

IPY  
2007  
2008

## **Space Task Group of the IPY Sub-Committee on Observations**

### **AN ACQUISITION STRATEGY FOR SAR AND INSAR**

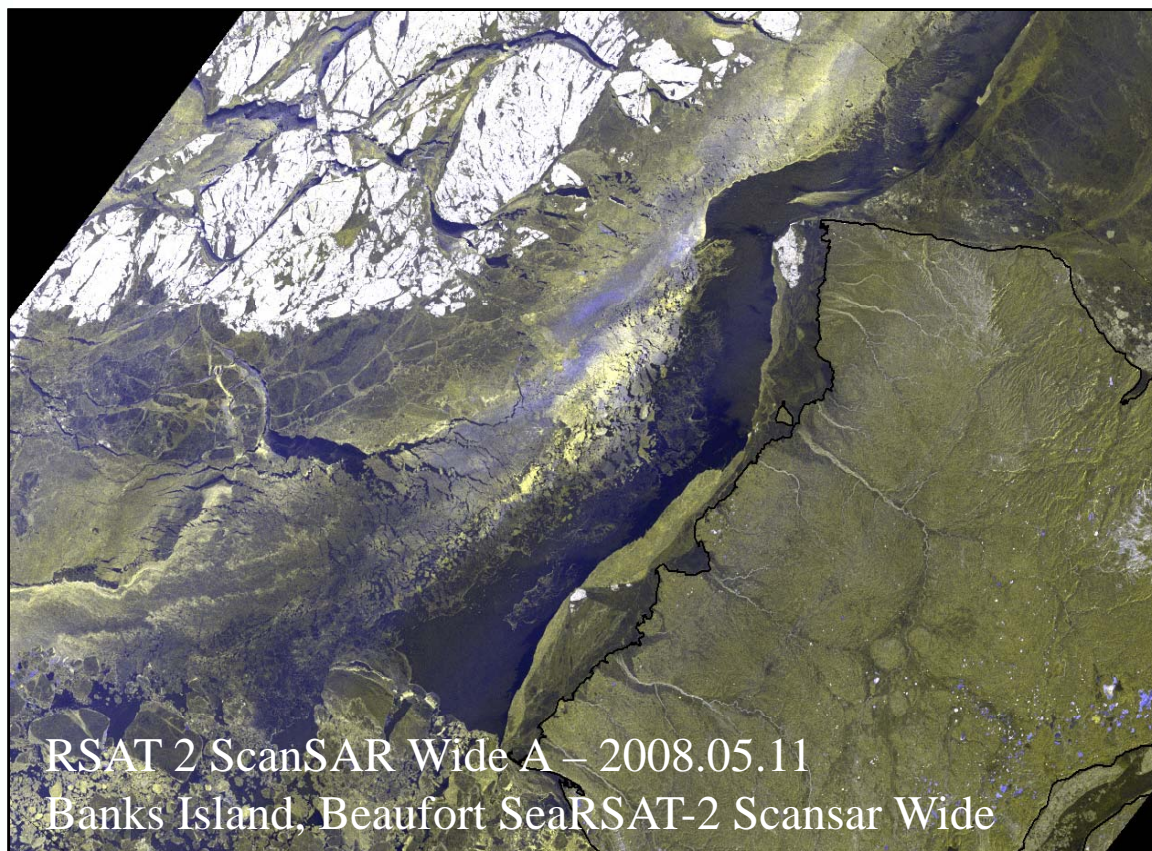
### **COORDINATED RESPONSE OF THE SPACE AGENCIES TO IPY SCIENCE OBJECTIVES**

**Yves Crevier**  
**Canadian Space Agency**

**Second SAR**  
**Coordination Meeting**

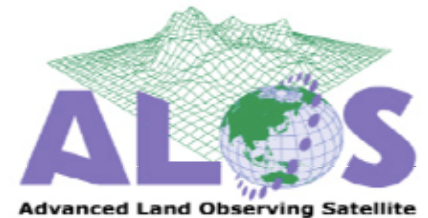
**DLR**  
**Sept 30 – Oct 1, 2008**

**WMO**  
**OMM**

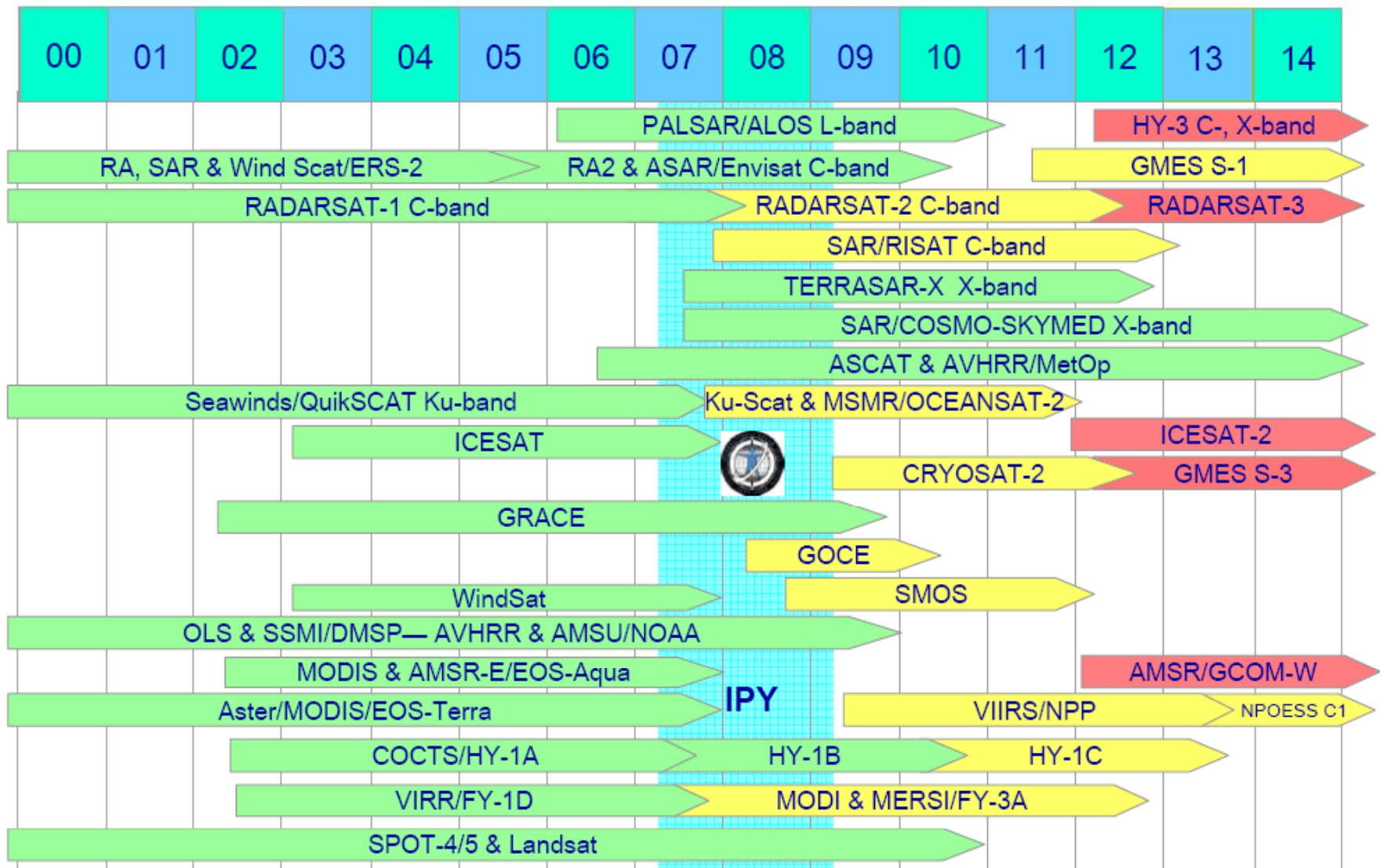


# Contributors

- SAR Space Agencies
  - Agenzia Spaziale Italiana – Fabrizio Battazza
  - Canadian Space Agency – Yves Crevier, Robert Saint-Jean
  - DLR, German Aerospace Center – Manfred Gottwald, Dana Floricioiu, et al.
  - European Space Agency – Henri Laur
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  - NASA – Craig Dobson
- STG members and collaborators
  - Mark Drinkwater
  - Ken Jezek, Katy Farness
- Private sector and International organisations
  - MDA, ASF, KSAT, GIIPSY, WMO JC, Universities, etc.



# Cryosphere Satellite Missions



In orbit



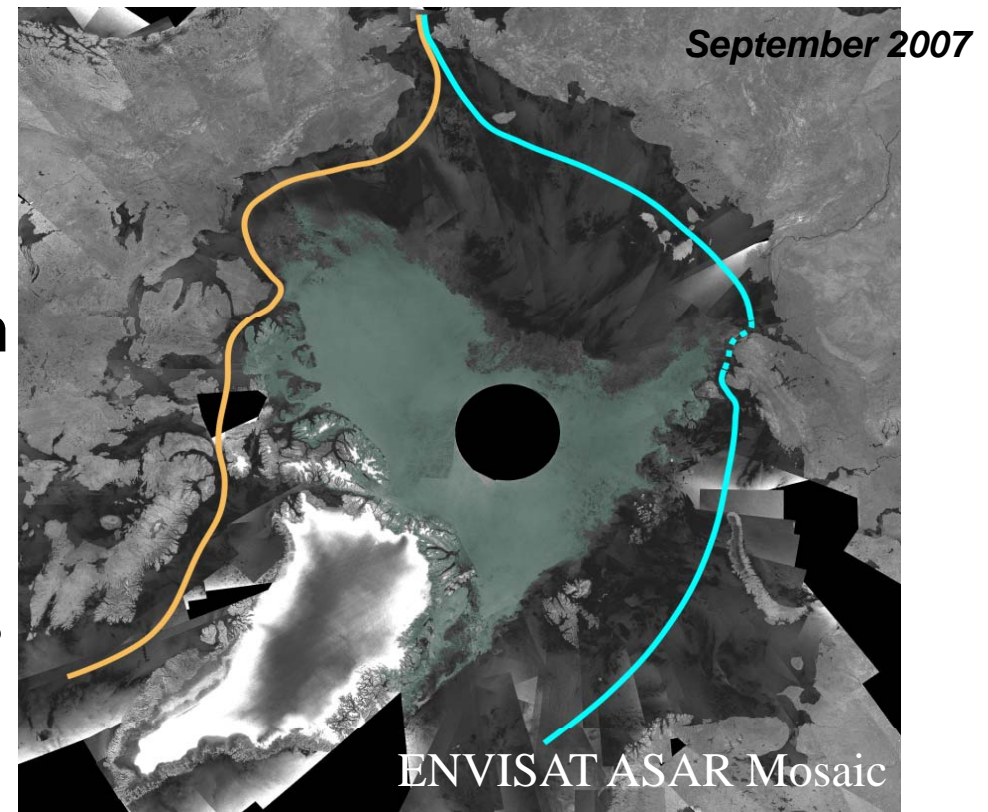
Approved



Planned/Pending approval

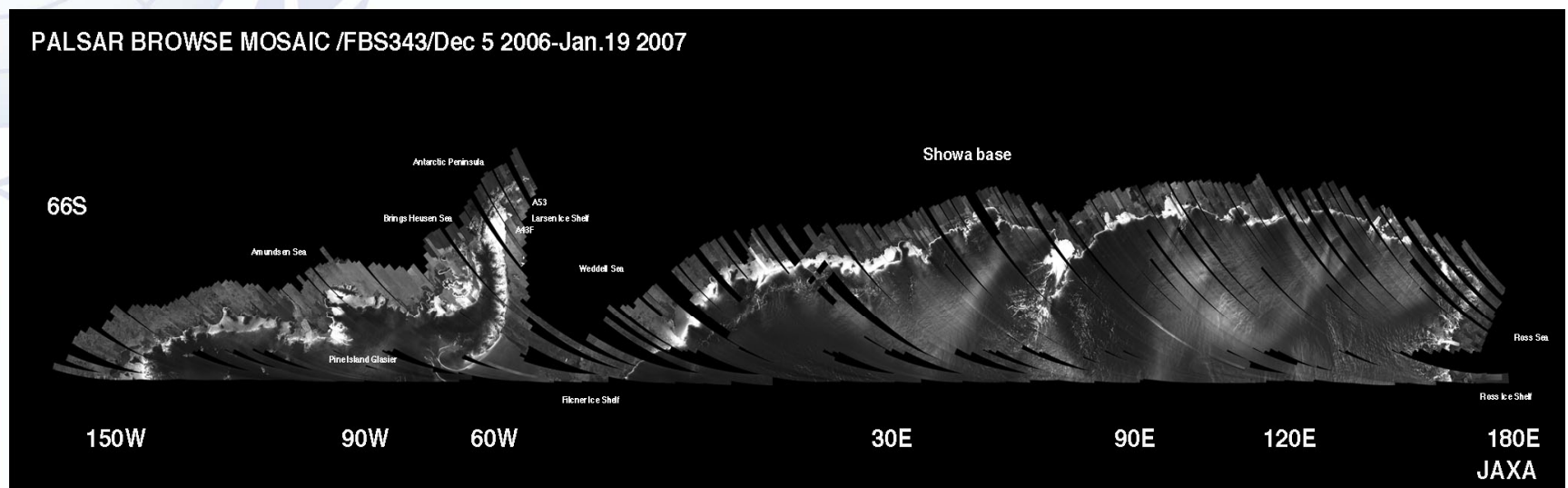


- **In response to an action:**
  - **STG2 – A9 - Action on CSA** - to set up an inter-agency meeting of SAR mission managers to optimise SAR coverage - in order to address top level scientific objectives/requirements stated in the GIIPSY User requirements document.
- **Objectives:**
  - Develop an acquisition strategy for SAR and InSAR data that achieves the maximum number of IPY science objectives
  - Distribute the acquisition load across the different agencies



# Path Towards SAR Coordination

- Assessment of SAR system capacity vs IPY science objectives – meeting 1
- SAR acquisition plan consolidation exercise – meeting 2
- SAR processing strategy and data dissemination - sustainability



# Assessment of SAR system capacity vs IPY science objectives

- Review existing GIIPSY science requirements (the Global Inter-agency IPY Polar Snapshot Year (GIIPSY) Strategy Document)
- Review the Agencies strategic priorities in line with IPY science activities.
- Review current acquisition plans focused on IPY.
- Review the satellite and ground segment operators system capabilities and constraints related to the acquisition of data in support to IPY.
- Agree on priorities

# SAR Coordination Meeting

## March 08

- 13 organisations were represented at this meeting
  - 6 Space Agencies
  - 3 Ground Segment Operators
  - 4 end-user and research organizations
- Presentation material available on the GIIPSY website

# Meeting Outcomes

- Agreement to focus the acquisition strategy on:
  - Solving important science problem (in line with STG objectives)
  - Filling a gap in planned coverage for IPY (build from existing agencies' imaging activities)
  - Involve interagency collaboration (no-single agency can do it all)



# Derived Contribution From SAR

- C-Band coverage (3-day snapshots) for the Arctic Ocean during the remainder of IPY (background missions, operation data acquisitions, etc.).
- Winter Pole to Coast InSAR coverage of the Antarctic in high-resolution mode (3-4 consecutive cycles in ascending and descending).
- Greenland and Major Canadian Icefields of InSAR acquisition over 3-4 consecutive cycles of high-resolution in winter.
- Supersites (where possible using what exists already): determine acquisition parameters (frequency, resolution, etc.) for multi-polarisation and polarimetry data collection.

# User Requirements Guidelines

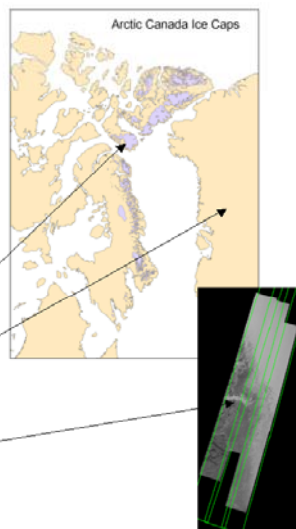
## SAR Requirements for Arctic Land Ice

### Thematic Objective: Sea level rise, and hemispheric climate:

- 1) One summer, one winter SAR snapshot of the Arctic Ice Caps. Near simultaneous imagery at L, C, and X band, polarimetric quad pole for documenting ice surface physical parameters.
- 2) One, winter, multi-frequency InSAR measurement of ice surface velocity.
- 3) Repeated InSAR observations of the most rapidly changing outlet glaciers

### Coverage Requirement

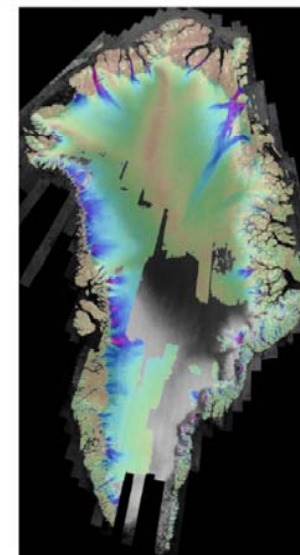
- 1) Canadian Ice Caps InSAR: 4 consecutive cycles in Dec 2008-March 2009 (see map at right)
- 2) Greenland Ice Sheet InSAR: 4 consecutive cycles covering the entire ice sheet in Dec 2008-March 2009
- 3) Jakobshavn Glacier: every cycle for 3 adjacent tracks



## SAR Requirements for Arctic Land Ice

### Sensor Requirements

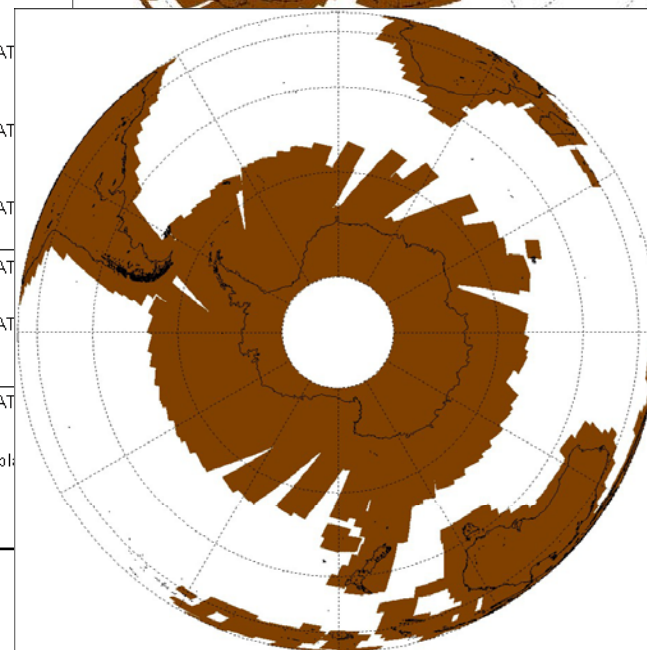
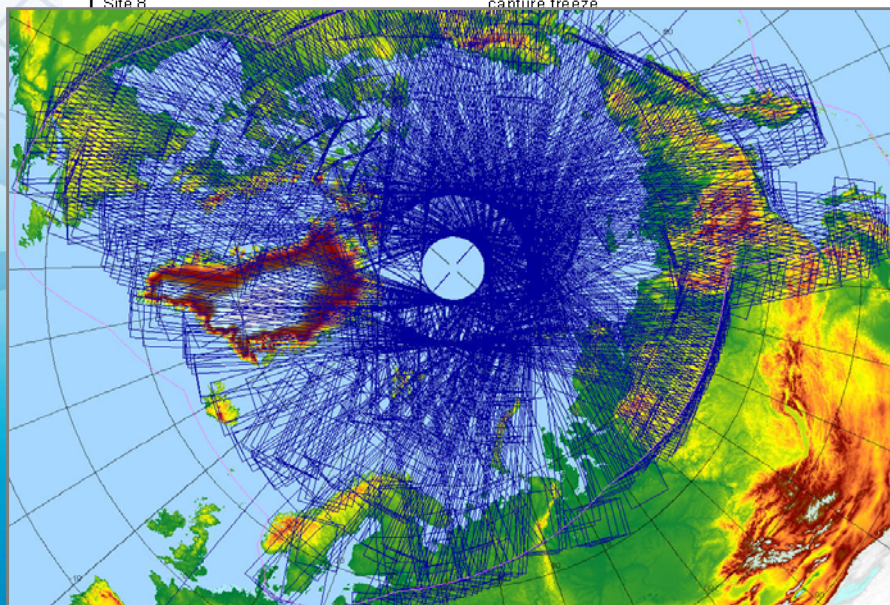
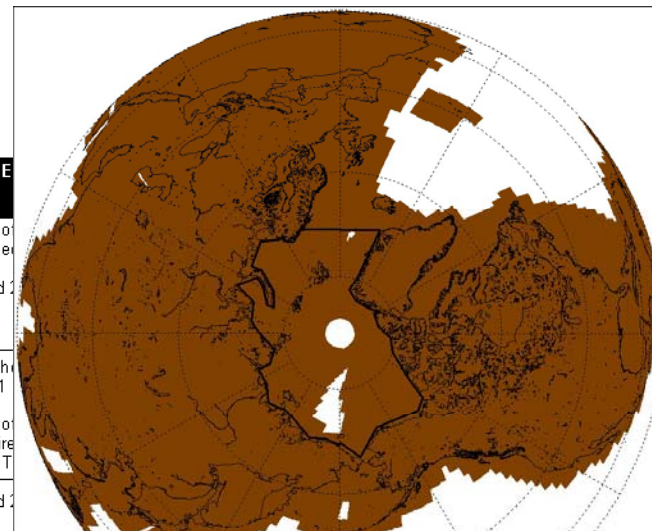
1. InSAR observations: select highest bandwidth radar modes and shortest repeat cycles over fast glaciers (right image). 200 m baseline.
2. One summer and one winter, L, C and X band near simultaneous image mapping with comparable beam modes (25 m, 23°).



# SAR Agency IPY Portfolios

- <http://bprc.osu.edu/rsi/GIIPSY/>

| Name                          | Image Type                  | Geographical coverage  | Mission  | Start date                        | End date                           | Product  | Number of scenes | E   |
|-------------------------------|-----------------------------|--|--|-----------------------------------|------------------------------------|--|------------------|---|
| Frozen Baseline               | Fine Descending orbits only | North of 60 + coastal regions of Hudson and James Bay and Arctic Archipelago | Canadian Interferometric mission                   | Sept 2000                         | Feb 2001                           | Individual image product<br><br>Include only data received as real-time or playback data in Gatineau or Prince Albert. | 3106             | Processing of over site-spe<br>RSAT 1 and 2                                       |
| Sea Ice Min and Max Snapshots | ScanSAR Wide A&B            | Circum-Polar Basin   | Extended Background Mission                        | Sept 2003<br>2004<br>2005<br>2006 | March 2003<br>2004<br>2005<br>2006 | Individual image products only over Canadian waters<br><br>Mosaics of annual min and max ice extent                    | 358              | Continued th<br>with RSAT 1<br><br>Processing o<br>sets – require<br>of ASF and T |
| Arctic Supersites Site 1-7    | ScanSAR Wide A&B            | ArcticNet research sites   | Shoulder seasons to capture freeze and thaw cycles | 1996                              | ...                                | Individual image products  | 2878             | RSAT 1 and 2  |
| Great Slave Site 8            | ScanSAR Wide A&B            | Great Slave Lake   | Shoulder seasons to capture freeze                 | 1996                              | ...                                | Individual image products  | 237              | RSAT  |
|                               |                             |  |  |                                   |                                    | Image products   | 221              | RSAT  |
|                               |                             |  |  |                                   |                                    | Image products   | 117              | RSAT  |
|                               |                             |  |  |                                   |                                    |  | 203              | RSAT  |
|                               |                             |  |  |                                   |                                    | Image products complex   | 389              | RSAT  |
|                               |                             |  |  |                                   |                                    | ged images<br>ll res. Images   | 35000 +          | RSAT  |
|                               |                             |  |  |                                   |                                    | es and<br>250, 500 and<br>l size.  | 600              | No pl   |



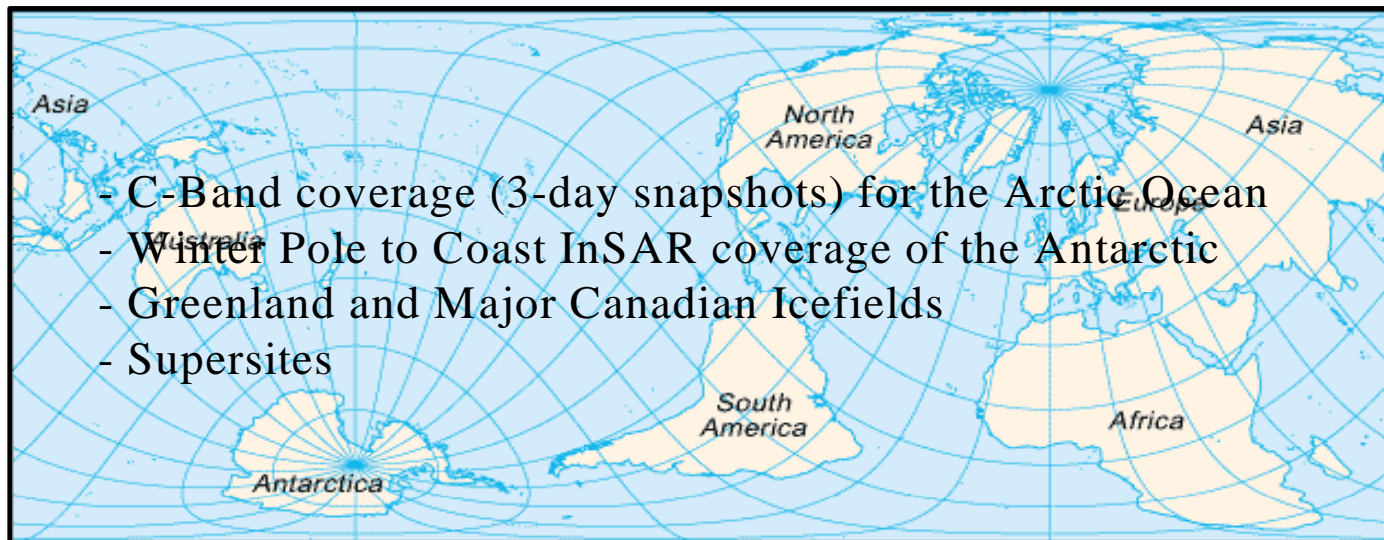
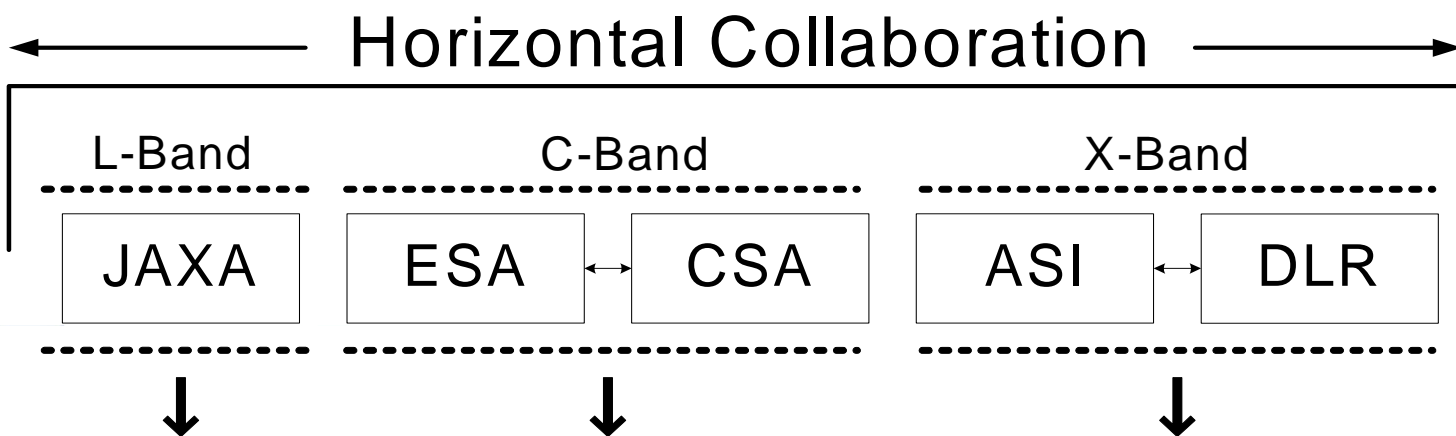
# SAR acquisition plan consolidation exercise

- Avoid Gaps and Overlaps – optimize resources
- Consolidate the current SAR planning and imaging activities occurring under the auspices of IPY/STG (i.e. thematic / instrument matrix, common planning tool, etc.)
- Distribute imaging load according to Agencies' capacities and priorities, and develop acquisition plans
- Look at a short/med/long term planning approach to continue the acquisitions (if at all possible)

Meeting Objectives



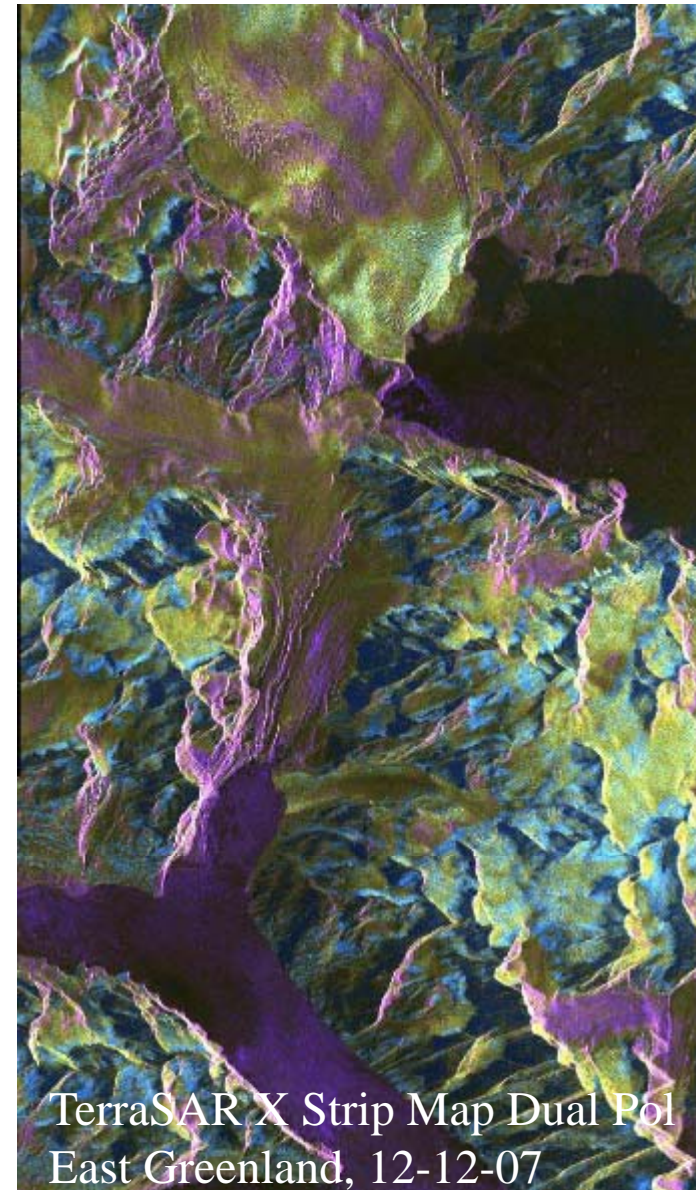
# Space Task Group Coordination



- C-Band coverage (3-day snapshots) for the Arctic Ocean
- Winter Pole to Coast InSAR coverage of the Antarctic
- Greenland and Major Canadian Icefields
- Supersites

# SAR processing strategy and data dissemination

- Definition of priorities (defined by users)
- Develop a processing strategy that will use the existing agency resources (from signal to data archive)
- Funding opportunities for science initiative and private sector involvement for the development of derived products



# Dissemination Challenge

- Challenge to comply to the IPY Data Policy
  - Free and unrestricted exchange
  - Timely exchange
  - Quality control
  - Metadata submission
  - Preservation of data
  - Easy access
  - Use and enhance existing facilities
  - Reporting requirements
  - Sensitivity of traditional knowledge
- Reconcile the scientific and commercial mission objectives
- Within the context of the Agencies Framework (i.e. open, AO, etc.)
- Work within security regulations and national legislation

# Our Commitment (!?!?)

- Ensure data collection
- Support data processing
- Comply with data dissemination standards
- Make data available
- Encourage science and creation of derived-products



# Agenda

- See word file...

