

RADARSAT-2 Initial System Operations and Performance

A. Hillman, P. Rolland, R. Periard, M. Chabot, MDA GSI, Richmond, B.C., Canada
C. Chen, MDA Space Missions, Montreal, Quebec, Canada
N. Martens, Telesat, Ottawa, Ontario, Canada

Following a successful SOYUZ launch on 14th December, 2007, from Baikonur, Kazakhstan, the RADARSAT-2 Satellite went through intensive Launch and Early Orbit Phase (LEOP) appendage deployment and attitude configuration activities controlled from MDA's control centre in St. Hubert, Quebec. The first SAR data, including a remarkable Quad Pole image of Greenland, was acquired on-board on Day 4 of the mission. System commissioning covered the satellite, ground segment, overall system performance, and operations, along with operational orbit acquisition, and initial calibration. While the early commissioning results were impressive, delays arose from Payload outages which were determined to be caused by Single Event Upsets (SEU) to the SAR Antenna. This provided an earlier than expected opportunity to demonstrate the flexibility of the system for evolution and enhancements. The Payload Antenna software was modified to mitigate the SEU impacts, and in-orbit trials confirmed satisfactory Payload availability for the remainder of commissioning. Initial Operations Capability was declared on 24th April, 2008.

The Commissioning Phase transitioned smoothly to the Routine Phase with organizational transition within MDA from the system development program to MDA Geospatial Services International (GSI), continuation of a large multi-user service demonstration project initiated during commissioning, certification of external network stations for data acquisition and processing, and ramp-up of Canadian Government system loading. This initial period of system operations has also seen the introduction of a new high resolution imaging mode, demonstration of rapid tasking capabilities, successful operation through the first annual eclipse season, implementation of a new regulatory framework for control of user access to imagery, and continuous system improvement through tuning and enhancement of performance and to improve operations robustness.

RADARSAT-2 is a commercial mission with a keen focus on projected mission operations costs, and the need to contain actual costs while safeguarding satellite health and safety and achieving satisfactory system performance with acceptable risk. The need to contain development costs drove decisions to defer ground segment functionality implementation until the business justification could be better quantified. The need to contain operations costs influenced decisions on automation levels, operations organization, and the maintenance support concept. With operations experience, these factors and decisions can now be more clearly evaluated, and the experience provides a basis for evolution of the system and operations concept.

This paper provides a summary of the achievements and status of system operations and performance from the flight operations experience of LEOP, Commissioning and initial Routine Phase operations. A view is provided from the perspective of the mission and

system, including key performance metrics and status of the system components, as well as from the perspective of system operations. Each of the RADARSAT-2 operations functional groups (Operations Management and Mission System Engineering, Order Handling and Operations Planning, Spacecraft Operations, and Data Handling) are examined and presented. Comparisons with pre-launch expectations, specifications, and plans are made to draw lessons from the flight experience. Plans for sustaining and enhancing system operations performance are outlined.