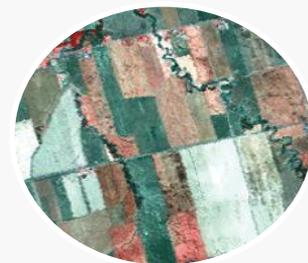
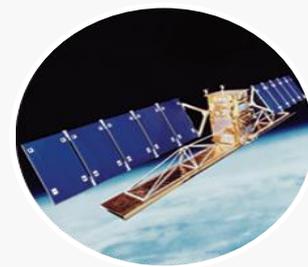


## JECAM - Joint Experiment for Crop Assessment and Monitoring

Ian Jarvis and Pierre Defourny  
*Co-lead of JECAM*

Science and Technology Branch, Agriculture and Agri-Food Canada

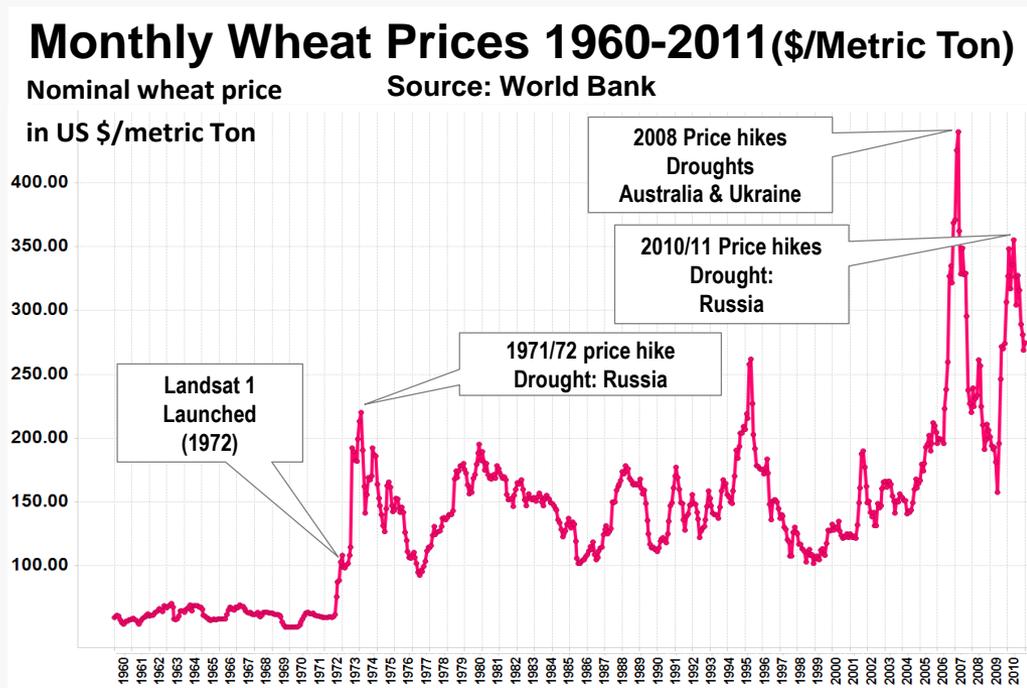


## JECAM Origins

The GEO Agricultural Community of Practice established JECAM in 2009 to enhance international collaboration around agricultural monitoring towards a better use satellite remote sensing in operational systems

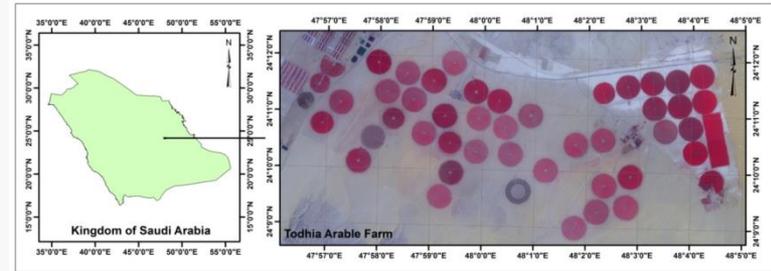
### JECAM achieves this by:

- Network of research sites distributed across the world
- Share standards, time series from EO satellites and in-situ data
- Supporting methods inter-comparison of mapping, monitoring and modeling



## JECAM Principles

- **Collect and share** time-series datasets from a variety of Earth observing satellites and in-situ crop and meteorological measurements for each site.
- 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**.
- **Catalyze R&D activities across JECAM sites** to move from scientific state of the art to operational monitoring (incl. with AgMIP)



## Global network of over 30 voluntary JECAM sites

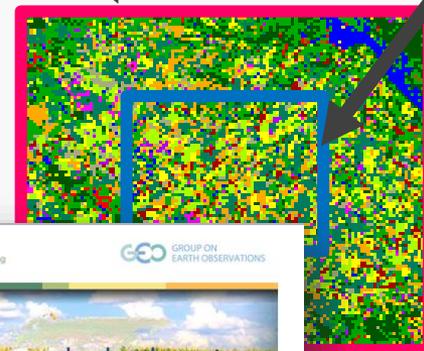


## JECAM – Standards and requirements

- Minimum Requirements:
  - JECAM has minimum standards for both satellite and in-situ data.
  - Satellite data requires a combination of optical, and Synthetic Aperture Radar (SAR) over JECAM sites
  - Next week we will be exploring new standards development at the JECAM annual meeting in Belgium (LAI)

Area of 25 x 25 km  
representative of the  
cropping system

10 x 10 km  
for most intensive  
field measurements



*This document is the first version of the JECAM Guidelines for field data collection. It has been prepared based on 24 JECAM site reports for 2013, and the discussions from several working sessions in the framework of different international on-going efforts, including the ESA Sen2Agri and FP7-SIGMA projects which supports this work.*

I. Objective

II. Cropland and crop types definition

- A. Annual cropland
- B. Annual cropland class from remote sensing perspective (legend definition)
- C. Crop types and land cover classes (legend definition)

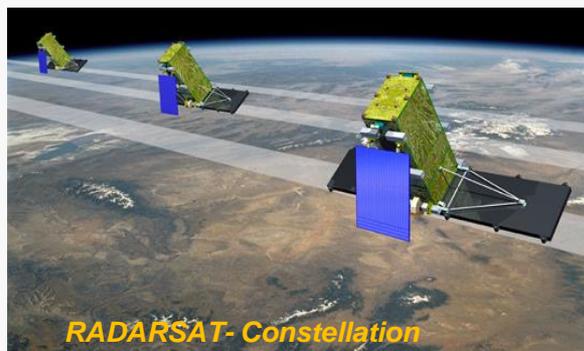
III. Field data collection for cropland and crop type

- A. Objective
- B. Field observation for validation data set
- C. Complementary data collection for cropland information



Great CEOS  
Support providing  
coordinated EO  
Data access for  
JECAM sites

JECAM Site	COSMO SkyMed	RADARSAT-2	TerraSAR-X	AWIFS	DMCII	ASTER	HJ-1	Landsat	MODIS	Quickbird	Rapideye	SPOT-4/5/6	Worldview-2	Pléiades	Formosat-2	Deimos	Chris
Argentina	1	18 <sup>1</sup>	7	6	7						24	17					
Belgium		11						x			28	14					
Brazil – Sao Paulo								4	220				3				
Brazil – Tapajos								x <sup>2</sup>			48			3		10	
Burkina Faso								11						7			
Canada CFIA – Ottawa								8				7					1
Canada/Red River		x						x			x						
Canada/South Nation			8					x			15						
China/Guangdong (Taishan)	12	6									4						
China/Heilongjiang	4	5	5				27		21		5	x					
China/Jiangsu <sup>3</sup>																	
China/Shandong	4	4	1		x		21		46		5	18					
France								7				15		3	16	8	
Italy Apulian Tavoliere									x								
Madagascar												25		9			
Morocco												36					
Russia								x	x								
Saudi Arabia						x		x		4							
South Africa								7	20		11	135					
Taiwan									x			x			x		
Tunisia	15		2			2		21				25					
Ukraine		14						6	x		29	17					
Uruguay								x									
U.S.A.				4													



**RADARSAT- Constellation**

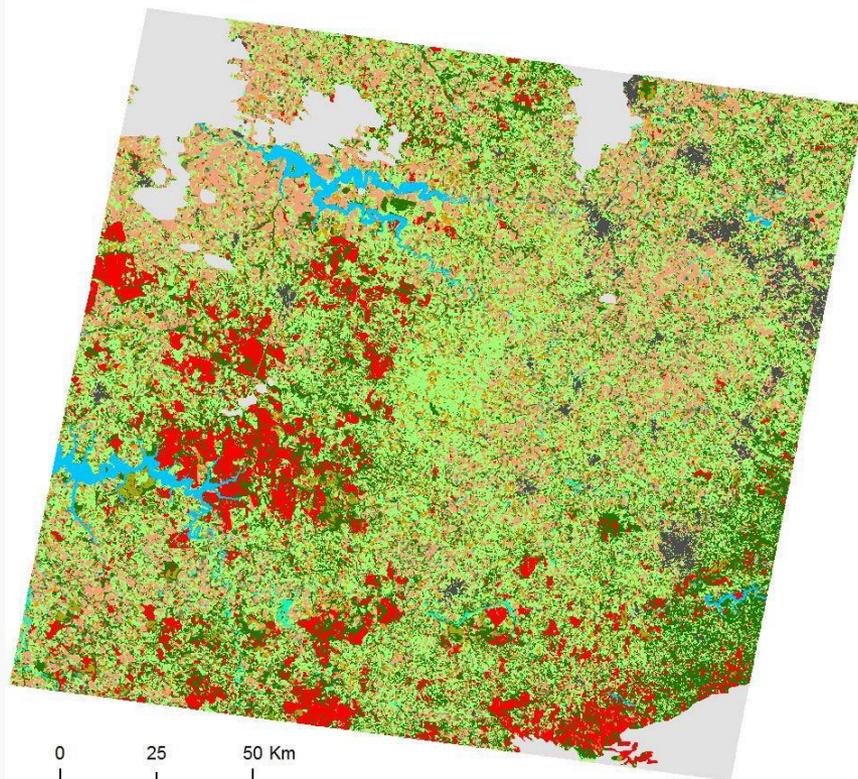
## JECAM Request to CEOS Agencies

- JECAM has received a significant number of datasets from CEOS Agencies
- Improved access and coverage + early access to new mission datasets are needed to address the highlighted areas.

Measurement Resolution Measurement Type	Current Missions Future Missions	Crop Mask	Crop Type	Crop Condition	Rainfall and Soil Moisture	Spatial Resolution	Sample Type	Frequency	Calendar
Coarse Optical	Aqua/Terra (MODIS) NPP (VIIRS) Proba-V (VGT-P) Sentinel-3A (OLCI & LSTR)	X	X	X		100-2000m	Cropland Extent	Daily	Annual
Moderate Optical	Landsat 7/8 (ETM+/OLI/TIRS) ResourceSat-2 (AWiFS) Sentinel-2A (MSI)	X	X	X		20-70m	Cropland Extent and Sample	Weekly to Monthly	Growing Season and Annual
Fine Optical	RapidEye SPOT-5/6 SPOT-7	X	X	X		5-10m	Refined Sample	Weekly to Monthly	Growing Season
Very Fine Optical	Pleiades SPOT-6 Worldview-2 SPOT-7		X			<5m	Refined Sample	One per Season	Growing Season
Moderate SAR	Radarsat-2 (C) RCM (C) COSMO-SkyMed (X) TerraSAR-X (X) Sentinel-1A (C) RISAT-1 (C) ALOS-2 (L)	X	X	X		10-100m	Sample	Weekly to Monthly	Growing Season and Annual
Moderate Radar and Microwave	TRMM (PR/TMI) Aqua (AMSR-E) COM-W1/W2 (AMSR-2) SMOS (MIRAS) GPM (DPR/GMI) SMAP (L-Band)			X	X	10-50km	Cropland Extent	Daily	Annual

From the 2014 JECAM document  
*JECAM Guidelines: Definition of the Minimum Earth Observation Dataset Requirements*

## Example of Research Activities from Annual Report



- Other crop
- Sugarcane
- Natural forest
- Clouds
- Citrus orchard
- Pasture
- Eucalyptus plantation
- Hevea plantation
- Pinus plantation
- Coffee plantation
- Bare ground
- Water
- Urban area
- Flooded area
- Not classified

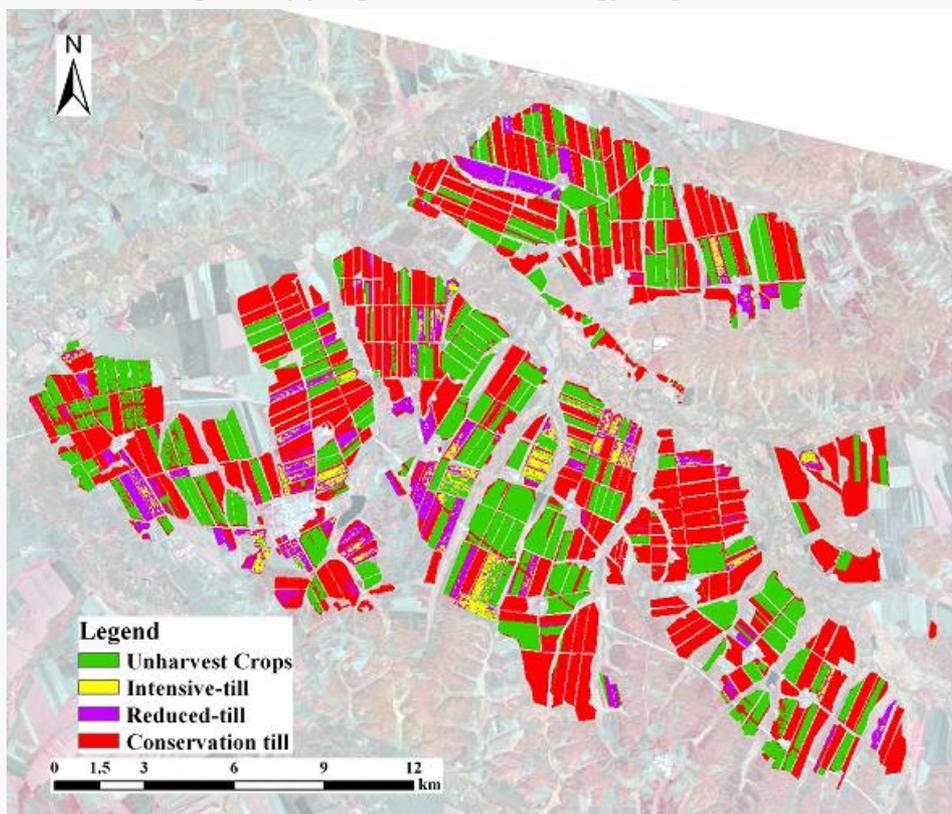
Land cover map; Brazil; Sao Paulo site 2011. Based on data from Worldview, MODIS and Landsat-5



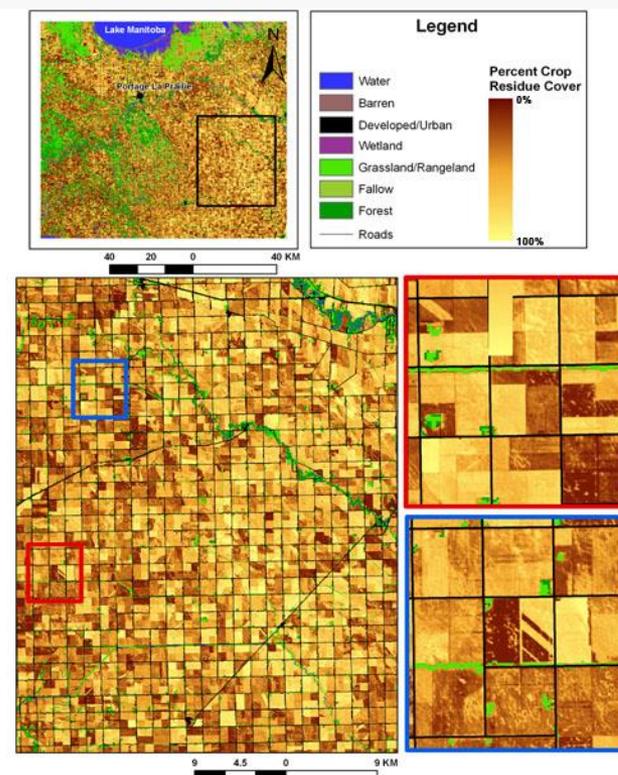
## Example of Research Activities Residue and Tillage Mapping

- About half of the sites reporting include residue and tillage monitoring research

Tillage Mapping, China, Heilongjiang Site



Crop Residue, Canada Red River Site



## What's next...

### **Working group for a cross-site SAR experiment**

- Coordinated by Pierre Defourny (UCL) and Heather McNairn (AAFC)
  - 7 Sites
  - Datasets: Radarsat-2 with a multi-user agreement to foster sharing within JECAM, and other optical datasets + shared in situ data
- **NASA and AAFC to develop a JECAM Data Service Prototype**
    - Dedicated cloud-based storage and SAR processing capabilities
    - Secure access and data sharing within guidelines of license agreements
    - Pilot project will start soon

## The Way Forward - Strategic Issues

### 1. Enhancing Technology Transfer

#### Challenge:

Ensuring research is transferred, implemented and made relevant to our collective GEOGLAM outcomes.

### 2. Inter-comparison Projects and Strategic Partnerships

#### Challenge:

Need to leverage our multi-site research platform efforts to strengthen and focus R&D delivery towards operations.

## The Way Forward - Strategic Issues

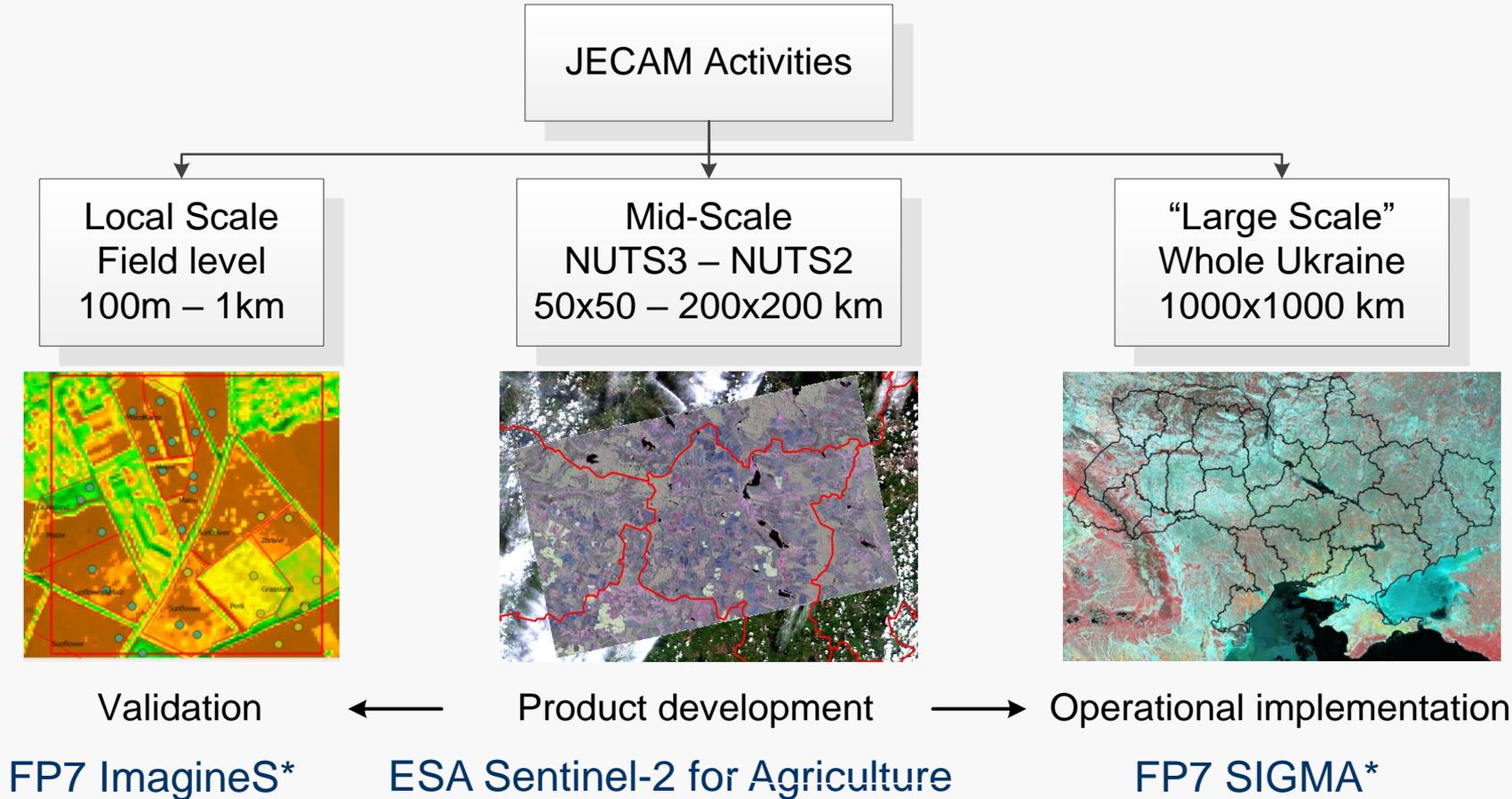
### 3. Enhanced R&D Networks for Countries-at-Risk

#### Challenge:

Monitoring in food insecure nations is much different than major exporters: Small and complex fields; limited in-situ data networks, technical capacity, infrastructure, and institutional support.

Current R&D footprint of & coordination effort within GEOGLAM is insufficient to address this challenge.

## Multi-scale approach – JECAM site in Ukraine



\* Collaborative projects with the EU under the Seventh Framework Programme for Research (FP7).

# *Thank You !*

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**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