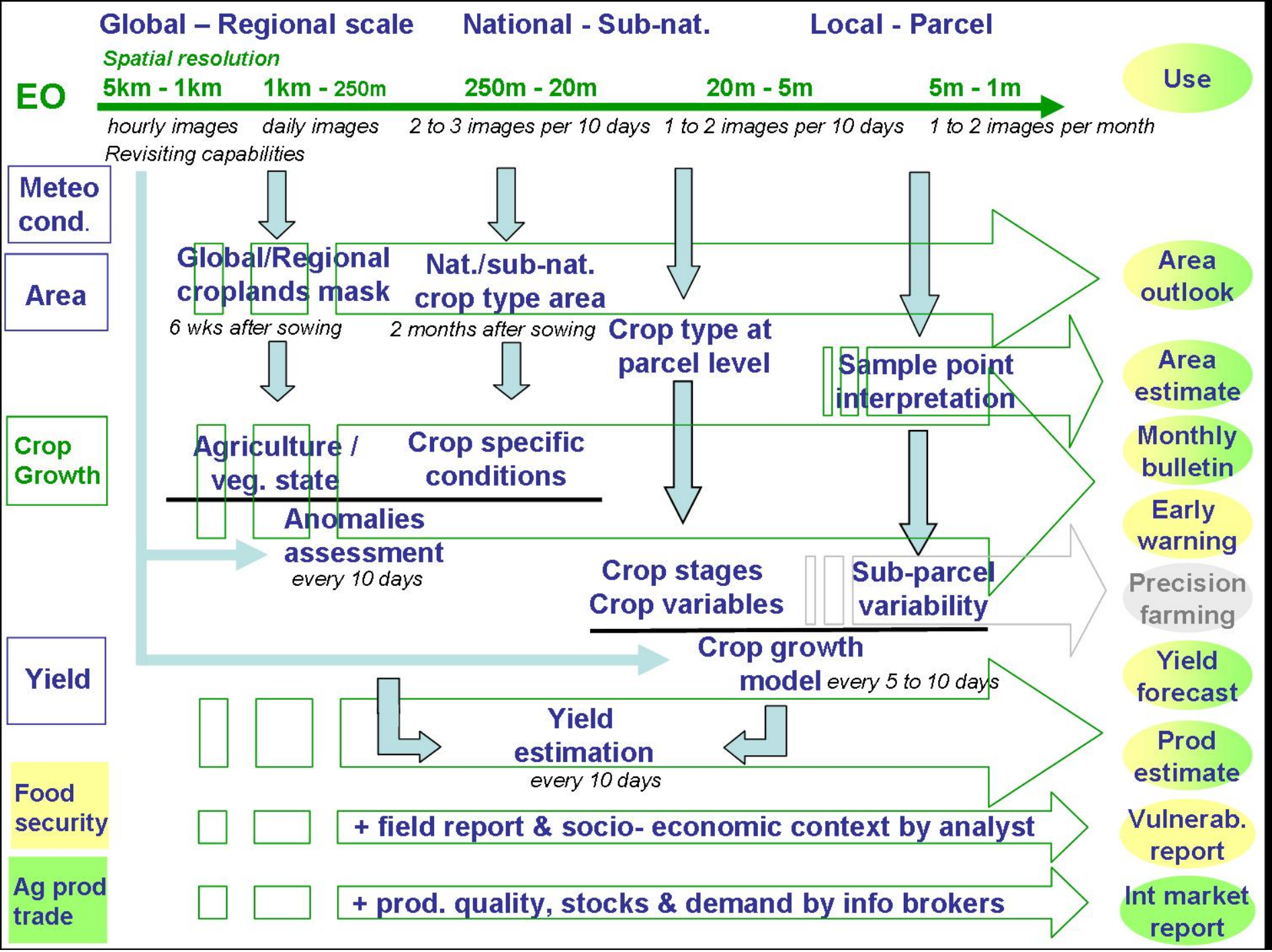
GEOGLAM Components

- **Component 1: Monitoring Global Producer Countries**
  - Focus: Global markets and trade, long term trends (climate change implications, extreme events, etc)
- **Component 2: National Monitoring Systems**
  - Focus: National statistics, national policy, subsidies, insurance
- **Component 3: Countries at Risk**
  - Focus: Early warning & food security
- **Component 4: Observations Coordination**
  - Focus on acquisition, availability, access needed for GEOGLAM implementation
- **Component 5: R&D**
  - Focus: Operational R &D, Best practices, Research to Operations, Joint Experiments -JECAM
- **Component 6: Information dissemination**
  - Focus on timely and transparent availability of information

4. EO DATA COORDINATION (acquisition, availability, access)

- **Goal: secure the international data necessary to implement GEOGLAM**
- GEOGLAM has substantive and specific observation data needs (what, where and when) which underpin its implementation – <u>no one satellite system can meet the data needs – international cooperation is needed</u>
- Approach: work in close partnership with CEOS ("the space arm of GEO") and other data providers to:
  - Lay out the overall program observation requirements to enable the necessary information products to be generated (building on the experience with GEO FCT and GFOI)
  - Work with data providers to establish and implement data acquisition and dissemination systems

GEOGLAM
Global Agricultural Monitoring


Global – Regional scale
National - Sub-nat.
Local - Parcel
Spatial resolution
EO
5km - 1km
1km - 250m
250m - 20m
20m - 5m
5m - 1m
Use
hourly images
daily images
2 to 3 images per 10 days
1 to 2 images per 10 days
1 to 2 images per month
Revisiting capabilities
Meteo cond.
Area
Crop Growth
Yield
Food security
Ag prod trade
Global/Regional croplands mask
6 wks after sowing
Nat./sub-nat. crop type area
2 months after sowing
Crop type at parcel level
Sample point interpretation
Agriculture / veg. state
Crop specific conditions
Anomalies assessment
every 10 days
Crop stages
Crop variables
Sub-parcel variability
Crop growth model every 5 to 10 days
Yield estimation
every 10 days
+ field report & socio- economic context by analyst
+ prod. quality, stocks & demand by info brokers
Area outlook
Area estimate
Monthly bulletin
Early warning
Precision farming
Yield forecast
Prod estimate
Vulnerab. report
Int market report

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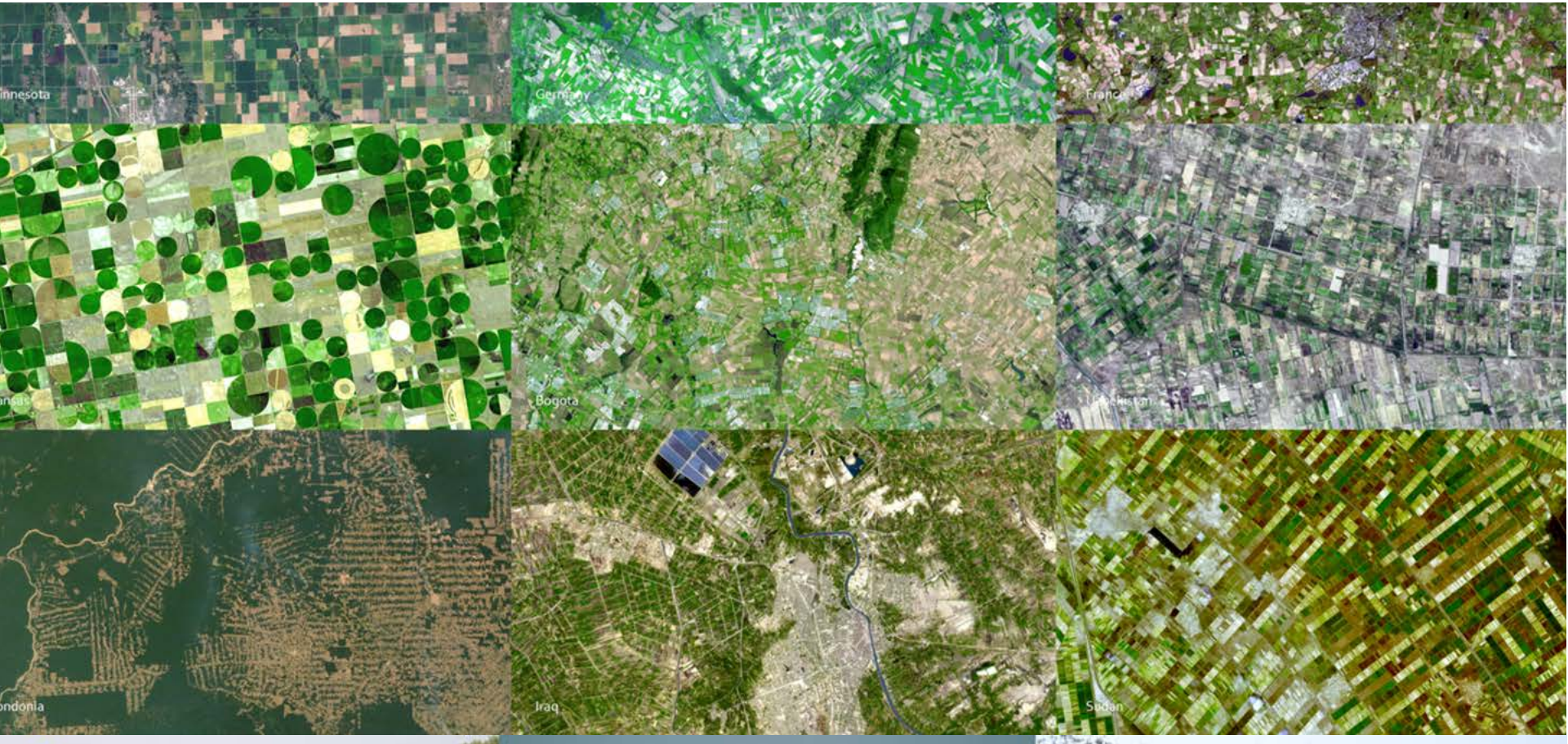
GEOGLAM Global Agricultural Monitoring

GEOGLAM/CEOS WORKSHOP ON OBSERVATION REQUIREMENTS
CSA, MONTREAL JULY 10-11, 2012

Tabulating the satellite observation requirements (spatial resolution, frequency, and period of coverage) for GEOGLAM

Recognition that cropping systems are inherently diverse which dictates the monitoring observations and methods



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GEOGLAM Global Agricultural Monitoring

GEOGLAM USER REQUIREMENTS WORKSHOP RESULTS

The results package includes the following elements:

a. A summary table of requirements developed taking into consideration the observation needs, the derived products they will serve, and high-level regional specificities;

OBSERVATIONS					DERIVED PRODUCTS							GLOBAL	REGION SPECIFIC ACQUISITIONS**			
Spatial resolution	Spectral range	Effective observ. frequency (cloud free)	Swath	Use (Primary Source /Secondary S.)	Croplands mask	Crop type area	Crop cond. indicators	Crop bioph. var.	Env. variables (reservoir, water, soil moisture)	Ag. Practices / Cropping systems	Crop yield	Agricult. coverage	Large, Medium, Small fields	Crop types diversity	Calendar/Multi-ple cropping	Cloud coverage
2000 - 500 m	thermal IR + optical	few per day	global	NRT products (PS)			x	x (LF)				x				
100-300m	optical + SWIR	2 to 5 per week	global	NRT products (PS)	x	x	x	x (LF)		x (LF)	x (LF)	x	all L			
1-15km	passive microwave	daily	global	NRT products (PS)					x			x				
150-75 m	SAR dual pol. (X,C,L)	5 per season	main crops	NRT products (SS/PS)*	x	x	x	x (LF)	x	x (LF)			all L	rice area	entire growing seasons	high cloud cov.
5-10m	SAR dual pol. (X,C,L)	5 per season	main crops	NRT products (SS/PS)*		x	x	x	x	x			L/M/S	rice area		high cloud cov.
20-70m	optical + SWIR	1 per month (if possible same sensor)	croplands	annual products (PS)	x	x							all M		year-round, focus on growing season	
Footprint	RADAR Altimetry	weekly		NRT products (PS)					x							
50-100m	thermal	daily ?	main crops	NRT products (PS)			x						L/M/S		entire growing seasons	
20-70m	optical+SWIR	1 per week (min. 1 per 2 weeks)	main crops	NRT products (PS)			x	x	x	x			country specific (1) L/M		entire growing seasons	
5-10 m	optical (+SWIR)***	1 per month (if possible same sensor)	croplands	annual products (PS)	x	x							all S		year-round, focus on growing season	
5-10 m	optical (+SWIR)***	1 per week (min. 1 per 2 weeks)	main crops	NRT products (PS)			x	x	x	x			country specific (1) S		entire growing seasons	
< 5 m	optical	1 to 2 per month	croplands	annual products (PS)		x				x	x		demo. case (2 to 5% of		2 to 4 coverages per year	

Working to have the program endorsed by CEOS (SIT)

5. R and D in support of operational monitoring systems

- **Goal: to expand the investment in User-Driven 'operational' R and D activities for agricultural monitoring:**
  - Improved satellite retrievals of Soil Moisture and ET
  - Improved global Ag Drought indices and alerts
  - Improved global cropland data layer
  - Automated cropland and crop-type mapping
  - Inter-comparison of EO-driven methods for yield estimation (JECAM)
  - Enhance procedures for EO data inter-use
  - Increase timeliness of delivery systems
  - Increased use of Geospatial and Information Technologies e.g.
    - Satellite data dissemination systems
    - Mobile phone (in situ) data collection and dissemination pilot

JECAM
Joint Experiment for Crop Assessment and Monitoring

GEO GROUP ON EARTH OBSERVATIONS

- JECAM activities are being undertaken at a **series of study sites** which represent the world's main cropping systems and agricultural practices. Focus for satellite data collection and availability for research and development
- 15 sites currently exist (1 in development). Additional sites will be added to meet science objectives and ensure all major crop systems are addressed.

Mali site in development

JECAM
Joint Experiment for Crop Assessment and Monitoring

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CEOS-JECAM Satellite Data Acquisition and Access

Optical Data

- Aqua
- Terra
- Landsat 5
- Landsat 7
- MNP EO-1
- ResourceSat 1
- ResourceSat 2
- THEOS
- DMCii
- QuickBird
- Worldview-1
- Worldview-2

Radar Data

- Radarsat 1
- Radarsat 2
- TerraSARX
- Envisat
- ERS-2

Passive Radar

- Aqua
- SMOS

NASA Near Real Time EOS Data for Agricultural Monitoring

Timely data is critical for crop monitoring!!

NASA EOS near-real-time daily observations are processed and integrated into USDA FAS system (< 3 hours from observation)

A contribution to GEO-GLAM

GEOGLAM
Global Agricultural Monitoring

New Data Initiative for Agricultural Landuse from Landsat and Sentinel 2 (NASA, CNES, ESA)

Goal 1: Create consistent, merged Landsat and Sentinel-2 reflectance dataset

- builds on MODIS, MERIS, and Landsat processing heritage
- builds on previous data initiatives among NASA, ESA, and USGS
- establishes consistent radiometric data set for land phenology

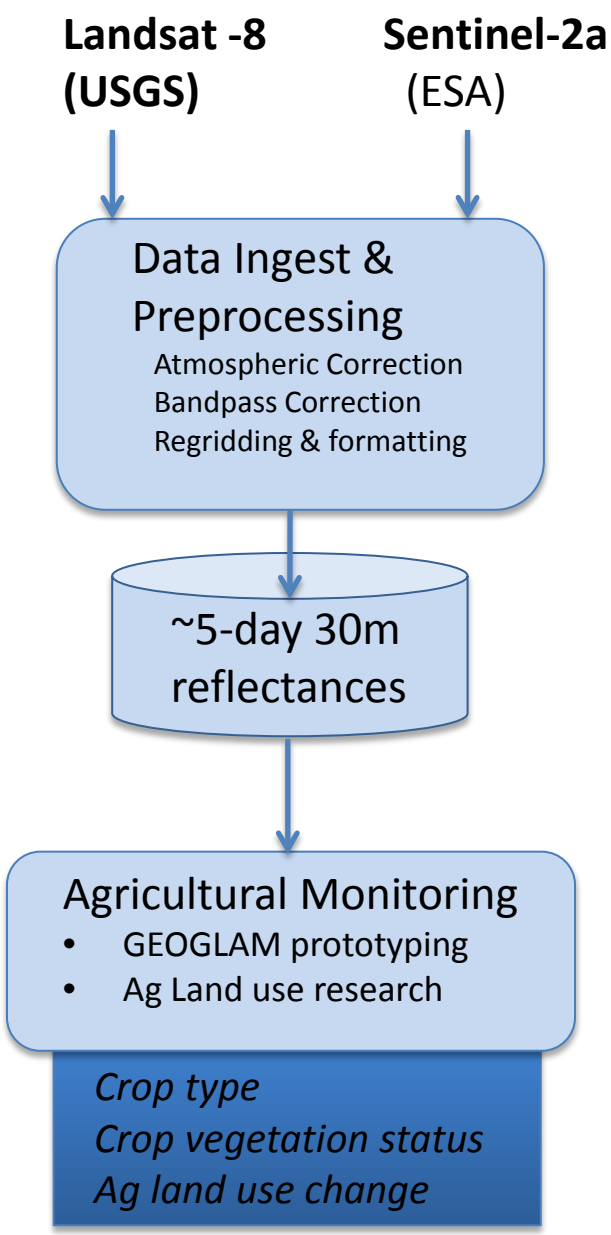
Goal 2: Leverage new datasets for agricultural monitoring (e.g. GEOGLAM prototyping)

Goal 3: Support transition to operational agencies

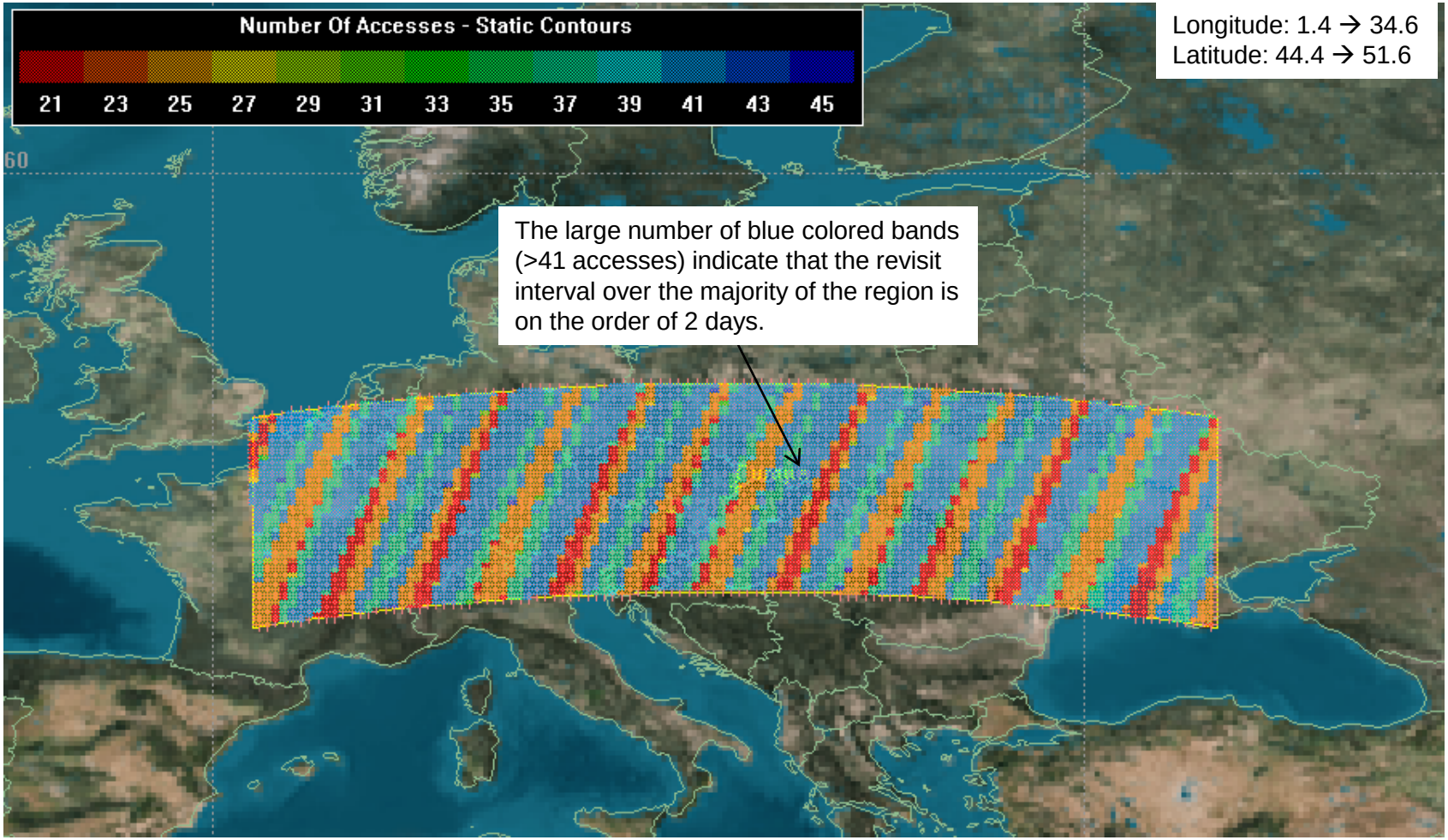
- GEOGLAM, USDA FAS and EC JRC MARS programs
- examples: UMD/USDA MODIS GLAM – MODIS LANCE

Four year effort (2013 – 2016)

- Phase 1: prototype with limited geographic scope (4-5 demonstrator countries);
- Phase 2: expand to support global Ag monitoring with demonstration of success



Ag 01 need for high frequency moderate resolution observations: Sentinel 2A and B – LDCM



- The picture shows the number of times LDCM and the Sentinel 2 satellites accessed areas on the ground over an 80 day period of time.
  - 21 accesses indicates **a maximum revisit interval of ~3 days 19 hours**
  - 46 accesses indicates a **minimum** revisit interval of ~1 day 18 hours

Courtesy Brian Killough, NASA LARC

The GEOGLAM Initiative: 2011-2012 Progress

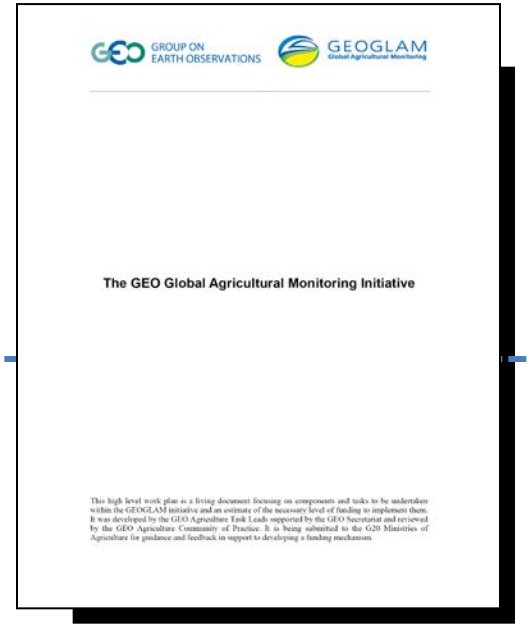
International cooperation for the definition of GEOGLAM

- 09/2011 Geneva : First GEOGLAM international Workshop (***13 countries***)
- 11/2011 Istanbul : GEO VI Plenary Assembly
- 01/2012 Geneva : GEOGLAM coord. Group meeting
- 02/2012 Rome : Present to the 1st meeting of the AMIS coord. Group
- 02/2012 Canberra : International Workshop on crop monitoring
- 03/2012 Mexico : Present. to XIIth "Foro de expectativas agropecuarias"
- 03/2012 La Hoya : CEOS Strategic Implementation Team
- 04/2012 Tokyo : GEOSS in the Asian Pacific Symposium
- 4/2012 Mexico: G20 Ag Ministers preparation meeting
- 4/2012 Italy: ESA Sentinel 2 workshop
- 5/2012 Geneva: GEO Workplan Meeting
- 6/2012 Mexico City: Meeting with SIAP (Min of Ag)
- 7/2012 Montreal: CEOS-GEOGLAM data requirements workshop

- ***9/2012 Buenos Aires: Regional Ag Monitoring Systems workshop***
- ***10/2012 Beijing: Drought Monitoring Workshop w. GEO Water Task***

+ regional and national meetings and presentations

+ **EU FP-7 Call for GEOGLAM proposal (Ag and Environment) 9 Million Euro**


GEO GROUP ON EARTH OBSERVATIONS GEOGLAM

The GEO Global Agricultural Monitoring Initiative

This high level work plan is a living document focusing on components and tasks to be undertaken within the GEOGLAM initiative and an estimate of the necessary level of funding to implement them. It was developed by the GEO Agriculture Task Leads supported by the GEO Secretariat and reviewed by the GEO Agriculture Community of Practice. It is being submitted to the G20 Ministries of Agriculture for guidance and feedback in support to developing a funding mechanism.

2. Global Agricultural Monitoring: Transitioning NPP VIIRS Observations into the USDA FAS Decision Support System

Chris Justice, Eric Vermote, Inbal Becker-Reshef,
Mark Sullivan,
UMD

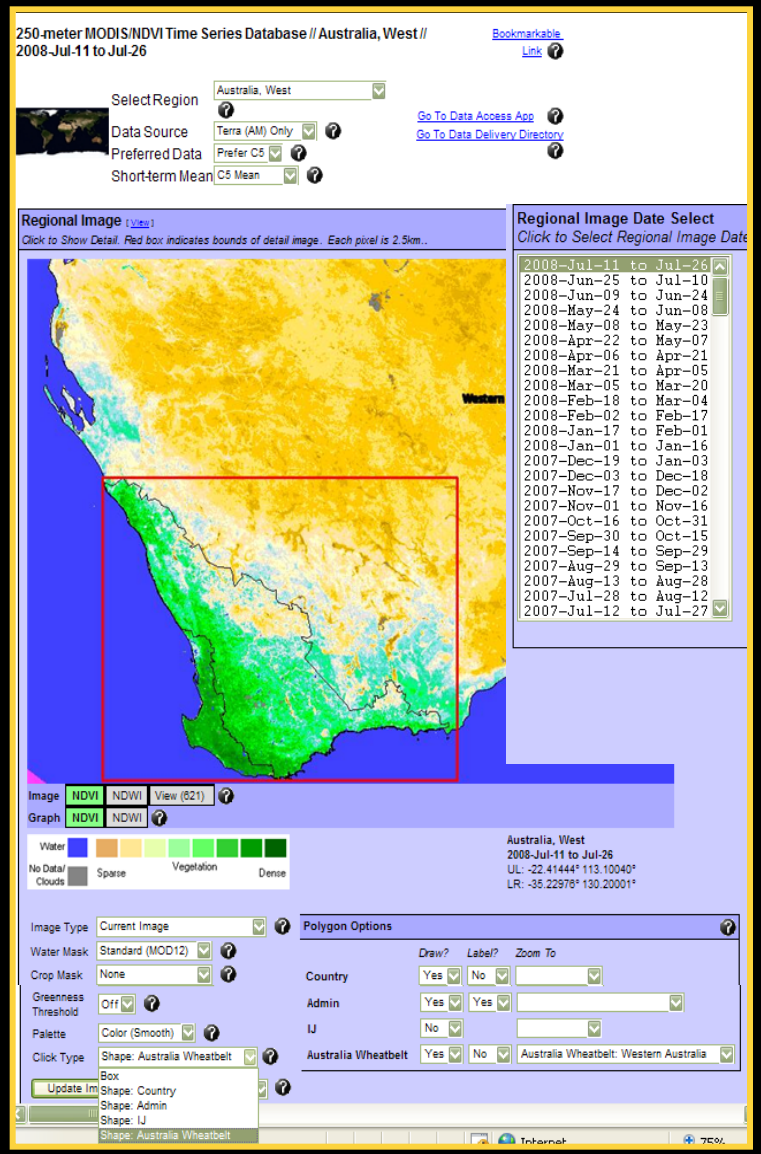
VIIRS First light images generated by this project

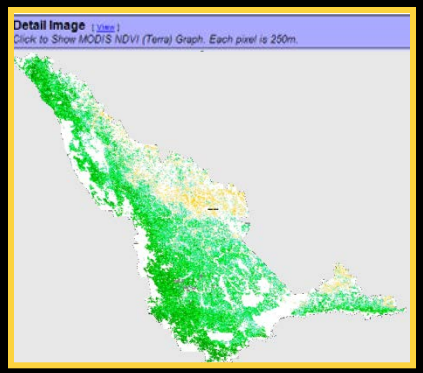
- VIIRS has a MODIS-like capability for global agricultural monitoring providing continuity
- Terra is beginning to show its age
- A second VIIRS(J1) is planned for launch in 2017 – a third (J2) planned for 2022

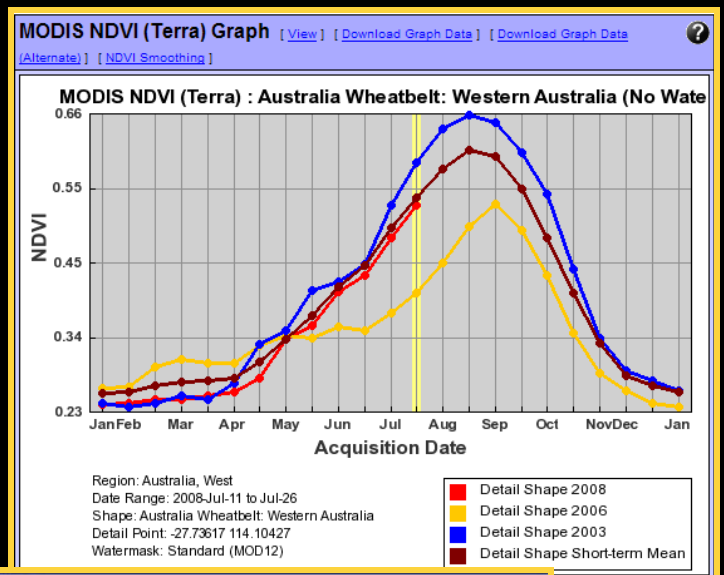
Project Objectives

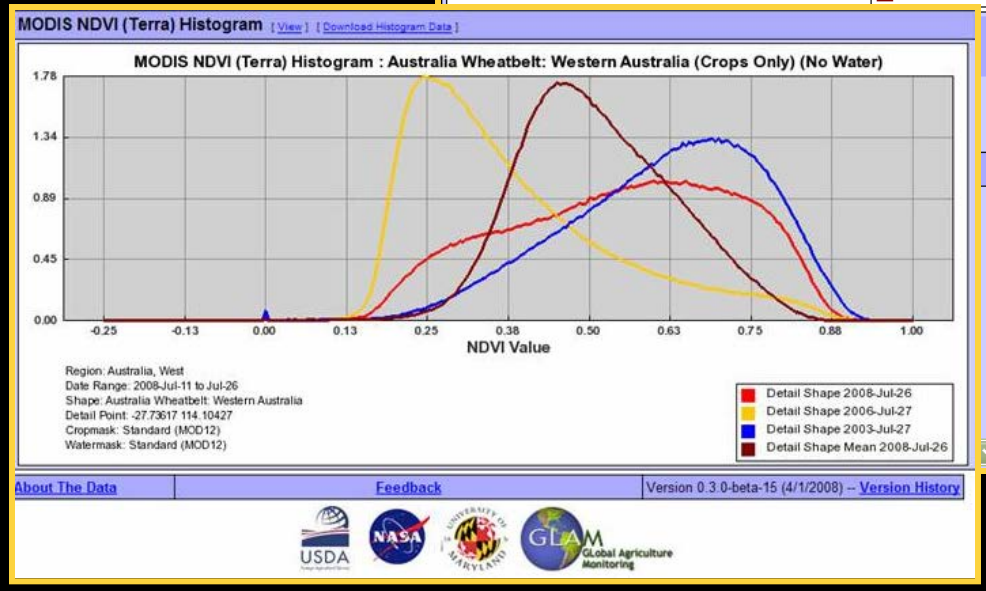
- To develop and deliver MODIS-like product suite from VIIRS to FAS via. the NASA-developed GLAM System
  - Ensure instrument is well calibrated (work with the NASA VIIRS Science Team and NOAA STAR)
  - Evaluate IDPS Surface Reflectance Intermediate Product and implement algorithm improvements in the NASA Land PEATE
  - Generate prototype products from the VIIRS for FAS (and community) evaluation
  - Prototype operational NRT data production on the NASA Land PEATE

Build on the MODIS GLAM System Web Interface for Querying and Analyzing Time Series Data

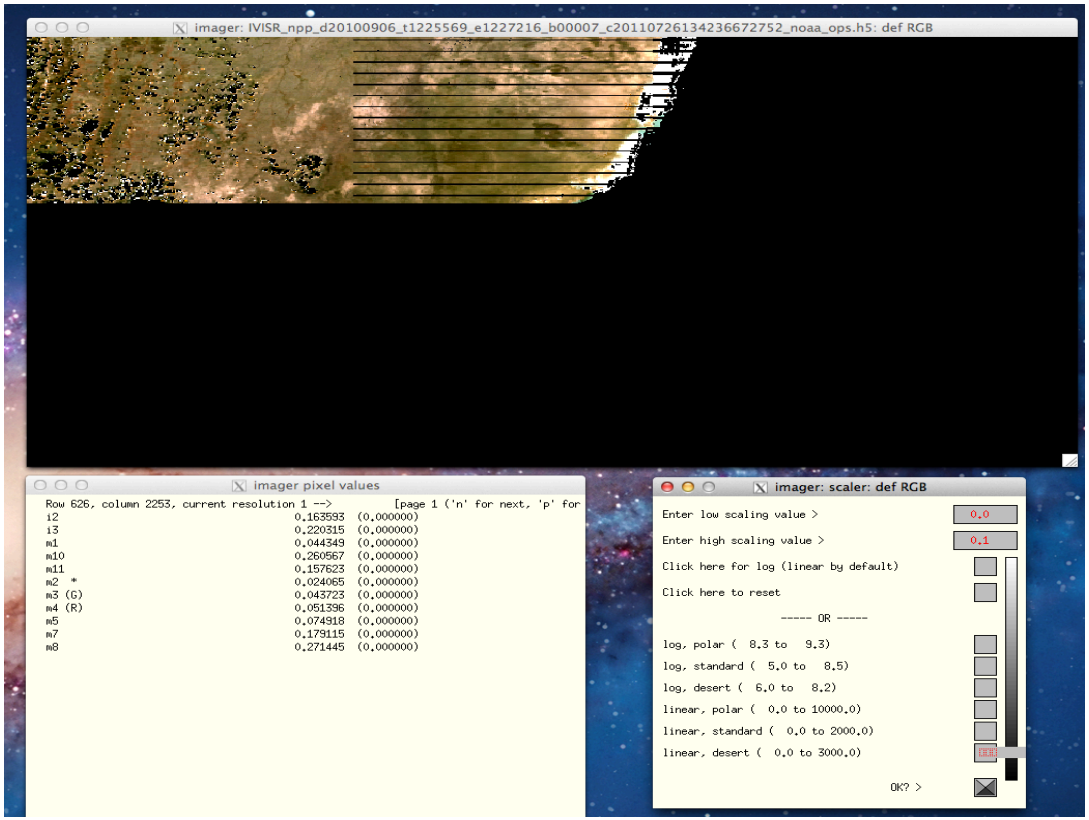








Tool developed and being used for VIIRS ANALYSIS



VIIRS surface reflectance from IDPS (hdf5) visualized by imager

Vermote UMD

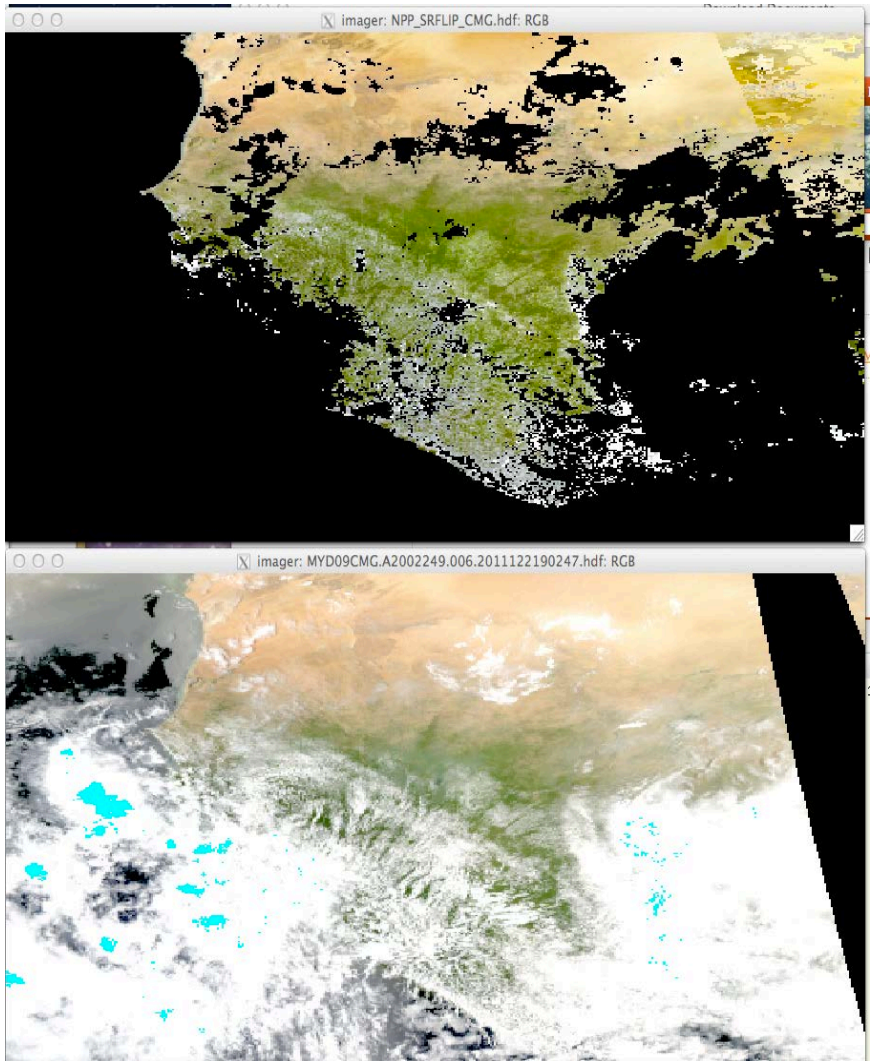
Assessment of Science Data Records using operational products and SCF generated products underway.

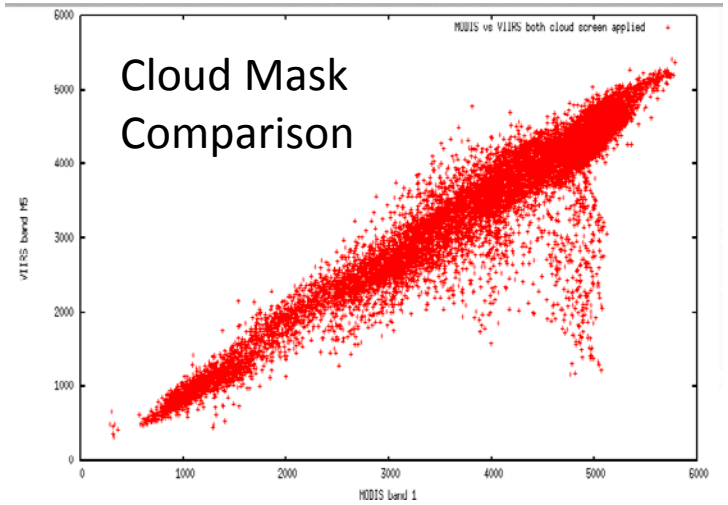
- The current VIIRS Intensive Calibration and Validation period - activities focused on specific product performance evaluation and improvement with a series of changes proposed for implementation in the IDPS.

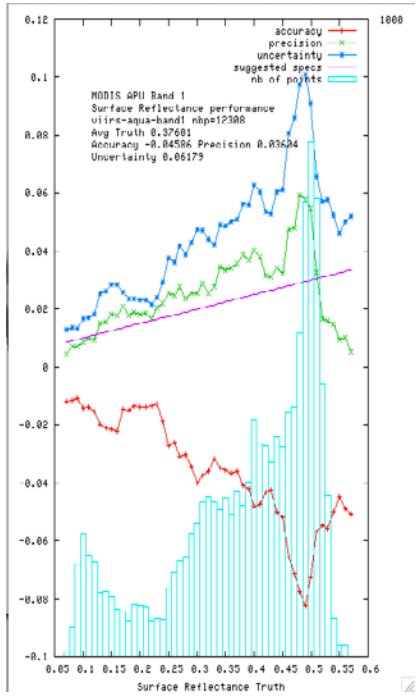
- Comparing VIIRS surface reflectance products (over land) corrected for BRDF effect (Vermote 2009) with the Aqua SR CMG product (0.05 degree resolution) corrected for BRDF effects. VIIRS is also projected on the CMG grid.

- Data access from the NASA Land PEATE

Early VIIRS assessment using MODIS Aqua CMG



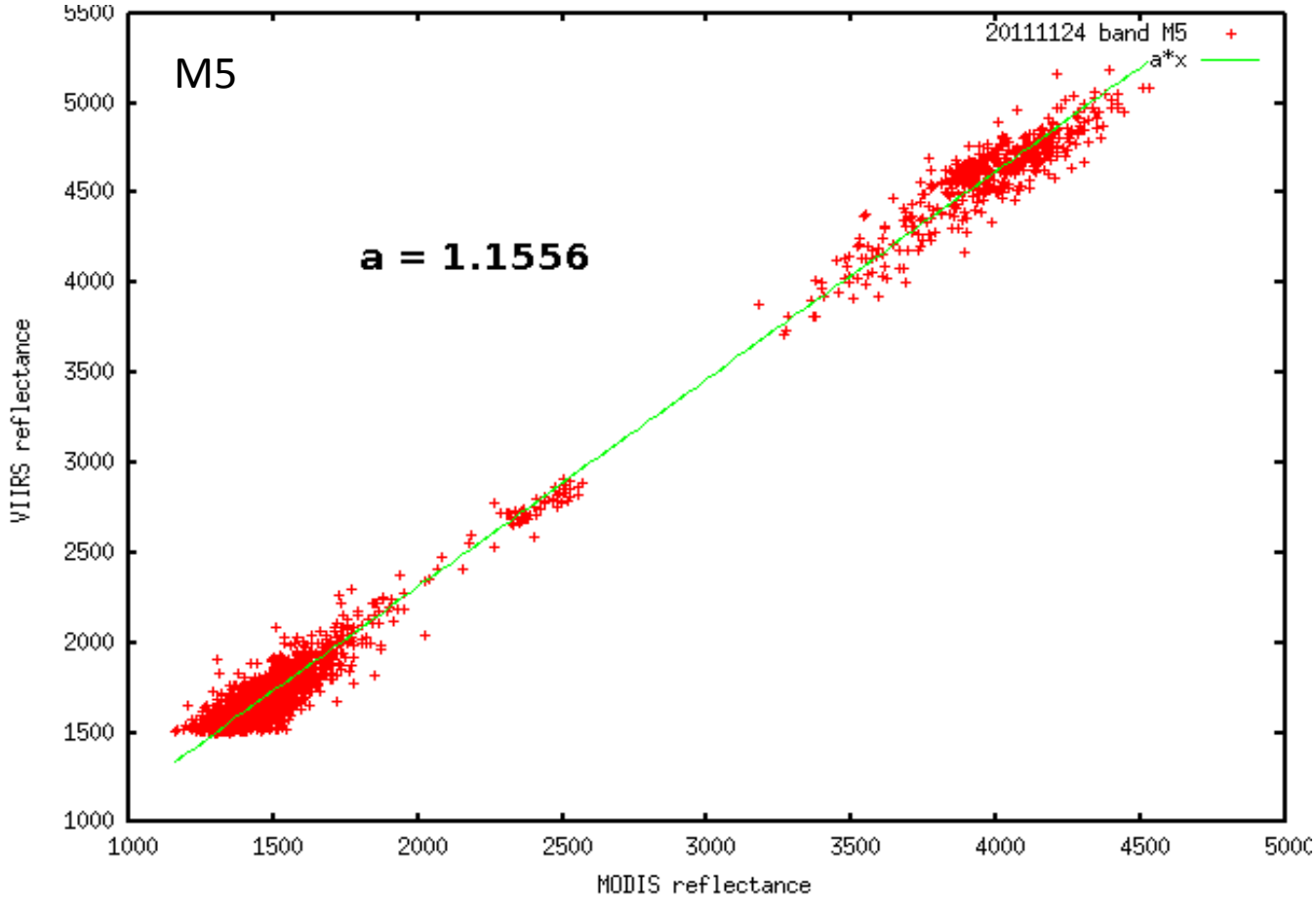




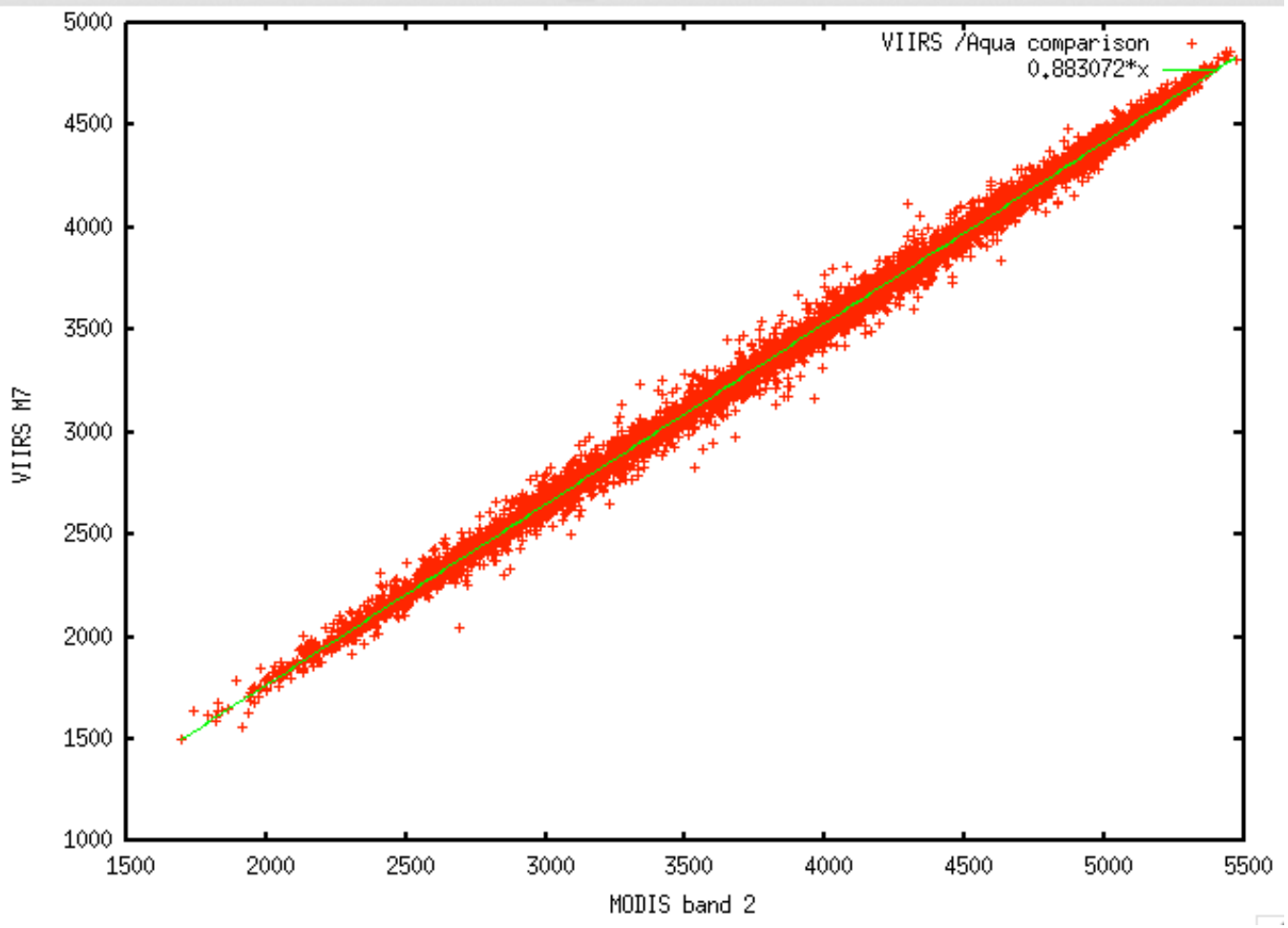
Accuracy
Precision and
Uncertainty
Analysis

Vermote et al. UMD

Early assessment of VIIRS SDR showed consistent overestimation of VIIRS calibration (preflight) by about 15%

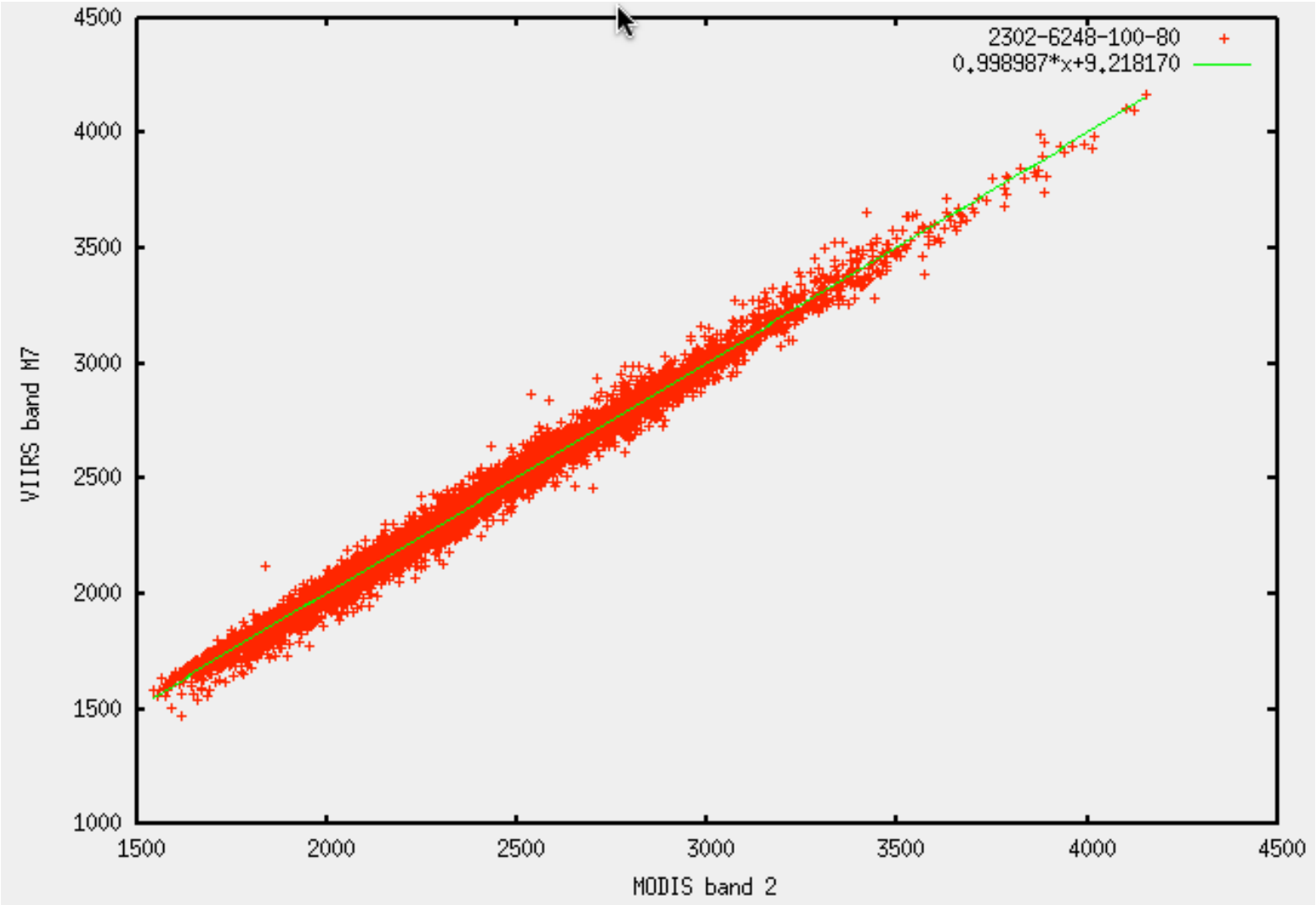


Example of Results for 2/25/2012

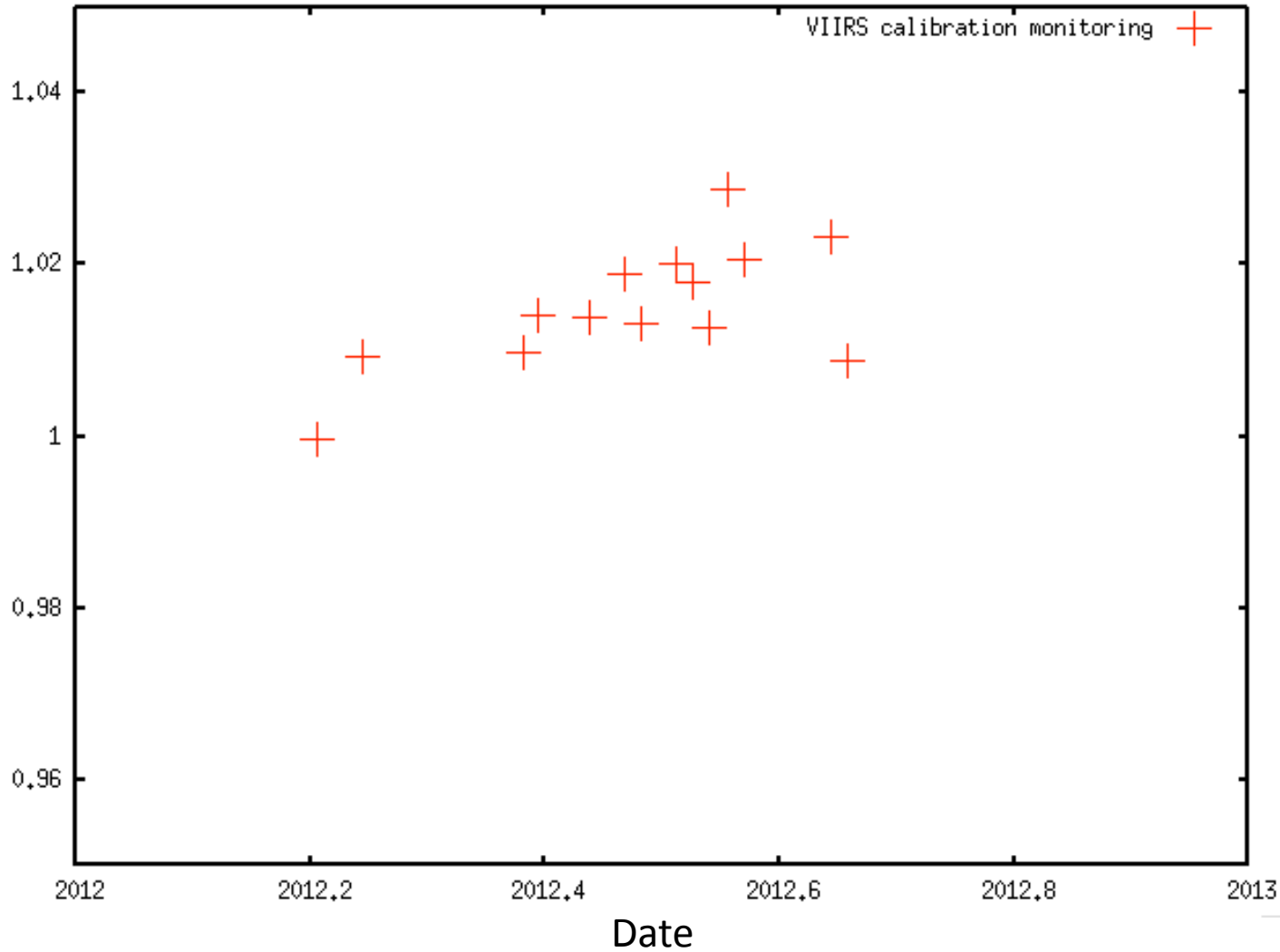


The results show for VIIRS M7 an underestimation (about 12%), it turns out the updated SDR LUT was not used to generate the Land PEATE data for 2/25/2012 as previously thought

Results for 3/06/2012 shows that the problem was fixed

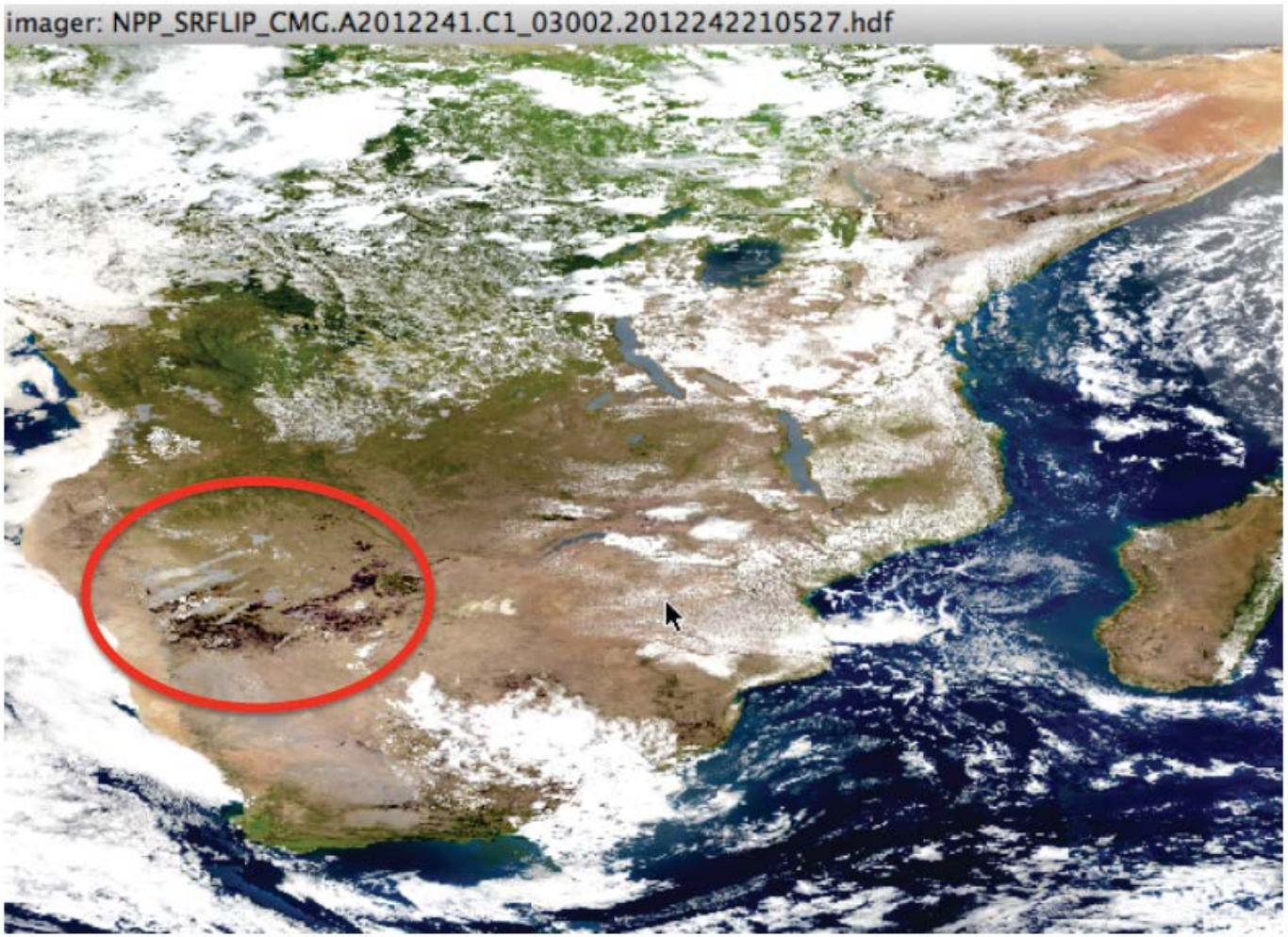


VIIRS calibration is being monitored on a continuous basis (selected daily obs)



Emphasis on Surface Reflectance Data Product and the impact of aerosol and cloud mask

Example of current issue with the atmospheric correction :
Data from August 28 2012, issue with the Dust aerosol model.



Project Status

- Working w. NOAA STAR and within the NASA VIIRS Science Team to evaluate SDR's/EDR's and develop 'improved science products'
- Land products starting to achieve beta maturity status (i.e. w. known issues), according to their specified performance and their dependencies on the VIIRS SDR, Cloud Mask and Aerosol products.
- Primary Challenge: transitioning desired NASA 'science algorithm' improvements into the IDPS
- SR and VI "Applications Products" from this project anticipated to be ready for evaluation early next year
- Following evaluation we recommend establishing a NASA Science Applications Product Stream from the LAND PEATE
  - Providing a NASA LANCE-like capability functionality for VIIRS at NASA to meet NASA user needs (SR, VI, … > LST, others?)
  - Explore Longer term 'transition of a LANCE-type functionality" to NOAA/JPSS

Global monitoring of agricultural drought: a contribution to GEOGLAM

Chris Justice, Eric Vermote, Inbal Becker-Reshef, Mark Sullivan

UMD

Objective Task 1.

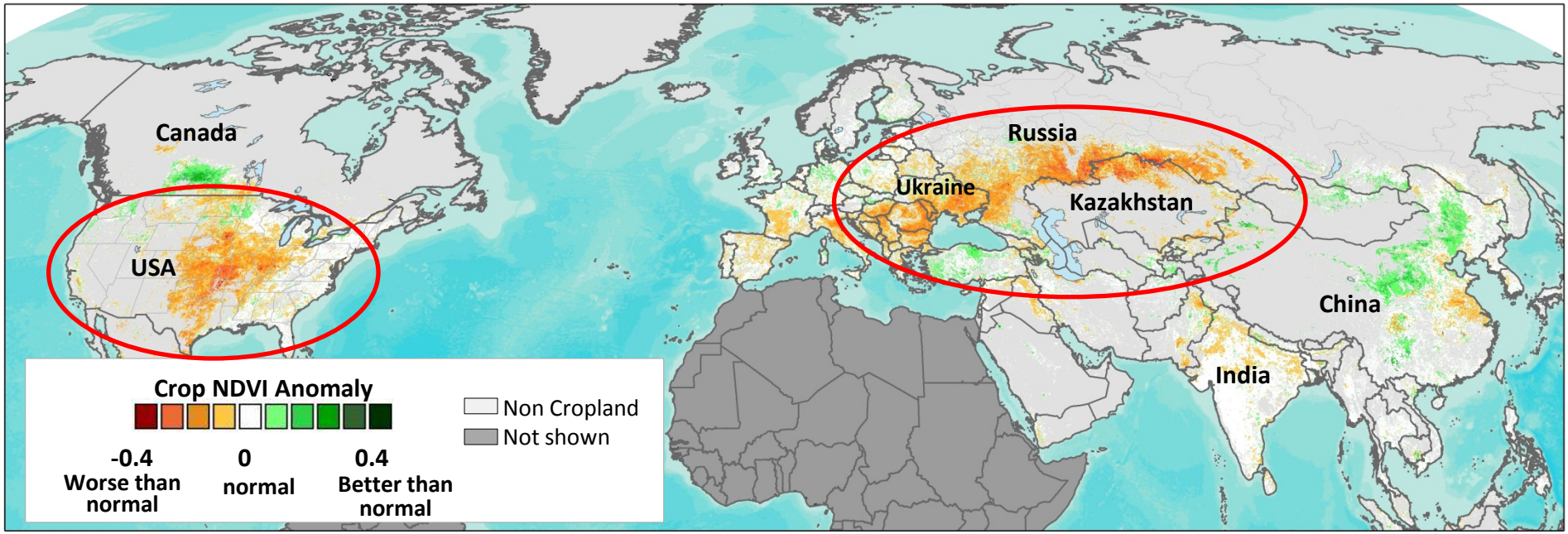
- Provide timely satellite-based information on global agricultural conditions and drought anomalies for major producer countries for primary crops
- Develop an information product suite to meet the needs of GEOGLAM CoP (data users and brokers) and AMIS decision-makers
  - Successive augmentation of product suite (multisource information inputs from international partners)
- Establish an international panel to provide a consensus on a timely, qualitative assessment of the data on conditions prior to availability of official production estimates
- Early prototyping effort underway

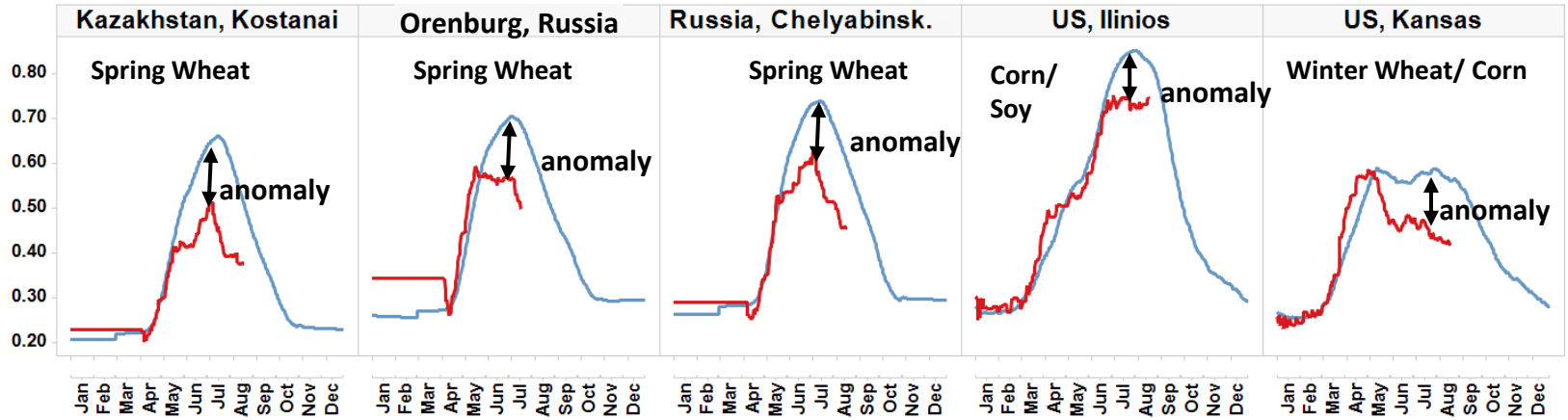
Prototyping: tracking impacts of 2012 droughts on crop condition through daily satellite observations

- Severe drought conditions are hampering crop production across the northern hemisphere.
- The US, which is the world's largest corn and soy producer, is currently experiencing its worst drought in over 50 years.
- **Compounding the effects of the US drought, large areas of the Black Sea region (Russia, Ukraine and Kazakhstan) are also in the midst of a wide spread drought.** The Black Sea countries account for a quarter of the world's wheat exports
- **Focus on agricultural area only and sensitive crop stage for 4 primary crops (wheat, corn, soy, rice)**

Current Conditions in Northern Hemisphere Crop Condition Anomaly, August 13th, 2012

GEOGLAM Global Agricultural Monitoring





Current season crop development (2012)
Average season development (2000-2011)

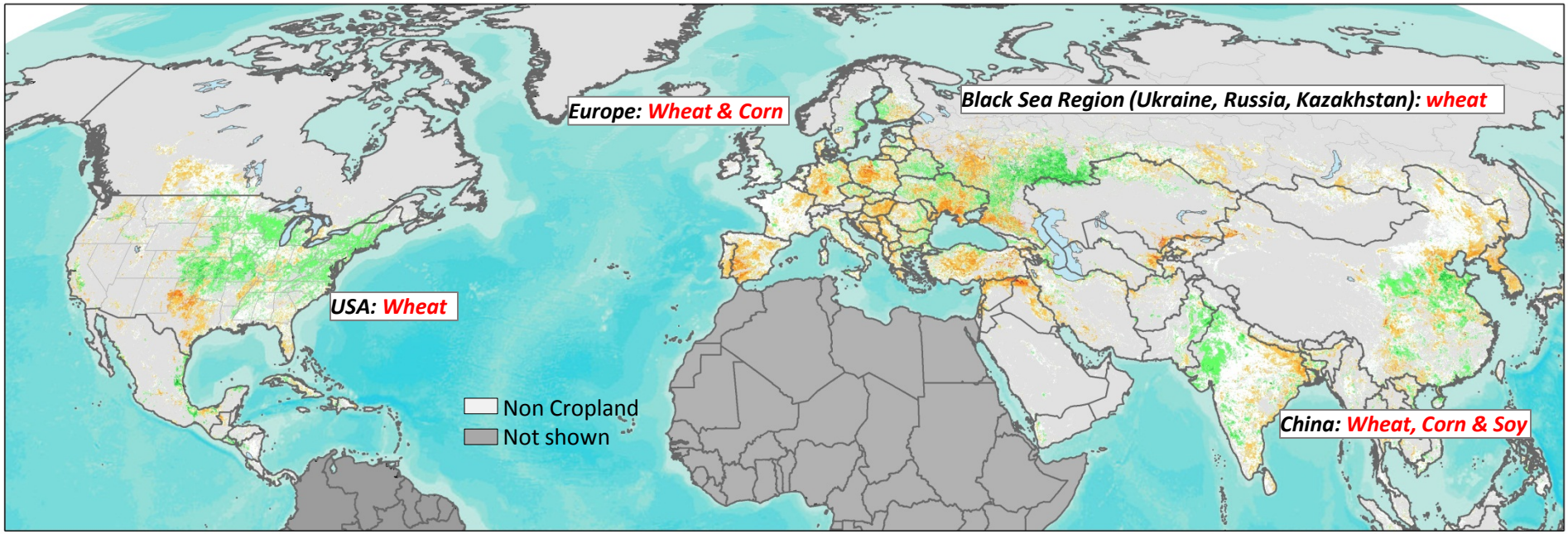
Becker-Reshef /Vermote UMD

University of Maryland 1856

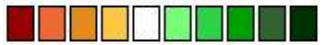
Time Series of Depicting impact of drought conditions on croplands only in Northern Hemisphere, 2012

- Crop condition depicted through NDVI anomalies on 1st day and 15th day of each month (May-August)
- Crops in development stages sensitive to drought conditions are highlighted in red text within each region

Northern Hemisphere Crop Condition Anomaly, May 1st, 2012



Crop Anomaly



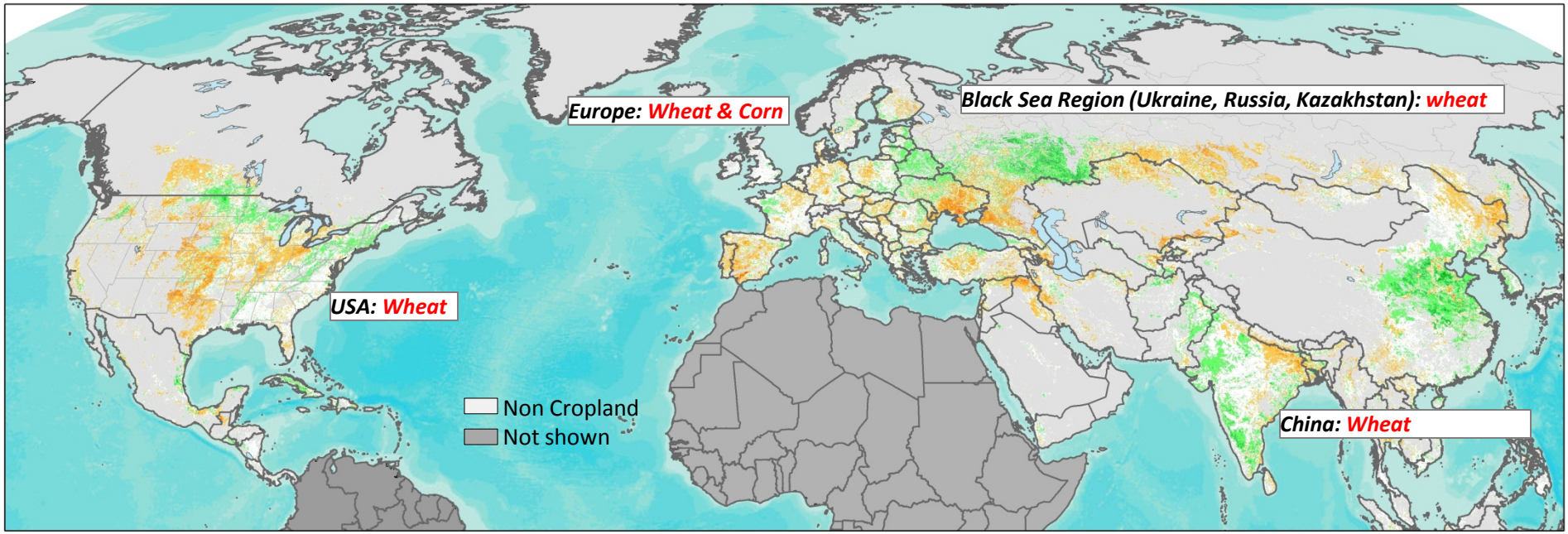
-0.4	0	0.4
Worse than normal	normal	Better than normal

Highlights:

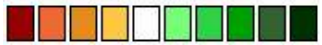
- Drought in southern Ukraine affecting winter wheat
- Drought in Spain affecting winter wheat

- *Crop stage sensitive to moisture and temperature*
- Crop stages largely based on USDA/NOAA Joint Agricultural Weather Facility (JAWF

Northern Hemisphere Crop Condition Anomaly, May 15th, 2012



Crop Anomaly



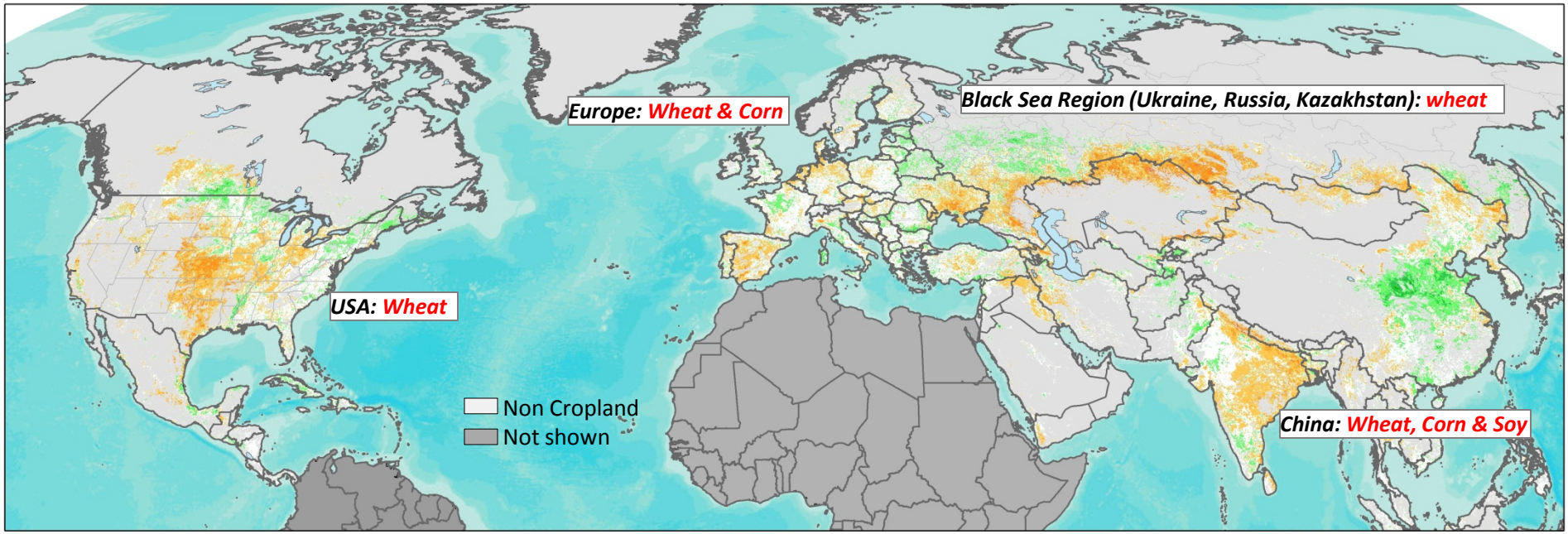
-0.4	0	0.4
Worse than normal	normal	Better than normal

Highlights:

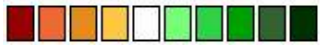
- US drought developing
- Drought in Ukraine affecting winter wheat
- Drought in Spain affecting winter wheat
- Drought in Russia, Kazakhstan developing

- *Crop stage sensitive to moisture and temperature*
- Crop stages largely based on USDA/NOAA Joint Agricultural Weather Facility (JAWF

Northern Hemisphere Crop Condition Anomaly, June 1st, 2012



Crop Anomaly



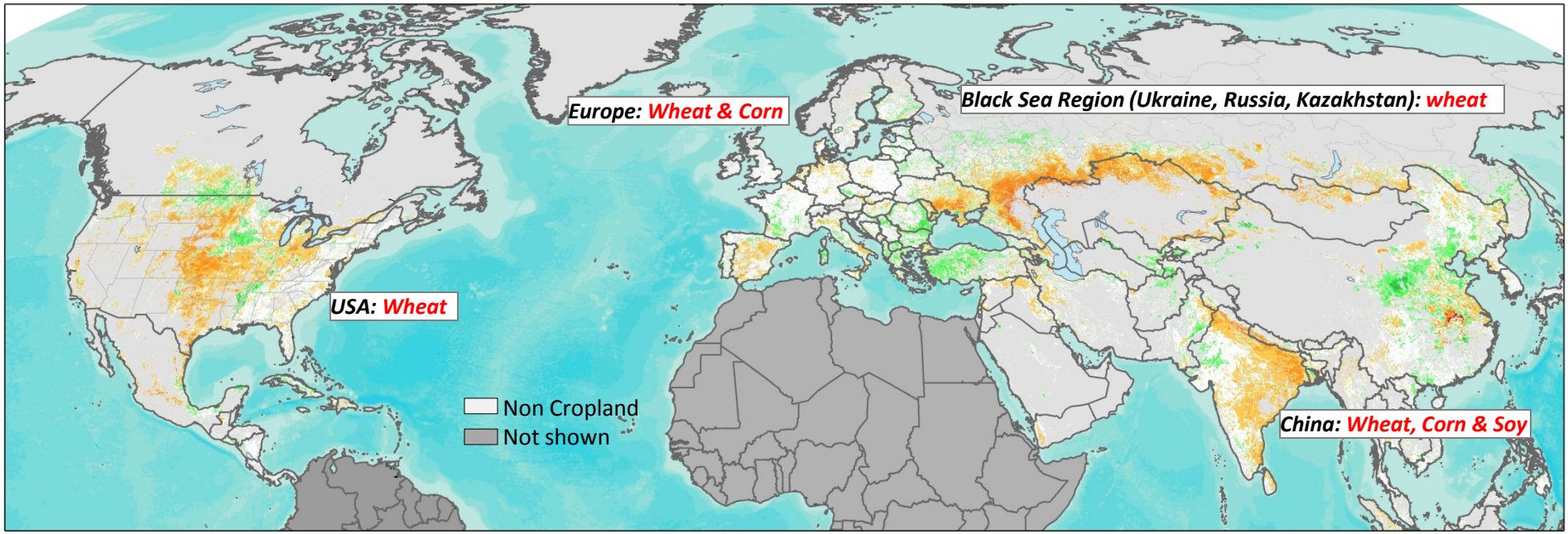
-0.4	0	0.4
Worse than normal	normal	Better than normal

Highlights:

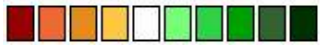
- US drought developing
- Drought in Ukraine affecting winter wheat
- Drought in Spain affecting winter wheat
- Drought in Russia, Kazakhstan during planting
- Dry conditions in India during planting

- *Crop stage sensitive to moisture and temperature*
- Crop stages largely based on USDA/NOAA Joint Agricultural Weather Facility (JAWF

Northern Hemisphere NDVI Crop Anomaly, June 15th, 2012



Crop Anomaly



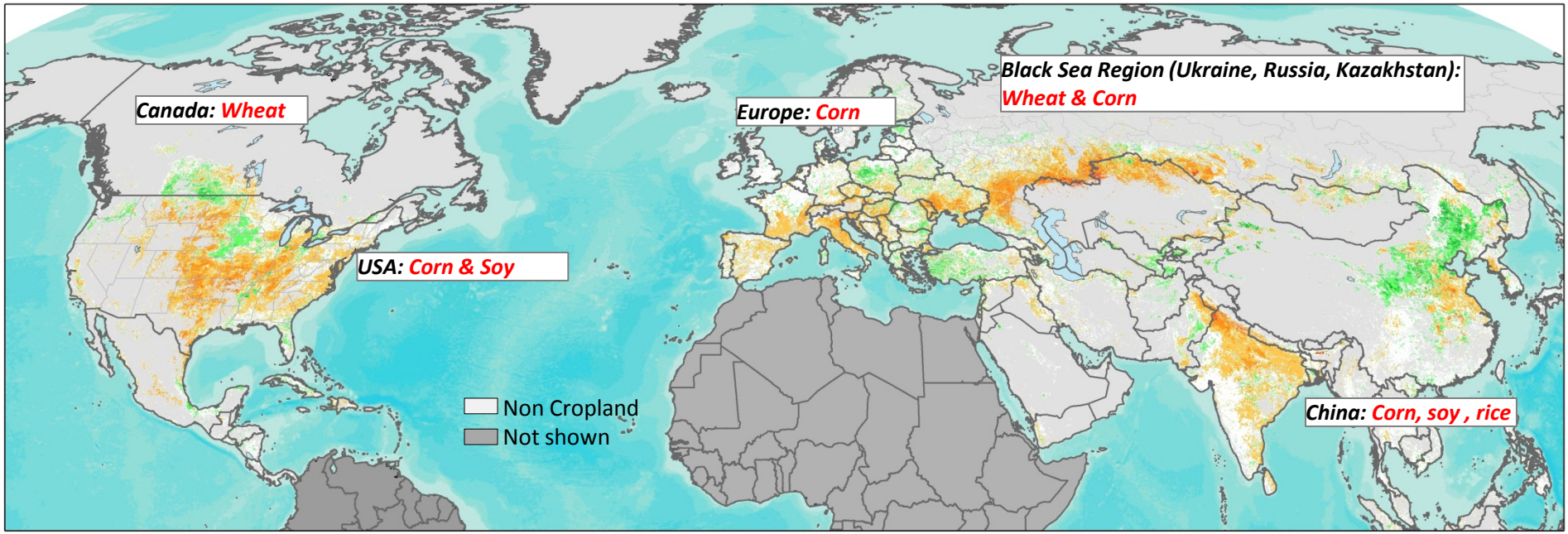
-0.4	0	0.4
Worse than normal	normal	Better than normal

Highlights:

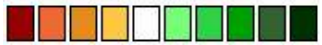
- US drought spreading and intensifying
- Drought in Ukraine intensifying in the south
- Drought in Russia, Kazakhstan intensifying
- Dry conditions spread in India

- *Crop stage sensitive to moisture and temperature*
- Crop stages largely based on USDA/NOAA Joint Agricultural Weather Facility (JAWF

Northern Hemisphere NDVI Crop Anomaly, July 1st, 2012



Crop Anomaly



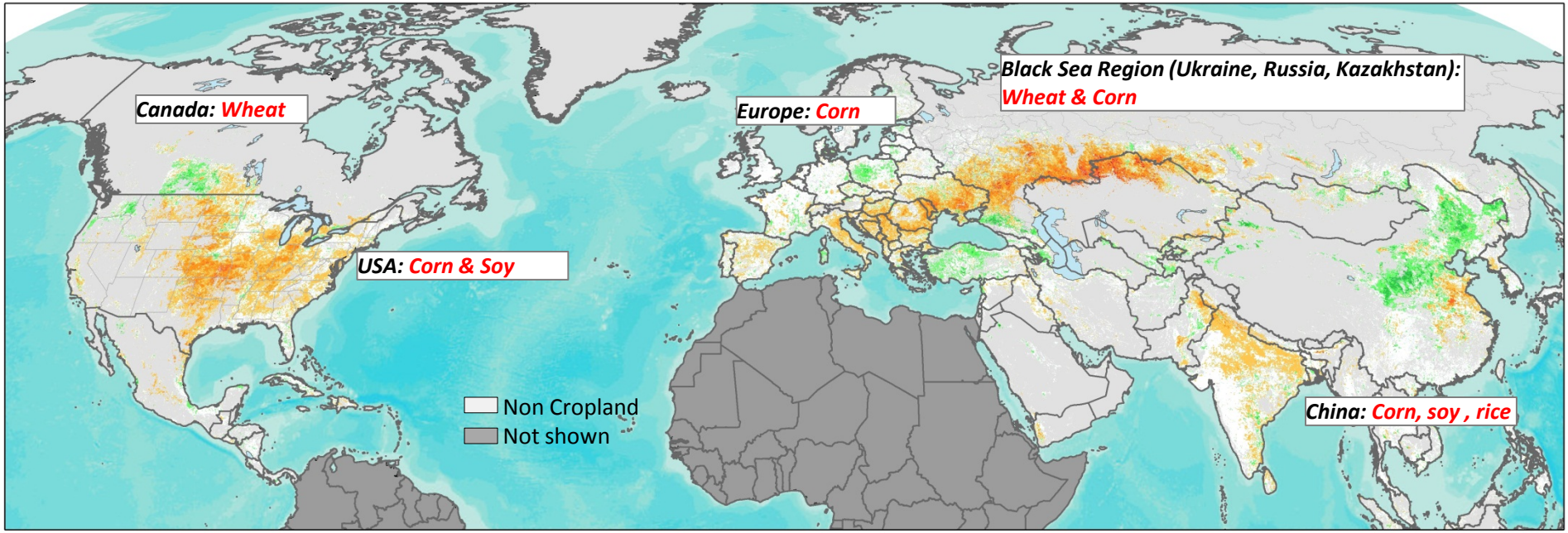
-0.4	0	0.4
Worse than normal	normal	Better than normal

Highlights:

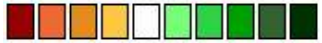
- US drought continues to spread and intensify affecting soy and corn
- Drought in Ukraine intensifying in the south
- Drought in Russia, Kazakhstan intensifying, affecting spring wheat and corn
- Dry conditions continue in India

- *Crop stage sensitive to moisture and temperature*
- Crop stages largely based on USDA/NOAA Joint Agricultural Weather Facility (JAWF

Northern Hemisphere NDVI Crop Anomaly, July 15th, 2012



Crop Anomaly



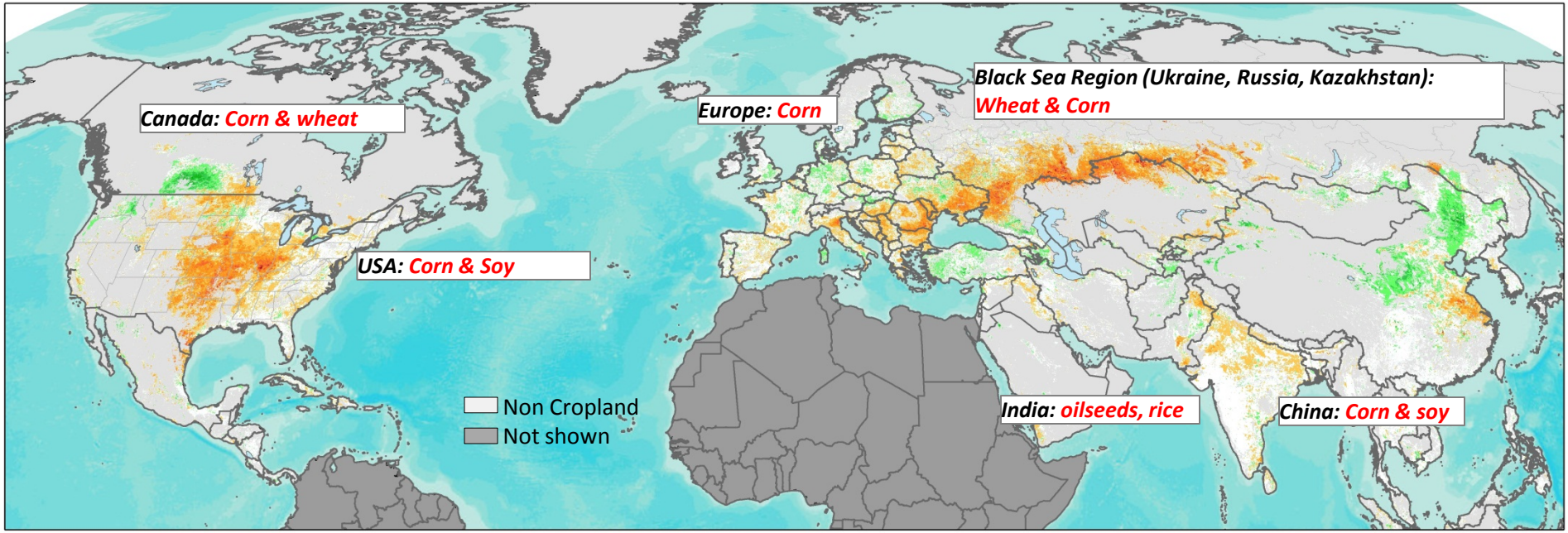
-0.4	0	0.4
Worse than normal	normal	Better than normal

Highlights:

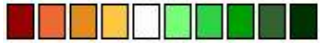
- US drought continues to spread and intensify affecting corn and soy
- Drought in Ukraine continues and spreading north
- Drought in Russia, Kazakhstan intensifying, affecting spring wheat and corn
- Dry conditions in Manitoba/Ontario Canada, affecting corn

- *Crop stage sensitive to moisture and temperature*
- Crop stages largely based on USDA/NOAA Joint Agricultural Weather Facility (JAWF

Northern Hemisphere NDVI Crop Anomaly, August 1st, 2012



Crop Anomaly



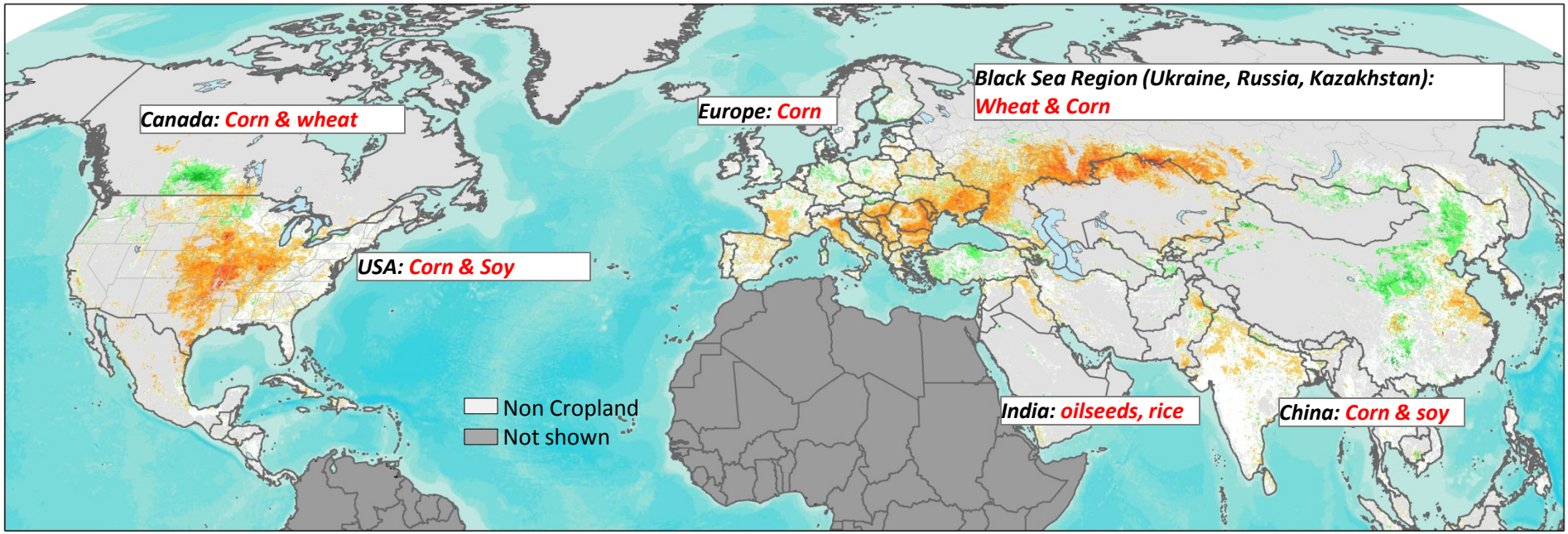
-0.4	0	0.4
Worse than normal	normal	Better than normal

Highlights:

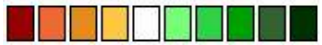
- US drought continues to spread and intensify
- Drought in Ukraine continues to intensify in south east
- Drought in Russia, Kazakhstan intensifying, affecting spring wheat and corn
- Rains mitigate dry conditions in Ontario, good conditions in the western Canada

- *Crop stage sensitive to moisture and temperature*
- Crop stages largely based on USDA/NOAA Joint Agricultural Weather Facility (JAWF

Northern Hemisphere NDVI Crop Anomaly, August 13th, 2012



Crop Anomaly



-0.4	0	0.4
Worse than normal	normal	Better than normal

Highlights:

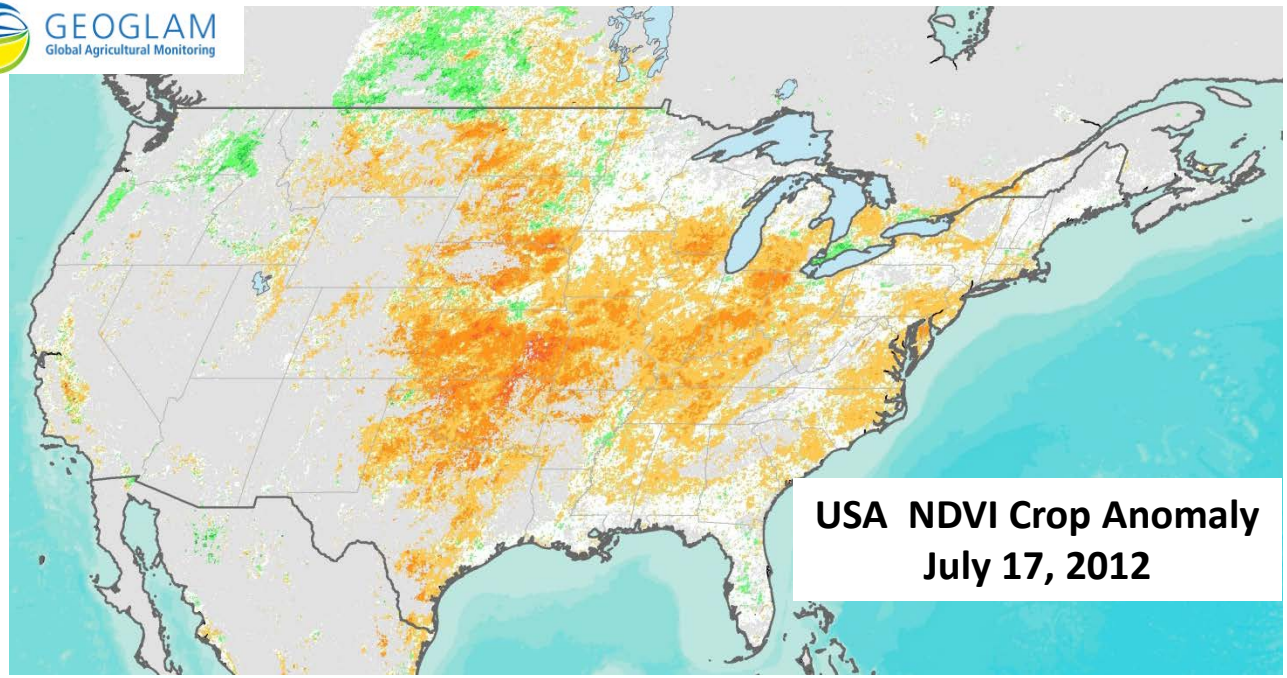
- Drought conditions persist in US, Russia, Kazakhstan, and Ukraine
- Conditions continue to improve in Manitoba/Ontario, good conditions in the western Canada

- *Crop stage sensitive to moisture and temperature*
- Crop stages largely based on USDA/NOAA Joint Agricultural Weather Facility (JAWF)

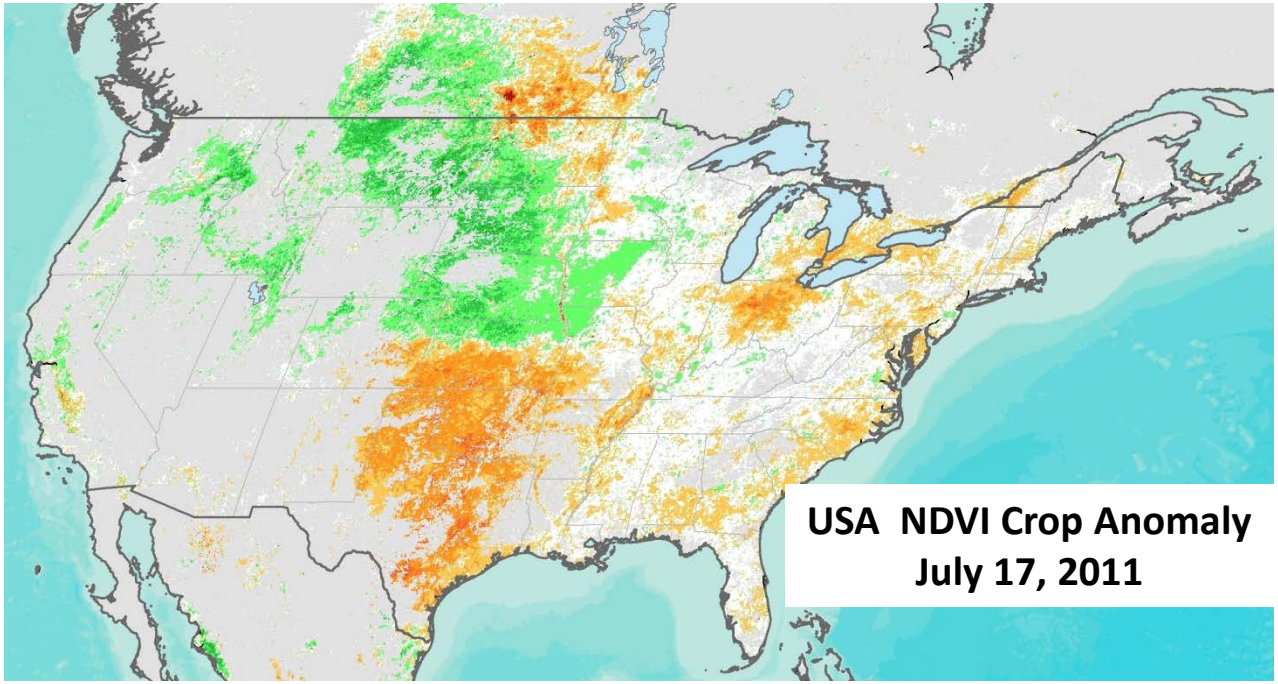
Comparison of 2012 Drought with Conditions in Previous Years

USA and Russia

GEOGLAM
Global Agricultural Monitoring



2012 drought primarily affecting corn and soy crops



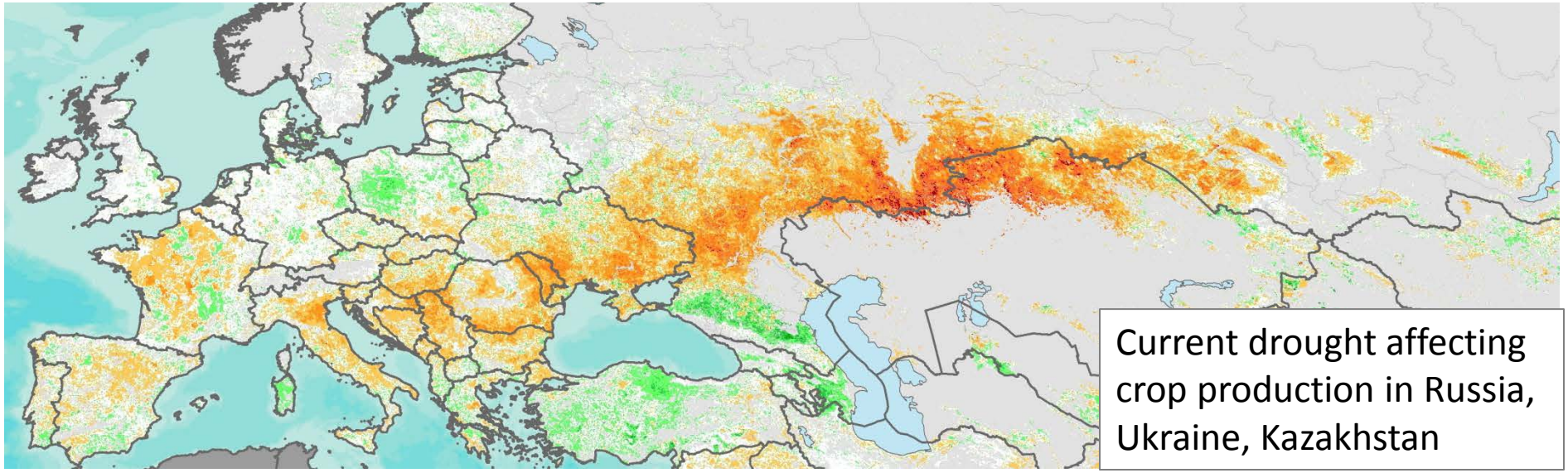
Vegetation Anomaly from last year (July 2011) depicting the Texas drought

UNIVERSITY OF MARYLAND 1856

Comparing the 2012 Black Sea Region Drought to the 2010 Drought

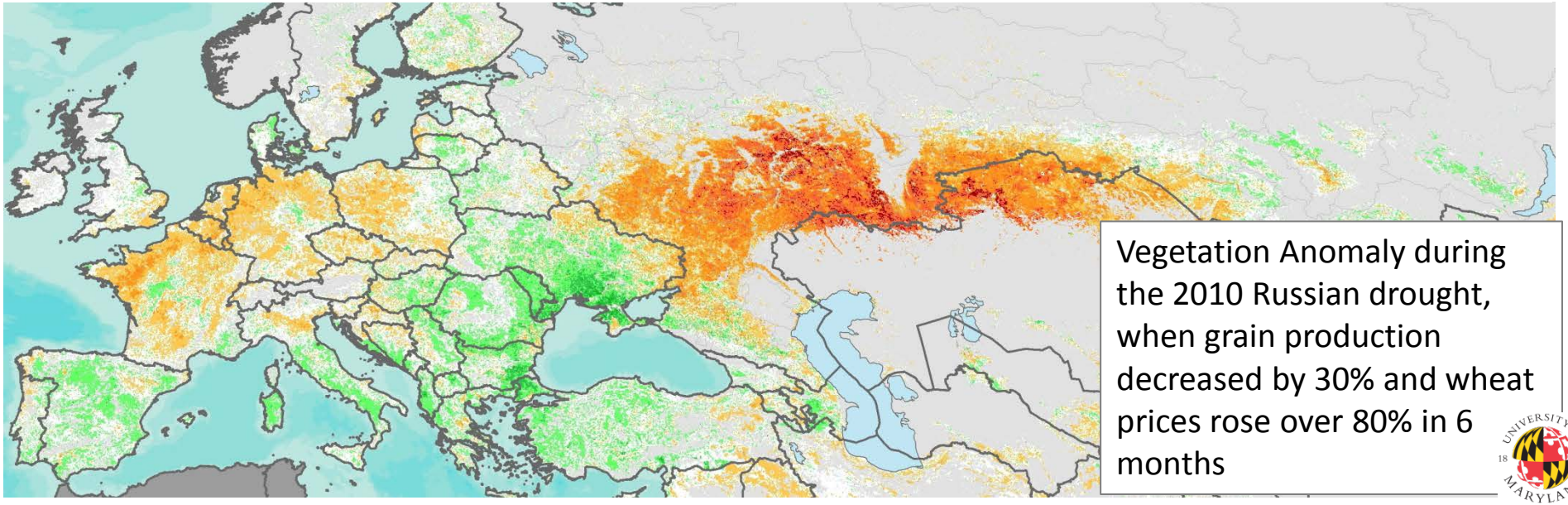
GEOGLAM Global Agricultural Monitoring

Crop Condition July 17, 2012



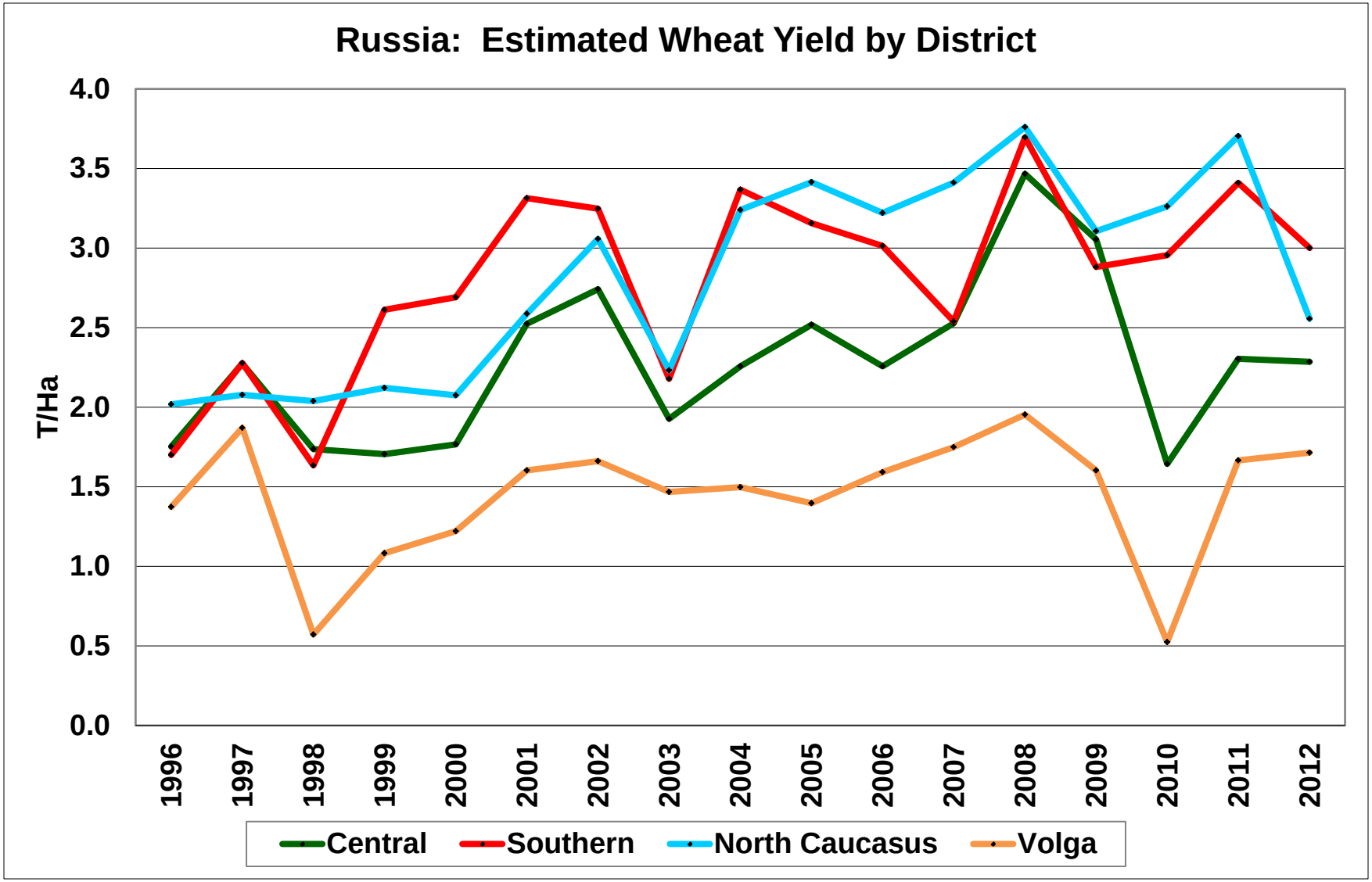
Current drought affecting crop production in Russia, Ukraine, Kazakhstan

Crop Condition During the 2010 Russian Drought: (July 17 2010)



Vegetation Anomaly during the 2010 Russian drought, when grain production decreased by 30% and wheat prices rose over 80% in 6 months

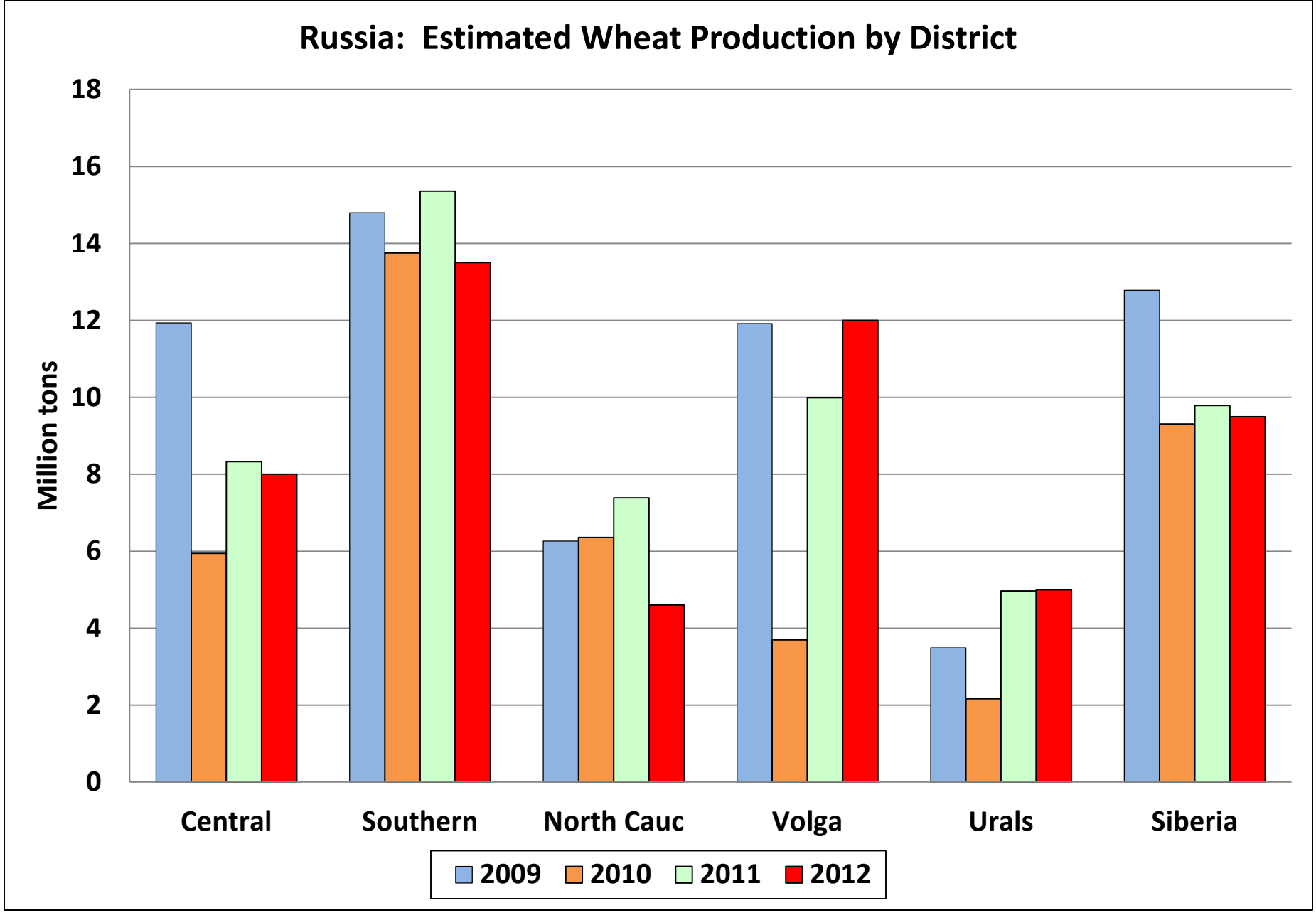
University of Maryland 1856



Source: USDA/FAS estimates

Courtesy – Mark Lindeman, FAS

USDA Office of Global Analysis
Foreign Agricultural Service



Source: USDA/FAS estimates

Courtesy – Mark Lindeman, FAS

USDA Office of Global Analysis
Foreign Agricultural Service

Next Steps Task 1

- Under GEOGLAM establish the forum for building international consensus on crop status and continued engagement of regional partners
  - Initial panel telecon (next week)
  - GEOGLAM Regional Workshop - Argentina Sept 22-24
  - GEOGLAM Drought Workshop w. the GEO Water Task – Beijing Oct 23-26
- Initial discussions with AMIS and regional GEOGLAM Partners on refining the product suite
- Refine the inputs and information delivery system