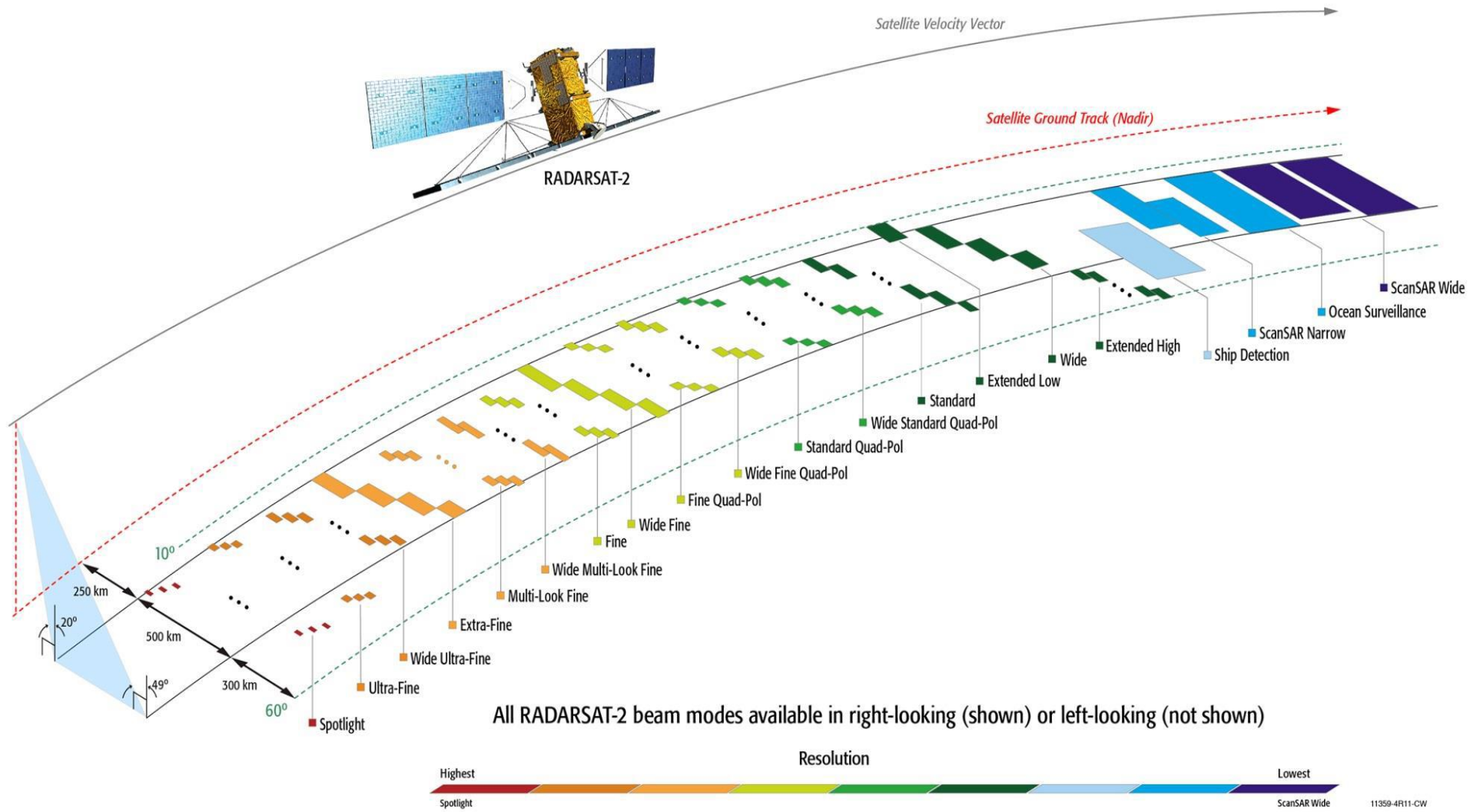




Lab 1: Where's the Data

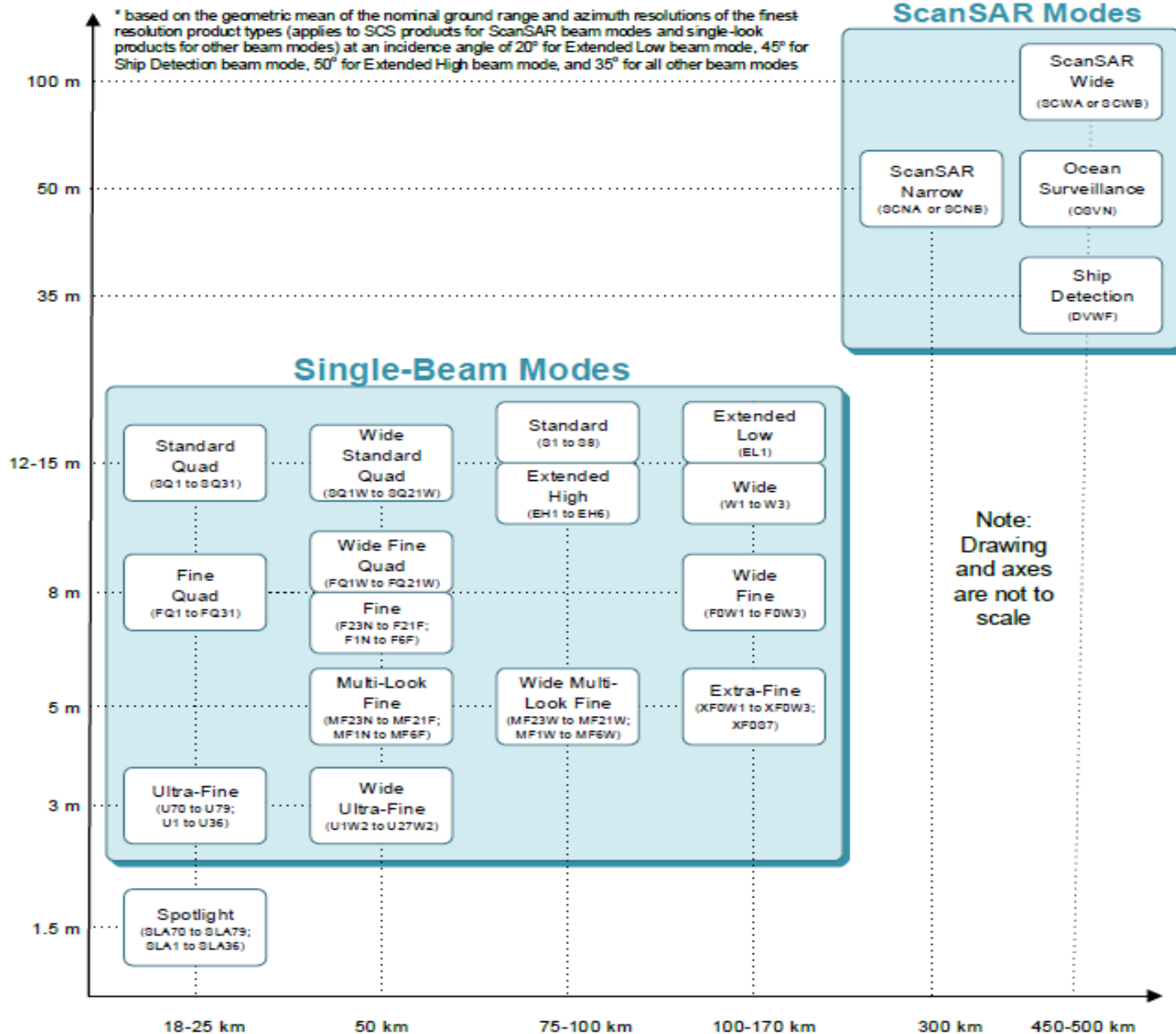


RADARSAT-2



RADARSAT-2 SAR Beam Modes - Revisit time: 24 days

Nominal Resolution Cell Size *



Nominal Swath Width (ground range)

RADARSAT-2 beam modes and beam positions in terms of their nominal swath width and achievable product resolution

RADARSAT-2 Image Products

Slant Range SLC Product (Single Look Complex)

- Each image pixel is represented by a **complex** (real I and imaginary Q) magnitude value.
- No interpolation into ground range coordinates is performed during processing for SLC image products, and so the range coordinate is given in radar **slant range** rather than ground range.
- The processing for all SLC products covers a **single look** in range and azimuth directions.
- Intended for applications that require the full bandwidth and phase information, e.g. for SAR **interferometry** and **polarimetry**.

RADARSAT-2 Image Products

Ground Range Products (1)

- The range resolution is measured in ground range coordinates, i.e. along an assumed Earth's surface that follows the shape of the ellipsoid at a local elevation height.
- These products are useful, if geocoding or orthorectification is to be applied by the customer, or in case geocoding is not required.

SGX - SAR Georeferenced eXtra: have very fine resolution that ensures that all image information is preserved and makes the imagery suitable for post-processing.

SGF - SAR Georeferenced Fine: generated with pixel dimensions larger than those of the corresponding SGX products, therefore appropriate for applications where the reduction in product volume is important, and where the full precision is not needed.

The numerical value of each pixel in the digital image represents the intensity of the SAR image averaged over the sampling interval.

RADARSAT-2 Image Products

Ground Range Products (2)

SCN - ScanSAR Narrow beam: refers to SGF product produced from the ScanSAR Narrow Beam Mode generated using two looks in range and two looks in azimuth.

SCW - ScanSAR Wide beam: refers to SGF product produced from the ScanSAR Wide Beam Mode generated using four looks in range and two looks in azimuth.

SCF (ScanSAR Fine) and SCS (ScanSAR Sampled): are similar to SCN or SCW products with the additional processing options of noise subtraction.

RADARSAT-2 Image Products

Geocorrected Products:

SSG - SAR Systematic Geocorrected: generated by geocorrection of single beam products. The geocorrection process for SSG products does not include the use of ground control points (GCP).

Geocorrection can include either orthorectification using a Digital Elevation Model (DEM) or can be based on a fixed elevation above a reference ellipsoid, which is specified by the user.

SPG - SAR Precision Geocorrected: bears the same relationship to the input image data as the SSG product, except that it is geocorrected using precise ground control points.

RADARSAT-2 Data Access

- Natural Resources Canada Earth Observation Data Management System (EODMS).
- RADARSAT-2 data is available through EODMS for Government of Canada users only.
- EODMS will be used for RCM data ordering. Other users need to register.

The screenshot shows the Natural Resources Canada Earth Observation Data Management System (EODMS) website. The header includes the Government of Canada logo and navigation links for Canada.ca, Services, Departments, and Français. The main navigation bar lists various sectors: Energy, Mining/Minerals, Forests, Earth Sciences, Hazards, Explosives, The North, and Environment. A search bar is located on the right. The breadcrumb trail indicates the path: Home → Natural Resources Canada → EODMS. The left sidebar contains a 'Start' section with a welcome message and a list of options for visitors, including search, registration, and help. The right sidebar shows 'Map Options' and a map of North America with a scale bar and coordinates.

Government of Canada / Gouvernement du Canada

Canada.ca | Services | Departments | Français

Natural Resources Canada

Canada

Energy ▾ Mining/Minerals ▾ Forests ▾ Earth Sciences ▾ Hazards ▾ Explosives ▾ The North ▾ Environment ▾

Home → Natural Resources Canada → EODMS

Start

Welcome to the EODMS
(Earth Observation Data Management System)

Select one of the following options:

All Visitors

- Search for Earth Observation Data and Aerial Photographs ?
- Register (Required to order products) ?
- Read What's New ?
- View Help Documentation ?
- About ?
- Contact Us ?

Registered Visitors

- Login ?
- View Saved Search Criteria ?
- View Saved Watch Mode Searches ?
- View Account ?
- View Order Status ?
- Add Remote Search Target - Catalogue Service for the Web (CSW) ?

Map Options

Map of North America showing provinces and territories. Scale: 1000km / 500mi. Coordinates: 21K 538954.15 7965669.97

RADARSAT-2 Data Access


[Home](#) → [Natural Resources Canada](#) → [EODMS](#)


Start Search ✕

Search

1. Select an Area of Interest

- ▶ [Search for a Geographic Location](#) ?
- ▶ [Use Current Map Extent](#) ?
- ▶ [Draw an Area](#) ?

 Rectangle Remove

 Polygon

 Circle

 Line

 Point

- ▶ [Enter Coordinates](#) ?
- ▶ [Import a File](#) ?
- ▶ [Use a Saved Area of Interest](#) ?
- ▶ [Enter Roll and Photo Number \(Aerial Photos Only\)](#) ?

2. Select Dates

3. Select Data

4. Select Data Options

Map Options



RADARSAT-2 Data Access

Start Search

Search

1. Select an Area of Interest

2. Select Dates

3. Select Data

☐ **National Air Photo Library [Online]**
Over six million aerial photographs covering all of Canada, some of which date back to the 1920s.

☒ **Radar Satellites**
Radar Satellites

☐ **RADARSAT-1 Raw Products [Online]**
Raw data products from the RADARSAT-1 satellite.

☒ **RADARSAT-2 Raw Products [Online]**
Raw data products from the RADARSAT-2 satellite.

☐ **Value-added Satellite Products**
Value-added Satellite Products

☐ **CCRS Thematic Data Sets [Online]**
Various composite and landcover time series of Canada

4. Select Data Options

5. Submit Search

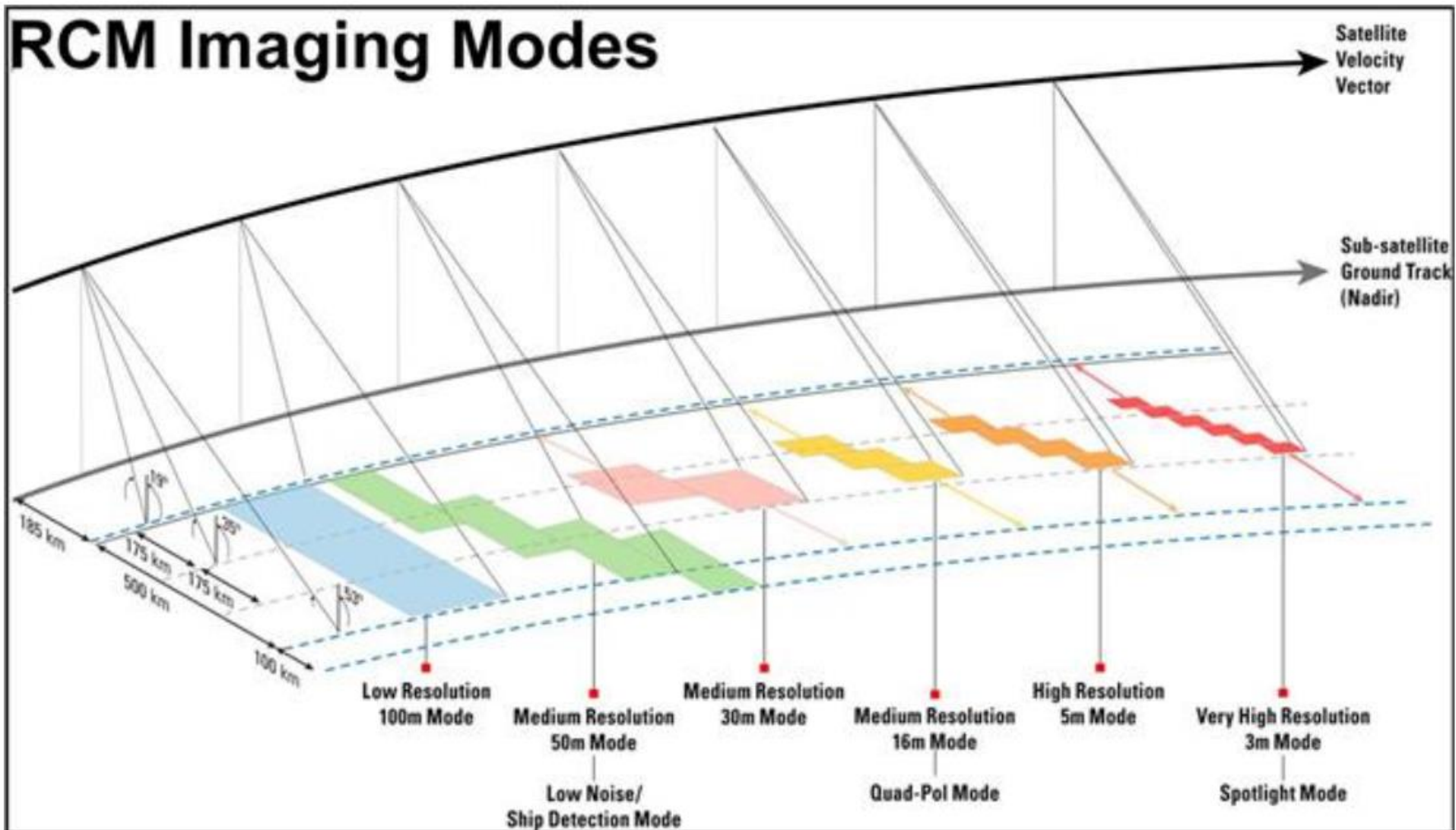


RADARSAT-2 Data Access

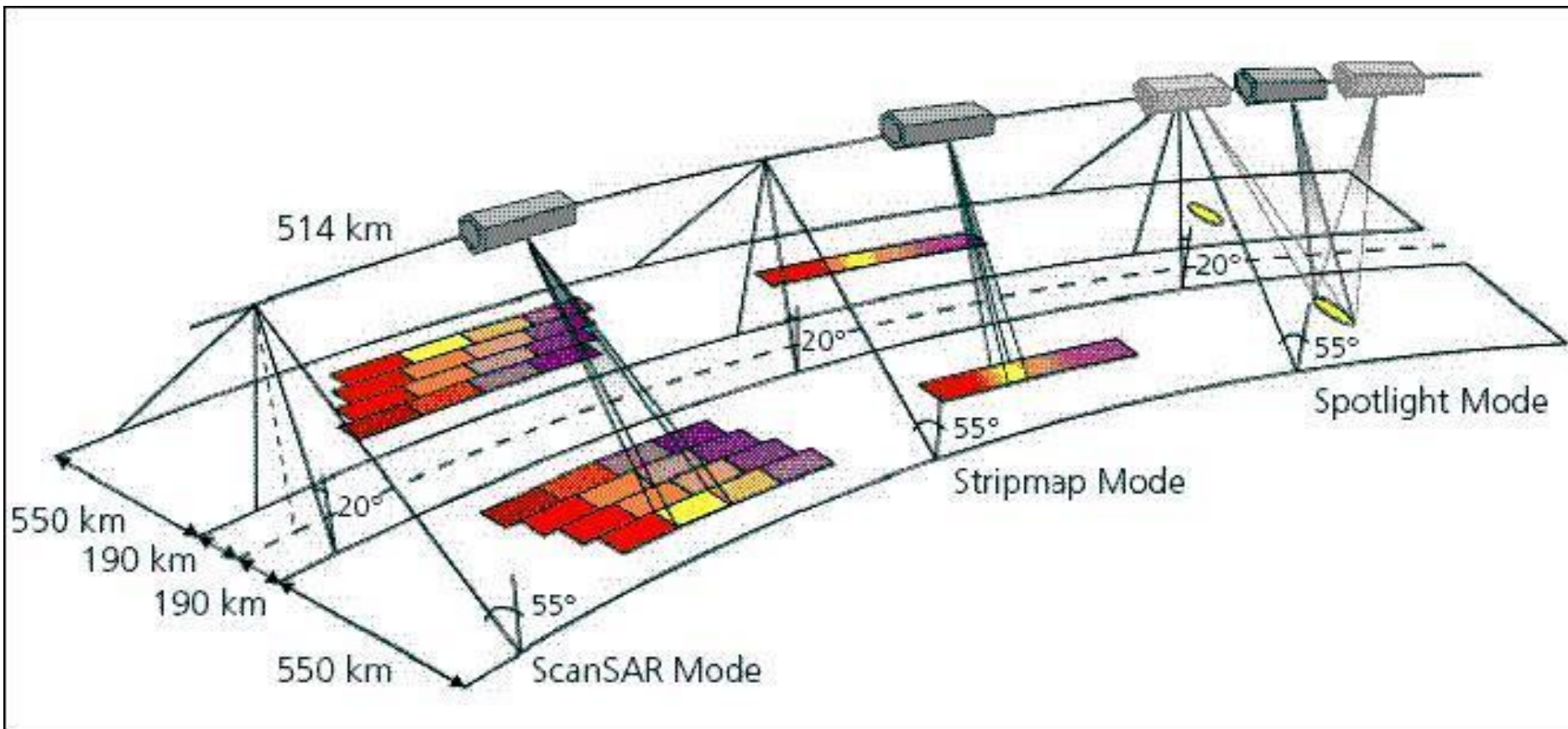
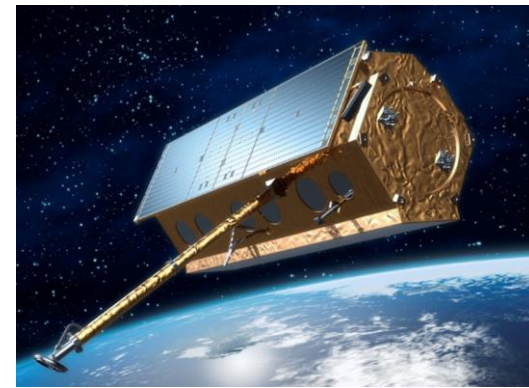
MDA Portal



RADARSAT Constellation Mission



TerraSAR-X/TanDEM-X



Overview of the TerraSAR-X scanning modes - Revisit time: 11 days

| Imaging Mode | Standard Scene Size ^a [km] | Maximum Acquisition Length [km] | Slant Range Resolution ^b [m] | Azimuth Resolution ^b [m] ^c | Polarisation | Full Performance Range [°] |
|-----------------------------------|--|---------------------------------|---|--|--|----------------------------|
| Staring SpotLight (ST) | 4 x 3.7 ^d | 3.7 | 0.6 | 0.24 | Single (VV or HH) | 20° to 45° |
| HighRes SpotLight 300 MHz (HS300) | 10 x 5 ^c | 5 | 0.6 | 1.1 | Single (VV or HH) | 20° to 55° |
| HighRes SpotLight (HS) | 10 x 5 | 5 | 1.2 1.2 | 1.1 2.2 | Single (VV or HH) Dual (HH & VV) | 20° to 55° |
| SpotLight (SL) | 10 x 10 | 10 | 1.2 1.2 | 1.7 3.4 | Single (VV or HH) Dual (HH & VV) | 20° to 55° |
| StripMap (SM) | 30 x 50 single pol 15 x 50 dual pol | 1,650 | 1.2 1.2 | 3.3 6.6 | Single (VV or HH) Dual (HH & VV, HH & HV, or VV and VH) | 20° to 45° |
| ScanSAR (SC) | 100 x 150 | 1,650 | 1.2 (at 150 MHz) | 18.5 | Single (VV or HH) | 20° to 45° |
| Wide ScanSAR (WS) | 270 x 200 ^c | 1,500 | Depending on range bandwidth 1.7 - 3.3 | 40 | Single (VV, HH, HV or VH) | 15.6° to 49° |

TerraSAR-X imaging modes

TerraSAR-X Image Products

SSC - Single Look Slant Range Complex: data are represented as complex numbers containing amplitude and phase information. It is compatible with the SLC product available from RADARSAT-2.

MGD - Multi Look Ground Range Detected: multi look product with reduced speckle and approximately square resolution cells. For the slant to ground range projection the WGS84 ellipsoid and an average, constant terrain height value are used.

GEC - Geocoded Ellipsoid Corrected: multi looked, resampled and projected product. The image is represented in map geometry with ellipsoidal corrections only, thus no terrain correction is performed.

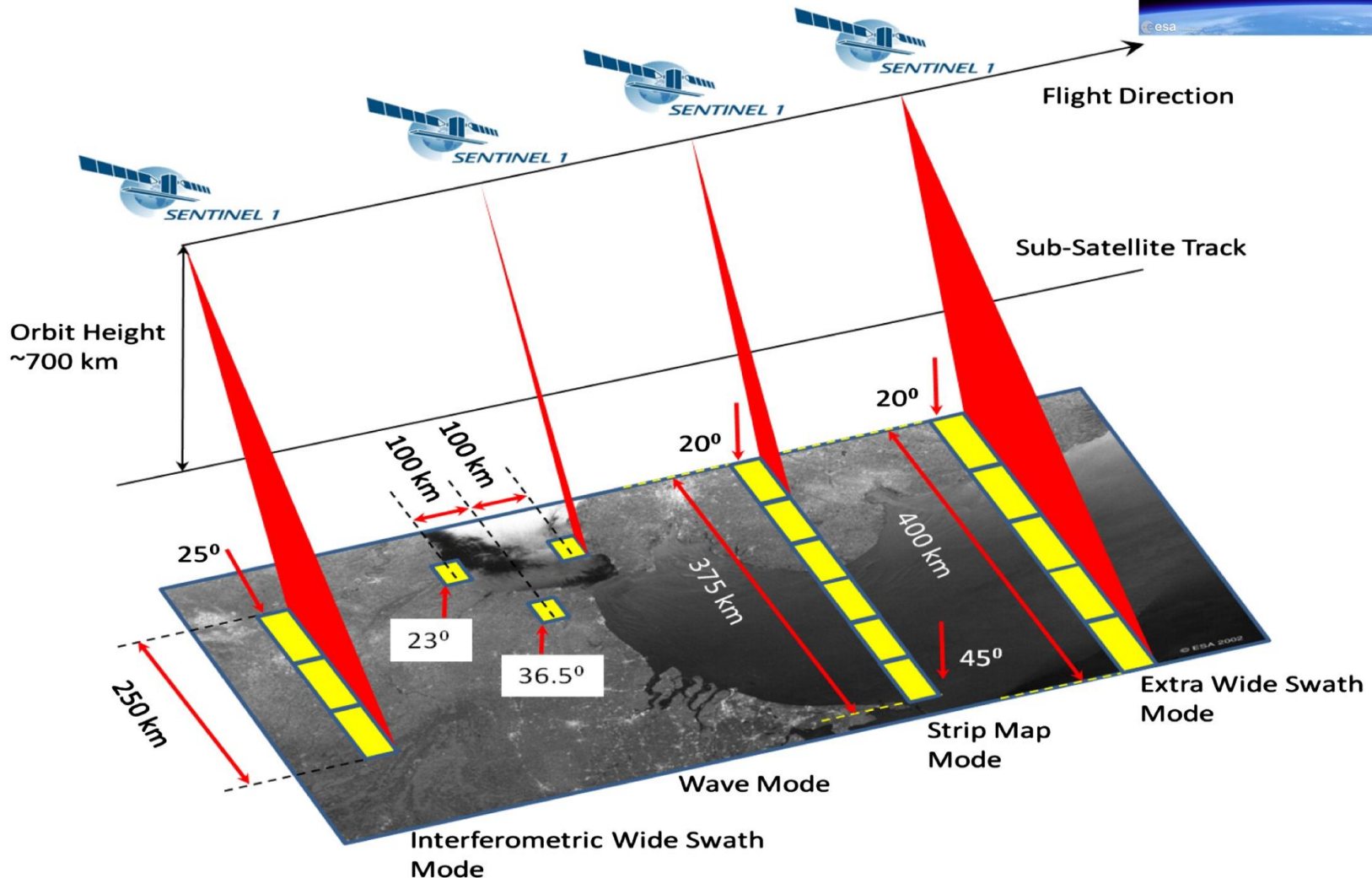
EEC - Enhanced Ellipsoid Corrected: multi looked, resampled and projected product. However, image distortions caused by varying terrain height are corrected using an external Digital Elevation Model (DEM). It features the highest level of geometric correction available and is thus quickly interpretable and combinable with other sources of information.

TerraSAR-X/TanDEM-X Data Access

- EOWEB® GeoPortal (EGP) is used to check the data archive and program future acquisitions.
- The data are not free. However users may be able to submit proposals to DLR to access a limited number of images for research

The screenshot displays the EOWEB GeoPortal interface. At the top, the logo 'EOC EOWEB® GeoPortal' is on the left, and 'Logged in as: guest' and 'Help' are on the right. Navigation tabs for 'Home', 'Catalog', and 'Maps' are in the center. Below these, there are buttons for 'Filter Management', 'Filter:', 'Clear Filters', and 'Hide Filter Gallery'. The main area is divided into four filter panels: 'Filter by Keywords' with a search box and 'Ok' button; 'Filter by Region' with a world map and a coordinate field showing '25°18'45"S 20°0'0"E'; 'Filter by Time' with 'Starttime' (1970-01-01 00:00:00) and 'Endtime' (2019-08-13 23:59:00) fields, and a 'Set Time' button; and 'Filter by Type' with checkboxes for 'Dataset' (blue), 'Dataset Series' (red), and 'Services' (green). Below the filters, there is a 'Data Overview' section with a 'Sort By' dropdown set to 'Modification D...'. A list of data entries is shown, with the first entry being 'TerraSAR-X - Staring Spotlight Images (TerraSAR-X Staring Spotlight)'. This entry has a red vertical bar to its left and buttons for 'View', 'Export', 'Map', 'Items', 'Download...', 'FTP', and 'Other'. A description below the entry states: 'This collection contains radar image products of the German national TerraSAR-X mission acquired in Staring Spotlight'. To the right of the text is a small thumbnail image of a radar scan with coordinates '48°56'51"N 13°31'13"E'.

Sentinel-1A / 1B



Overview of the Sentinel-1 scanning modes- Revisit time: 6 days

Sentinel-1 Image Modes and Products

| Acq. Mode | Product Type | Resolution Class | Resolution Rng x Azi [m] | Pixel Spacing Rng x Azi [m] | Num Looks Rng x Azi |
|-----------|--------------|------------------|--------------------------|-----------------------------|---------------------|
| SM | SLC | | 1.7x4.3 to 3.6x4.9 | 1.5x3.6 to 3.1x4.1 | 1x1 |
| | GRD | FR | 9x9 | 3.5x3.5 | 2x2 |
| | | HR | 23x23 | 10x10 | 6x6 |
| | | MR | 84x84 | 40x40 | 22x22 |
| IW | SLC | | 2.7x22 to 3.5x22 | 2.3x14.1 | 1x1 |
| | GRD | HR | 20x22 | 10x10 | 5x1 |
| | | MR | 88x87 | 40x40 | 22x5 |
| EW | SLC | | 7.9x43 to 15x43 | 5.9x19.9 | 1x1 |
| | GRD | HR | 50x50 | 25x25 | 3x1 |
| | | MR | 93x87 | 40x40 | 6x2 |
| WV | SLC | | 2.0x4.8 3.1x4.8 | 1.7x4.1 2.7x4.1 | 1x1 |
| | GRD | MR | 52x51 | 25x25 | 13x13 |

Sentinel-1 imaging modes

Product types

- **SLC - Single Look Complex:** Slant range Single Look Complex product
- **GRD - Ground Range Detected:** Ground range multi-looked that can be in one of three resolutions: Full Resolution (FR), High Resolution (HR), and Medium Resolution (MR)

Sentinel-1 Data Access

<https://scihub.copernicus.eu/dhus/#/home>


The screenshot displays the Copernicus Open Access Hub (Dhus) interface. The top navigation bar includes the ESA and Copernicus logos, the text "Copernicus Open Access Hub", and user icons. Below the navigation bar is a search bar with the placeholder text "Insert search criteria...".


The left sidebar contains the "Advanced Search" panel, which is currently expanded. It includes the following sections:

- Sort By:** A dropdown menu set to "Sensing Date".
- Order By:** A dropdown menu.
- Sensing period:** A date range selector with "From" set to "2018/10" and "to" set to "2018/11".
- Ingestion period:** A date range selector with "From" and "to" fields.
- Mission: Sentinel-1** (checked):
 - Satellite Platform:** A dropdown menu set to "S1A_*".
 - Polarisation:** A dropdown menu.
 - Relative Orbit Number (from 1 to 175):** A text input field.
 - Product Type:** A dropdown menu.
 - Sensor Mode:** A dropdown menu.
 - Collection:** A dropdown menu.
- Mission: Sentinel-2** (unchecked):
 - Satellite Platform:** A dropdown menu.
 - Relative Orbit Number (from 1 to 143):** A text input field.
 - Product Type:** A dropdown menu.
 - Cloud Cover % (e.g [0 TO 9.4]):** A text input field.

The main area of the interface shows a map of the Ottawa-Montreal region. A large orange rectangular area is highlighted on the map, covering the area around Ottawa and the northern part of the St. Lawrence River. The map includes labels for various cities and towns, such as Ottawa, Montreal, Saint-Jérôme, and Cornwall. The map also shows geographical features like rivers and lakes.

Alaska Satellite Facility Data Portal

Find a DAAC



Vertex is the [Alaska Satellite Facility's](#) data portal for remotely sensed imagery of the Earth.

VertexInteractive ToursHelpASF Home

Earthdata LoginDownload QueueContact

GeospatialGranuleMissions

Geographic Region

Option 1: Click on map and move cursor

Option 2: Enter coordinates:
Polygon counterclockwise, decimal degrees, (long,lat)
e.g., -102,37.59,-94,37,-94,39,-102,39,-102,37.59

Dataset

Select: AllNone

| Dataset | Info |
|---|---------------------------|
| <input checked="" type="checkbox"/> Sentinel-1B | 2016-now |
| <input checked="" type="checkbox"/> Sentinel-1A | 2014-now |
| <input type="checkbox"/> SMAP | 2015-now |
| <input type="checkbox"/> UAVSAR | 2008-now |
| <input type="checkbox"/> ALOS PALSAR | 2006-2011 |
| <input type="checkbox"/> RADARSAT-1 | 1995-2008 |
| <input type="checkbox"/> ERS-2 | 1995-2011 |
| <input type="checkbox"/> JERS-1 | 1992-1998 |
| <input type="checkbox"/> ERS-1 | 1991-1997 |
| <input type="checkbox"/> AIRSAR | 1990-2004 |
| <input type="checkbox"/> SEASAT | 1978-1978 |

Optional Search Criteria


Clear Search Area

World MapSouth Polar

☒ Satellite

☐ Map

Please use the map and/or the search parameters on the left to select your search criteria.



Google

Imagery ©2018 NASA, TerraMetrics | Terms of Use

Number of Frames

1

2-5

6-10

11-20

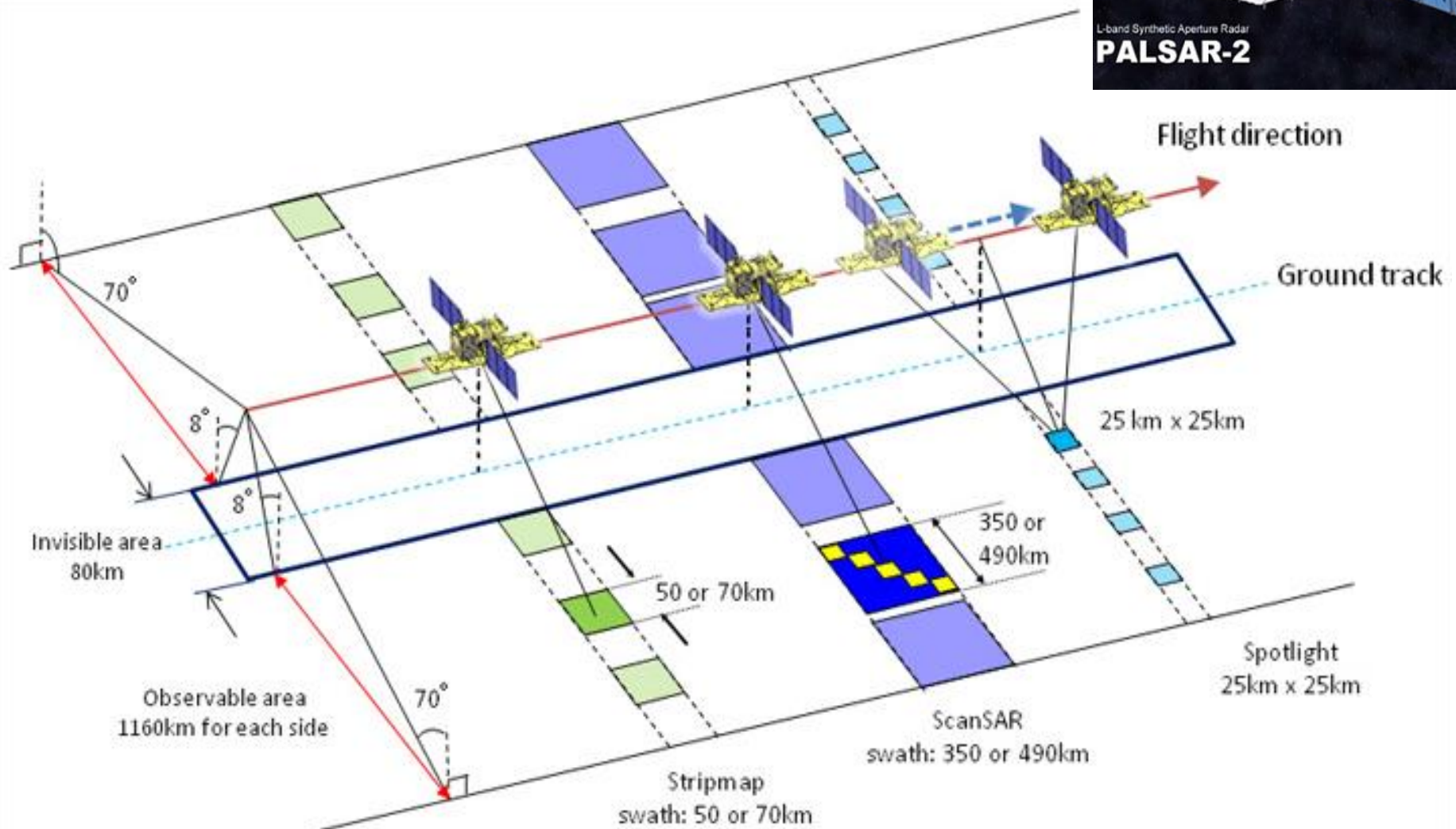
21+

Copyright © 2018 Alaska Satellite Facility
Vertex: ASF's Data Portal V0.04-03
Phone: (907) 474-5041

Vertex

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[www.alaska.edu/nondiscrimination](#)

ALOS-2 / PALSAR-2



Overview of the PALSAR-2 scanning modes - Revisit time: 14 days

| Observation Mode | Spotlight | ScanSAR | | | Stripmap * | | | Full (Quad.) Polarimetry * | |
|---|-------------------------------|---|--------------|----------------|---|------------------------|------------------|---|------------------|
| | | [28MHz] | [14MHz] | [490km] | [3m] | [6m] | [10m] | [6m] | [10m] |
| Obs. Mode ID (code) | SBS | WWS/WWD | WBS/WBD | VBS/VBD | UBS/UBD | HBS/HSD | FBS/FBD | HBQ | FBQ |
| Width (East-West) (Length of Range Direction) | 25km | 350.5km | 350.5km | 489.5km | 55km (max) | 55km (max) | 70km (max) | 40-50km | 30km |
| Length (North-South) (Length of Azimuth Direction) | 25km | 355km | 355km | 355km | 70km | 70km | 70km | 70km | 70km |
| Time Duration of Azimuth Direction | N/A | 52 sec | 52 sec | 52 sec | 10 sec | 10 sec | 10 sec | 10 sec | 10 sec |
| Range Resolution*1 | 3.0m | 47.5m(5look) | 95.1m(5look) | 44.2m(2look) | 3.0m | 6.0m | 9.1m | 5.1m | 8.7m |
| Azimuth Resolution*1 | 1.0m | 77.7m(3look) | 77.7m(3look) | 56.7m(1.5look) | 3.0m | 4.3m | 5.3m | 4.3m | 5.3m |
| Pixel Spacing Levels 1.5/3.1 | 0.625m | 25m | | | 2.5m | 3.125m | 6.25m (2look) | 3.125m | 6.25m (2look) |
| Pixel Spacing Level 2.1 | 0.625m/1.25m/2.5m | 25m/50m/100m | | | 2.5m/5.0m /10.0m | 3.125m/6.25m /12.5m | 6.25m /12.5m | 3.125m/6.25m /12.5m | 6.25m /12.5m |
| Polarization | Single (HH, HV, VH, or VV) | Single (HH, HV, VH, or VV) Dual (HH+HV or VH+VV) | | | Single (HH, HV, VH, or VV) Dual (HH+HV or VH+VV) | | | Full (Quad.) Polarimetry (HH+HV+VH+VV) | |

PALSAR-2 imaging modes - Revisit time: 14 days

PALSAR-2 Image Products

| Level | Definition |
|-----------|--|
| Level 1.1 | This is complex number data on the slant range following compression of the range and azimuth. As one-look data, it includes phase information and will be the basis for later processing. In wide-area mode, image files are created for each scan. |
| Level 1.5 | This is multi-look data on the slant range from map projection amplitude data, with range and azimuth compressed. |
| Level 2.1 | Geometrically corrected (orthorectified) data using the digital elevation data from Level 1.1. |
| Level 3.1 | Image quality-corrected (noise removed, dynamic range compressed) data from Level 1.5. |

Slant range
products

(Similar
to SLC)

Ground range
detected
product

PALSAR-2 Data Access

The Earth Observation Data Utilization Promotion Platform

The screenshot displays the PLATFORM interface for searching Earth Observation Data. The left sidebar contains search filters, and the main area shows a map of the Ottawa region with a red bounding box.

PLATFORM
衛星データ利用促進プラットフォーム

Top navigation: Top page, Support, Cart, Account, Log in, Language

Search: By ID, Upload

STEP1: Search Targets

- ☐ Earth Observation Data
 - ☒ ALOS-2 PALSAR-2
 - ☐ ALOS PRISM
 - ☐ Terra ASTER
- ☐ Added Value Data
 - ☐ Polarimetric Images
- ☐ Vector Data
- ☐ Numeric Data
- ☐ Feature Data

STEP2: Search Range

Search Range

W -75.390166 N 45.630931 E -74.758452 S 45.326651

STEP3: Query Parameter

Earth Observation Data

Observation date: 2018-11-15 - 2018-11-22

PALSAR-2 Setting

- ☐ Obs Mode
- ☐ Polarization
- ☐ Off-nadia[deg]

Observation Direction: Any

Orbit Direction: Any

Browse Image: Any

Map: Google Streets, Move map, Box Select, Polygon Select, Polygon Edit, Upload

Map labels: Maniwaki, Rivière Rouge, Mont-Tremblant, Papineau-Labelle Wildlife Reserve, Ottawa, Chelmsford, Cornwall, Kingston, etc.

Image Source: https://satpf.jp/spf/?sb=search&sensor=ALOS-2_PALSAR-2&item=sb1_sar_palser2