Agence spatiale canadienne | Canadian Space Agency

Distribution Information Document

System : **RCM Publication of Acquisition Plans**

Intended for : Public / Vetted users

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Canada

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Modification History

Date **(AAAA-MM-JJ)**	**Description**	**Author(s)**
2021-07-26	First draft, based on "RCM – Publication of Acquisition Plans – Software Design Document"	Émiline Filion, Cédric Pelland
2021-09-22	Removal of two columns (PRODTYPE_1_2 & PRODTYPE_2_2) and addition of a column (PRODTYPE) containing both information. Document formatting.	Cédric Pelland

1. Introduction

The RADARSAT constellation is the evolution of the RADARSAT program with the objective of ensuring data continuity, improved operational use of Synthetic Aperture Radar (SAR) and improved system reliability. The three-satellite configuration provide daily revisits of Canada's vast territory and maritime approaches, as well as daily access to 90% of the world's surface.

1.1. Document Overview

This document is the distribution information document of the publication system of the RADARSAT Constellation Mission (RCM) at the Canadian Space Agency (CSA). The purpose of this document is to describe the data format used for the dissemination of future and past acquisition plans for this radar data acquisition mission.

The publication system produces and publishes acquisition plans to the Federal Geospatial Portal (FGP) for dissemination to open government portal users, such as public and vetted external entities.

The RADARSAT Constellation Mission (RCM) distribution information document, serves as a companion document by capturing the architecture of the acquisition plans published on a biweekly and monthly basis. This document is updated as needed throughout the development of RCM and officially presented as a milestone for the release of acquisition plans.

You can refer to the following page to obtain more technical information on RCM : Technical characteristics - Canadian Space Agency (asc-csa.gc.ca)

ACRONYM

CSA	Canadian Space Agency
CSV	Comma-Separated Value
FGP	Federal Government Platform
ICD	Interface Control Document
ID	Identifier
OHS	Ordering Handling Subsystem
PDF	Portable Document Format
RCM	RADARSAT Constellation Mission
SAR	Synthetic Aperture Radar
UTC	Universal Time Coordinated
WKT	Well-Know Text representation of coordinate reference systems
M	Meter(s)

2. Publication Time Period and Window

I. Future acquisition plans are published every two weeks for a two-week window that starts two weeks from the publication date.

As an example, acquisition plan published on April 1st covers acquisitions from April 14 to 27. The next plan is published on April 14th and covers from April 28 to May 11.

II. Past acquisitions plans are published monthly and covers a period of one month from the first to the last day

As an example, acquisition plan published on April 1st covers acquisition made between the March 1 and March 31. The next plan covers the month of April.

3. Architecture

CSA makes acquisition plans available via the FGP and acquisition plans are sent to the FTP server in the following format:

- Comma-Separated Value file (CSV)
- Field separator is "|"
- Data is in string format for all the fields.
- Well-Know Text representation of coordinate reference systems (WKT) format
- No geospatial conversions are required.
- Some text fields may be delimited by quotes.

Table 1 describes all the fields that made of the CSV files.

Table 1 Format of CSV Files

Order	Field	Description	Example
1	WKT	Swath The format is as follow: "MULTIPOLYGON (((longitude1, latitude1, longitude2, latitude2, longitude3, latitude3, longitude4, latitude4, longitude1, latitude1,)))" **Note:** Be aware that the first point and the last one are the same.	"MULTIPOLYGON (((-156.313695493689 79.3498280563328,-156.483348890963 79.4034519122513,-156.654651275229 79.4569892080128,-156.827623942888 79.5104390638714,-156.827693980928 79.5104605787012,-151.539236261412 80.0122015464865,-145.751099244323

			80.4223165166492,-139.518410180399 80.7286452227126,-139.518373747216 80.7286209124726,-139.429534082413 80.6689528249646,-139.341722310945 80.6092659376892,-139.254921505174 80.5495603596724,-145.382321824978 80.2480781195626,-151.086803471105 79.8442927693303,-156.313695493689 79.3498280563328)))"
2	SATID	Satellite ID (RCM-1, RCM-2 or RCM-3)	RCM-3
3	BEAMTYPE	Beam type: • Low Resolution 100m • Medium Resolution 50m • Medium Resolution 30m • Medium Resolution 16m • High Resolution 5m • Very High Resolution 3m • Low Noise • Ship Detection • Quad-Polarization • Spotlight Appendix 4.1 provides more information on beam types.	Low Noise
4	BEAMID	Beam Mode Mnemonic This corresponds to beam mnemonics. The link below provides the list of beam mode mnemonic : Technical characteristics - Canadian Space Agency (asc-csa.gc.ca)	SC3D
5	POLTYPE	Polarization type Accepted values are: (*) • Single Polarization • Dual Co/Cross Polarization • Compact Polarization	Dual Co/Cross Polarization

		• Dual HH-VV Polarization • Quad Polarization Appendix 4.1 provides more information on polarization.	
6	TXPOL	Transmit polarization : • C : for compact polarization • H : for horizontal polarization • V : for vertical polarization • H + V : for Horizontal and vertical polarization Appendix 4.1 provides more information on polarization.	H
7	RXPOL	Receive polarization (H, V, H+V, V+H) • H : for horizontal polarization • V : for vertical polarization • H + V : for Horizontal and vertical polarization Appendix 4.1 provides more information on polarization.	V
8	CCD	CCD Boolean value TRUE or FALSE	FALSE
9	EXACTCCD	Exact CCD Boolean value TRUE or FALSE	FALSE
10	UTC_STRT	Acquisition start time (UTC) Format: yyyy-MM-ddThh:mm:ss	2019-07-08T03:55:48
11	UTC_END	Acquisition end time (UTC) Format: yyyy-MM-ddThh:mm:ss	2019-07-08T03:56:15
12	PRODTYPE	Product type and product option Accepted values are: (*) • SLC • GRD • GRC • GCD • GCC	GRD – 16 bit

		Followed by the product option: • Integer, 16 bit • Floating-point, 32 bit Appendix 4.2 describes each product type.	
14	BAQ	The possible values are : • 1 bit • 2 bit • 3 bit • 4 bit • 8 bit	3 bit
15	RADARM	Radar mode Accepted values are: • ScanSAR • Spotlight • Stripmap Continuous • Stripmap Burst	ScanSAR

4. Appendix

4.1. RCM Beam Types

Table 2 presents the list of beam types for RCM - *Notes available on the next page*

Table 2 RCM Beam Types

Imaging Mode	Resolution for detected products m	Number of Looks for detected products rng x az	Nominal Swath Width km	Nominal Incidence Angle Range deg	NESZ (Spec) dB	Polarization Options					Product Options									
						Single Pol (HH, VV, HV or VH)	Dual Pol		Compact Pol	Quad Pol (HH+VV+HV+VH)	Fixed point (16-bit)						Floating point (32-bit)			
							(HH+HV or VV+VH)	HH+VV [1]			SLC	GRD	GRC	GCD	GCC	MLC[4]	SLC	GRD	GRC	MLC
Low Resolution 100m	100	8x1	500	19-55	-22	✓	✓	✓	✓		✓	✓		✓		✓	✓	✓		✓
Medium Resolution 50m	50	4x1	350	19-59[2]	-22	✓	✓	✓	✓		✓	✓		✓		✓	✓	✓		✓
- **High PRF**	50	4x1	350	19-59[2]	-22	✓	✓		✓		✓	✓		✓		✓	✓	✓		✓
- **High Incidence[3]**	50	4x1	133	55-60	-22	✓	✓		✓		✓	✓		✓		✓	✓	✓		✓
Medium Resolution 30m	30	2x2	125	17-48	-24	✓	✓	✓	✓		✓	✓		✓		✓	✓	✓		✓
Medium Resolution 16m	16	1x4	30	20-47	-25	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	
High Resolution 5m	5	1	30	19-54	-19	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	
Very High Resolution 3m	3 @35°	1	20	18-54	-17	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	
Low Noise	100	4x2	350	19-59[2]	-25	✓	✓		✓		✓	✓		✓		✓	✓	✓		✓
Ship Detection	variable	5x1	350	40-58	variable	✓	✓		✓		✓	✓				✓	✓	✓		✓
Quad-Polarization	9	1	20	24-44	-24					✓	✓	✓	✓	✓	✓		✓	✓	✓	
Spotlight	1 (az) x 3 (grd) @35°	1	20 [5km in az]	19-47	-17	✓	✓		✓		✓	✓		✓			✓	✓		

[1] Some performance parameters will be degraded for the HH+VV polarization: swath width is reduced to 250km for the Low Resolution 100m mode and 175km for the Medium Resolution 50m mode; number of looks in azimuth is reduced to one for the Medium Resolution 30m mode and two for the Medium Resolution 16m mode; azimuth resolution is degraded to 12m for the High Resolution 5m mode and to 7.5m for the Very High Resolution 3m mode. Complex products (SLC, GRC, GCC or MLC) are not available for the HH+VV polarization.

[2]For Medium Resolution 50 m and Low Noise modes, there is possibly degraded performance for the last 100 km of the accessible swath.

[3]Medium Resolution 50m High PRF and High Incidence are two variants of the same beam mode type (Medium Resolution 50m). The High PRF version has improved azimuth ambiguities but a higher data rate. The High Incidence variant can cover the North pole but has a reduced swath width and degraded ambiguities (no image quality performance requirement).

[4]MLC format supports dual Co-/Cross-Polarization and Compact Polarization options, but its usefulness is mainly for Compact Polarization since the polarimetric phase of the dual Co-/Cross-Polarization products is not calibrated. The nominal number of looks for MLC is: Low Resolution 100 m: 6x1, Medium Resolution 50 m: 4x1, Medium Resolution 30 m: 2x2, Low Noise: 3x2, Ship Detection: 5x1.

Note: Noise subtraction option is available for ScanSAR modes with one look in azimuth: Low Resolution 100m, Medium Resolution 50m and Ship Detection Mode.

4.2. RCM Image Product Types

Table 3 provides the list of product types for RCM.

Table 3 RCM Image Products Types

RCM Image Product Types	Description
SLC	Single-Look Complex or SLant range georeferenced Complex
GRD	GRound range georeferenced Detected
GRC	GRound range georeferenced Complex
GCD	GeoCoded Detected
GCC	GeoCoded Complex
MLC	Multi-Look Complex