An Overview of the RADARSAT Program

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Presentation outline

- Mission description of Radarsat-2
  - Mission Objectives
  - System Characteristics
  - Data Commercialization/Allocation

- Program Update
  - Spacecraft Assembly and Testing Status
  - Ground Segment Installation and Testing Status
  - Schedule to Launch

- Commercial Update
  - Radarsat 1 trends
One of the key priorities of the Canadian Space Program:
- Responding to the challenges of monitoring the environment, managing natural resources and performing coastal surveillance.

Objectives:
- Provide SAR data continuity from RADARSAT-1
- Meet user needs for new applications opportunities
- Maintain Canada's position in the commercialization, utilization and development of advanced operational SAR capabilities

Innovations
- Strong partnership with industry
- Advanced imaging modes
MDA

- Direct investment in mission costs
- Design Authority
- Will own and operate RADARSAT-2
- MDA-GSI has exclusive distribution rights

Canadian Space Agency

- Technical expertise and Interface with other Canadian Government Departments
- CSA's investment is returned as a data allocation that will allow access to the SAR imagery required by all parts of the Canadian Government
Current Ground Station Locations

- MDA/GSI Vancouver Order Handling
- CCRS Prince Albert Receiving Station
- CSA/MDA St-Hubert Mission Control and TT&C
- CSA Saskatoon TT&C
- CCRS Receiving Station and MDA production
- Gatineau
MDA-GSI

- Will commercialize and distribute RADARSAT-2 data worldwide
- Will develop data distribution agreements with regional partners around the world
- Will develop strategic partnerships with the value added sector to maximize the use of RADARSAT-2 improved capabilities

CSA

- CSA will manage the RADARSAT-2 data allocation within the Canadian Government
- All Canadian Government Departments and Agencies will be provided RADARSAT-2 data to support their mandate
- Data allocation can also be used for scientific, R&D and non-commercial institutional use
The SAR payload consists of the SAR antenna and specific support equipment required to perform timing and control of the payload, signal distribution, signal detection and thermal control.

The ESS is the mechanical interface between the bus and the antenna. Its function is first to deploy and then preserve the flatness and the attitude of the antenna.

**Status:**
- Completed Testing of the 4 Antenna Panels at system level
- Completed integration and deployments of the SAR wings with the Extendable Support Structure (ESS) and the Bus
Spacecraft level completed and upcoming tests at DFL

- Bus Delivery
- TVAC 1
- Integration +Y Panel
- SAR Delivery
- IST 1
- TVAC 2
- SAR Integration
- IST 2
- Solar Arrays Integration
- IST 3
- Vibration & Acoustic test
- Appendage Deployments
- Pack & ship to launch site
- S/C Ops Validation
- IST 3

2004 2005 2006
Jan June Dec Jan June Dec Jan June Dec
Launch on a Soyuz rocket from Baikonur Summer 2007
Radarsat-2 Features and Benefits
RADARSAT-2 will operate in an orbit identical as RADARSAT-1 except for an offset in time.

**Orbit Parameters**

<table>
<thead>
<tr>
<th>ORBIT CHARACTERISTICS</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altitude (average)</td>
<td>798 km</td>
</tr>
<tr>
<td>Inclination</td>
<td>98.6 degrees</td>
</tr>
<tr>
<td>Period</td>
<td>100.7 minutes</td>
</tr>
<tr>
<td>Ascending node</td>
<td>18 hrs (± 15 min)</td>
</tr>
<tr>
<td>Sun-synchronous</td>
<td>14 orbits per day</td>
</tr>
<tr>
<td>Repeat cycle</td>
<td>24 days</td>
</tr>
</tbody>
</table>

**Coverage Access**

- **North of 70°**: Daily
- **North of 48°**: Every 1-2 days
- **Equator**: Every 2-3 days
RADARSAT-2 Imaging Modes
RADARSAT-2 Innovations

Higher resolution: Spotlight (nominal 1 m) & Ultra-Fine (3 m)
Multi-look Fine: 8 m resolution
Polarmetric modes
  • single & dual/cross polarization
  • quad-pol
Faster satellite tasking
  • 12 to 24 hours routine
  • up to 6 hours emergency
Left and right-looking capability
On-board solid-state recorders
Enhanced ground system providing faster data processing
Enhanced Data security through Downlink encryption
OPERATIONAL & COMMERCIAL FLEXIBILITY
RADARSAT-2 Key Applications

Defence
- target surveillance

Marine Surveillance
- oil pollution spill/slick detection
- ship detection/ fisheries monitoring
- sea ice mapping

Agriculture
- crop type
- crop condition

Mapping
- feature extraction
- INSAR (Deformation and change)
Radarsat Usage and Commercial Trends
RADARSAT-2

RADARSAT-1 Beam Usage Trend

Fine
Standard
Monitoring Modes
Total Data Reception Facilities: 32 (including 9 transportable stations) with 4 under certification

4 more expected in 2007
RADARSAT-1 Data Commercial Trends

- Continuing growth in lower resolution modes for maritime monitoring
- Continuing trend toward higher resolutions for defence/mapping
- Continuing trend towards faster and more reliable NRT
- Continuous growth of the network of ground stations
RADARSAT-2 Commercial Response

- Higher resolution modes to facilitate trend toward higher resolutions for defence/mapping
- RADARSAT-1 beam continuity but with improved revisit coupled with more flexible SSR and faster NRT turnaround to facilitate more growth in marine monitoring applications
- Continue policy of downlinks to international ground stations
- Value added development and information derivation is another growth area
  - cross and quad pole data to help this sector grow
RADARSAT-1 success built on a solid group of international partners. Ground station distributors, and value added partners have helped build a market.

Success also built on support from Canadian and international academic and research and Govt sectors programs.

RADARSAT-2 will continue the relationships and build new ones for new market sectors.
Brazilian Partners and Development – 10 year history

- Early institutional champion and Ground Station:
  - INPE

- Radar user development:
  - SAREX, GlobeSAR, Amazon Nations – with INPE, Cad govt and MDA

- Resource Centre for Training and R&D
  - Fed U of Rio (CBRR)

- Early adopter of technology for maritime applications
  - Petrobras – Cenpes

- Commercial Partner
  - Threetek
Brazilian Programmes for Radarsat 2

- Continuing development of maritime surveillance programs with various clients
- Development of interferometric techniques with partners such as Transpetro and Petrobras – Cenpes for pipeline monitoring
- Programme of workshops for use and understanding of polarimetric techniques
- Development of Amazonian programs
- SOAR Programme
Conclusions

- Make a commercial return on investment for MDA
- Fulfill commitment to provide the Canadian govt their allocation
- Continue growth of traditional business areas such as ice, maritime monitoring and mapping
- Build on successful development of defence and monitoring sector
- Grow new business areas by developing new value added information services
- Further continuity through the Radarsat-C future programme