



G20 Global Agricultural Monitoring International Coordination

GEOGLAM

Christina Justice

www.geoglam.org

@G20_GEOGLAM

GEO is the interministerial international program focused on the use of Earth Observations for societal benefit

- GEO was initiated in 2005
- Agriculture is one of the GEO societal benefit areas
- GEOGLAM is GEO's Agricultural initiative



Connecting Space Agencies to User Communities

Building a Community Agenda: Identifying and Addressing Common Issues facing Agricultural Monitoring

- Timeliness in obtaining EO data (satellite and in-situ)
- Accessibility to international satellite data
- Continuity of satellite data for operational monitoring
- Robustness of methods for national, regional to global application – lack of field level validation data, absence of best practices for different cropping systems and regions
- Difficulty in transitioning research methods into operational use
- Need for capacity building and support to use EO data in many operational monitoring institutions - including new sensors
- Quality and timeliness of global/national agricultural data and statistics
- Decline and privatization of in-situ weather data
- Accuracy of seasonal forecast data
- In general a low investment in agricultural research and agricultural extension services

GEOGLAM Actors

GEOGLAM Community of Practice

Open Community made up of individuals from international and national agencies concerned with agricultural monitoring including Ministries of Ag, Space Agencies, Universities, & Industry

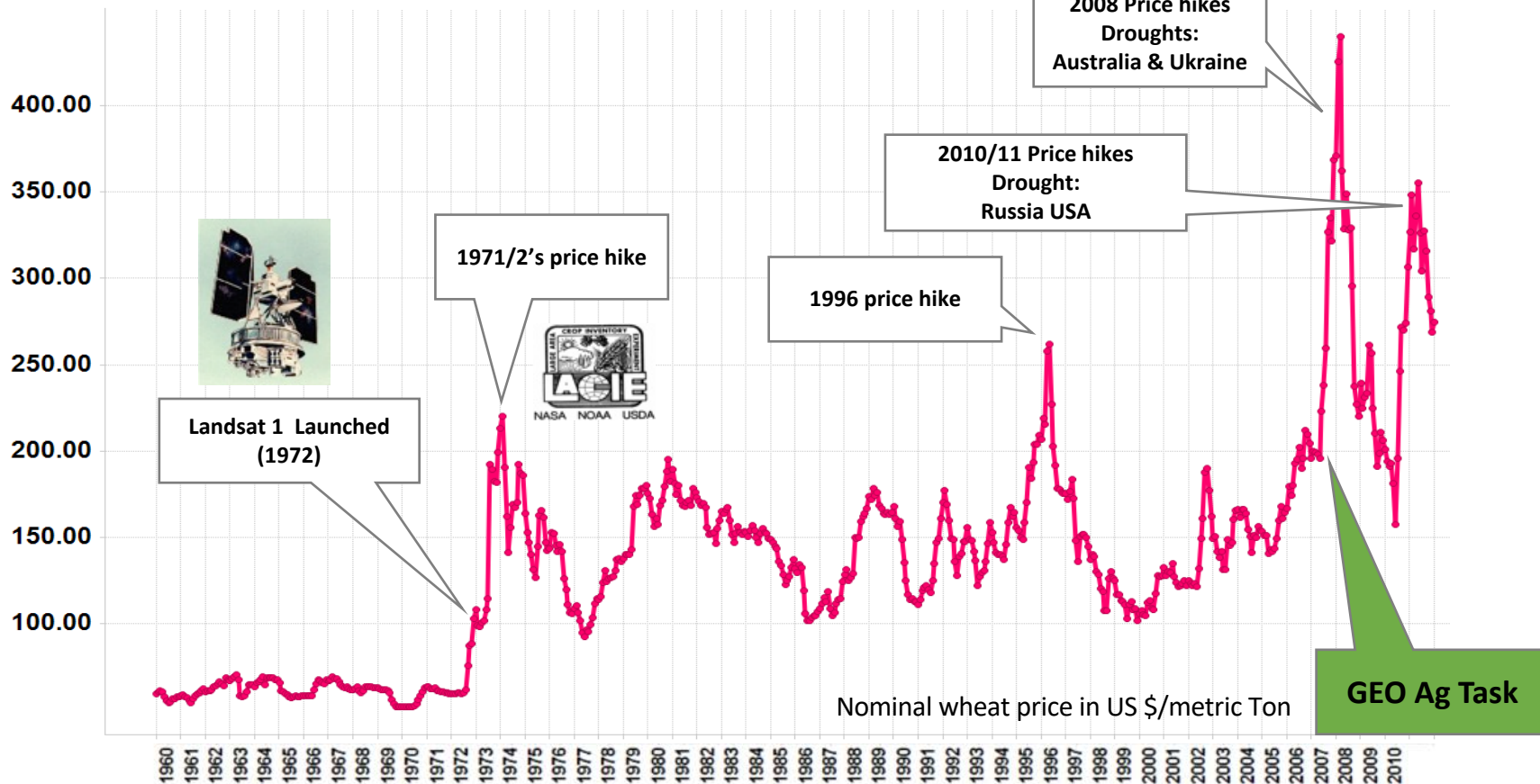




Context For GEOGLAM

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

Source: World Bank





NORTH KOREA
Huge Gap Predicted In Supply
guardian.co.uk TheObserver
Food aid to poorest countries slashed as price of grain soars
UN warns of drastic crisis as relief workers urge donor countries to help

APP - Standing amidst a group of straggly fellow Ethiopian farmers, Tuka Shika points to the scorching sun when asked why his food reserves have dwindled this year.
"The weather has changed. It's not as it used to be before," he laments. "The rains are increasingly erratic."
16 November 2011



BBC NEWS
Last Updated: Friday, 23 March 2007, 00:25 GMT
Biofuel demand makes food expensive

The Economist
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International recognition of critical need for improved real-time, reliable, open information on global agricultural production prospects critical for agricultural policies, stabilizing markets, averting food crises
Need to increase food production by 50%-70% by 2050 to meet demands (FAO)

More than 1 billion hungry, UN says
By Tom Eley
Thursday, Oct 22, 2009
13 October 2009
More than 1 billion people, one sixth of humans undernourishment by the end of 2009, two UN reports on Wednesday. The ranks of the hungry 100 million people in one year, a result of the since the Great Depression.
"The State of Food Insecurity," produced by the Organization (FAO) and the World Food Program the sharp increase in global hunger is not the natural disasters, but the man-made causes of unemployment, and declining incomes.

Department of Agriculture, Fisheries and Forestry
ABARES
BY LESTER BROWN | JANUARY 10, 2011
More than 1 billion people, one sixth of humans undernourishment by the end of 2009, two UN reports on Wednesday. The ranks of the hungry 100 million people in one year, a result of the since the Great Depression.
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Kenya among food crisis nations, UN says
中国农业部
中国农业科学院
The Chinese Academy of Agricultural Sciences
SAGARPA
SECRETARIA DE AGRICULTURA, GANADERIA, DESARROLLO RURAL, PESCA Y ALIMENTACION



The New York Times
The Food Crisis
February 24, 2011
prices are soaring to record levels, three countries with mass hunger and political inst...
asters of the Group of 20 leading econom...
meeting in Paris last week, but for all of!



BBC NEWS AFRICA
Somalia famine: UN warns of 750,000 deaths
As the new year begins, the price of wheat is setting an all-time high in the United Kingdom as riots are spreading across Algeria. Russia is importing grain to sustain its cattle herd
As many as 750,000 people could die as Somalia's drought worsens in the coming months, the UN has warned, exacerbating a famine in a new area.
The UN says tens of thousands of people have

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The UN says tens of thousands of people have

Hunger in India: The Crisis Wor...
SDAP
Comisión de Investigación Agraria y Alimentaria



BBC NEWS
ONE-MINUTE WORLD NEWS
Bangladesh bans most rice exports

Global Food Crisis
The new world of food
INPE

TIME
IN PARTNERSHIP WITH CNN
Little Keeps Nigeria From Crisis

Policy Framework for GEOGLAM



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.

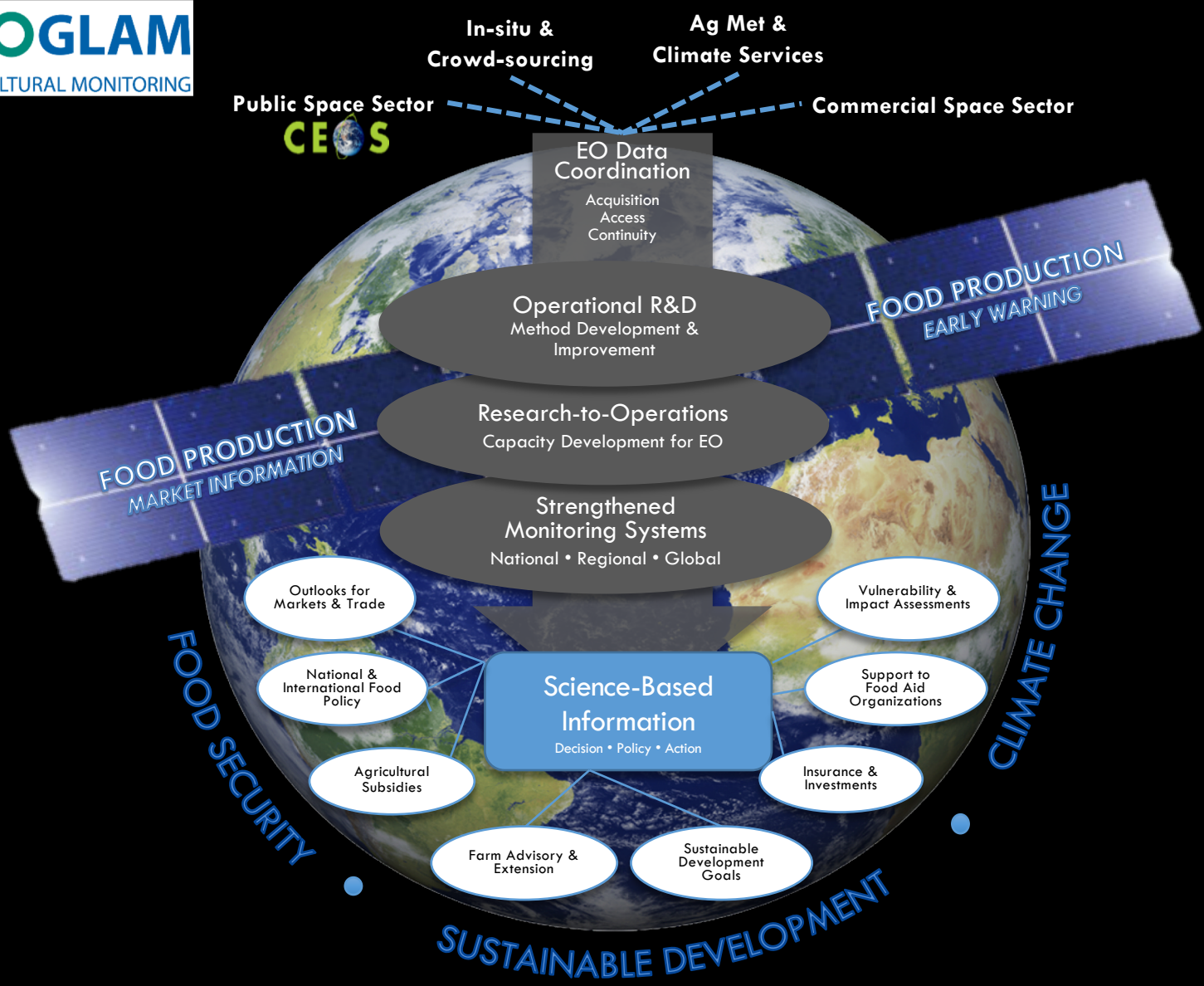
Vision:

Strengthen international community's capacity to provide actionable, science-driven, open, information at sub-national to global scales, in support of policies, investments and decisions, in food security, & ag. Markets



implementation of the concrete initiatives of the 2011 G20 Action Plan on Food Price Volatility and Agriculture in dedicated forums: Agricultural Market Information System (AMIS) and the Rapid Response Forum, GEO Global Agricultural Monitoring Initiative (GEOGLAM) for market and production international monitoring, and risk management tools, such as the Platform for

- Through use of coordinated Earth Observations (EO)
- Building on existing systems





The GEOGLAM Components

**1. Global / Regional
Monitoring Systems**

International/Global

**2. National
Monitoring Systems**

National / Subnational

**3. Monitoring
Countries at Risk**

Food Insecure and Most
Vulnerable

4. EO Data Acquisition & Dissemination Coordination 

5. Research & Development toward Operations

6. Capacity Development for EO

AMIS: Agricultural Market Information System

Improve market information and transparency

AMIS Agricultural Market Information System

HOME ABOUT MARKET MONITOR INDICATORS ANALYSES EVENTS STATISTICS

Monitoring markets

April update: The global cereal supply is proving to be exceptionally high this season in view of the latest upward adjustments to wheat and maize inventories.

LATEST NEWS
Market Monitor
Latest edition
Market Indicators
New series available

ANALYSES
Price transmission from global benchmarks
[Read more](#)
Improving feed estimates
[Read more](#)

STATISTICS UPDATE
Online Database
Access the online database to view the latest statistics
[View statistics](#)

MEETINGS
Expert Meeting
Stocks measurement
21 November 2014
[Read more](#)

Food and Agriculture Organization of the United Nations, IFAD, FAO, IOC, OECD, UNCTAD, WORLD BANK GROUP, WFP, WORLD TRADE ORGANIZATION

Contact us © AMIS 2015

AMIS Agricultural Market Information System

HOME ABOUT MARKET MONITOR INDICATORS ANALYSES EVENTS STATISTICS

Supply & Demand Crop Monitor Policy Developments International Prices Futures Markets Ethanol Update

Crop Monitor

last release: Apr 2015

DOWNLOAD THE MONITOR

OVERVIEW WHEAT MAIZE RICE SOYBEAN

Vegetational, Harvestable, Harvest, Plant, Plant end of season, No Data

Countries: AMIS Countries, Non-AMIS Countries

Crops: Maize, Wheat, Soybean, Rice

Map description

Highlights

- Wheat: In the northern hemisphere winter wheat has mostly resumed vegetative growth and conditions are generally favourable. In the EU, conditions are generally good. In the US there is still concern due to dry conditions in the Southern Plains. In China, conditions are favourable and in the Russian Federation and

Tweets

AMIS @AMISoutlook Crop Conditions in AMIS countries (as of 28 March 2015). Full report at bit.ly/amisoutlook #commodities pic.twitter.com/PegrDap5vE @ Show Photo

AMIS @AMISoutlook AMIS outlook for April now online bit.ly/amisoutlook @ Show Photo

Tweet to @AMISoutlook

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Email Address

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inter-Agency Platform to enhance food market transparency and encourage coordination of policy action in response to market uncertainty www.amis-outlook.org

Launch of Global Operational Crop Assessments: AMIS Request to GEOGLAM

- Provision of timely and transparent monthly crop condition assessments in primary agricultural production areas
- Reflecting an international consensus, building on existing systems
- Four Major Crops: Wheat, maize, soybean, rice
- Focus: main production/export countries (AMIS Countries), stabilizing/calming markets, avoid unexpected food price shocks
- Output: Crop Monitor, published in Market Monitor



Operational Monthly Bulletin Since 2013 Published in the AMIS Market Monitor

Focus on primary production and export countries
> 40 contributing organizations

Contents

- Main supply demand balance
- Crop monitor
- Price developments
- Policy and price
- Future outlook
- Market conditions
- Market conditions
- Market conditions
- Market conditions

AMIS MARKET MONITOR
No. 36 - March 2016

Roundup

In spite of small downward adjustments to 2015 wheat, maize and rice production this month, the overall supply prospects for these three AMIS crops remain favourable. Soybeans markets are also well forecast for 2015 global inventories already record opening. The export production in 2016 points to a new 2015 record.

Markets at a glance

From previous forecast From previous season

Wheat

Crop monitor

Crop conditions in AMIS countries (as of February 28th)

A condition map synthesizing information for all four AMIS crops as of February 28th. Crop conditions over the main growing areas for wheat, rice, maize and soybeans are based on a combination of national and regional crop output inputs along with earth observation data. Crops that are generally favourable are highlighted on the map with their crop codes.

Conditions at a glance

Wheat - In the southern hemisphere, the season has ended in mixed conditions. In the northern hemisphere, the dry crop is still mostly dormant in the majority of areas. Conditions are overall favourable at this early stage of the season. However, concerns continue in parts of asia due to the poor establishment conditions in autumn, attributed to a reduction in planted area.

Maize - In the southern hemisphere conditions are mostly favourable with the exception of South Africa, where conditions remain poor over large parts of the country due to severe drought attributed to El Niño. There are some concerns due to lack of rain in northern Brazil. The northern hemisphere is largely out of season with the exception of India and Mexico where conditions are favourable.

Rice - Conditions remain mixed in southeast Asia in part due to the impacts of El Niño which is having a severe impact on Thailand where conditions remain poor. Conditions are generally favourable in all other countries.

Soybeans - Conditions in the southern hemisphere remain favourable with only a few localized issues. The northern hemisphere is currently out of season.

El Niño to a possible La Niña

Wheat

EU conditions are generally favourable, though wet weather occurred in most of the east regions, while the western Mediterranean experienced substantially other-than-usual. In the US, conditions are favourable for the start of dormancy. In China, conditions are favourable as the crop starts to break up in the northern growing regions, and planting different regions. In the Russian Federation, the crop is dormant and warmer than usual conditions are seen throughout European Russia. Planted slightly down from last year. In Canada, conditions for winter wheat remain favourable in most of the Ontario and Quebec. However, continued

Maize

In Brazil, conditions for the summer planted crop (the larger producing season) are favourable and the crop is generally in planting to early vegetative stages. The spring planted crop is mostly in reproductive through harvesting stages and conditions are mostly favourable except in the northeast where there was a lack of rainfall. In Argentina, the crop is mostly in grain filling stages and conditions are favourable in most regions. However, there is some local variability in conditions due to both excessive moisture from this month and residual issues over a lack of moisture from January. In South Africa, drought and heat stress have had a negative impact on the crop in the western parts of the main producing region where white maize (main

Soybeans

are favourable for the late crop. In the dry season crop continue to struggle attributed to El Niño and plant disease outbreaks. In the rest of the southern hemisphere conditions are favourable for the autumn crop season crop is in the advanced stages and the crop is mostly in grain filling to maturity stages, and the second crop is in following to grain filling stages.

In Brazil, the crop is largely in vegetative to reproductive stages in the southern, north and northeast regions and is in ripening through harvesting stages in the rest of the country. The crop is in mixed condition in the north and northeast due to a lack of rainfall but favourable in the rest of the country. In Argentina, conditions remain mostly favourable but there are some areas affected by excess moisture from this month and lingering dry issues from January. The first crop is mostly in grain filling to maturity stages, and the second crop is in following to grain filling stages.

The main producing countries 90 percent of the crop is going and water wheat)

Argentina (Buenos Aires State), Brazil (Ceará, Mato Grosso do Sul, Mato Grosso, Paraná, São Paulo, Tocantins), China (Henan, Heilongjiang, Jiangsu, Shandong, Shaanxi, Sichuan, Yunnan), India (Madhya Pradesh, Punjab, Uttar Pradesh), Mexico (Durango, Jalisco, Querétaro), Russia (Krasnodar Krai, Rostov Oblast, Volgograd Oblast), South Africa (Free State, Northern Cape, Western Cape), USA (Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Tennessee, Wisconsin)

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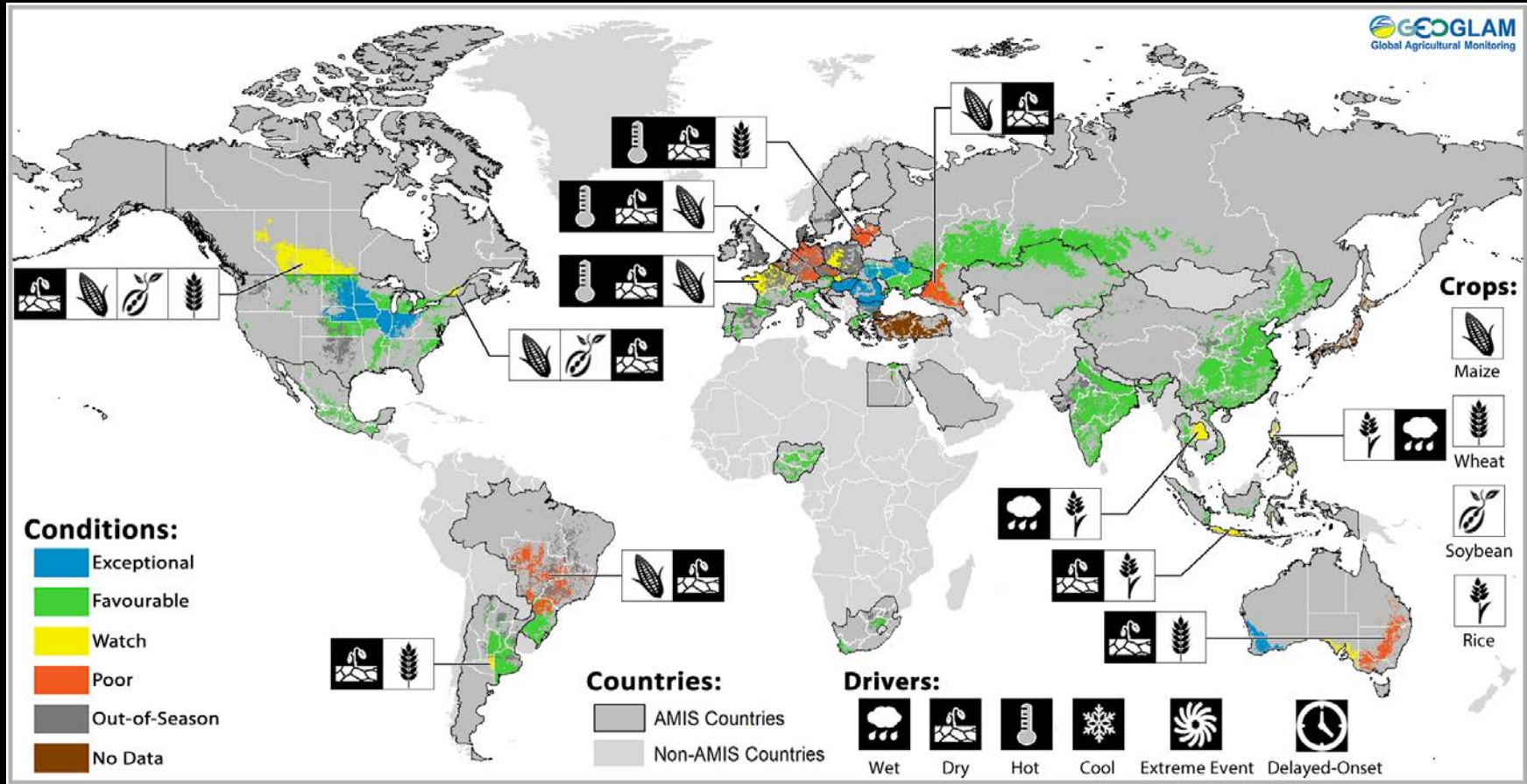
- First time the international community comes together to produce operational crop assessments
- Bridging the gap between the EO, Policy and Economics communities

GEOGLAM AMIS Crop Monitor Partners



43 partners and 16 inter-governmental organizations over 28 countries actively participating in the GEOGLAM community

Crop Monitor: an international consensus assessment – September 28th




Crop condition and driver map synthesizing information for all four AMIS crops. **Crops that are in other than favourable conditions are displayed on the map with their crop symbol.** (Cropland area shown is an aggregation of all cropland areas) 14
Becker-Reshef et al.

Crop Monitor for Early Warning

- Grew out of the success of the AMIS Crop Monitor
- Recognition even more pressing need for enhanced, reliable, vetted information on crop conditions within countries at risk
- Response to the Early Warning Community's request


No. 32 – October 2018 www.cropmonitor.org 





Overview:

In **West Africa**, main season cereals are in ripening stage and conditions are favourable due to good rains. In **East Africa**, main season cereals in the north of the subregion are in vegetative and ripening stage and rains have been above average. In the **Middle East** and **North Africa** early planting of wheat crops has started and conditions are favourable. In **Southern Africa**, winter wheat is favourable due to sufficient rainfall. In **Central and South Asia**, winter and spring harvest is complete and total production was slightly below the five-year average. In northern **Southeast Asia**, wet season rice harvest is underway and there is concern across many areas which suffered flood damage due to heavy rains from several typhoons and tropical depressions. In **Central America** and the **Caribbean**, *primera* season harvest is complete and poor production has resulted and in some cases complete crop failure over subsistence farming areas in Guatemala, El Salvador and Honduras due to the poor rainfall amounts received during key growth stages. Over less affected areas, conditions improved and production was favourable.






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- East Africa & Yemen.....3
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- Middle East & North Africa.....5
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- Central & South Asia.....7
- Southeast Asia Regional Climate Outlook.....8
- Central America & Caribbean; Regional Climate Outlook.....10
- Regional Climate Outlook.....11
- Appendix – Terminology & Definitions.....12



The Crop Monitor is a part of GEOGLAM, a GEO global initiative.

No. 32 – October 2018 

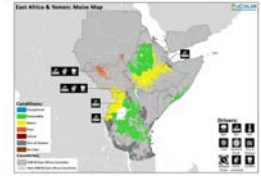
GEOGLAM Crop Monitor for Early Warning
 based on available information as of September 28th




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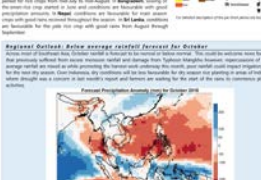
East Africa & Yemen



East Africa & Yemen



Regional Climate Outlook



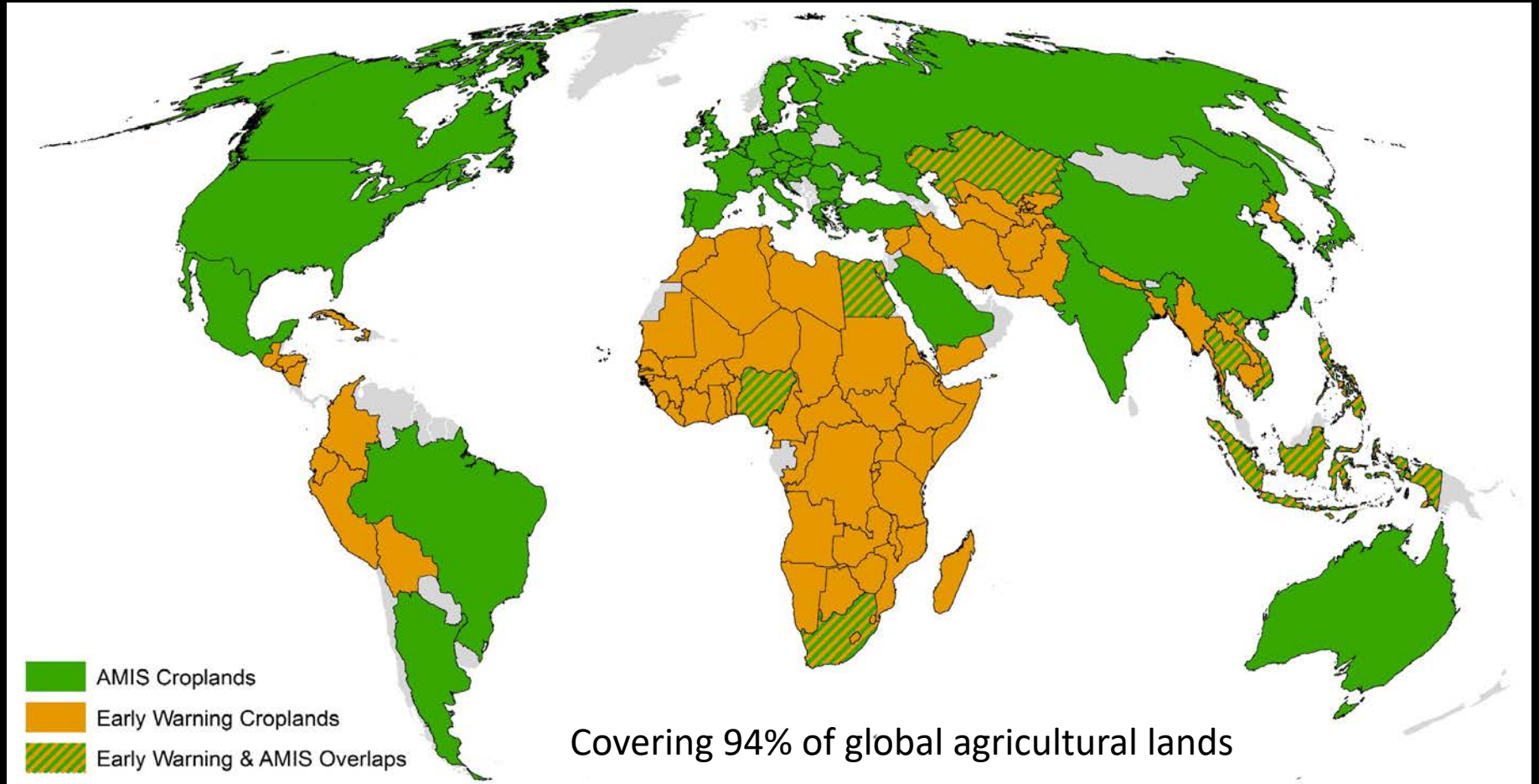
Objective and Partners

- Exchange information, build consensus and reduce uncertainty in countries most vulnerable to food insecurity, to strengthen agricultural decision making
- Monthly publication, first bulletin published Feb 2016
 - Building on AMIS CM bulletin
 - 14 crops: main food security crops for each region
- Strong focus on continued expansion to regional networks, and national partners

Quality of the product depends on the inputs and commitment of the contributors



Countries Covered: AMIS vs. EW



Crop Condition Reporting Interface



Dashboard

Map

CMET

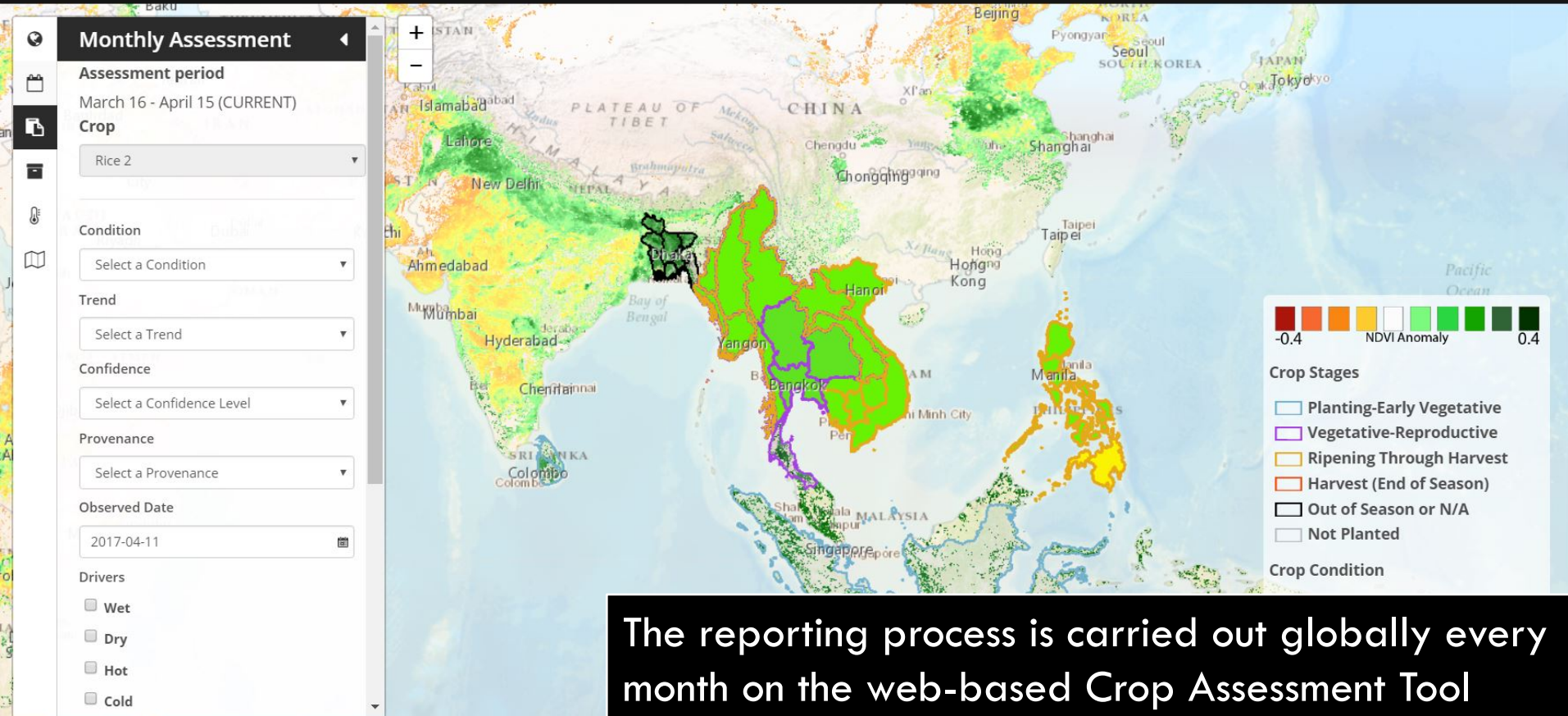
Monthly Assessment

Archive

Settings

Admin

Logout



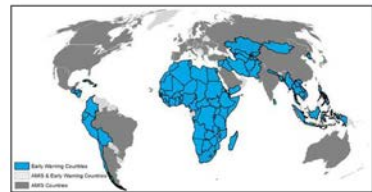
The reporting process is carried out globally every month on the web-based Crop Assessment Tool

Crop Monitor for Early Warning Bulletin

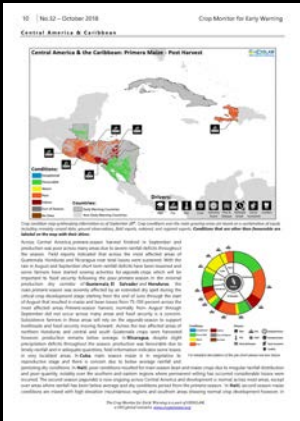
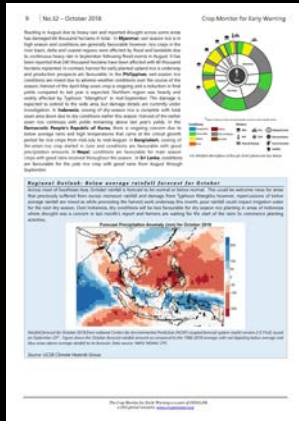
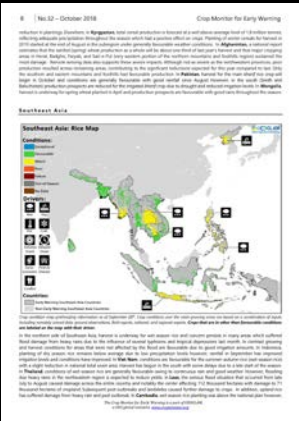
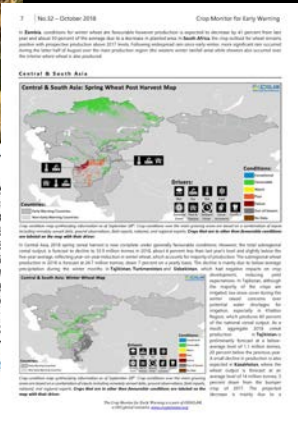
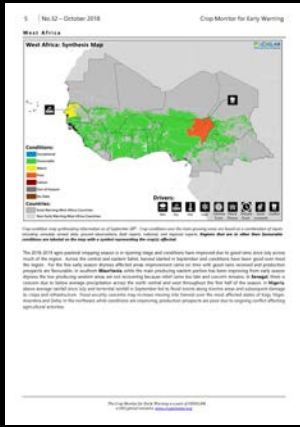
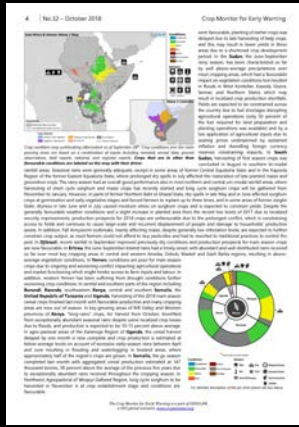
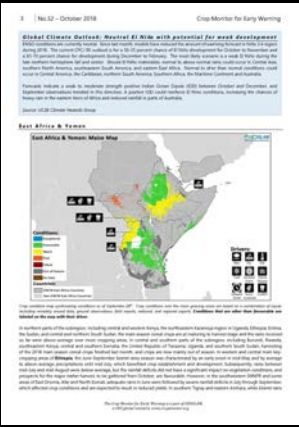
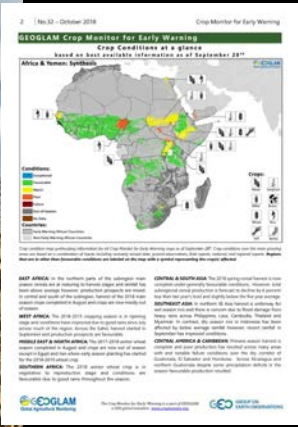
www.cropmonitor.org



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Business / Land & Agriculture
Dry and brown Southern Africa will need food aid
 BY EMKO TERAZONO AND ANDREW ENGLAND, FEBRUARY 15 2016, 05:52

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Vegetation Status and Crop Production Perspectives

WFP VAM Report

Southern Africa Growing Season 2015-2016: A Season of Regional Drought

FEWS NET

SOUTHERN AFRICA Special Report

Illustrating the extent and impact of the drought

Monitoring the globe

FEWS NET Special Report

Already informing agricultural decisions

Southern Africa

Friday 25 March 2016 09:40

ANA

ARC, South Africa

FINANCIAL TIMES

MARKETS OPINION LIFE & ARTS PORTFOLIO

ACTONABLE EXECUTIVE TRAINING AND ADVICE

ANYTIME, ANYWHERE.

Financial Times

Southern Africa warned of severe food crisis

AFRICA Thursday 24 March 2016 - 4:04pm

GEO Announces Launch of Early Warning Crop Monitor: A New Tool to Fight Food Insecurity

White Paper White Paper Reveals of Hidden Gains in Satellite Data

The Famine (FEWSNET) insecurity a 2016-2017 drought which...

South African corn withers amid worst drought on record

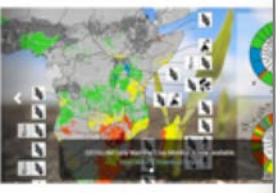
Impact of extreme weather on food prices set to remain severe

Humanitarian RESPONSE

HOME / SOUTHERN AFRICA

United Nations Office for the Coordination of Humanitarian Affairs

OCHA



Joint Statement

World Food Programme **FEWS NET** **European Commission** **Food and Agriculture Organization of the United Nations**

El Niño Set to Have a Devastating Impact on Southern Africa's Harvests and Food Security

Special alert: Food and Nutrition Security Working Group, 8 February 2016

Figure 2. Crop Monitor (Source: GEOGLAM) (https://cropmonitor.org)

Southern Africa: Maize Map

Conditions: Very Dry, Dry, Near Normal, Moist, Very Moist

Deliveries: Very Low, Low, High, Very High

Highlights

- Erratic rainfall, high temperatures and p...
- In the absence of consistent rains for th...
- These conditions are likely to have far n...
- Urgent action is required by member st...

Developed by the GEO Global Agricultural Monitoring Initiative (GEOGLAM) and its Agriculture Ministers, the Early Warning Crop Monitor (ECWM) provides an up-to-date crop conditions in countries at risk of food insecurity in Central and South...

Crop Monitor Impact – Southern Africa 2018



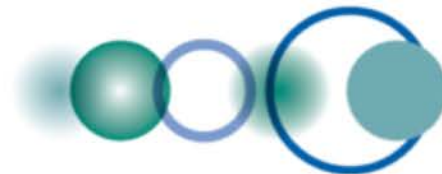
Urgent Actions:

“There is urgent need for members states and development partners to determine the scale and extent of the possible impact of the prolonged dry spell on the agricultural season (crop and livestock) to inform appropriate response actions for food security and nutrition and build the resilience of vulnerable populations in the region. Recommended actions include increased monitoring of the situation, ascertaining available cereal stocks, fast-tracking of planned crop assessments and annual vulnerability assessments for early warning and early action and increasing off season production where possible.”

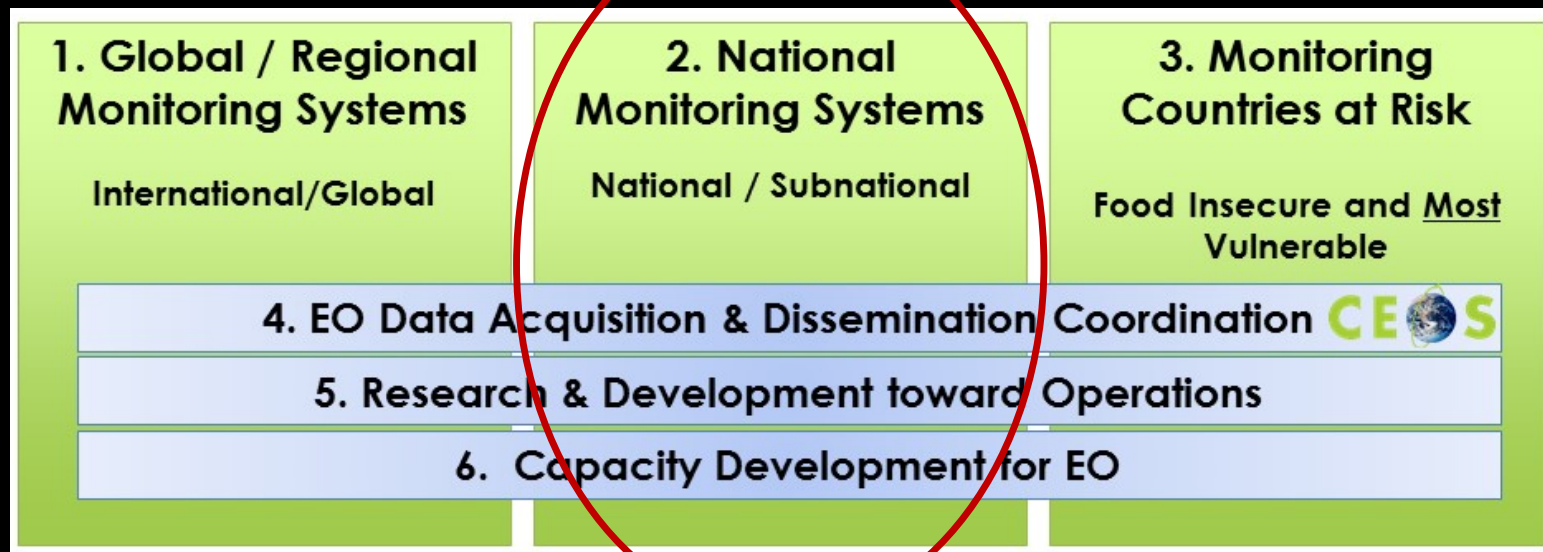
- These conditions are likely to produce in the 2018/19 cons
- Urgent action is required by production, ascertain the av

Next Step: Develop Rapid Response mechanism for more detailed and frequent assessments

Publication Date:
2018



The GEOGLAM Components



Development of National Crop Monitors, Facilitating National Food Security Reports

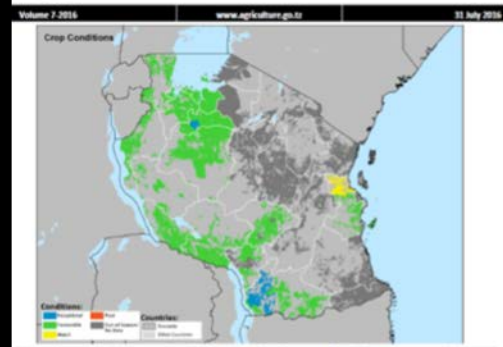
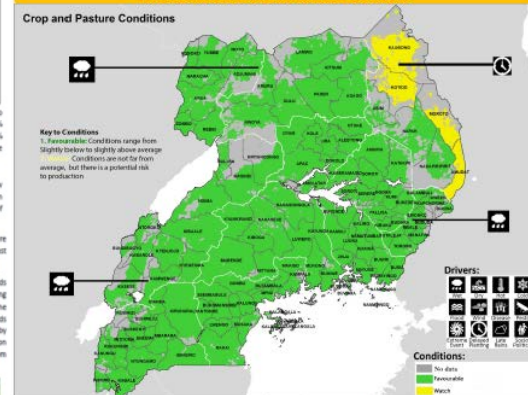


Fig. 1 This crop condition map synthesizes information for all crops as of 31st July 2016. Crop conditions over the main growing areas are based on a combination of national and regional crop analyst inputs along with remote sensing data and rainfall data provided by the Tanzania Meteorological Agency.

MAIN HIGHLIGHTS

- Currently, it is out of season therefore it is only cassava, found in the fields after crops have been harvested and farmers are busy planting and doing their produce.
- The 2015/16 Preliminary Food Crop Production Forecast amounts 16,172,841 tonnes grain equivalent of which 9,457,108 tonnes constitute cereals and 6,715,733 tonnes comprise non-cereals.
- Requirement for 2016/17 marketing year amounts 13,859,326 tonnes of which cereals make up 8,355,767 tonnes and non-cereals constitute the rest, 4,803,560 tonnes.
- Based on these availability and requirement figures, a self-sufficiency status of 123% is attainable in terms of total food crop whereby cereals make up 123% and non-cereals make up 146%.
- In terms of gap/corpus analysis, this is respectively, 5,013,510 tonnes surplus of total food, of which cereals is 1,201,940 tonnes and non-cereals is 3,811,570 tonnes.
- At national level the upper end self-sufficiency is impressively evidenced by 13 regions that will definitely produce surplus, 12 regions will be definitely self-sufficient and 2 regions will be definitely deficit.
- Towards operational setting to curb food insecurity in the country cereals areas are well irrigated in 43 districts in 12 regions out of the current total of 26 regions.



Early Warning for Regions

According to Uganda National Meteorology Authority (UNMA), by late February, rain had covered the entire country with the peak expected around mid to late April through early May in most of the regions. Land preparation and planting is ongoing in all regions except for some districts in Karamoja region where there is delayed planting.

West Nile: The region is under 'favourable' pasture conditions with improving rainfall during the first ten days of March. Westerns: Pasture conditions in the region have improved to 'favourable' due to increased rainfall in last two weeks of February with exception of northern parts of Bulira.

U-NIEWS DISTRIBUTION

- 7,000 people by Email (Ministers, MP's, Ministries, technical offices...)
- 15 million phones; SMS
- 200 publications distributed to top leaders



Replicable and scalable over other countries

National Food Security Bulletin, published by the Tanzania Ministry of Agriculture Food Security, National Food Security Division

The Inter-Ministerial/Agencies Monthly National Integrated Multi-Hazard Early Warning Bulletin, published by the Uganda Office of the Prime Minister

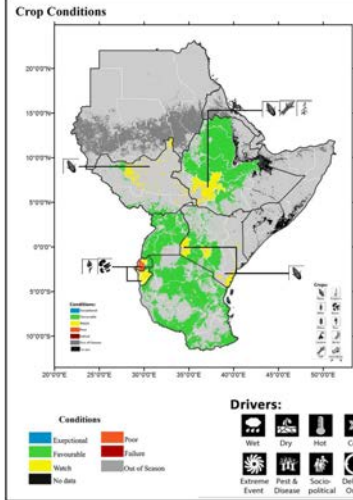
The Eastern Africa Crop Monitor, launched May 2018

Replicable and scalable at the regional scale

EASTERN AFRICA CROP MONITOR BULLETIN

Overview

- Eastern Africa has been experiencing average to above average favorable crop conditions.
- Watch conditions prevailed in Rwanda, Burundi for rice a season maize mostly due to water logging and flooding
- Poor conditions have been reported in Rwanda due to extreme weather
- Prices of grain staples in the region were below the 5-year average. With inbound stocks from Tanzania a expected to decrease towards the end of quarter-2 of 2018



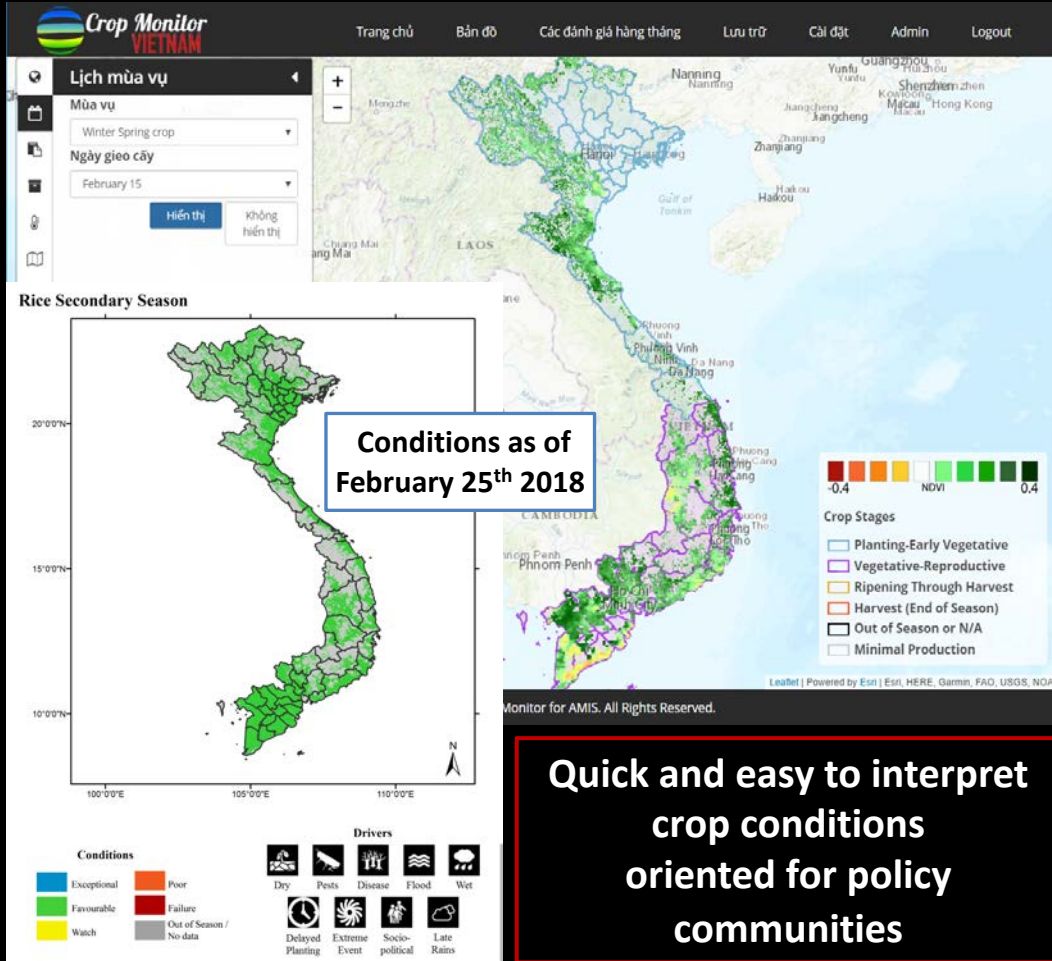
Co
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- IGAD Climate Prediction and Applications Centre (ICPAC) Eastern Africa Crop Monitor Report
 - Launched in Djibouti May 2018
 - Published in The Greater Horn of Africa Climate Outlook Forum (GHACOF) Bulletin
- 19 analysts trained and 11 national focal points
- Strong regional support



National Crop Monitor for Vietnam

- National Crop Monitor for Vietnam coordinated with MARD and VNSC (in Vietnam & English lang. version)
- Bridging gap between earth observations, research, and policy communities nationally
 - Enhancing remote sensing capabilities within the Ministry to better inform national reporting
- Integration of remote sensing products into national bulletins on crop condition (Vietnam & English lang.)

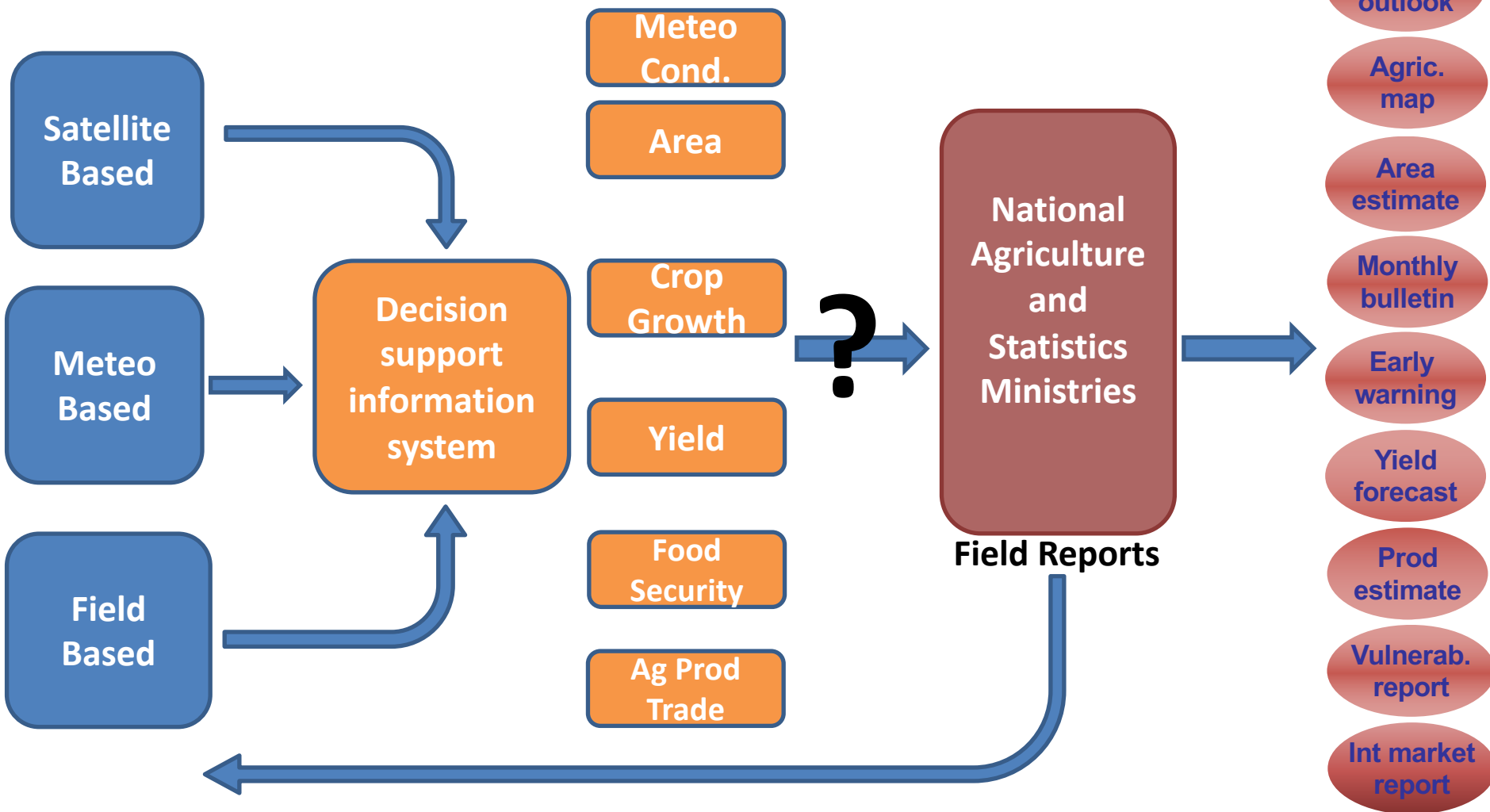


Quick and easy to interpret crop conditions oriented for policy communities

National Agricultural Monitoring : Inputs to Outputs

RESEARCH

OPERATIONS



GEOGLAM Lessons Learned in moving from Research to Operations

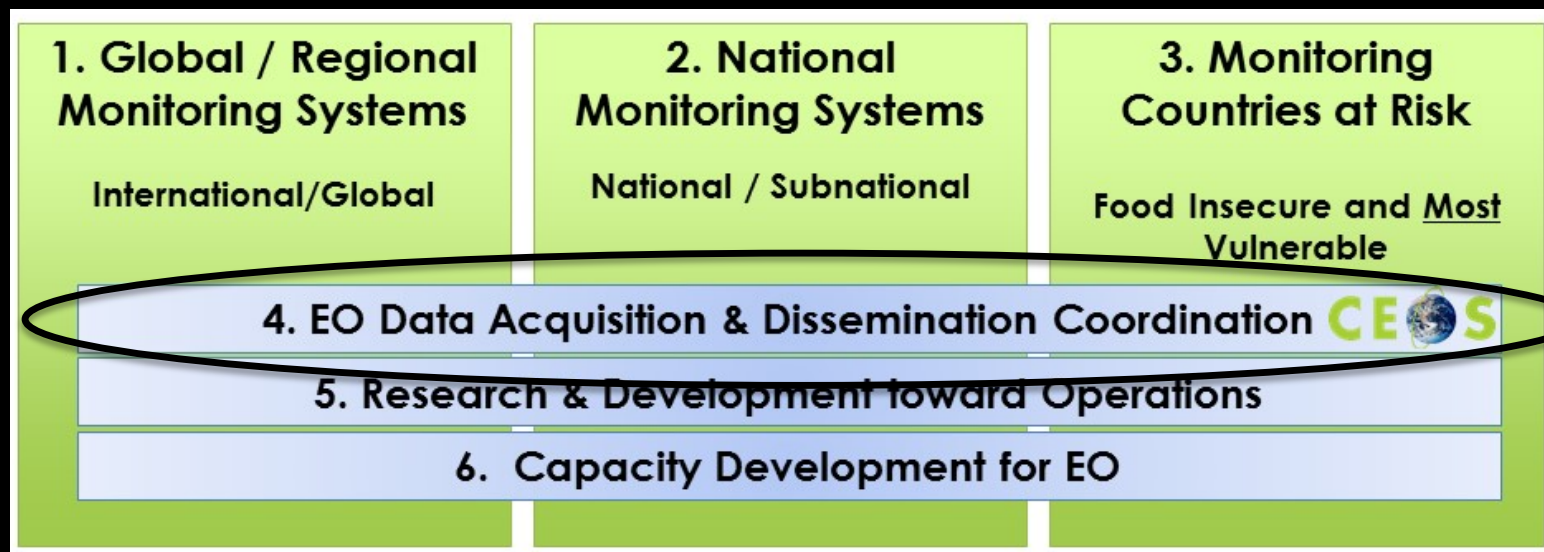
- Initial system Co – development/Partnership between Research and Agricultural Ministry
- Customize system for national situation (baseline data sets, cropland masks, cropping systems)
- Parallel Operation over several seasons to build confidence
- Eventual Operational Agency Ownership
- Continued System monitoring/improvement / enhancement by the Research partner (instrument calibration, new sensors, new techniques, additional data sets)

GEOGLAM Crop Monitor

- GEOGLAM Crop Monitor provides a public good: open, timely, science-driven, actionable information on crop conditions
- Proven effective & scalable mechanism for coordination of crop assessments
- First time the International and Early Warning communities have come together on a monthly basis
 - to produce joint assessments that reflect a consensus
- End user driven with strong community & high level support
 - Bridging the gap between the policy and EO communities
- Increasing communication and knowledge transfer amongst national, regional & international organizations
 - Thereby strengthening national monitoring systems
- Internationally recognized as a highly valuable source of information
 - Already informing decisions



The GEOGLAM Components



Developing the EO Data Requirements for GEOGLAM: through a CEOS/GEOGLAM Ad Hoc Working Group

Goals of the EO Data Coordination Component.

- Articulate data requirements for agricultural monitoring
- Coordinate international satellite acquisition over agricultural areas during the growing season
- Promote near-real time data availability
- Increase the frequency of moderate resolution data
- Standardize processing of data, facilitating data interoperability
- Promote easy data access for operational users
- Advocate for continuity of critical data streams/products

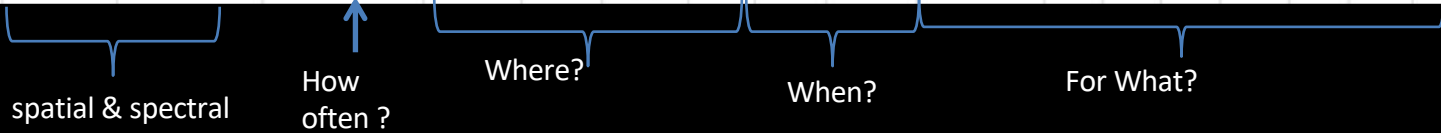
Recognition that cropping systems are inherently diverse which dictates the monitoring observations and methods
No one system can meet agricultural monitoring needs



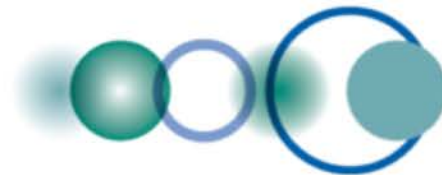
GEOGLAM CEOS: EO Data Requirements Table

developed taking into consideration the observation needs, the derived products they will serve, and regional specificities; CEOS-GEOGLAM July 2012 Montreal)

Sensor Mission	OBSERVATION & SENSOR TYPE			REGIONAL CHARACTERISTICS & GEOGRAPHICAL EXTENT				DERIVED PRODUCTS & MONITORING APPLICATIONS								
	SPATIAL RES.	SPECTRAL RES.	TEMPORAL RES.	WHERE? (+ cropland mask & sampling scheme)			WHEN?		Use (Primary or Secondary Source)	Cropland s mask	Crop type area	Crop cond. indicators	Crop bioph. var.	Env. variables (reservoir, water, soil moisture)	Ag. Practices / Cropping systems	Crop yield
MODIS (Aqua/Terra), VIIRS/NPP, Vegetation (SPOT-5)	2000 - 500 m	thermal IR + optical	few per day	global	w2w							x	x (1)			
MODIS (optical not SWIR), Sentinel 37 (future), CMA FY series3, Proba-V (future)	100-300m	optical + SWIR	2 to 5 per week	global	w2w	L/M/S		*				x	x	x	x (1)	x (1)
FUTURE	1-15km	passive microwave	daily	global	w2w	s										
FUTURE	50-150 m	SAR dual pol. (X,CL) ****	5 per season	main crops	s	L/M/S	rice area	entire growing season	high cloud cov.		x	x	x	x (1)	x	x (1)
FUTURE	5-20m	SAR dual pol. (X,CL) ****	5 per season	main crops	s	L/M/S	rice area		high cloud cov.			x	x	x	x	x
FUTURE	Footprint	RADAR Altimetry	weekly		s											
ETM+ (Landsat-7), ASTER (Terra), TIRGLDCM, IRMISS (CBERS-3)	50-100m	thermal	daily ?	main crops	s	L/M/S		entire growing season				x				
AI-Optical Mid-Resolution (Gambut, Terra, EO-1, Resourcesat-2, CBERS-3, Sentinel-2)	20-70m	optical + SWIR	1 per month (if possible same sensor) (min 2 out of season + 3 in season)	croplands	w2w	all M/S		year-round, focus on growing season			M					
AI-Optical Mid-Resolution (Gambut, Terra, EO-1, Resourcesat-2, CBERS-3, Sentinel-2)	20-70m	optical+SWIR	1 per week (min. 1 per 2 weeks)	main crops	s	country specific (see phasing) L/M/S		entire growing season			M/S	x	x	x	x	x
HGR (SPOT-5), Rapid Eye (optical)	5-10 m	optical (+SWIR)***	1 per month (if possible same sensor) (min 2 out of season + 3 in season)	croplands	rs	L/M/S (focus on S)		year-round, focus on growing season			L/M/S					
HGR (SPOT-5), Rapid Eye (optical)	5-10 m	optical (+SWIR)***	1 per week (min. 1 per 2 weeks)	main crops	rs2	country specific (see phasing) S		entire growing season				x	x	x	x	x
HRV (Pialexis), IKONOS, GeoEye, WorldView2 (optical)	< 5 m	optical	1 to 2 per month	croplands	rs3	demo. case (2 - 5% of croplands) L/M/S)		2 - 4 coverages per year				x			x	x



GEOGLAM data plan submitted to the CEOS plenary in 2013



The GEOGLAM Components

**1. Global / Regional
Monitoring Systems**


International/Global

**2. National
Monitoring Systems**

National / Subnational

**3. Monitoring
Countries at Risk**

Food Insecure and Most
Vulnerable

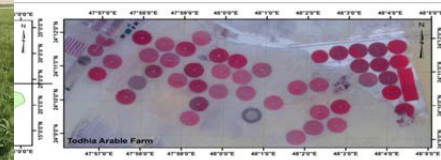
4. EO Data Acquisition & Dissemination Coordination 

5. Research & Development toward Operations

6. Capacity Development for EO

JECAM Principles

- **Collect and share** time-series datasets
- Develop **common standards** in definition, reporting methods and field protocols.
- The Committee on Earth Observing Satellites (CEOS) and member agencies support with the **acquisition and timely provision of data.**
- **R&D focused on operational implementation**



Global network of over 30 voluntary JECAM sites

JECAM

Joint Experiment for Crop Assessment and Monitoring

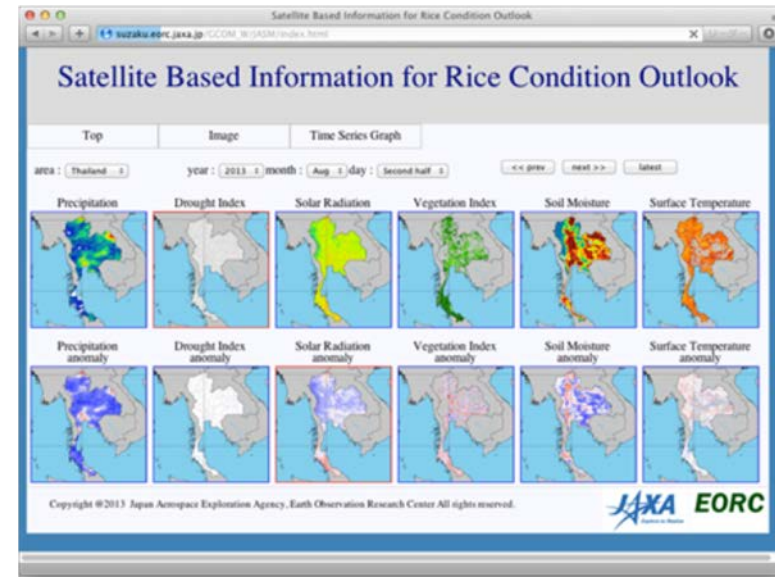




Asia-RiCE Regional Monitoring

- 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>



GEOGLAM Latinoamérica

National Scale Mapping Initiative

- **Argentina-led initiative**
 - strong support from Jesus Silveyra (Undersec for Ag Markets)
- **First in series of training workshops on Cropland Mapping held at UMD in March 2018**
- **Product: 2017 National Cropland Extent with 30m spatial resolution**
- **Ministry Participants from:**
 - Mexico, Brazil, Argentina, Chile

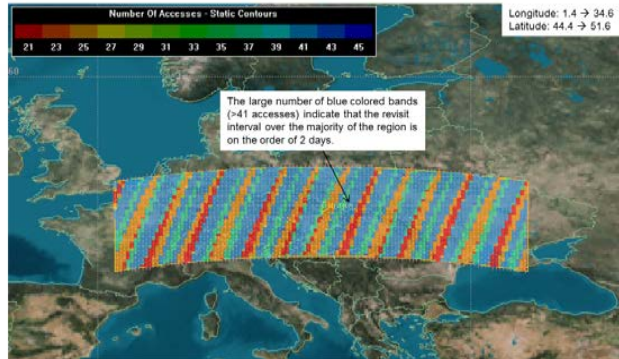


Harmonized Landsat Sentinel-2 (HLS) Project



- Merging Sentinel-2 and Landsat data streams can provide **2-3 day global coverage**
- Goal is “seamless” near-daily 30m surface reflectance record including atmospheric corrections, spectral and BRDF adjustments, regridding
- Project initiated as collaboration among GSFC, UMD, NASA Ames

Sentinel 2A and B - LDCM Europe

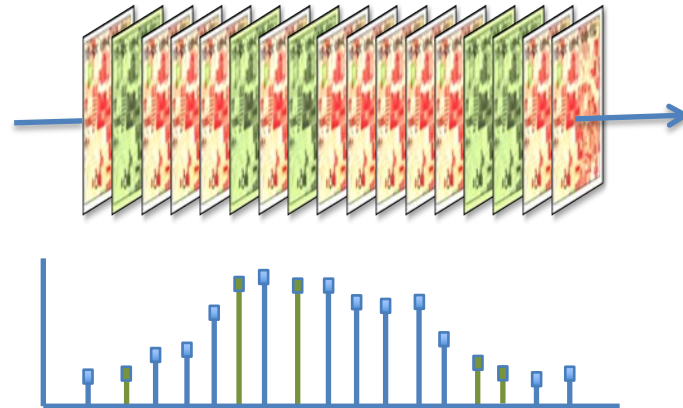


- The picture shows the number of times LDCM and the Sentinel 2 satellites accessed areas on the ground over an 80 day period of time.

- 21 accesses indicates a maximum revisit interval of ~3 days 19 hours
- 46 accesses indicates a minimum revisit interval of ~1 day 18 hours

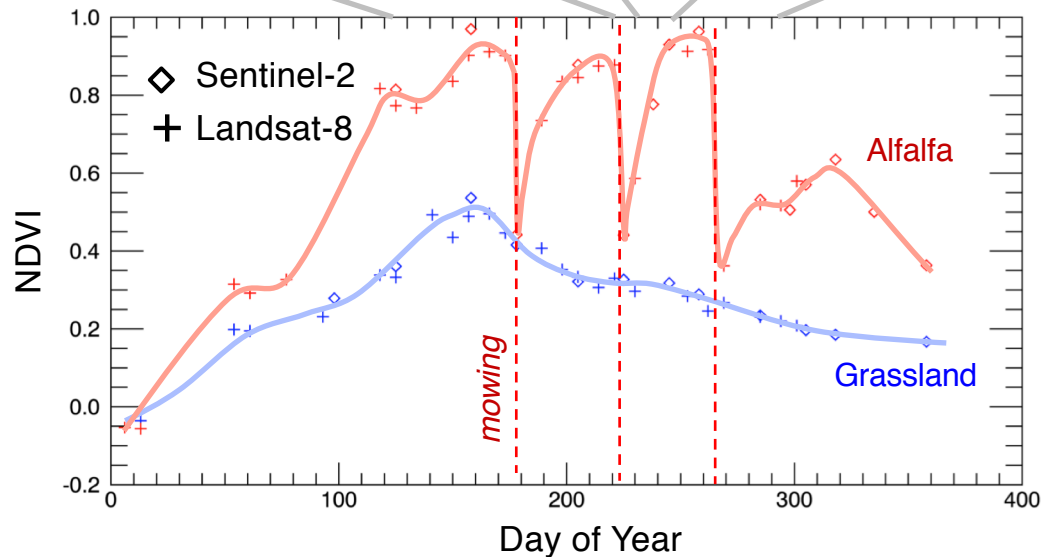
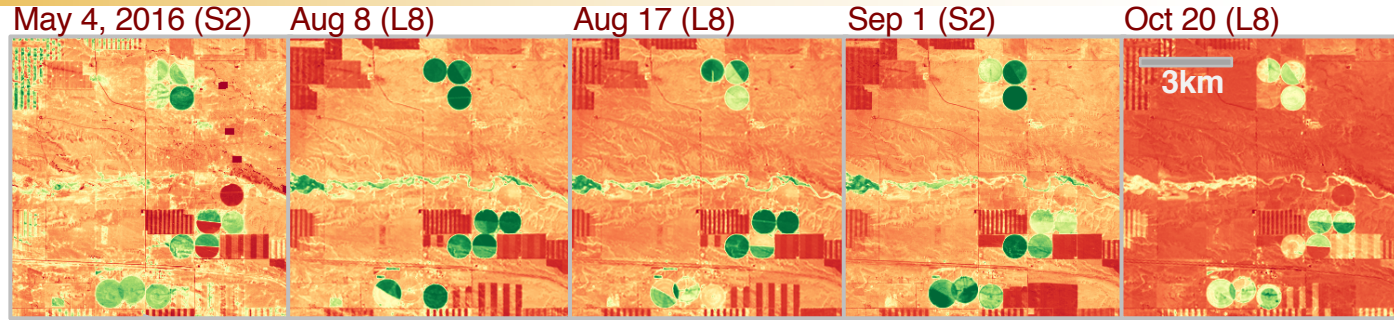
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Courtesy Brian Kilbough, NASA LARC



Harmonized Landsat / Sentinel-2 Products

Laramie County, WY



Seasonal phenology (greening) for natural grassland (blue line) and irrigated alfalfa fields (red line) near Cheyenne Wyoming observed from Harmonized Landsat/Sentinel-2 data products. The high temporal density of observations allows individual mowing events to be detected within alfalfa fields. HLS Products available from <https://hls.gsfc.nasa.gov>

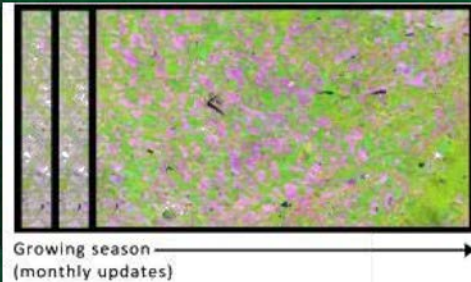
Top Priority: open source system to deliver 4 Sen2Agri products along the season



In line with the GEOGLAM core products

Monthly cloud free surface reflectance composite at 10-20 m

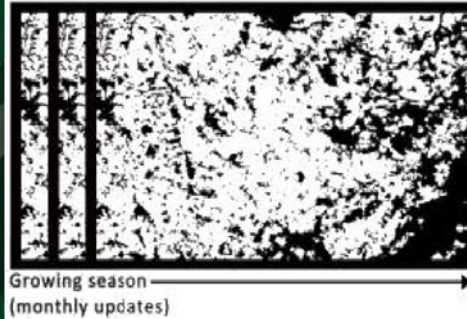
CLOUD FREE SURFACE REFLECTANCE COMPOSITES



Vegetation status map at 10 m delivered every week (NDVI, LAI, phenoindex)

Defourny et al.

DYNAMIC CROPLAND MASK



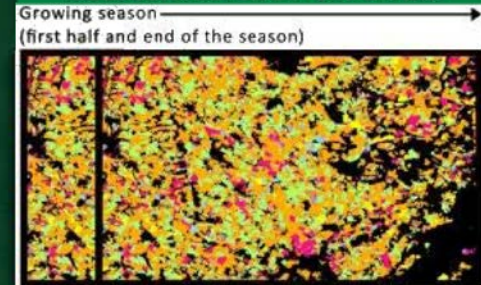
Binary map identifying annually cultivated land at 10m updated every month

Open source toolbox
Capacity building and training

VEGETATION STATUS

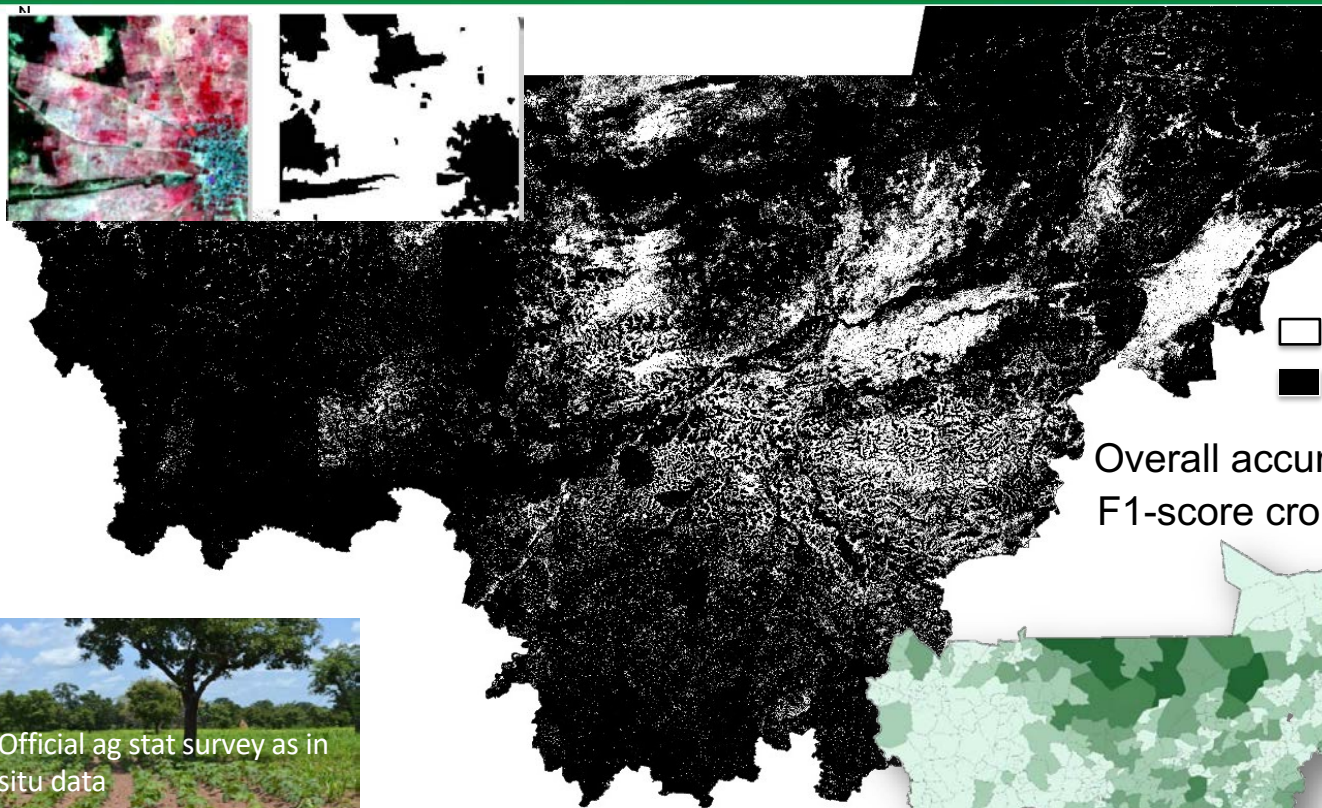


CULTIVATED CROP TYPE MAP



Crop type map at 10 m for the main regional crops including irrigated/rainfed discrimination

2016 Cropland mask at 10m resolution for Mali from Sentinel-2 and Landsat 8



0 75 150 300 km



sentinel-2

→ AGRICULTURE



UCL
Université
catholique
de Louvain



rkshop - Ispra, Italy - 17-18 April 2018



Univ
cathol
de Louv



Cropland Area (Bt/Culture)
per 1000 ha of land
for the 2015 growing
season



Radarsat Constellation – February 2019

The Evolution of RADARSAT

RADARSAT-1 (1997-2013)
16 years



RADARSAT-2 (2007-)



RADARSAT-Constellation
launch 2018



	RADARSAT-1	RADARSAT-2	RCM
# satellites	1	1	3
Centre frequency	5.3 GHz	5.405 GHz	5.405 GHz
Exact revisit	24 days	24 days	12 day (each satellite) 4 days (constellation)
SAR time/orbit	28 min	28 min	15 min/sat
Polarization	HH	HH, VV, HV, VH (Quad)	HH, VV, HV, VH (quad) Compact pol.
Look direction	Right	Right or Left	Right
Altitude	800 km	800 km	600 km
Descending node	6 h	6 h	6 h +/- 15 min
Ascending node	18 h	18 h	18 h +/- 15 min

Workshop on Cloud Computing and Knowledge Management for Agricultural Monitoring (GEOGLAM)

29-31 August 2018; Sanya, China (Host: RAD-CAS)

Cloud Computing is enabling big data analysis for agricultural monitoring (e.g. GEE, AWS, Alibaba, DIAS, Data Cube)

- *Increased volumes of accessible data in the cloud*
- *Proliferation of tools*
- *Increasing number of satellite-based products generated*

Community requirement for guidance on best practices and coordinated data sharing.

Selected Workshop Outcomes:

- Task Force established for coordinating cloud computing—focus on developing country capacity building (China DBARAgri/EU)
 - GEO(GLAM) to approach Alibaba to host Chinese satellite data
- Community Algorithms and Tools to be shared via a GEOGLAM TEP (Thematic Exploitation Platform)
 - EU targeting ESA funding
- Document and report archives through Knowledge Management Hub (GEOGLAM Sec)
 - GEOGLAM Best Practices documentation given priority (Fund being established at GEOSec)
- Community Research Agenda in development (NASA Harvest with JECAM EC/Canada)





Upcoming Meetings

2018

- AGU, Washington D.C USA (December 10-14)
 - GEOGLAM Session

2019

- ISPRS, GEOGLAM, ISRS Joint International Workshop on Earth Observations for Agricultural Monitoring, New Delhi India (February 18-20)
 - Abstract submission deadline October 31st
- NASA LCLUC SARI Workshop, Malaysia (July 22-24)
 - Agricultural Session



NASA HARVEST

www.nasaharvest.org
[@NASAHarvest](https://twitter.com/NASAHarvest)

Earth Data for Informed Agriculture Decisions

A new NASA program to advance the awareness, use, and operational uptake of satellite-based Earth observations to guide decisions that support food security, stable markets, economic progress, and sustainable, resilient crop production.

EO INVESTMENTS
TARGETED AT END
USER NEEDS



IMPROVED
AGRICULTURAL
ASSESSMENTS



ENHANCED, TIMELY,
ACTIONABLE
INFORMATION



IMPROVED
DECISION MAKING
BY END-USERS

- Link NASA's agriculture & food security activities
- Strengthen communication between EO, economics, and statistics communities
- Improve application-ready research methods
- Transition research to operational users
- Strong partnership with NASA Food Security Office with strong support/linkages to GEOGLAM (G20 initiative)
- Established 2017 with initial 5 year period

A diverse Consortium of >40 members from public, private, NGO, intergovernmental, & humanitarian sectors



So in Summary

What is GEOGLAM doing?

- Increasing communication and sharing experience amongst the Ag Monitoring Community of Practice and with related programs
- Helping improve national agricultural monitoring systems
- Promoting EO-based approaches to agricultural monitoring and raising the importance of agricultural remote sensing
- Articulating and advocating for community requirements to the EO data providers
- Translating EO data into policy relevant information
- Increasing the awareness of EO by the econ/policy community
- Method testing and inter-comparison, developing best practices
- Developing new monitoring capabilities and products

GEOGLAM Contributes to Multiple Goals



Monitoring, Measuring



A scenic landscape featuring a small, weathered building with a rusted metal roof and a few trees in the middle ground. In the foreground, there is a pond surrounded by lush green grass. The background shows a vast green field and a range of misty mountains under a clear sky.

Thank you

www.geoglam.org, www.cropmonitor.org

@G20_GEOGLAM, @GEOCropMonitor

Contact: [Christina Justice](mailto:justicec@geoglam.org), justicec@geoglam.org