



# Canadian Space Agency

JECAM/GEOGLAM Science Meeting

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**JECAM**

Joint Experiment for Crop Assessment and Monitoring



GROUP ON  
EARTH OBSERVATIONS

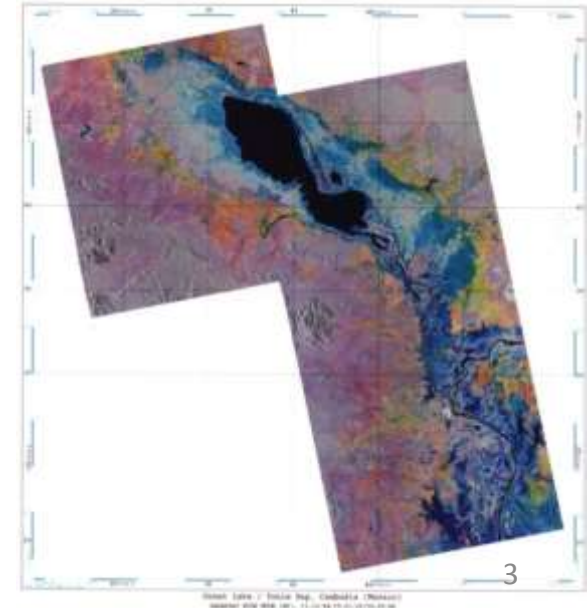
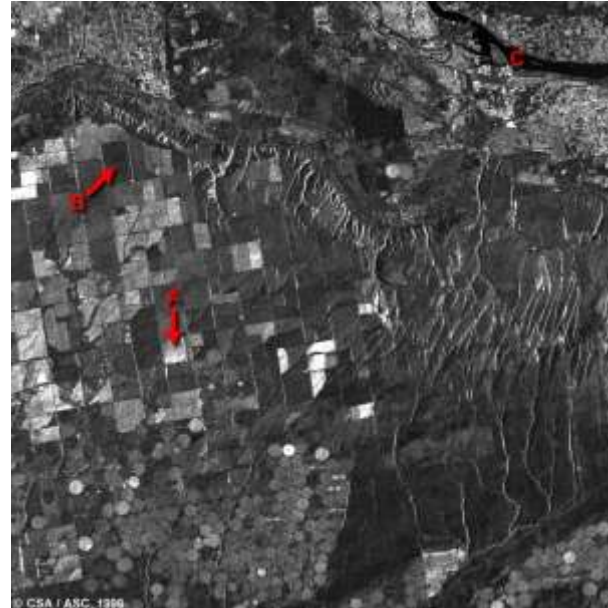
# Summary of Mission Capacity to Meet JECAM/GEOGLAM Needs

- **Name of Agency/Data Provider:**
  - Canadian Space Agency/MDA
- **Data Provider Role/Interest in Agricultural Monitoring and Research Programs:**
  - Moving Science into Operations
  - Support the implementation of an EO-based National Monitoring Framework for land surface stakeholders
  - Ensure the contribution of SAR instruments is well understood
- **Current Mission Portfolio for Crop Monitoring:**
  - RADARSAT 1 and 2, third party EO missions over Canada and eventually RADARSAT Constellation Mission (RCM)

# RADARSAT-1

<http://www.asc-csa.gc.ca/eng/satellites/radarsat1/default.asp>

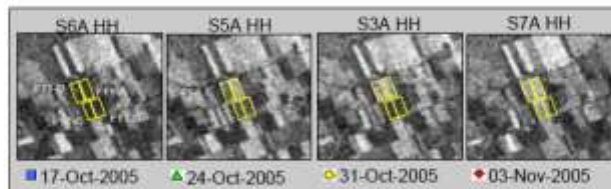
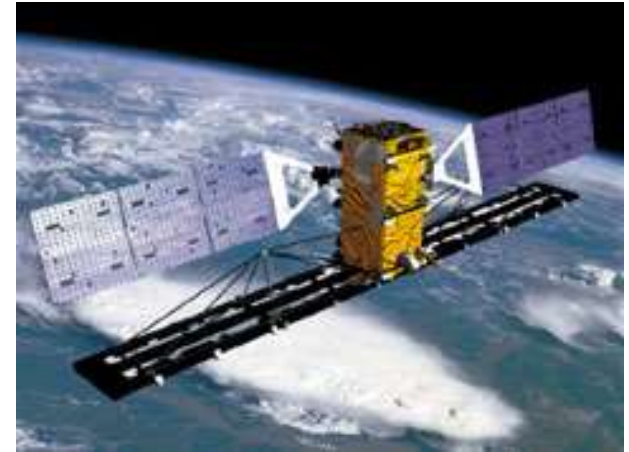
- C-Band SAR sensor (single pol. capability – H)
- Launched 1995; Operational since early 1996; Decommissioned in March 2013
- Demonstrated potential for routine observation (supporting science and operational activities)
- 17+ years of archive collected over the globe



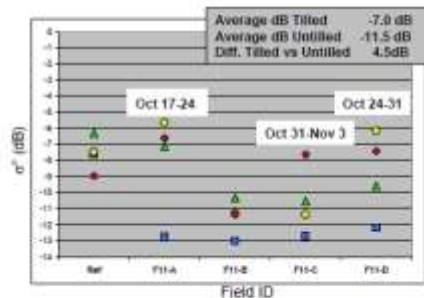
# RADARSAT-2

[http://www.asc-csa.gc.ca/eng/satellites/radarsat2/inf\\_data.asp](http://www.asc-csa.gc.ca/eng/satellites/radarsat2/inf_data.asp)

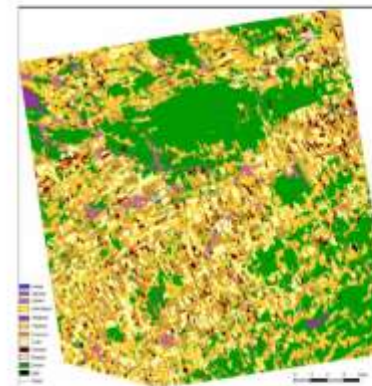
- Advanced SAR instrument – Multi-pol and fully polarimetric, high-resolution, + R-1 heritage modes
- Owned and operated by MDA
- GoC data allocation available for Science activities



Identifying the timing of tillage events is important in assessing best management practices and in erosion and carbon modeling.



## Crop Classification Using Integrated Optical and SAR Data



Agriculture and Agri-Food Canada is developing a method to deliver an annual inventory of crops using a multi-sensor solution.

This classified map was derived using multi-temporal optical (Landsat and SPOT) and SAR (RADARSAT-1 and Envisat ASAR) acquired throughout the 2005 growing season. A decision-tree classifier was used.

Once available, the method will be migrated to use RADARSAT-2 dual-polarization data.

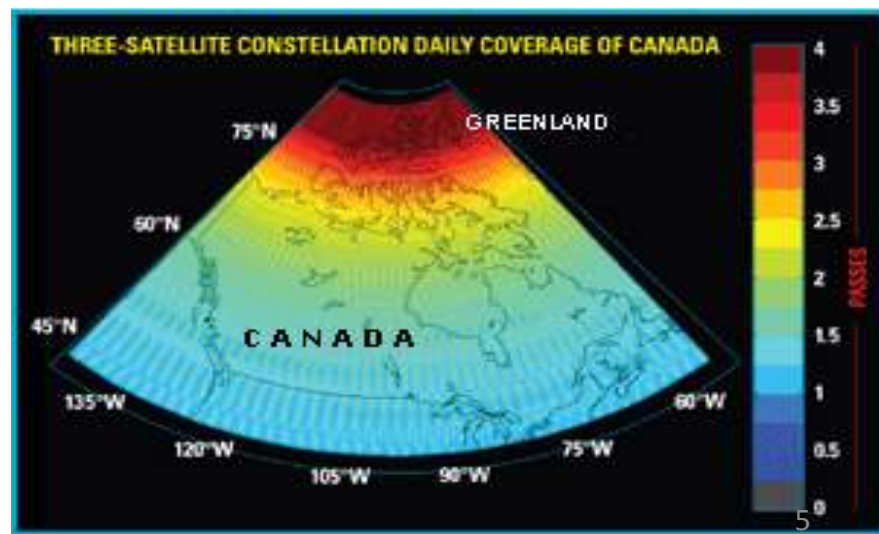
### Classification Accuracies

Cereals	76.4%
Com	86.3%
Pasture	92.9%
Potato	87.7%
Soybean	92.3%
Overall	88.5%
Kappa	0.84

# RADARSAT Constellation Mission

<http://www.asc-csa.gc.ca/eng/satellites/radarsat/default.asp>

- Evolution of the RADARSAT Program → 3 satellites – 600 km orbit, 32 minutes separation
- 15 min/orbit imaging (avg) x 3 satellites
- Average daily global access; 4-day exact repeat
- Focus on Marine Surveillance, Disaster Management and Ecosystem Monitoring (*including Agriculture*)

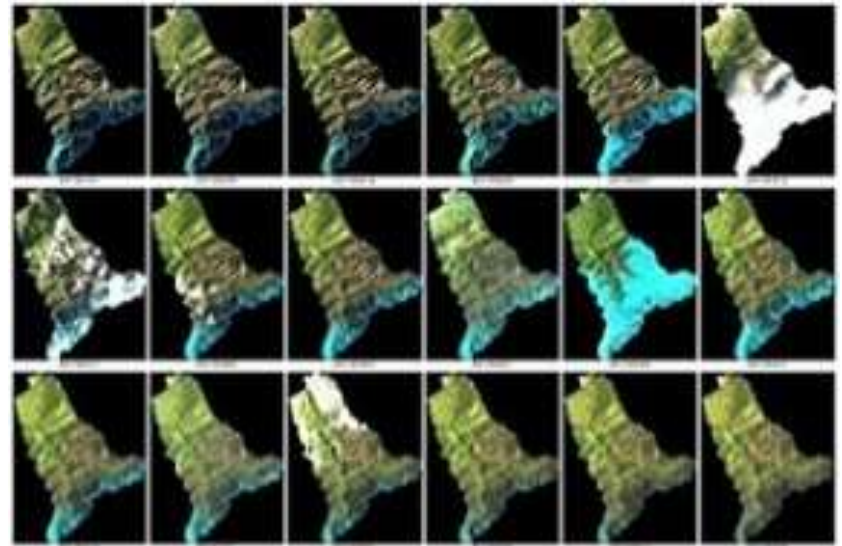


# ESA EO Missions

- Through the Participation Agreement between the CSA and the ESA, Canada is negotiating direct access to ESA Sentinel missions
- Sentinel-1, Sentinel-2, and Sentinel-3



Simulated multi-date Sentinel-1 image



Working with simulated Sentinel-2, SPOT4 and RapidEye Take 5 data

# CSA Contribution

## SOAR-JECAM

- Science and Operational Applications Research (SOAR)
- SOAR is a joint partnership program between MacDonald Dettwiler and Associates Ltd. - Geospatial Services Inc. (MDA GSI) and the Canadian Government through the Canadian Space Agency (CSA) and the Natural Resources Canada Centre for Remote Sensing (CCRS).
- The program provides access to RADARSAT-2 data for research and testing purposes.
- The SOAR program provides an opportunity to explore the enhanced capabilities of RADARSAT-2 and their potential contributions to various applications.

# Data Sharing in the Context of the JECAM/GEOGLAM Request

- Data policy in context of **JECAM/GEOGLAM**
  - Can data be shared among the sites and/or broader GEO community?
- Can previously acquired data over these sites be made available?
- Can a catalog of previous acquisitions over JECAM/GEOGLAM sites be made available?
- For RADARSAT-1, the answer to all these questions is “Yes”, in the context of Science activities.
- For RADARSAT-2, as the SOAR JECAM program is set-up now the answers are “No” ...BUT
  - Specific requests can be accommodated following a request and certification process (still limited sharing and distribution)



# Data Request and Distribution Process

- Process for planning data over JECAM sites
  - What is the method for ordering data (R-2) over JECAM sites?
    - Submission of a SOAR-JECAM proposal  
<http://www.asc-csa.gc.ca/eng/ao/2011-soar-jecam.asp>
    - Compliance with the End User License Agreement (EULA), signing of a data Loan Agreement, and agreement to publish and present results
- Process for sites (PIs) to access data
  - How is the data accessed/provided?
    - Approved SOAR-JECAM investigators will receive instructions from the CSA to access data products via a secure website and/or ftp location

# Meeting the JECAM Data Requirements

- Capability to meet the specific JECAM data request
  - Capabilities
    - No system restriction according to the current data requirements
    - Possible programmatic restrictions (e.g. beam mode type, # of scenes, data format, etc.)
  - Possible data gaps
    - JECAM requests/acquisitions are a component of the Background Mission (Science; lower priority) → possible conflicts with operational and/or commercial orders

# Research Opportunities

- Are there research funding opportunities that JECAM/GEOGLAM sites can apply for?
  - Yes, for Canadian Science teams
  - No direct funding (\$'s) to International researchers
- (if so) Description of funding opportunity:
  - Earth Observations Applications Development Program (EOADP) → Industry
  - Government Related Initiatives Program (GRIP) → Government
  - Grants and Contributions (G&C) program → Industry & Academia
  - Each of above programs requires a Canadian lead