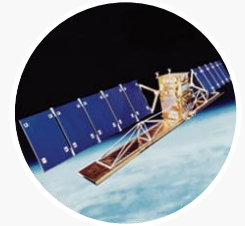


Joint Experiment for Crop Assessment and Monitoring

GEOGLAM Implementation Meeting
Washington D.C. February 21, 2013

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Overview of GEO-JECAM

The GEO Agricultural Community of Practice Established JECAM to:

- Enhance international collaboration around agricultural monitoring towards the development of a “systems of systems” to address issues associated with food security and a sustainable and a profitable agricultural sector worldwide

JECAM is achieving this objective by:

- Network distributed regional experiments on cropland pilot sites around the world representing a range of agricultural systems
- Share time series datasets from a variety of earth observing satellites and in-situ data and assess them for agricultural assessment and monitoring
- Facilitating the inter-comparison of monitoring and modeling methods, product accuracy assessments, data fusion and product integration, for agricultural monitoring

Overview... 2

Synthesis of the results from JECAM will enable:

- Development of **standards** for monitoring and reporting protocols
- A convergence of the monitoring science approaches to define **best practices** for different agricultural systems
- Inform **user requirements** for Earth Observation Data needs
- Support monitoring enhancements in the development of the **GEOGLAM system of systems**

The Approach:

- **Collect and share** time-series datasets from a variety of Earth observing satellites and in-situ crop and meteorological measurements for each site.
- The Committee on Earth Observing Satellites (CEOS) and member agencies are supporting this activity with the **acquisition and timely provision of data for JECAM.**

JECAM.ORG



The screenshot shows the JECAM website homepage. At the top left is the JECAM logo and tagline. At the top right is the GEO logo and tagline. Below the logos is a navigation menu with links for Home, Charter, Science Plan, Sensors, Map, and Contact Us. A secondary navigation bar contains links for Study Sites, North America, South America, Europe, Asia, and Africa, along with a Google Custom Search box. The main content area features a large image of a cornfield with a central text box titled "JECAM GOALS". The text in the box states: "The overarching goal of JECAM is to reach a convergence of approaches, develop monitoring and reporting protocols and best practices for a variety of global agricultural systems." Below this text is the logo for the Agriculture Community of Practice.

JECAM
Joint Experiment for Crop Assessment and Monitoring

GEO GROUP ON
EARTH OBSERVATIONS

Home Charter Science Plan Sensors Map Contact Us

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Google™ Custom Search Search

JECAM GOALS

The overarching goal of JECAM is to reach a convergence of approaches, develop monitoring and reporting protocols and best practices for a variety of global agricultural systems.

 Agriculture
Community of Practice

Joint Experiment of Crop Assessment and Monitoring

The overarching goal of JECAM is to reach a convergence of approaches, develop monitoring and reporting protocols and best practices for a variety of global agricultural systems. JECAM will enable the global agricultural monitoring community to compare results based on disparate sources of data, using various methods, over a variety of global cropping systems. It is intended that the JECAM experiments will facilitate international standards for data products and reporting, eventually supporting the development of a global system of systems for agricultural crop assessment and monitoring. The JECAM initiative is developed in the framework of GEO Global Agricultural Monitoring (GEOSS Task AG0703 a) and Agricultural Risk Management (GEOSS Task AG0703 b).

- JECAM activities are being undertaken at a **series of study sites** which represent many of the world's main cropping systems
- 15 sites currently exist, at least 3 in development, 3 dormant



★ Sites in development

Current Status – JECAM Annual Reports

- JECAM annual reports are in progress (Complete for CEOS mtg in March)
- 8 Sites have submitted reports, 2 pending, 3 sites dormant, 2 sites not yet ready to report
- From the 8 sites reporting there have been 10 peer reviewed papers and 19 presentations related to JECAM research identified

Current Status – Satellite Data Access

- The interaction with the space agencies and commercial providers has been positive
- Not all sites have made use of the JECAM-CEOS data support arrangements
- On-going communication is required to ensure sites are aware of the opportunity
- There has been significant support from SAR providers
 - From sites reporting at least 60 acquisitions from Radarsat 2 and 32 TerraSAR-X
- Significant Support from optical data providers
 - MODIS
 - MERIS
 - DMC
 - SPOT
 - RapidEye
 - HJ1 and HJ1 IRS (China sites)
 - AWifs

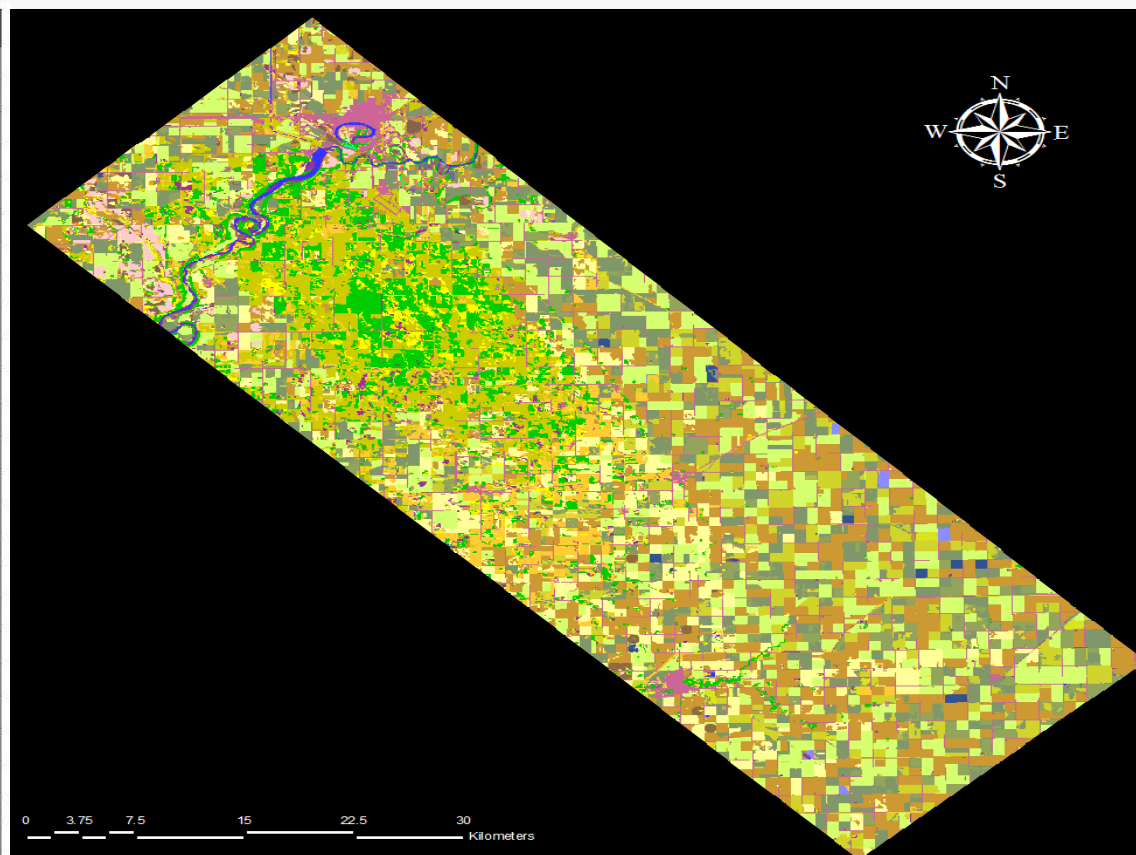
Current Status – Research Activities

Crop Mapping and Area Estimation

- All sites reporting include crop mapping as an objective

2012 Crop Map, Canada-Red River Site

| Color | Values | Description |
|--------------|--------|------------------|
| Black | 0 | Unclassified |
| Blue | 20 | Water |
| Brown | 30 | Barren |
| Pink | 34 | Urban |
| Yellow | 50 | Shrubland |
| Purple | 80 | Wetland |
| Light Green | 110 | Grassland |
| Orange | 122 | Forage Crops |
| Light Orange | 131 | Fallow |
| Yellow-Green | 133 | Barley |
| Light Green | 136 | Oats |
| Light Green | 137 | Rye |
| Light Green | 139 | Triticale |
| Dark Green | 146 | Wheat |
| Light Yellow | 147 | Corn |
| Light Green | 153 | Canola/Rapeseed |
| Blue | 154 | Flaxseed |
| Dark Blue | 157 | Sunflowers |
| Light Brown | 158 | Soybeans |
| Dark Brown | 162 | Peas |
| Pink | 177 | Potatoes |
| Dark Purple | 179 | Other Vegetables |
| Dark Orange | 181 | Berries |
| Light Green | 194 | Nursery |
| Dark Green | 220 | Broadleaf |

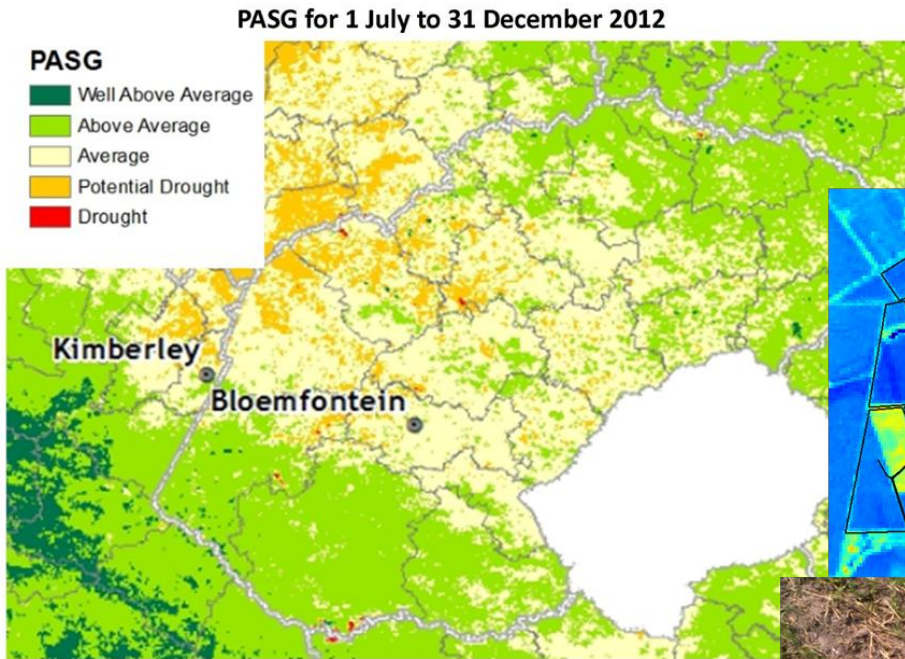


Current Status – Research Activities

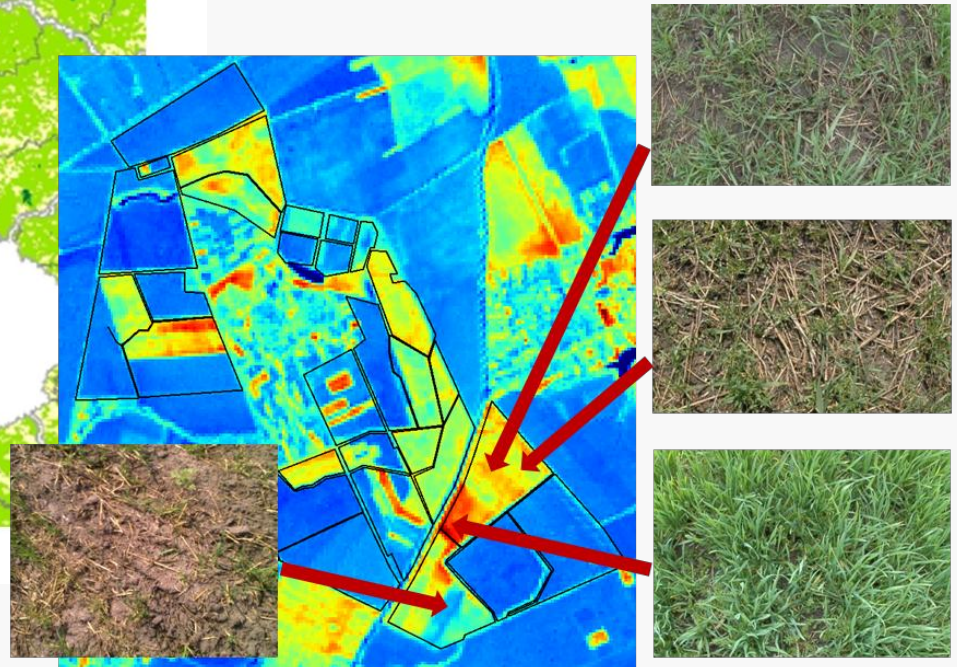
Crop Condition – crop Growth Parameters

- 6/8 Sites reporting include crop condition objectives

2012 PASG Map, South Africa Site



2012 Ukraine Site

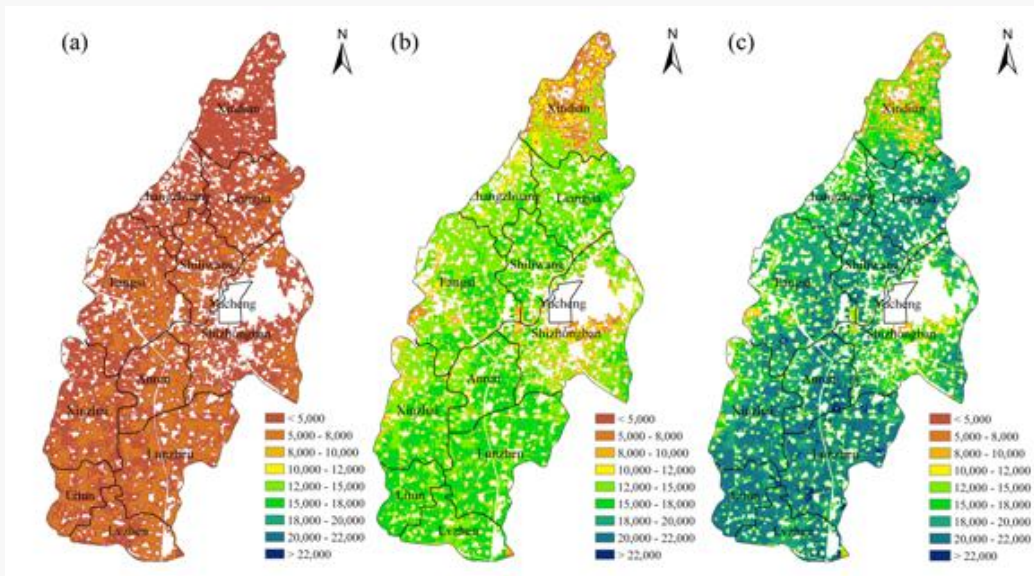


Current Status – Research Activities

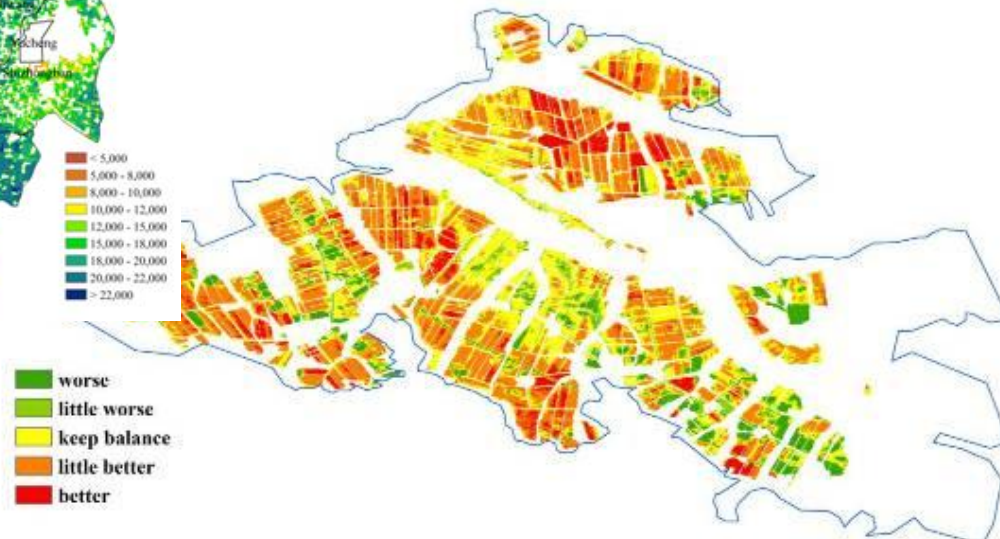
Crop Yield Forecasting

- 6/8 Sites reporting include yield research

2012 Crop Biomass, China Shandong Site



July 2012 Crop Status, China Heilongjiang

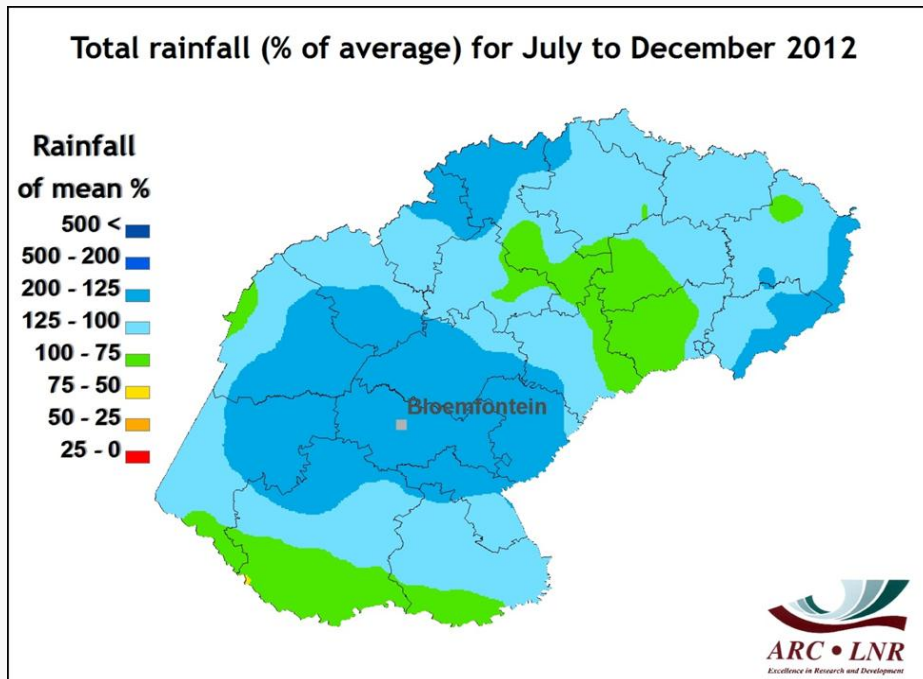


Current Status – Research Activities

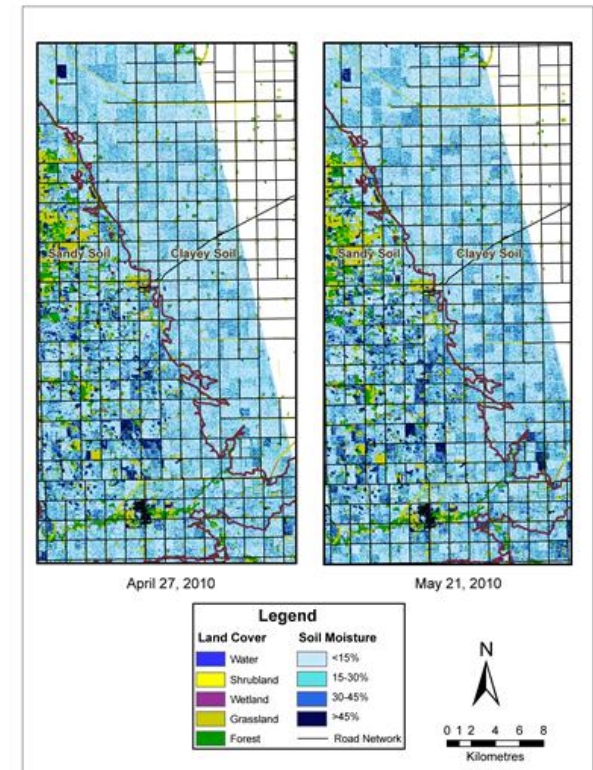
Soil Moisture Monitoring

- 4/8 Sites reporting include soil moisture monitoring research

December 2012 Rainfall Map, South Africa Site



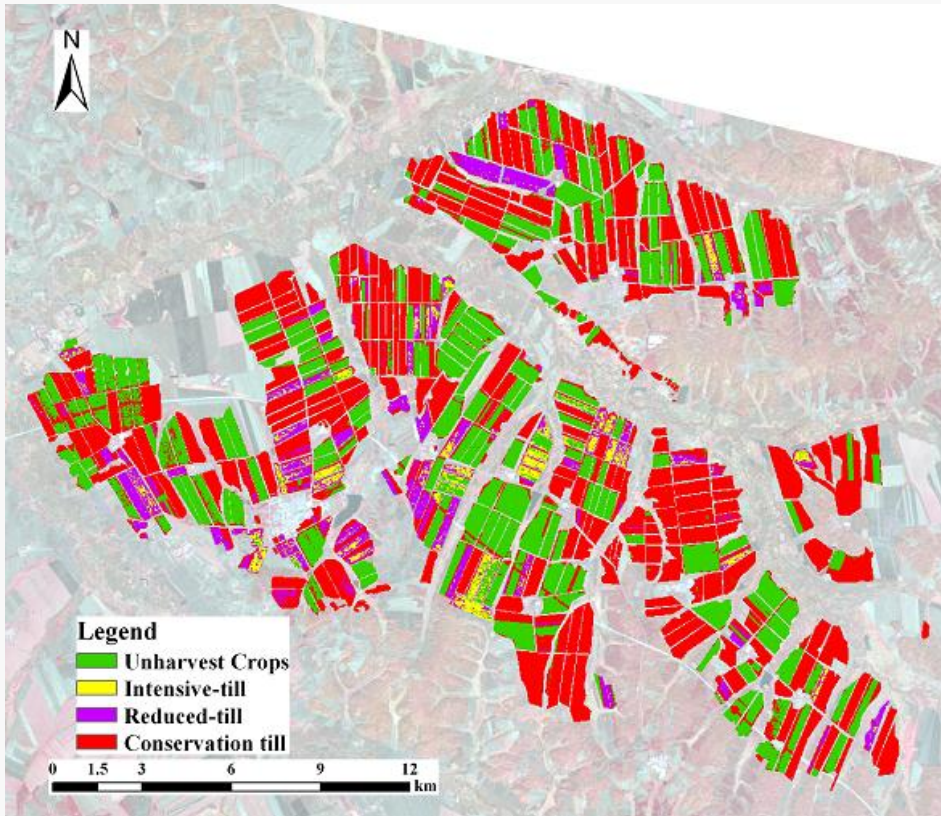
Radarsat 2, Soil Moisture, Canada South Nation Site



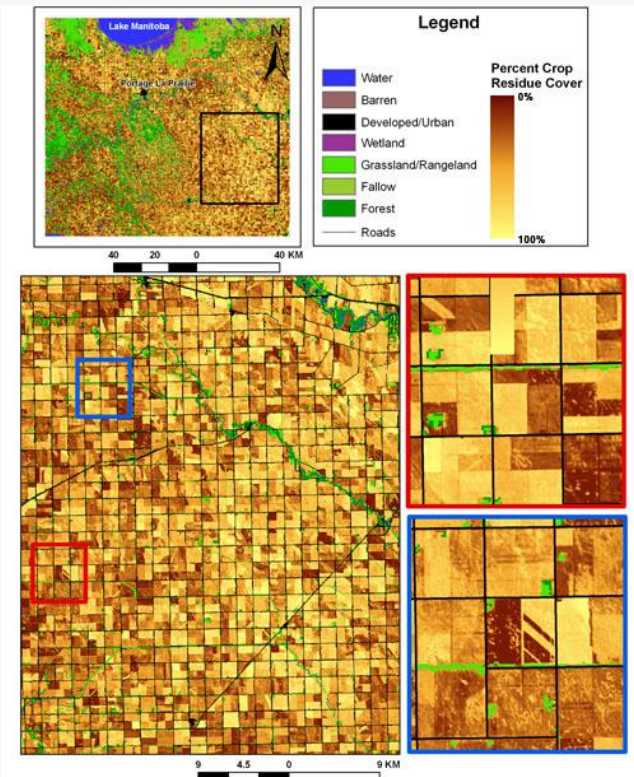
Current Status – Research Activities Residue and Tillage Mapping

- 4/8 Sites reporting include residue and tillage monitoring research

Tillage Mapping, China, Heilongjiang Site



Crop Residue, Canada Red River Site



Current Status – JECAM Collaboration

- There is already significant bi-lateral collaboration between site planned and underway.
- Use of the site network to support research external to JECAM is now taking place:
 - ESA Sentinel 2 Simulation over JECAM sites
 - IMAGINES project
 - NASA-Canada SMAP Validation Experiment (SMAPVEX)
 - UMD-Validation of LAI and FAPAR derived from coarse spatial resolution data
 - EC FP7 Proposals

Current Status – JECAM Collaboration

NASA/Canada SMAP Validation Experiment (SMAPVEX)

- SMAP will provide global soil moisture data using active radar and passive microwave sensors
- AAFC was asked by NASA and U.S. Department of Agriculture to lead an international SMAP validation experiment using the Red River JECAM site
- SMAPVEX will help NASA validate their models for soil moisture retrieval and will be used to adapt AAFC models to use SMAP data
- Involved 75 scientists
 - Canada: AAFC, EC, Manitoba provincial agriculture ministry (MAFRI) and 3 universities
 - U.S.: NASA, Jet Propulsion Lab, USDA and 10 universities
- Campaign lasted 6 weeks and resulted in 45,000 soil moisture measurements; NASA flew 2 aircraft 17 times

Current Status – JECAM Collaboration

ESA Sentinel 2 Simulation over JECAM sites

- 6 JECAM sites were asked to participate
- 5 are able to support the mission with ground data
- ESA will acquire Spot4 and RapidEye over the sites from February through May
- SPOT 4 orbit was lowered 3km to mimic the Sentinel 2 Constellation 5 day repeat cycle
- Simulated multi-temporal datasets will be made available in June

European Commission FP7 and JECAM

- Evaluation of proposals are underway
- Linkage to and expansion of JECAM sites has been identified by proposals
- Anticipate JECAM site network will make a significant contribution to GEOGLAM through the FP7 project once selected and implemented

Current Status – New Site Proposals

- Several sites have come forward recently, the following have documented sites already:
 - **Tunisia** (CISBO): cereals / forage / broad beans in winter, vegetables in summer
- The following documented tropical sites link in with CIRAD mission, and include:
 - **Madagascar** (Antsirabé) : Mid-altitude mixed rice cropping system; irrigated on terraces or basins, and rainfed on the hills. - Partnership FOFIFA
 - **Tanzania** (Rungwe) : Highland agro-forestry system based on coffee, banana and corn - Partnership State university of Sao Paulo (UNESP)
 - **Brazil** (Sao Paulo) : Mainly eucalyptus tree plantations (typical field size of 50 ha), and sugar cane, pastures, citrus orchards - partnership ICRAF

Summary

- The data acquisition planning with CEOS, Space Agencies and Commercial providers went fairly well and several JECAM sites are receiving data
- Lessons learned with CEOS-JECAM data acquisition process:
 - We have instituted an annual report process to obtain information on JECAM research progress, EO data usage and collaboration activities. The final report will be delivered to CEOS at the SIT meeting in March.
 - New website launched last year. Content from the annual reports will be used to keep the site “fresh” (JECAM.ORG)

Current Priorities

- JECAM focus has shifted to enhanced collaboration between sites
 - Be responsive to GEOGLAM “R&D towards monitoring enhancements” needs to define JECAM community activities
 - Use the JECAM network to test/contrast/compare national monitoring approaches
 - Development of regional studies to define best practices for harmonized national to regional monitoring
 - Development of comparative studies to develop standards and practices that inform GEOGLAM “system of systems” for agricultural monitoring
 - Use JECAM sites to validate new sensors

Discussion



DATA REQUESTS OF JECAM SITES: ARGENTINA AND PARAGUAY

| | Argentina | Paraguay |
|---------------|-----------|----------|
| Landsat-5 & 7 | X | |
| AWIFS | X | |
| LISS-3 | | X |
| LISS-4 | | |
| UK DMC-2 | X | X |
| RapidEye | | |
| Quickbird | X | |
| Worldview- 2 | X | X |
| RADARSAT-2 | X | X |
| TerraSAR-X | X | X |
| Envisat ASAR | X | |
| | | |



DATA REQUESTS OF JECAM SITES: CANADIAN RED RIVER AND SOUTH NATION WATERSHEDS

| | Red River | South Nation |
|-----------------|-----------|--------------|
| Landsat-5 & 7 | X | X |
| AWIFS | X | |
| LISS-3 | X | X |
| LISS-4 | | X |
| UK DMC-2 | X | X |
| RapidEye | X | X |
| Quickbird | X | X |
| Worldview-1 & 2 | X | X |
| RADARSAT-2 | X | X |
| TerraSAR-X | X | X |
| | | |