GROUP ON EARTH OBSERVATIONS

GEOGLAM Global Agricultural Monitoring

The GEO Global Agricultural Monitoring (GEOGLAM) Initiative

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University of Maryland, USA

GEOGLAM

- Launched by G-20 in 2011 (French Presidency), under the Action Plan on Food Price Volatility and Agriculture and re-affirmed in 2016

- Vision: Provision of actionable, science-driven, open, information at sub-national to global scales, that guides policies, investments and decisions in food security, crop productivity and agricultural markets
  - Through use of coordinated, multi-sensor, Earth Observations (EO)
  - Recognizing the need for more reliable, open, transparent information on agriculture

www.geoglam.org

GEOGLAM: an International Collaborative Initiative

- Based on common interests, leveraging domestic and international research and development activities
- Strengthening existing national and international agricultural monitoring systems
- Foundation in user-driven operational R&D
  - Emphasis on identifying information needs and transitioning research to operations - building capacity for sustained monitoring

- The Initiative is being Implemented through Contributory Projects

- Governance Structure
  - Advisory Committee (chaired by USDA and China)
  - Secretariat at GEO HQ in Geneva
  - Distributed implementation Team with Project Leads

GEOGLAM Terminology

- **Earth Observations (EO)**
  - Satellite and in-situ data (e.g. from meteorological ground stations)
  - Timely information products and model output
  - Data > products and services > reliable Information
  - Validated i.e. of known accuracy
- **The GEOGLAM Community of Practice**
  - Data Providers, Researchers, Operational Agencies for Agricultural Monitoring (e.g. Ministries of Agriculture, Hydromet and Ag Statistics) and Many Others
  - Providing decision support for markets and policies
- **From Research to Operations**
  - Moving robust research methods into the operational domain
  - Challenging for all countries
  - Issue of capacity, resources and institutional roles and sustainability

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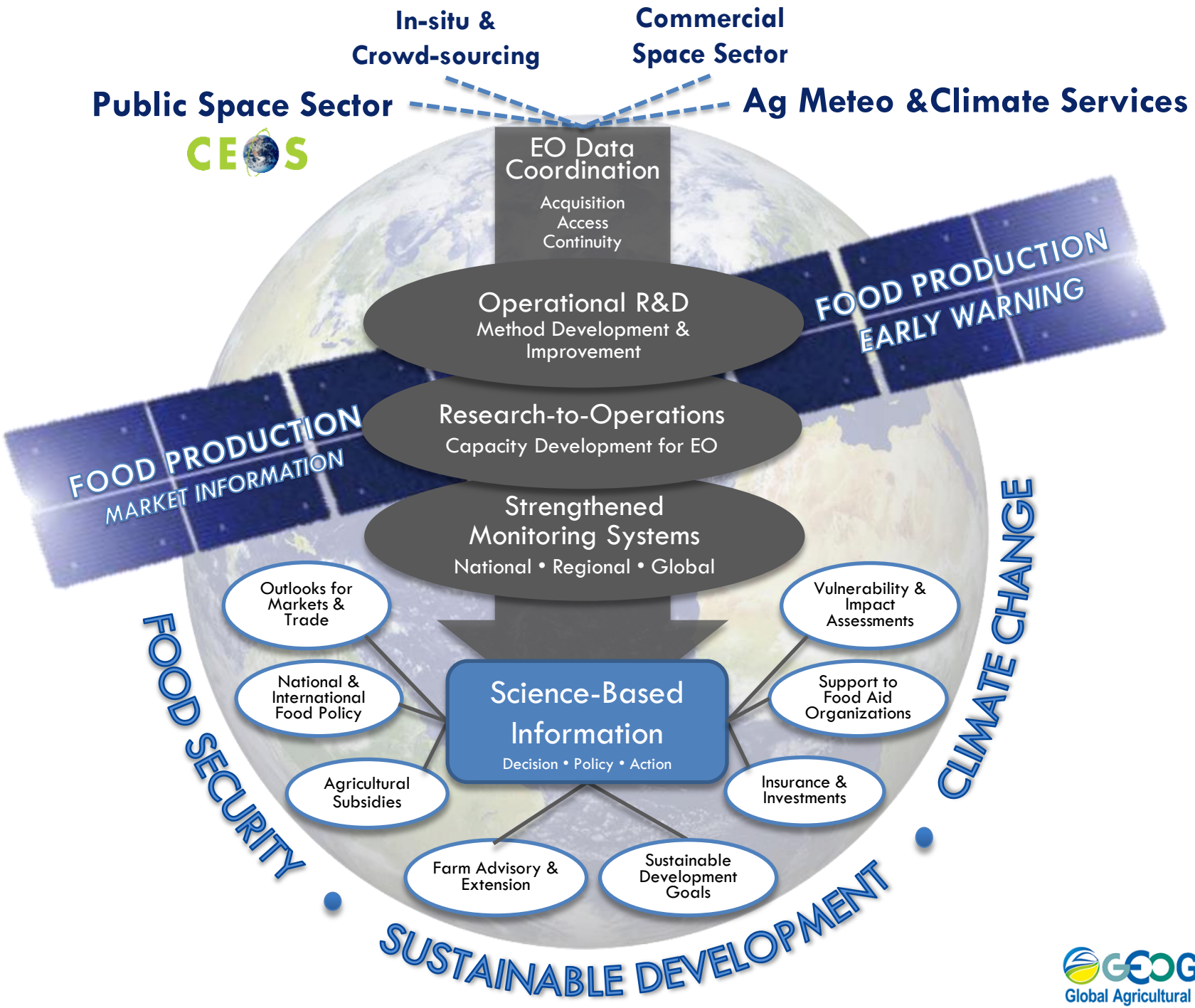
GEOGLAM Global Agricultural Monitoring

The GEOGLAM Community

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



GEOGLAM
Global Agricultural Monitoring

What does GEOGLAM Provide?

- Platform for multi-lateral and bilateral cooperation
  - coordination on provision and use of Earth Observations for agricultural monitoring
  - forum for exchange of experience, tools, methods → best practices
- R&D in support of operational systems
- Translating EO data into policy relevant information
  - Bridging the gap between EO-science & the Economics / Policy communities
- Articulating and advocating community observation requirements and information needs to EO data providers

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GEOGLAM Global Agricultural Monitoring

Free & Open Access to EO data, information, tools is a critical component

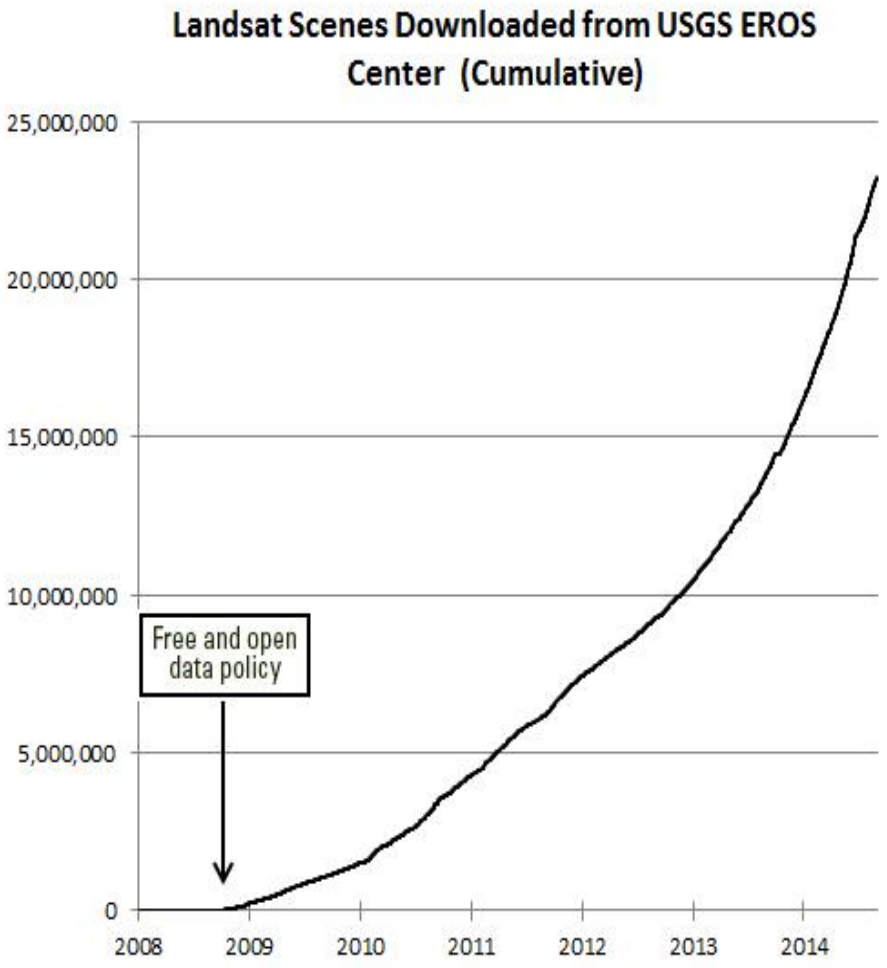
More access = more users

More users = better methods

Better methods + good data = improved quality of information

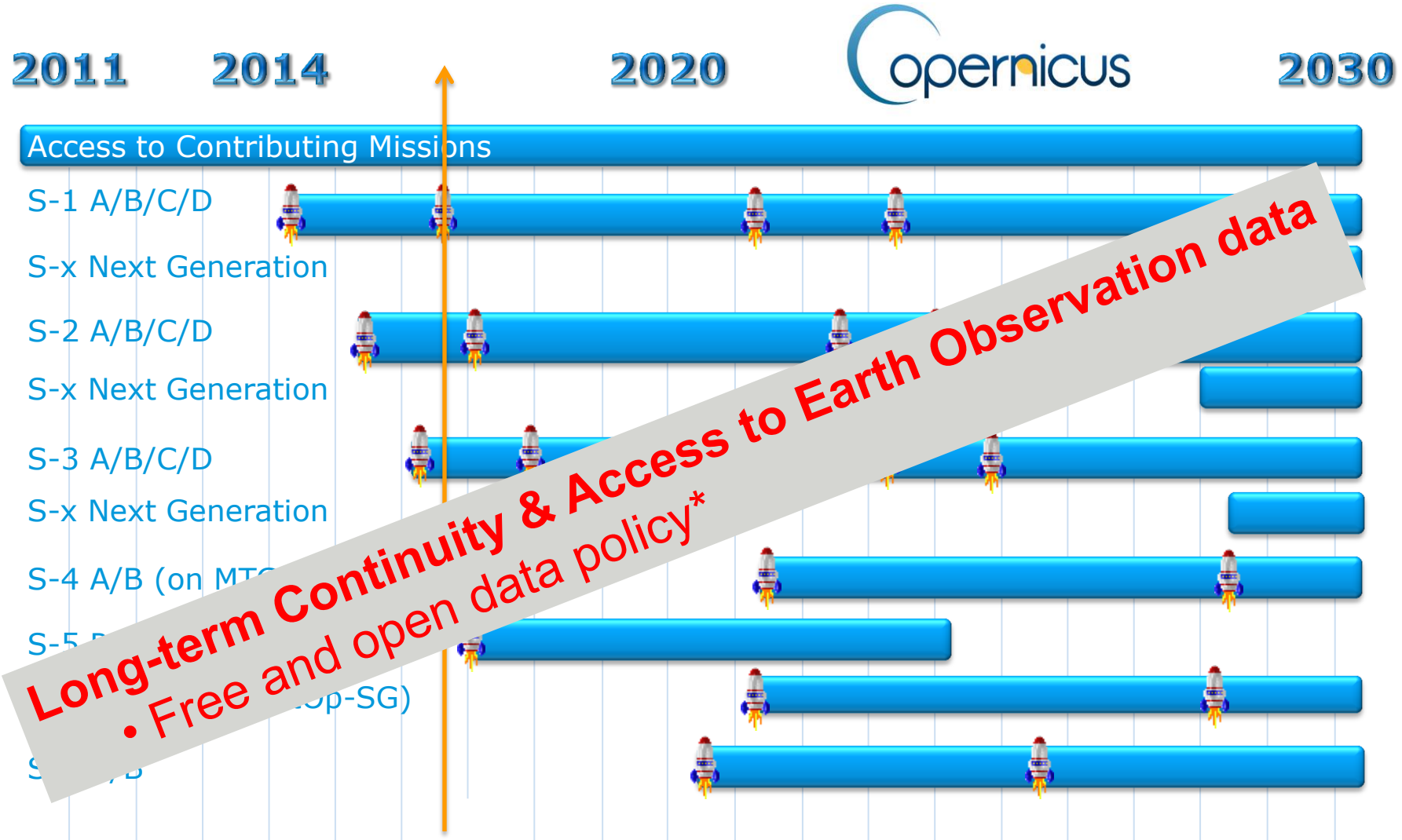
Improved quality of information supports better decision making and mitigates food insecurity.

Restrictive data policies are missed opportunities.



Source: USGS

Sentinels – New Era of Observations
EU-ESA Copernicus Space Programme



Need for Timely Information

- Cropland Area
- Crop Calendars, Crop Rotation
- Area Planted
- Crop Type (within season)
- Crop Condition (within season)
- Crop Yield Estimates (within season)
- Crop Production Assessments (within season)

- Agricultural Land Use Change
  - Intensification, Increase or loss of agricultural land, Changing cropping systems, Abandonment

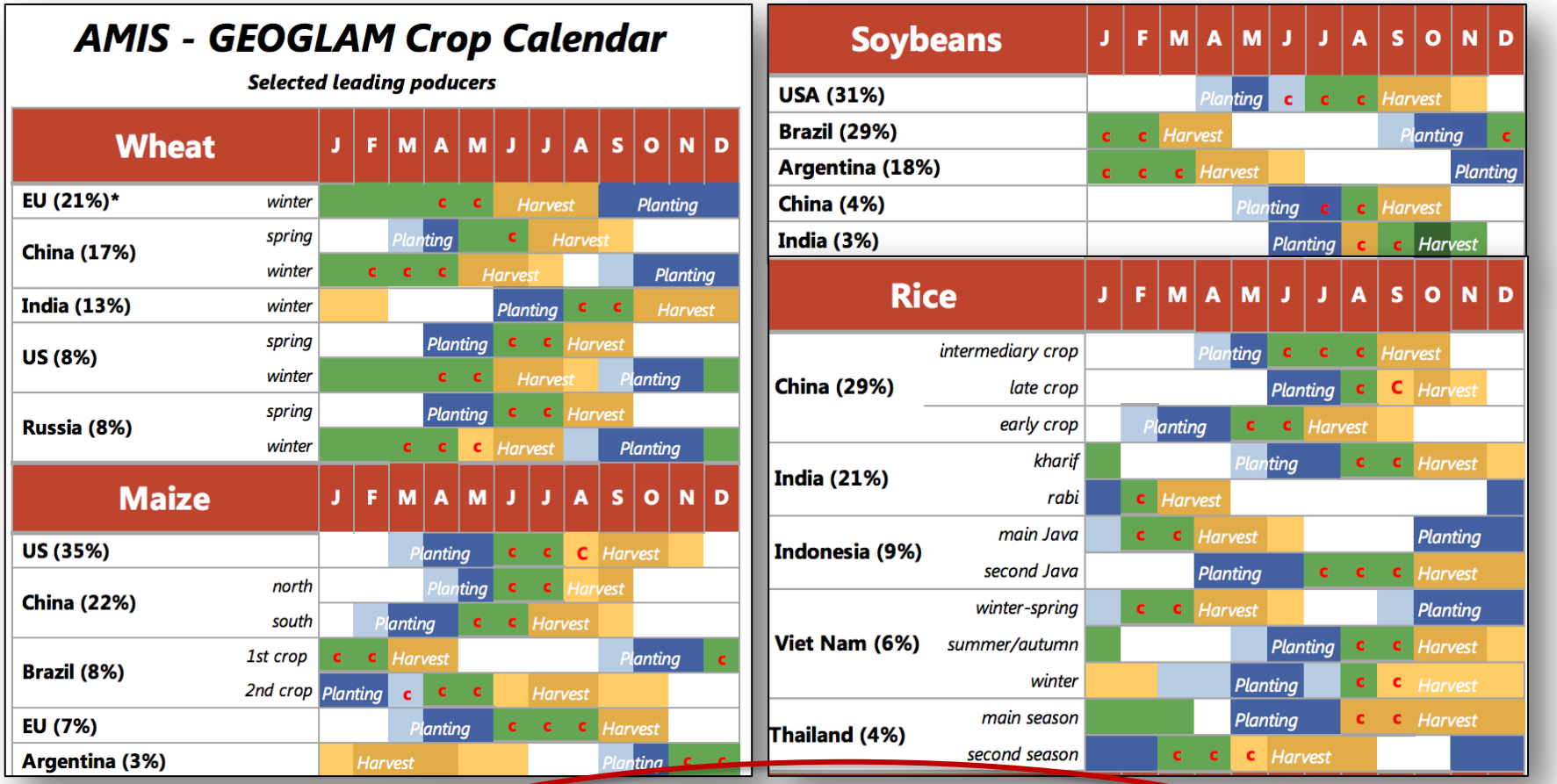
GEOGLAM Crop Monitor for AMIS

- Partnering with the Agricultural Market Information System
- Objective: transparent, timely, crop condition assessments in primary agricultural production areas
- Reflecting an international consensus, building on existing systems
- 4 Crops: Wheat, maize, soybean, rice
- Focus: main production/export countries (G20)

www.geoglam-cropmonitor.org

Product Updates: AMIS-GEOGLAM Crop Calendar

AMIS Agricultural Market Information System

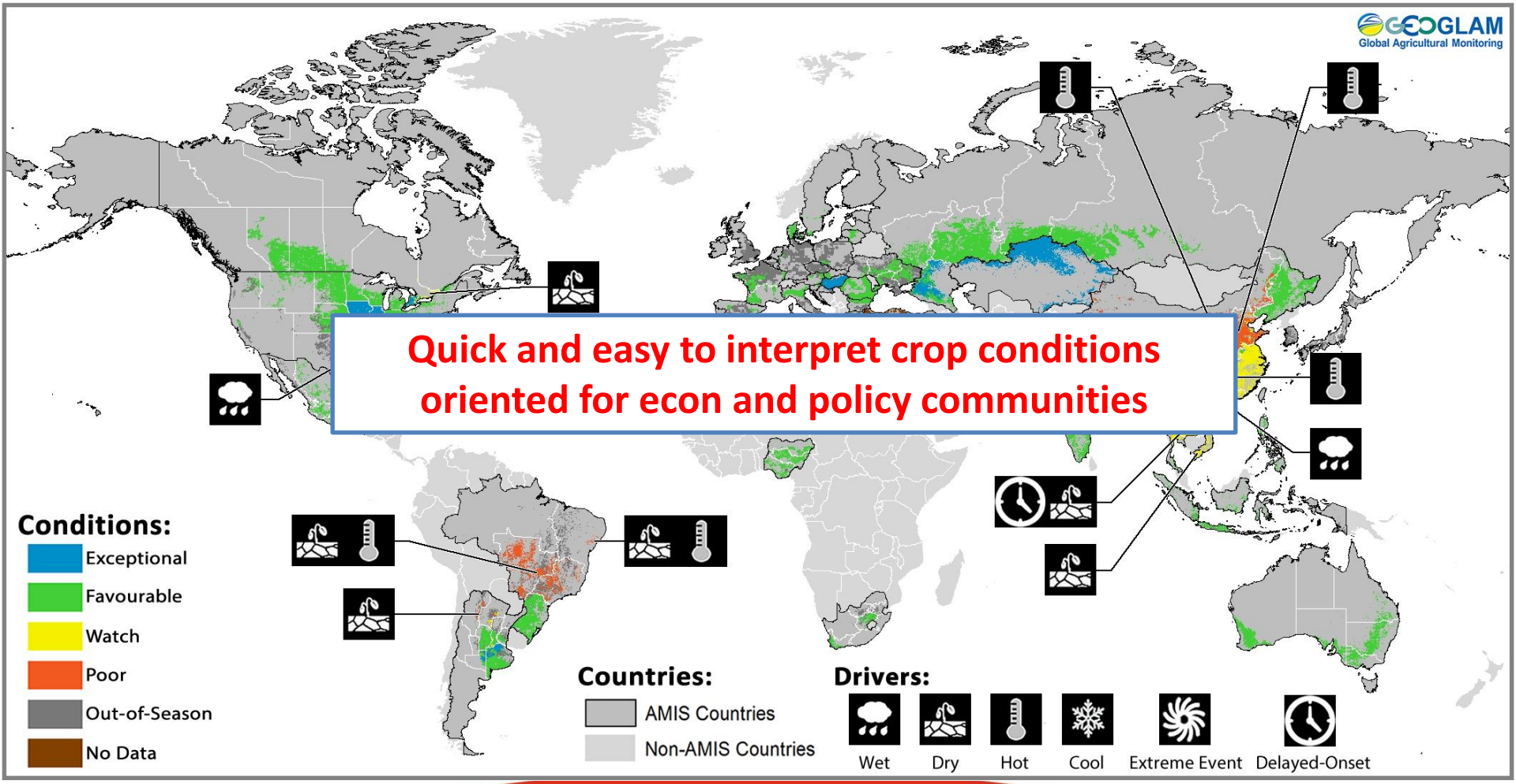


Food and Agriculture Organization of the United Nations

AMIS Agricultural Market Information System

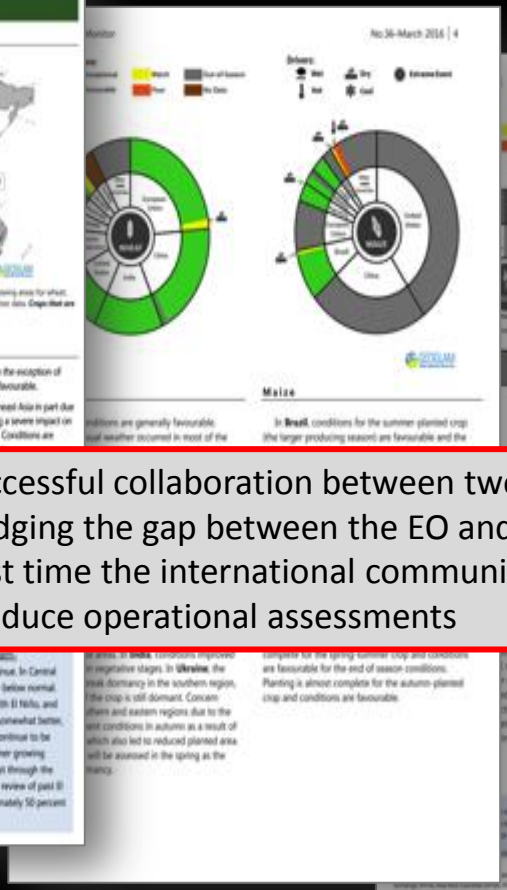
Output Crop Condition Maps Covering AMIS Crops

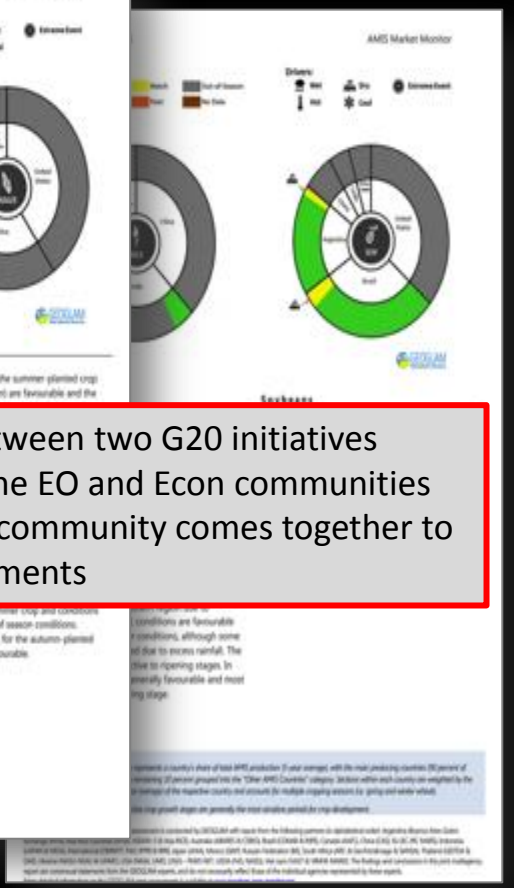
Conditions as of September 28th 2016



Crops that are in other than favorable conditions are displayed on the map with their crop symbol & driver.

Operational Monthly Bulletin Since 2013 Published in the AMIS Market Monitor

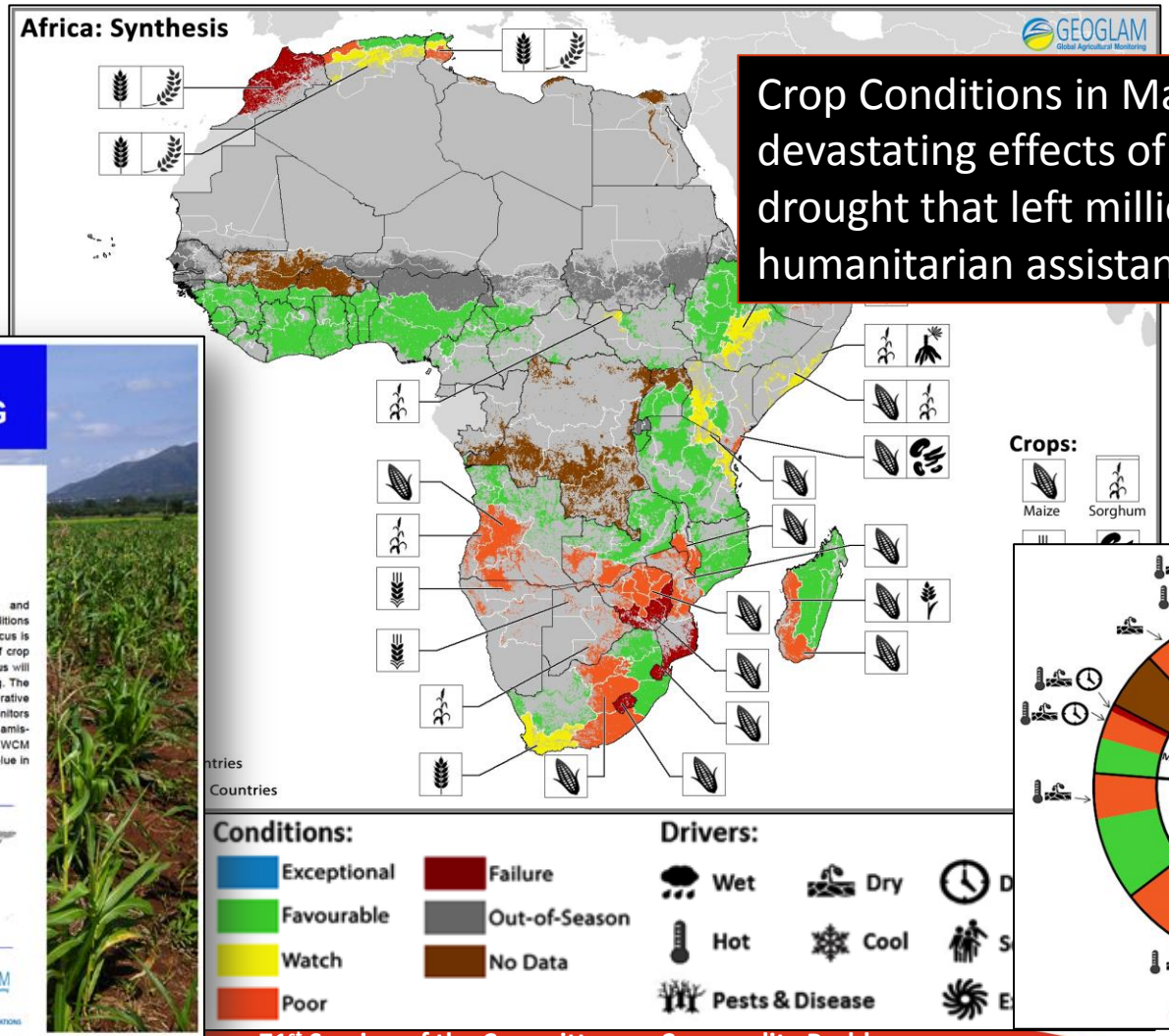




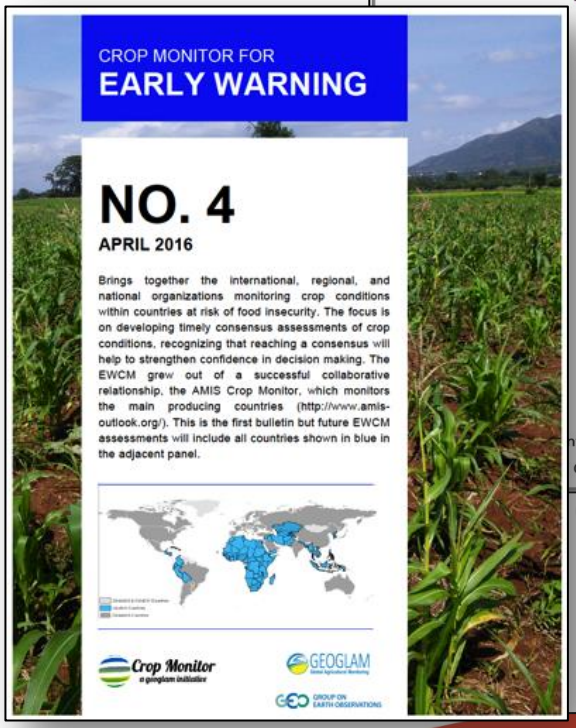
- Successful collaboration between two G20 initiatives
- Bridging the gap between the EO and Econ communities
- First time the international community comes together to produce operational assessments

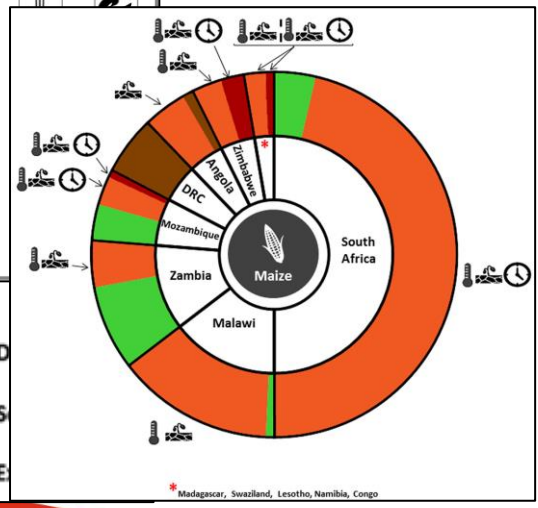
Gave Rise to the GEOGLAM Early Warning Crop Monitor

Focused on countries most vulnerable to food insecurity



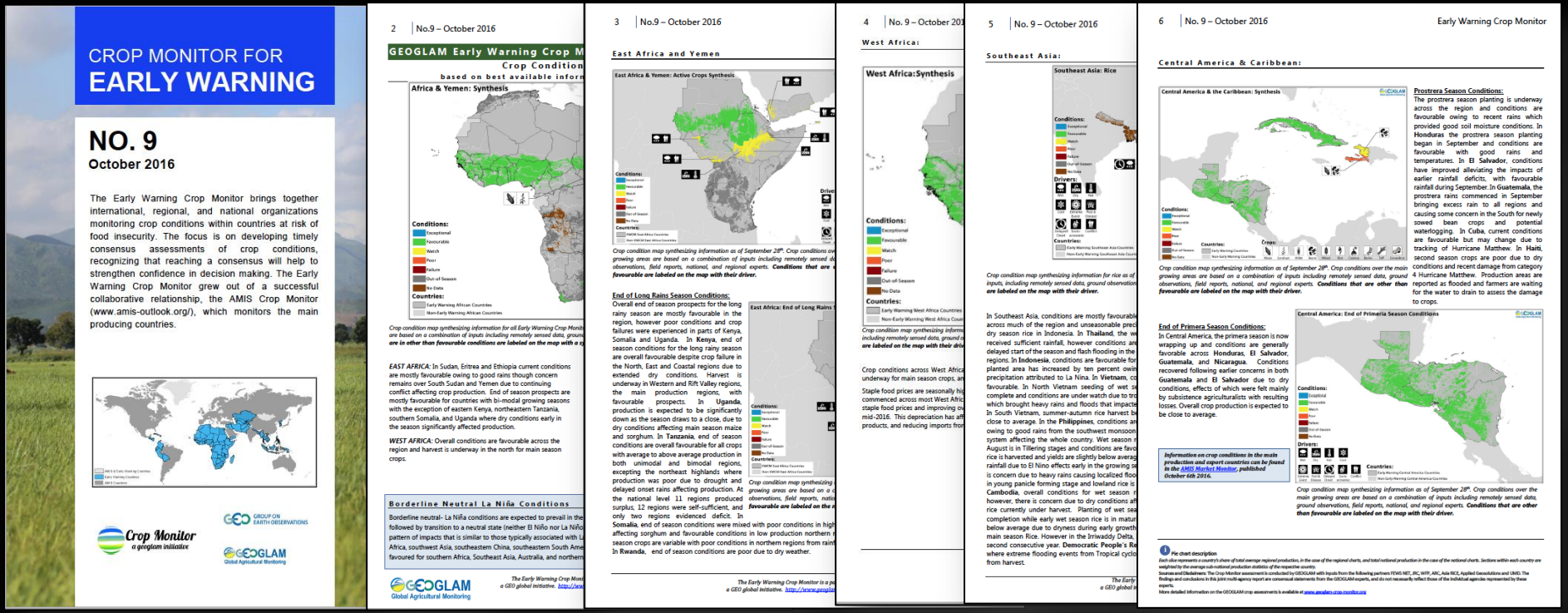
Crop Conditions in May 2016 showing devastating effects of southern Africa drought that left millions in need of humanitarian assistance





GEOGLAM Early Warning Crop Monitor

Monthly Reporting Since February 2016



CROP MONITOR FOR
EARLY WARNING

NO. 9
October 2016

The Early Warning Crop Monitor brings together international, regional, and national organizations monitoring crop conditions within countries at risk of food insecurity. The focus is on developing timely consensus assessments of crop conditions, recognizing that reaching a consensus will help to strengthen confidence in decision making. The Early Warning Crop Monitor grew out of a successful collaborative relationship, the AMIS Crop Monitor (www.amis-outlook.org/), which monitors the main producing countries.

Crop Monitor
a geoglam initiative

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GEOGLAM Early Warning Crop M

Crop Condition

based on best available inforn

Africa & Yemen: Synthesis

Conditions:
Exceptional
Favourable
Watch
Poor
Failure
Out-of-Season
No Data

Countries:
Early Warning African Countries
Non-Early Warning African Countries

Crop condition map synthesizing information for all Early Warning Crop Monit... are based on a combination of inputs including remotely sensed data, groun... are in other than favourable conditions are labeled on the map with a c...

EAST AFRICA: In Sudan, Eritrea and Ethiopia current conditions are mostly favourable owing to good rains though concern remains over South Sudan and Yemen due to continuing conflict affecting crop production. End of season prospects are mostly favourable for countries with bi-modal growing seasons with the exception of eastern Kenya, northeastern Tanzania, southern Somalia, and Uganda where dry conditions early in the season significantly affected production.

WEST AFRICA: Overall conditions are favourable across the region and harvest is underway in the north for main season crops.

Borderline Neutral La Niña Conditions

Borderline neutral- La Niña conditions are expected to prevail in the... followed by transition to a neutral state (neither El Niño nor La Niño... pattern of impacts that is similar to those typically associated with L... Africa, southwest Asia, southeastern China, southeastern South Ame... favoured for southern Africa, Southeast Asia, Australia, and northern...

GEOGLAM
Global Agricultural Monitoring

The Early Warning Crop Monit... a GEO global initiative. http://ww...

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East Africa and Yemen

East Africa & Yemen: Active Crops Synthesis

Conditions:
Exceptional
Favourable
Watch
Poor
Failure
Out-of-Season
No Data

Countries:
FAM/4 East Africa Countries
Non-FAM East Africa Countries

Drivers:

Crop condition map synthesizing information as of September 28th. Crop conditions ov... growing areas are based on a combination of inputs including remotely sensed d... observations, field reports, national, and regional experts. Conditions that are ... favourable are labeled on the map with their driver.

End of Long Rains Season Conditions:

Overall end of season prospects for the long rainy season are mostly favourable in the region, however poor conditions and crop failures were experienced in parts of Kenya, Somalia and Uganda. In **Kenya**, end of season conditions for the long rainy season are overall favourable despite crop failure in the North, East and Coastal regions due to extended dry conditions. Harvest is underway in Western and Rift Valley regions, the main production regions, with favourable prospects. In **Uganda**, production is expected to be significantly down as the season draws to a close, due to dry conditions affecting main season maize and sorghum. In **Tanzania**, end of season conditions are overall favourable for all crops with average to above average production in both unimodal and bimodal regions, excepting the northeast highlands where production was poor due to drought and delayed onset rains affecting production. At the national level 11 regions produced surplus, 12 regions were self-sufficient, and only two regions evidenced deficit. In **Somalia**, end of season conditions were mixed with poor conditions in high... affecting sorghum and favourable conditions in low production northern r... season crops are variable with poor conditions in northern regions from rain... In **Rwanda**, end of season conditions are poor due to dry weather.

East Africa: End of Long Rains S...

Conditions:
Exceptional
Favourable
Watch
Poor
Failure
Out-of-Season
No Data

Countries:
FAM/4 East Africa Countries
Non-FAM East Africa Countries

Crop condition map synthesizing... growing areas are based on a c... observations, field reports, natio... favourable are labeled on the m...

The Early Warning Crop Monitor is a pa... a GEO global initiative. http://www.geoglam...

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West Africa:

West Africa:Synthesis

Conditions:
Exceptional
Favourable
Watch
Poor
Failure
Out-of-Season
No Data

Countries:
Early Warning West Africa Countries
Non-Early Warning West Africa Coun...

Crop condition map synthesizing inform... including remotely sensed data, ground o... are labeled on the map with their dri...

Crop conditions across West Africa... underway for main season crops, ar...

Staple food prices are seasonally hi... commenced across most West Afric... staple food prices and improving ou... mid-2016. This depreciation has aff... products, and reducing imports fro...

The Early... a GEO global i...

5 | No. 9 – October 2016

Southeast Asia:

Southeast Asia: Rice

Conditions:
Exceptional
Favourable
Watch
Poor
Failure
Out-of-Season
No Data

Drivers:

Countries:
Early Warning Southeast Asia Countries
Non-Early Warning Southeast Asia Countries

Crop condition map synthesizing information for rice as of ... inputs, including remotely sensed data, ground observation... are labeled on the map with their driver.

In Southeast Asia, conditions are mostly favourable across much of the region and unseasonable prec... dry season rice in Indonesia. In **Thailand**, the we... received sufficient rainfall, however conditions are... delayed start of the season and flash flooding in the... regions. In **Indonesia**, conditions are favourable for... planted area has increased by ten percent owin... precipitation attributed to La Nina. In **Vietnam**, co... favourable. In North Vietnam seeding of wet se... complete and conditions are under watch due to tro... which brought heavy rains and floods that impacte... In South Vietnam, summer-autumn rice harvest be... close to average. In the **Philippines**, conditions are... owing to good rains from the southwest monsoon... system affecting the whole country. Wet season r... August is in Tillering stages and conditions are favo... rice is harvested and yields are slightly below averag... rainfall due to El Nino effects early in the growing se... is concern due to heavy rains causing localized floo... in young panicle forming stage and lowland rice is... **Cambodia**, overall conditions for wet season r... however, there is concern due to dry conditions af... rice currently under harvest. Planting of wet sea... completion while early wet season rice is in matur... below average due to dryness during early growth... main season Rice. However in the Irriwaddy Delta, ... second consecutive year. **Democratic People's Re...** where extreme flooding events from Tropical cyclo... from harvest.

The Early... a GEO global i...

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Central America & Caribbean:

Central America & the Caribbean: Synthesis

Conditions:
Exceptional
Favourable
Watch
Poor
Failure
Out-of-Season
No Data

Countries:
Early Warning Countries
Non-Early Warning Countries

Crops:

Crop condition map synthesizing information as of September 28th. Crop conditions over the main growing areas are based on a combination of inputs including remotely sensed data, ground observations, field reports, national, and regional experts. Conditions that are other than favourable are labeled on the map with their driver.

Prostrera Season Conditions:

The prostrera season planting is underway across the region and conditions are favourable owing to recent rains which provided good soil moisture conditions. In **Honduras** the prostrera season planting began in September and conditions are favourable with good rains and temperatures. In **El Salvador**, conditions have improved alleviating the impacts of earlier rainfall deficits, with favourable rainfall during September. In **Guatemala**, the prostrera rains commenced in September bringing excess rain to all regions and causing some concern in the South for newly sowed bean crops and potential waterlogging. In **Cuba**, current conditions are favourable but may change due to tracking of Hurricane Matthew. In **Haiti**, second season crops are poor due to dry conditions and recent damage from category 4 Hurricane Matthew. Production areas are reported as flooded and farmers are waiting for the water to drain to assess the damage to crops.

End of Primera Season Conditions:

In Central America, the primera season is now wrapping up and conditions are generally favorable across **Honduras**, **El Salvador**, **Guatemala**, and **Nicaragua**. Conditions recovered following earlier concerns in both **Guatemala** and **El Salvador** due to dry conditions, effects of which were felt mainly by subsistence agriculturalists with resulting losses. Overall crop production is expected to be close to average.

Information on crop conditions in the main production and export countries can be found in the AMIS Market Monitor, published October 6th 2016.

Central America: End of Primera Season Conditions

Conditions:
Exceptional
Favourable
Watch
Poor
Failure
Out-of-Season
No Data

Drivers:

Countries:
Early Warning Central America Countries
Non-Early Warning Central America Countries

Crop condition map synthesizing information as of September 28th. Crop conditions over the main growing areas are based on a combination of inputs including remotely sensed data, ground observations, field reports, national, and regional experts. Conditions that are other than favourable are labeled on the map with their driver.

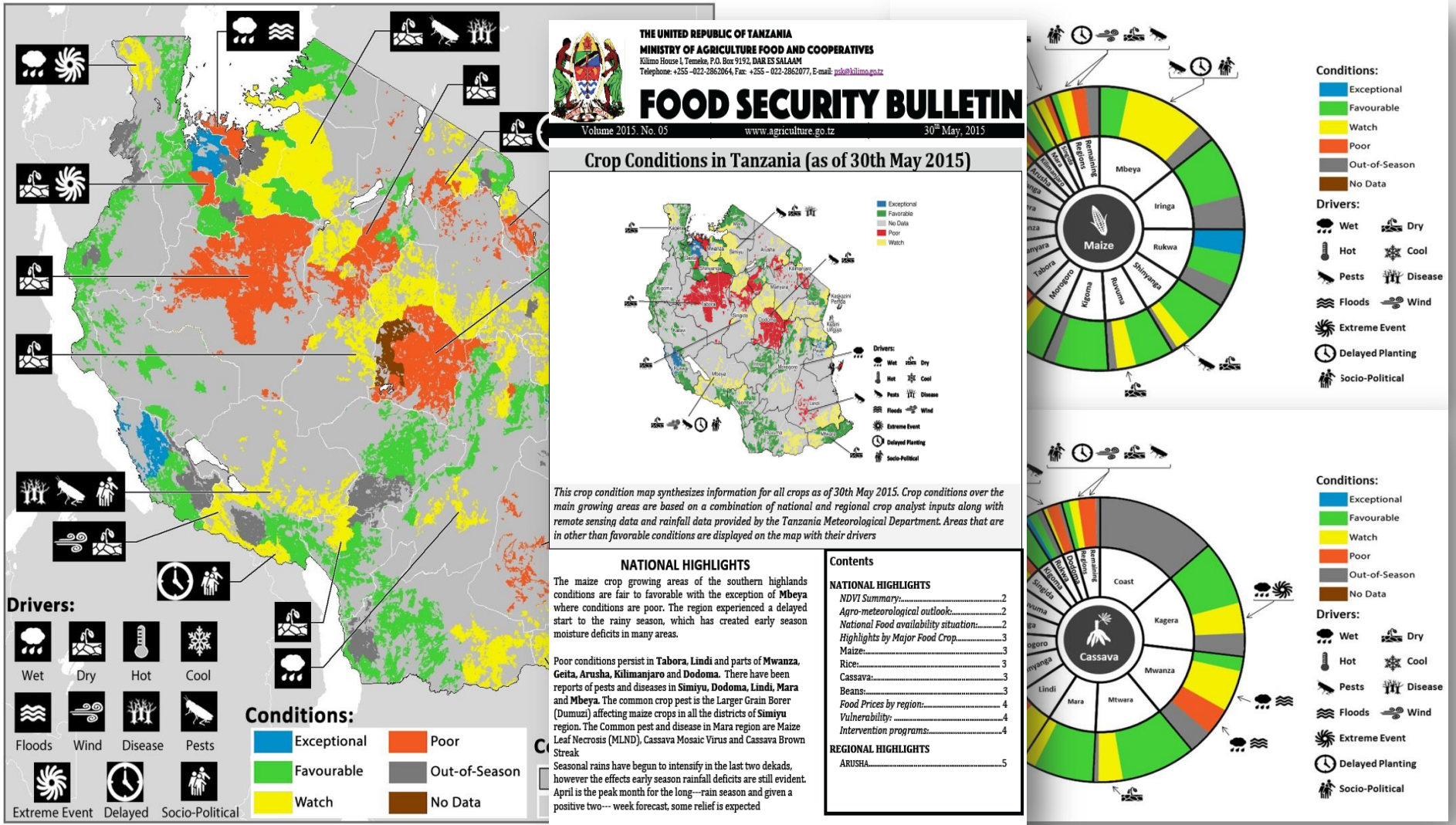
Pie chart description

Each slice represents a country's share of total average regional production, in the case of the regional charts, and total national production in the case of the national charts. Sections within each country are weighted by the average sub-national production statistics of the respective country.

Sources and Disclaimers: The Crop Monitor assessment is conducted by GEOGLAM with inputs from the following partners FEWS NET, JRC, WFP, ABC, Asia RICE, Applied Geosolutions and UMD. The findings and conclusions in this joint multi-agency report are consensual statements from the GEOGLAM experts, and do not necessarily reflect those of the individual agencies represented by these experts.

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

Initiation of National Crop Monitors: Tanzania Example

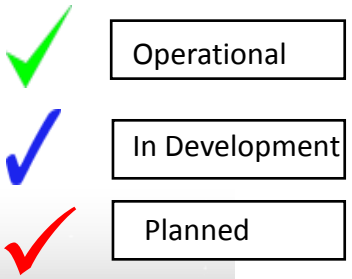


Canada: Earth Observation Working for Agriculture

Vision: To understand the state of Canadian agricultural production from pre-planting conditions through to post harvest conditions.

Decades of earth observation research has led to the development of innovative agricultural monitoring capabilities that are, or close to being operational:

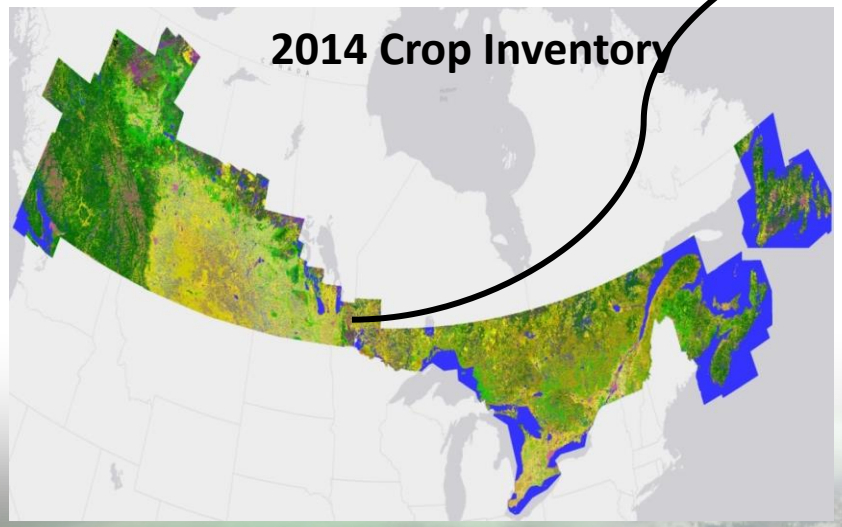
- Crop type, area and condition.
- Snow cover, Soil moisture, Excessive wetness, Drought.
- Climate and weather related impacts on production.
- Crop yield forecasting.
- Harvest progress monitoring.
- Soil management (tillage, crop residue).
- Biomass production.
- Crop damage, disease and pests.
- Soil health.

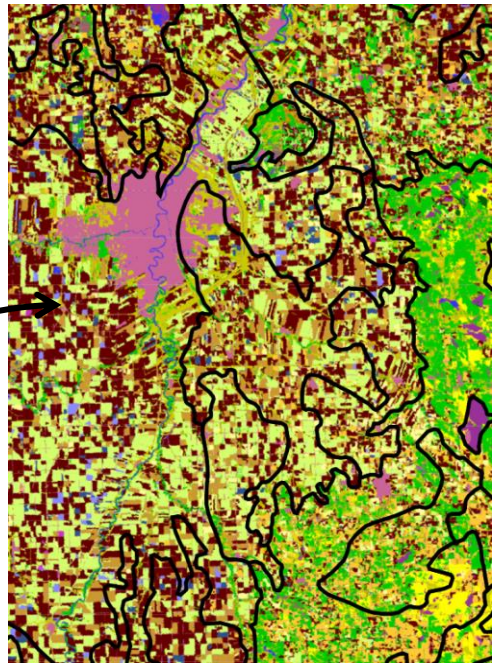


Current Operational Systems: Canada

Annual Crop Inventory

- Based on RADARSAT-2 and optical imagery.
- Maps every farm field in Canada at ≥ 80% accuracy.
- Consistently one of the top data sets downloaded from data.gc.ca.
- Used for programs and policy and a broad range of OGD, Provincial and sector uses…
  (eg. Next slide)





Crop inventory, Winnipeg Area

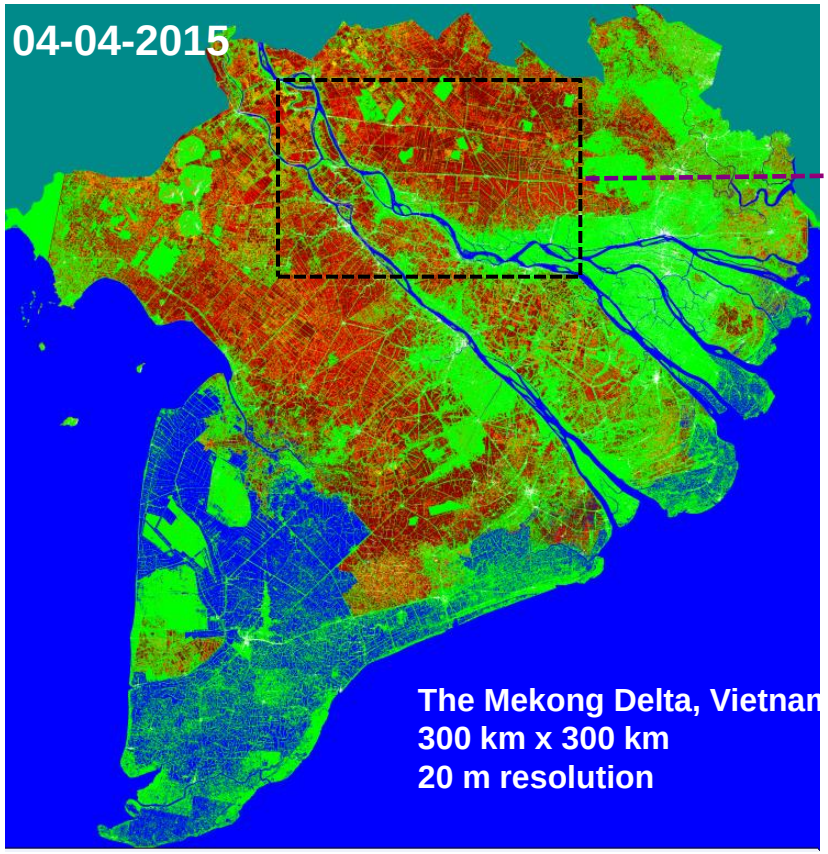
GROUP ON EARTH OBSERVATIONS

Asia-RiCE: Vietnam

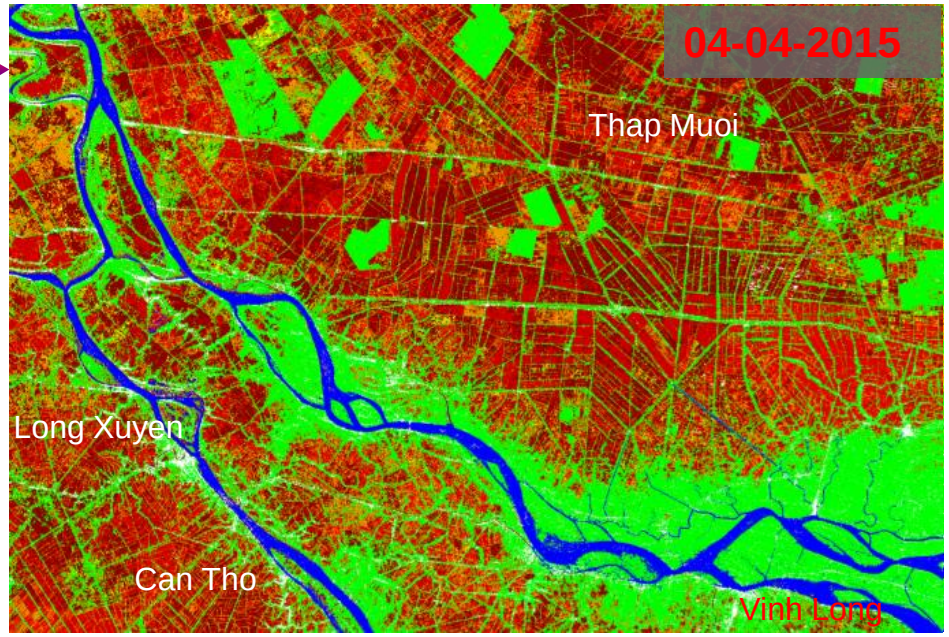
Rice monitoring using Sentinel-1A data

GEOGLAM Global Agricultural Monitoring

Monitoring of Winter-Spring rice



100 km x 70 km, 20 m resolution

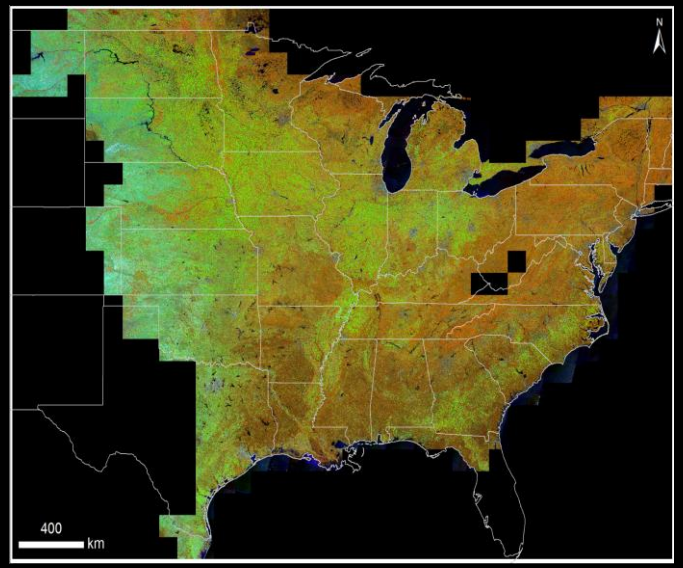


- Rice: early stage
- Rice: tillering stage
- Rice: reproductive stage
- Rice: maturity stage
- Non rice (forest, other LULC)
- Water (ocean, river, aquaculture)
- Land outside the Vietnam Mekong delta

CESBIO V.A.S.T esa Asia-RiCE Crop Estimation and Monitoring innovators georice

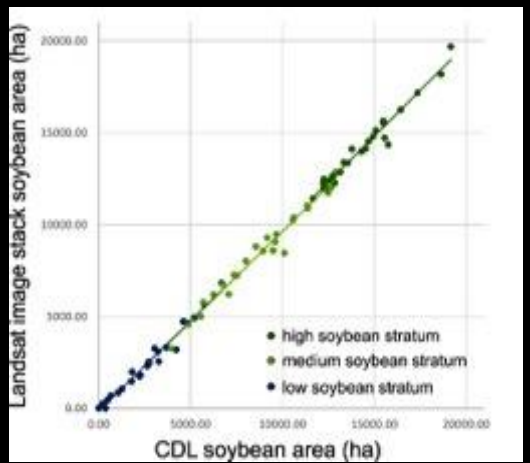
National Level Crop Area Estimation (USA)

Soy Example Using Multi- Resolution Data



- A Sample based approach
- 70 sample blocks, in 3 strata, to estimate in season soybean cultivated area

- Satellite based estimate: 351,317 km^2 (SE 24,915)
- USDA NASS 2015 soybean estimate: 334, 000 km^2

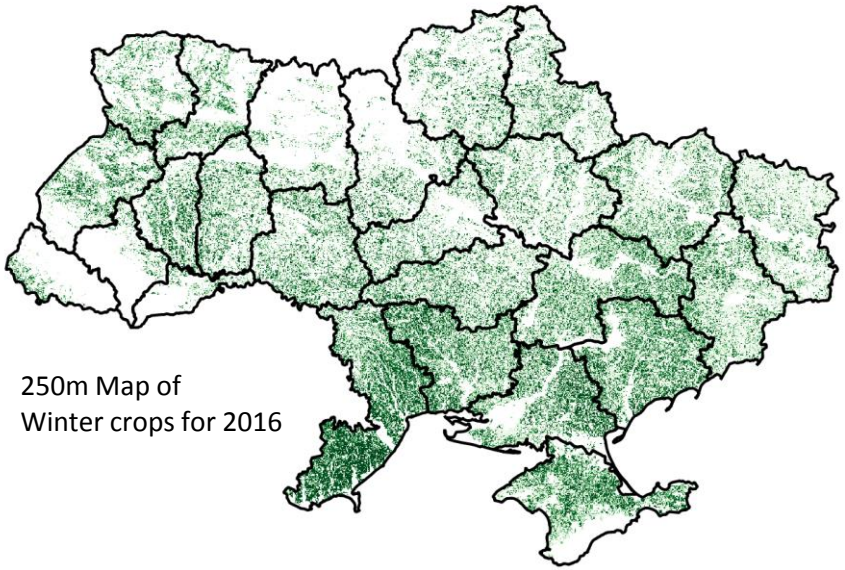


High soybean stratum
Medium soybean stratum
Low soybean stratum
Very low soybean stratum

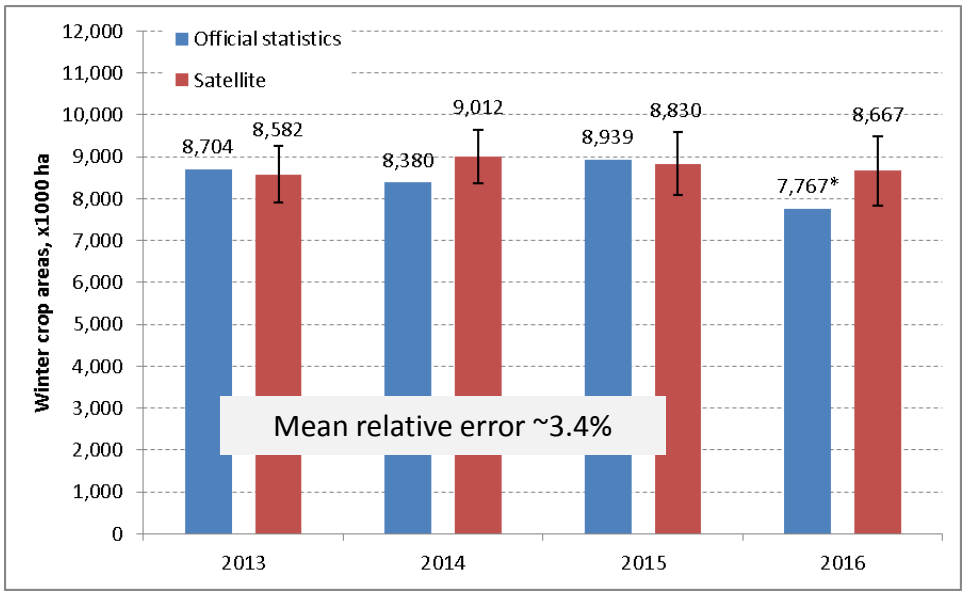
Hansen et al. 2014

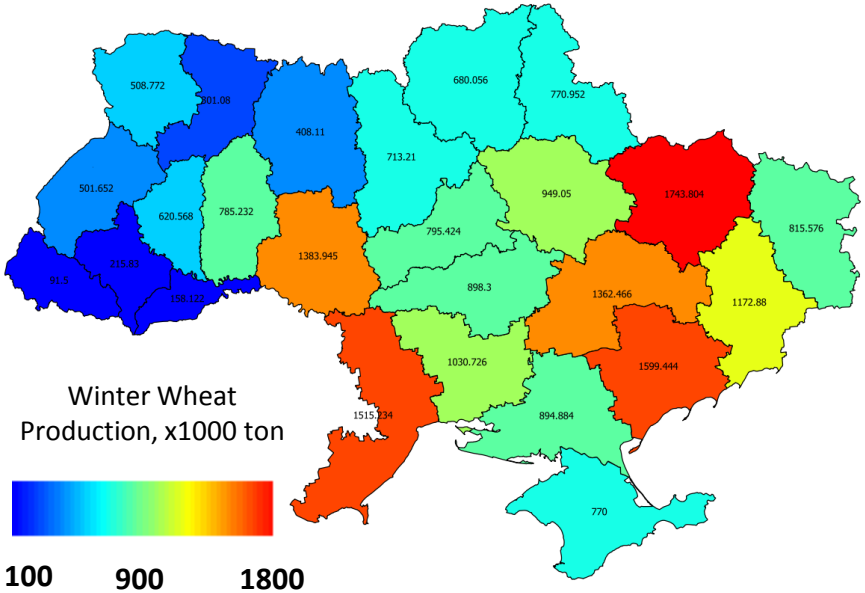
National Level Prototyping: Ukraine

- Winter wheat yield/production forecasting (1.5-2 months in advance of harvest)
- Early season winter crop mapping
- Early season winter crop area estimates



250m Map of
Winter crops for 2016



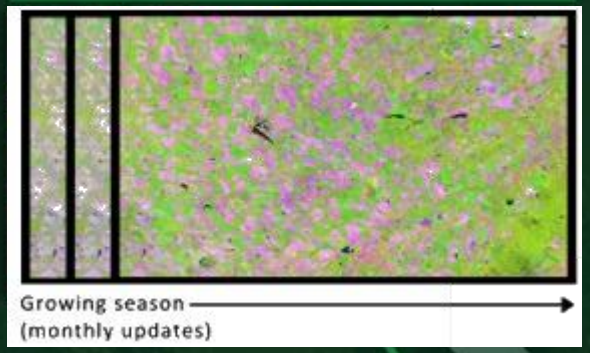


Skakun, Franch et al.

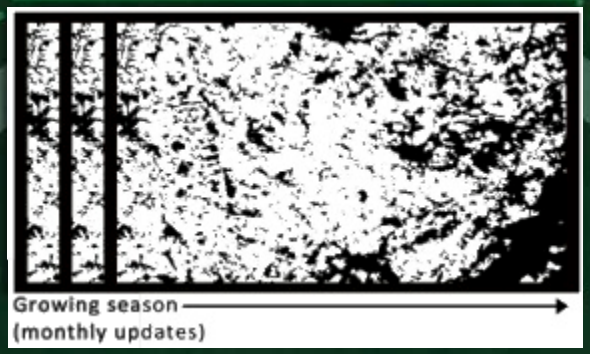
New Sentinel 2-based Products
aligned with the GEOGLAM core products

Monthly cloud free surface reflectance composite at 10-20m

CLOUD FREE SURFACE REFLECTANCE COMPOSITES



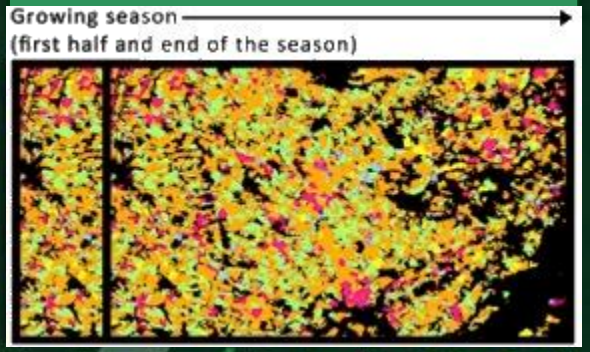
DYNAMIC CROPLAND MASK



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

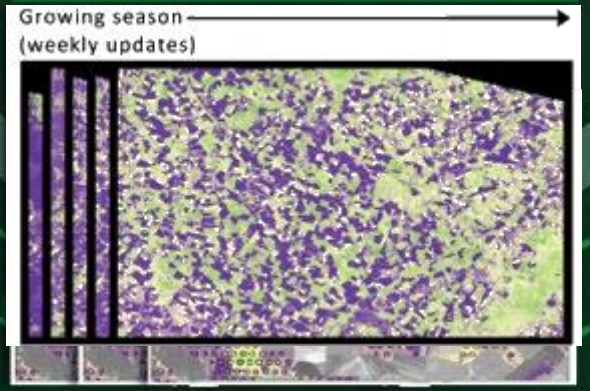
Open source toolbox
Capacity building and training

CULTIVATED CROP TYPE MAP



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

VEGETATION STATUS



Vegetation status map at 20m delivered every 10 days (NDVI, LAI, pheno index)

Defourny et al

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GEOGLAM Global Agricultural Monitoring

Research Foci at the Joint Experiment for Crop Assessment and Monitoring (JECAM) Sites

(JECAM co leads: Ian Jarvis (Canada), Pierre Defourny (Belgium))

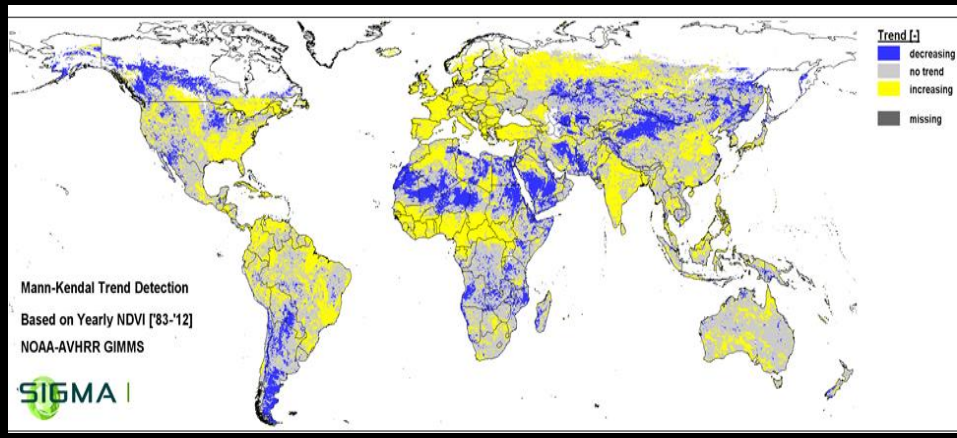
Developing and Comparing Methods for:

- Crop Type mapping
- Crop Condition monitoring
- Yield Estimation modeling
- Soil Moisture estimation
- Residue and Tillage monitoring etc.
- EC SIGMA Project, Sentinel 2 Agri are strengthening the JECAM field data collection and validation protocols and intercomparisons

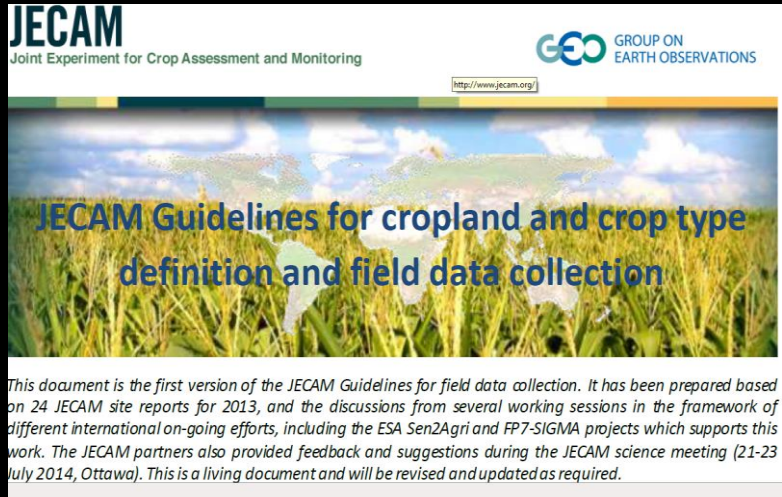
JECAM.org

SIGMA: Stimulating Innovation for Global Monitoring of Agriculture and its Impact on the Environment

- EC FP-7 Project
- Consortium lead by VITO (Belgium)
  - Partners in EC, Ukraine, Russia, China, Ethiopia, Kenya, Niger, Argentina, USA



- Contributing to Developing Standards and Best practices
  - Cross site experiments
    - Land cover mapping
    - Yield estimations
    - Agricultural Trend Analysis
- Capacity Needs Assessment-> selection of Priority countries
- Environmental Impact Assessment of Agricultural land use change



This Workshop

- Update on GEOGLAM Activities in Ukraine with a focus on new ESA Sentinel 2 Agri products and services (Monday pm)
- GEO UA Meeting (Tuesday)
  - Activity Updates, R and D presentations, discussion
- GEOGLAM JECAM Network Meeting (Tues/Wed am)
  - Network updates
  - Revisit CEOS Observation Requirements
  - New methods intercomparison initiatives
  - Shared validation data
- EC SIGMA Project Meeting (Wednesday pm/Thursday)
  - Project updates
  - Work Package results and accomplishments
- EC SIGMA Training (Friday)

GROUP ON EARTH OBSERVATIONS

GEOGLAM
Global Agricultural Monitoring

Дякую