



CUI//SP-EXPT

Science Data Systems (SDS) L-SAR Product File Naming Conventions

Rev C

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Initial	11/04/2021	Table 2.2, 2.4, 3, 4.1, 4.4		Deleted Table 2.2, Removed RCOV product. Added CRSD and HST_DRT products and filenames. Update launch date. Added additional separators in all file names except LOA. Removed PT token from RRST. Revised CRID and update definitions and filename conventions. LRR-052837
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Rev B	11/21/2023	1.2, Table 1-1, Table 2-3, Table 3-1, 3.1, 3.3, 4.1, 4.3		Add cross compatibility requirements and information. Added QA for LOA products. Added Engineering data information. Add On-Demand. Product level clarification. Fix references for Product counter. CRID: patch increment for new alg parameter file. LRR076883
Rev C	02/27/2025	1.5, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 4.1, 4.2		Add acknowledgements and copyrights. Add "XX" to file naming conventions, remove RCOV example filename, clarify fidelity values, change N for NRSC to I for ISRO, update CRID definition
Rev C	10/19/2025			URL for Distribution will be on https://nisar-jpl.nasa.gov . Updated the copyright and author status

* Include the JPL Limited Release System (LRS) clearance number for each revision to be shared with foreign partners.

TBD/TBR/TBC TABLE

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1 Overview

1.1 Project Summary

The National Aeronautics and Space Administration (NASA) formed a partnership with the Indian Space Research Organization (ISRO) to use concepts for Synthetic Aperture Radar (SAR) to determine Earth changes in three disciplines – ecosystems, solid earth, and cryospheric sciences. In the course of these studies, the two organizations formed a joint mission with L-band and S-band SAR systems called the NASA ISRO SAR (NISAR) Project. The NISAR satellite is expected to be scheduled for launch no earlier than January 2024 with a nominal mission life of 3 years.

The NISAR Project will implement a spaceborne Earth observation mission designed to collect measurements of the planet's most complex processes, including ecosystem disturbances, ice-sheet collapse, and natural hazards such as earthquakes, tsunamis, volcanoes and landslides.

1.2 Purpose, scope and objectives

This document describes the file naming conventions that will be used by NISAR to name Standard Data Products (SDPs) that are produced by the JPL Science Data System (SDS) during both the Nominal and Cross Compatibility Modes. Nominal mode is data transferred from the orbiter to the NASA ground stations using the NASA Telecom component. Cross Compatibility is data transferred from the orbiter to the NASA ground stations using the ISRO telecom component.

Table 1–1 Scope of the NISAR SDS L4 Requirements

ID	Requirement Text
L4-SDS-20	The SDS shall label science data products with Coordinated Universal Time Code (UTC).
L4-SDS-21	The SDS shall translate the L-SAR clock (LRCLK) time to UTC using a coefficients file provided by GDS.
L4-SDS-98	The SDS shall assign an algorithm version number to all science data products made available to ASF.
L4-SDS-99	The SDS shall assign a quality designation of beta, provisional or validated, as approved by the Science Team, to all science data products made available to ASF.
L4-SDS-145	The SDS shall make available the engineering telemetry produced by cross-compatibility processing to the GDS.

1.3 *Applicable Documents*

These documents contain information upon which this document depends, or are otherwise controlling for this document.

- [AD1] NISAR NASA SDS Product Description (D-95672)
- [AD2] NISAR NASA SDS Product Specification: Radar Raw Signal Data (RRSD) and Calibration (CRSD) Product (D-102267)
- [AD3] NISAR SDS L4 Functional Design and OpsCon (D-95657)
- [AD4] Flight Ground Interface Control Document (D-76297)
- [AD5] NISAR NASA SDS Product Specification: L1 Radar Range Doppler Single Look Complex (L1 RSLC) (D-102268)
- [AD6] NISAR NASA SDS Product Specification: L2 Radar Geocoded Single Look Complex (L2 GSLC) (D-102269)
- [AD7] NISAR NASA SDS Product Specification: L1 Radar Range Doppler Interferogram (L1 RIFG) (D-102270)
- [AD8] NISAR NASA SDS Product Specification: L1 Radar Range Doppler Unwrapped Interferogram (L1 RUNW) (D-102271)
- [AD9] NISAR NASA SDS Product Specification: L2 Radar Geocoded Unwrapped Interferogram (L2 GUNW) (D-102272)
- [AD10] NISAR NASA SDS Product Specification: L2 Radar Geocoded Polarimetric Covariance (L2 GCOV) (D-102274)
- [AD11] NISAR NASA SDS Product Specification: L1 Radar Range Pixel Offset Interferogram (L1 ROFF) (D-105009)
- [AD12] NISAR NASA SDS Product Specification: L2 Radar Geocoded Pixel Offset (L2 GOFF) (D-105010)
- [AD13] NISAR NASA SDS Product Specification: L3 Soil Moisture (L3 SME2) (D-105036)

1.4 *Reference Documents*

The following references provide additional information that is relevant to the content of this document.

- [RD1] NISAR Mission Plan (D-80830). Rev A, March 26, 2020
- [RD2] Geo Package, <https://www.geopackage.org>

1.5 *Acknowledgements and Copyrights*

The research was carried out at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration (80NM0018D0004).

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2 Background

2.1 NISAR Products

The products produced by NISAR are provided in the Products Table. The Products Table provides the short name used at the Distributed Active Archive Center (DAAC) (the last four-character code is used in the file name), description, category of the product, granule size of the product (see sec 2.1.1), and distribution status. Note that the L0 S-SAR products are listed in the following table as JPL will have the capability to produce L0 products should S-SAR data be received via the NASA ground stations. In addition, L-SAR science products from L0B to L2 also have associated Quality Assurance products such as a graphical summary, browse image etc.; and the Level 3 Soil Moisture product has an associated Quality Assurance product.

Table 2–1 Products Table

Product Short Name	Description	Category	Granularity	Distribute	Includes QA Product?
NEN_L_RRST	L-SAR Radar Raw Science Telemetry from NEN Ground Stations, binary	Raw	Downlink unit	N/A (NEN files are not sent to the ASF DAAC)	No
LOA_L_RRST	L-SAR Radar Raw Science Telemetry in downlink units with all communications layers removed, binary	Raw	Downlink unit, configurable size	Archive	No
LOB_L_RRSD	L-SAR Radar Raw Signal Data unpacked, reconstructed, unprocessed, instrument radar pulses, single mode, separated by transmit polarity data at full resolution, with all communications artifacts removed, HDF5	Raw	Observation	Public	Yes
LOB_L_CRSD	L-SAR Calibration from Radar Raw Signal Data, unpacked, reconstructed, unprocessed, separated by transmit polarity data with all communication artifacts removed, HDF5	SDP	Datatake	Public	No
HST_DRT	HST/DRT extracted from Science Telemetry and reconstructed for Instrument Team usage	Interm	Datatake	N/A	No
L1_L_RSLC	Background and Hi-Res Range-Doppler Single-Look Complex (SLC) polarity, HDF5	SDP	Track Frame	Public	Yes
L2_L_GSLC	Geocoded Single-Look Complex, HDF5	SDP	Track Frame	Public	Yes

Product Short Name	Description	Category	Granularity	Distribute	Includes QA Product?
L1_L_RIFG	Range-Doppler Interferogram (nearest-time pair), HDF5	SDP	Track Frame	Public	Yes
L1_L_RUNW	Range -Doppler Unwrapped Interferogram, HDF5	SDP	Track Frame	Public	Yes
L1_L_ROFF	Range-Doppler Offset, HDF5	SDP	Track Frame	Public	Yes
L2_L_GUNW	Geocoded Unwrapped Interferogram, HDF5	SDP	Track Frame	Public	Yes
L2_L_GOFF	Geocoded Offset, HDF5	SDP	Track Frame	Public	Yes
L2_L_GCOV	Geocoded Polarimetric Covariance, HDF5	SDP	Track Frame	Public	Yes
L3_L_SME2	Soil Moisture on a 200-meter global EASE (Equal-Area Scalable Earth) Grid projection, HDF5	SDP	Track Frame	Public	No
NEN_S_RRST	S-SAR Radar Raw Science Telemetry from NEN Ground Stations, binary	Raw	Downlink unit	Archive	No
LOA_S_RRST	S-SAR Radar Raw Science Telemetry in downlink units with all communication layers removed, binary	Raw	Downlink unit	Archive	Yes
LOB_S_RRSD	S-SAR Radar Raw Signal Data reconstructed, unprocessed instrument data at full resolution, with all communications artifacts removed, hdf5	Raw	Downlink unit	Public	Yes

2.1.1 Granularity of Products

Each product will be split into data granules that reflect the type of data. ([AD1]) RRST is split into raw units by VCID, RRSD is grouped into Observation units, CRSD and HST_DRT are grouped into Datatake units and all other products are based on Track Frame definition (current baseline of 240km x 240km). See Table 2–1 and sec 4.5 for more information.

- **Downlink unit:** Granules as received and repackaged at the ground station; is independent of any other granule extent definition.
- **Datatake:** One granule contiguously acquired along the track according to the Mission Plan; the physical size of a datatake may vary depending on the observation(s). A datatake consist of one or more observations.
- **Observation:** One segment of a datatake ranging from 2 seconds to 45 minutes of SAR data collected continuously in one radar mode.
- **Track-Frame:** A 240 x240 km consistent and unique segment of a NISAR orbital track. (See Section 4.5 or orbital track frame definition) There are 176 frames within a single NISAR orbital track. Track frame numbers are unique.

Custom processing may cross frame boundaries, therefore including start/end date/time will allow any arbitrary granularity.

2.2 Virtual Channels

Virtual Channels are used to identify the Radar Raw Science Telemetry Data (RRST) collected on the spacecraft's Solid State Recorder (SSR) and returned via NASA ground stations. The following table identifies the L-SAR and S-SAR data Virtual Channel Identifiers (VCID). The VCID only applies to the RRST raw product filenames. See section 3 and [AD4] for further details.

Table 2–2 L-SAR Virtual Channels

VCID	Sub-Type	Input Description
8	H Pol (0)	L-SAR Urgent Response H pol
9	H Pol (0)	L-SAR Urgent Response H pol
12	V Pol (1)	L-SAR Urgent Response V pol
13	V Pol (1)	L-SAR Urgent Response V pol
20	Retransmitted (1)	Any ground requested SAR data
21	Retransmitted (1)	Any ground requested SAR data
24	H Pol (0)	L-SAR Nominal H pol
25	H Pol (0)	L-SAR Nominal H pol
28	V Pol (1)	L-SAR Nominal V pol
29	V Pol (1)	L-SAR Nominal V pol

Table 2–3 S-SAR Virtual Channels

VCID	Sub-Type	Input Description
32	H Pol 1	S-SAR Urgent Response H pol 1
33	H Pol 1	S-SAR Urgent Response H pol 1
34	V Pol 2	S-SAR Urgent Response V pol 2
35	V Pol 2	S-SAR Urgent Response V pol 2
36	V Pol 1	S-SAR Urgent Response V pol 1
37	V Pol 1	S-SAR Urgent Response V pol 1
38	H Pol 2	S-SAR Urgent Response H pol 2
39	H Pol 2	S-SAR Urgent Response H pol 2
44	Retransmitted (1)	Any ground requested SAR data
45	Retransmitted (1)	Any ground requested SAR data
48	H Pol 1	S-SAR Nominal H pol 1
49	H Pol 1	S-SAR Nominal H pol 1
50	V Pol 2	S-SAR Nominal V pol 2
51	V Pol 2	S-SAR Nominal V pol 2
52	V Pol 1	S-SAR Nominal V pol 1
53	V Pol 1	S-SAR Nominal V pol 1
54	H Pol 2	S-SAR Nominal H pol 2
55	H Pol 2	S-SAR Nominal H pol 2

Table 2–4 Cross Compatibility Virtual Channels

VCID	Sub-Type	Input Description
5,6,7 or 8,9,10	N/A	Stream of one or more PDS Engineering, L-SAR, and S-SAR data, no distinction between H and V data
5,6,7 or 8,9,10	N/A	Stream of one or more PDS Engineering, L-SAR, and S-SAR data, no distinction between H and V data

3 File Naming Convention per Product type

NOTE: Items in bold are valid values for a field. Italicized items indicate a field that is replaced with a value.

3.1 QA and Browse Products

Quality Assurance (QA) products will be produced for the L0A to L2 products. The QA products will be a combination of reports, statistics and/or browse images. The filenames for the QA products are identified in the following tables.

The L0A RRST product identified in Section 3.2 has a QA report product.

Output Content	File Extension	Filename Format
Summary of corrupt packets and gaps	.bin.qa	<product name>.bin.qa

Table 3-1 File naming convention for L0A QA product

The L0B RRSD product identified in Section 3.4 has a QA report product.

Output Content	File Extension	Filename Format
Graphical Summary	.pdf	<product name>_QA_REPORT.pdf

Table 3-2 File naming convention for L0B QA product

Each NISAR L1/L2 product identified in Section 3.7 and Section 3.8 will contain a standard set of QA and browse image outputs generated.

Output Content	File Extension	Filename Format
Graphical Summary	.pdf	<product name>_QA_REPORT.pdf
Statistics Summary	.h5	<product name>_QA_STATS.h5
Browse image	.png	<product name>.png
Geolocation (for browse image)	.kml	<product name>.kml
Pass/Fail checks	.csv	<product name>_QA_SUMMARY.csv

Table 3-3 File naming convention for QA and Browse product

Each NISAR L3 product identified in Section 3.8 will contain statistics summary product.

Output Content	File Extension	Filename Format
Statistics Summary	.h5	<product name>_QA_STATS.h5

Table 3-4 File naming convention for statistics summary product

3.2 *RRST - Radar Raw Science Telemetry*

Syntax:

NISAR_IL_PROD_VCID_StartDateTime_EndDateTime_CRID_LOC_CTR.ext

Where:

- *NISAR* – 5 char for mission (static): **NISAR**
- *I* – 1 char for Instrument: **L** for L-SAR, **S** for S-SAR
- *L* – 1 char for Processing Level: **0**
- *PROD* – 4 chars for Product Identifier: **RRST**
- *VCID* – 4 chars for Virtual Channel Identifier
 - **VC** – static, 2 chars
 - **ID** – 2 chars, see Table 2–2 L-SAR Virtual Channels and Table 2–3 S-SAR Virtual Channels
- *StartDateTime* – 15 chars for Earth Received Time (ERT) as YYYYMMDDTHHMMSS (UTC)
- *EndDateTime* – 15 chars for Earth Received Time (ERT) as YYYYMMDDTHHMMSS (UTC)
- *CRID* – 6 chars for Composite Release Identifier
 - Format of EPMMmm See section 4.1.
- *LOC* – 1 char to represent the location of the Science Data System. **J** for JPL, recommends **I** for ISRO. See section 4.6
- *CTR* – 3 chars for Product Counter (zero padded). See section 4.4.
- *EXT* – 3 chars for Extension: **bin**

NOTES:

- 8 spacing characters: 7 underscores plus one period
- Total number of characters: **67** including the extension

Nominal Examples:

NISAR_L0_RRST_VC24_20220104T182346_20220104T182619_P01101_J_001.bin

NISAR_S0_RRST_VC32_20220104T182346_20220104T182619_P01101_J_001.bin

Cross Compatibility

NISAR_L0_RRST_VC05_20220104T182346_20220104T182619_P01101_J_001.bin

NISAR_S0_RRST_VC08_20220104T182346_20220104T182619_P01101_J_001.bin

3.3 RTLM - Engineering

Syntax:

NISAR_E0_RTLM_VCID_STA_ANT_PASS_StartDateTime_CRID_LOC_CTR.ext

Where:

- *VCID* – 4 chars for Virtual Channel Identifier
 - VC – static, 2 chars
 - ID – 02 for data collected from 5, 6, 7, 03 for data collected from 8, 9, 10
- STA and ANT will only be 6 characters combined, without underscore.
 - STA – 2 or 3 character station identifier (Only PA is 2 characters)
 - ANT – 3 or 4 character antenna identifier. (Only PA11 is 4 characters)
- Pass – 5-digit pass identifier
- *StartDateTime* – 23 chars for Earth Received Time (ERT) as YYYYDOYTHHMMSSffffff (UTC) (ffffff is microseconds)
- *CRID* – 6 chars for Composite Release Identifier
 - Format of EPMMmm. See section 4.1
- *LOC* – 1 char to represent the location of the Science Data System. J for JPL, recommends I for ISRO. See section 4.6
- *CTR* – 3 chars for Product Counter (zero padded). See section 4.4
- *EXT* – 3 chars for Extension: **bin**

NOTES:

- 11 spacing characters: 10 underscores plus one period
- Total number of characters: **73** including the extension
- StartDateTime is pulled from input filename; adopting NSN convention with 9 digits for microseconds

Example:

NISAR_E0_RTLM_VC02_ASF_AS5_00002_2022287T155657111111000_D00001_J_001.
bin

3.4 RRSD – Radar Raw Signal Data

Syntax:

NISAR_IL_PT_PROD_CYL_REL_P_RMDE_StartDateTime_EndDateTime_CRID_A_LOC_CTR.ext

Where:

- NISAR – 5 char for mission (static): **NISAR**
- *I* – 1 char for Instrument: **L** for L-SAR, **S** for S-SAR
- *L* – 1 char for Level: **0**
- *PT* – 2 char for Processing Type:
 - **PR** – Production
 - **UR** – Urgent Response
- *PROD* – 4 chars for Product ID: **RRSD**
- *CYL* – 3 chars for CycLe number in the mission, each cycle represents 12 days, zero padded, starting at 001. [RD1]
- *REL* – 3 chars for RELative orbit track number within a cycle, resets to 1 with a cycle number increment, zero padded. Valid values: 001-173. [RD1]
- *P* – 1 char for direction of movement of the satellite at the time of imaging [RD1]:
 - **A** for Ascending
 - **D** for Descending
- *RMDE* – 4 char:
 - 3 char for Radar Configuration Mode
 - 1 char for Radar Processing Mode: **S** for Single Mode or **M** for Mixed Mode
- *StartDateTime* – 15 chars for Radar Start Time of the data contained in the file as YYYYMMDDTHHMMSS
- *EndDateTime* – 15 chars for Radar End Time of the data contained in the file as YYYYMMDDTHHMMSS
- *CRID* – 6 chars for Composite Release Identifier
 - Format of EPMMmm. See section 4.1
- *A* – 1 char for Product Accuracy or Fidelity. See section 4.2
 - **T** – indicates the L0B uses the Science Telemetry HST/DRT XYZ fields instead of an orbit ephemeris file
 - **P, M, N, or F**- Product Accuracy or Fidelity of the Orbit Ephermis and Radar Pointing (P: Precise, M: Medium, N: Near-Reltime, F: Forecast)
 - **X** – indicates a manually generated special request version of the OE (XOE) was used
- *LOC* – 1 char to represent the location of the Science Data System. J for JPL, recommends I for ISRO. See section 4.6
- *CTR* – 3 chars for Product Counter (zero padded). See section 4.4.
- *EXT* – 1 to n chars for Extension: **h5, met, log**

NOTES:

- **14** spacing chars: 13 underscores plus one period
- Total number of chars: **78** excluding the extension

Example:

NISAR_L0_PR_RRSD_001_005_A_066S_20220104T182346_20220104T183426_P01101_F_J_001.h5

3.5 CRSD – Calibration Raw Signal Data

Syntax:

NISAR_IL_PT_PROD_CYL_REL_P_StartDateTime_EndDateTime_CRID_LOC_CTR.ext

Where:

- NISAR – 5 char for mission (static): **NISAR**
- *I* – 1 char for Instrument: **L** for L-SAR, **S** for S-SA
- *L* – 1 char for Level: **0**
- *PT* – 2 char for Processing Type:
 - **PR** – Production
 - **UR** – Urgent Response
- *PROD* – 4 chars for Product ID: **CRSD**
- *CYL* – 3 chars for CycLe number in the mission, each cycle represents 12 days, zero padded, starting at 001. [RD1]
- *REL* – 3 chars for RELative orbit track number within a cycle, resets to 1 with a cycle number increment, zero padded. Valid values: 001-173. [RD1]
- *P* – 1 char for direction of movement of the satellite at the time of imaging [RD1]:
 - **A** for Ascending
 - **D** for Descending
- *StartDateTime* – 15 chars for Radar Start Time of the data contained in the file as YYYYMMDDTHHMMSS from Pre-take
- *EndDateTime* – 15 chars for Radar End Time of the data contained in the file as YYYYMMDDTHHMMSS from Post-take
- *CRID* – 6 chars for Composite Release Identifier
 - Format of EPMMmm. See section 4.1
- *LOC* – 1 char to represent the location of the Science Data System. **J** for JPL, recommends **I** for ISRO. See section 4.6
- *CTR* – 3 chars for Product Counter (zero padded). See section 4.4.
- *EXT* – 2 chars for Extension: **h5**

NOTES:

- **11** spacing chars: 10 underscores plus one period
- Total number of chars: **71** excluding the extension

Example:

NISAR_L0_PR_CRSD_001_005_A_20220104T182346_20220104T183426_P01101_J_001.h5

3.6 *HST_DRT – HST/DRT from Science Telemetry*

Syntax:

NISAR_IL_PT_PROD_CYL_REL_P_StartDateTime_EndDateTime_CRID_LOC_CT
R.ext

Where:

- NISAR – 5 char for mission (static): **NISAR**
- *I* – 1 char for Instrument: **L** for L-SAR, **S** for S-SA
- *L* – 1 char for Level: **0**
- *PT* – 2 char for Processing Type:
 - **PR** – Production
 - **UR** – Urgent Response
- *PROD* – 7 chars for Product ID: **HST_DRT**
- *CYL* – 3 chars for CycLe number in the mission, each cycle represents 12 days, zero padded, starting at 001. [RD1]
- *REL* – 3 chars for RELative orbit track number within a cycle, resets to 1 with a cycle number increment, zero padded. Valid values: 001-173. [RD1]
- *P* – 1 char for direction of movement of the satellite at the time of imaging [RD1]:
 - **A** for Ascending
 - **D** for Descending
- *StartDateTime* – 15 chars for Radar Start Time of the data contained in the file as YYYYMMDDTHHMMSS – from pre-take
- *EndDateTime* – 15 chars for Radar End Time of the data contained in the file as YYYYMMDDTHHMMSS - from post-take
- *CRID* – 6 chars for Composite Release Identifier
 - Format of EPMMmm. See section 4.1
- *LOC* – 1 char to represent the location of the Science Data System. **J** for JPL, recommends **I** for ISRO. See section 4.6
- *CTR* – 3 chars for Product Counter (zero padded). See section 4.4.
- *EXT* – 3 chars for Extension: **bin**

NOTES:

- **12** spacing chars: 11 underscores plus one period
- Total number of chars: **74** excluding the extension

Example:

NISAR_L0_PR_HST_DRT_001_005_A_20220104T182346_20220104T183426_P01101_J_001.bin

3.7 RSLC, GSLC, GCOV, SME2

Syntax:

NISAR_IL_PT_PROD_CYL_REL_P_FRM_MODE_POLE_S_StartDateTime_EndDateTime_CRID_A_C_LOC_CTR.EXT

Where:

- NISAR – 5 char for mission: **NISAR**
- *I* – 1 char for Instrument: **L** for L-SAR, **S** for S-SAR
- *L* – 1 char for Level: **1** or **2** or **3**
- *PT* – 2 char for Processing Type:
 - **PR** – Production
 - **UR** – Urgent Response
 - **OD** – Science On-Demand
- *PROD* – 4 chars for Product Identifier: **RSLC, GSLC, GCOV, SME2**
- *CYL* – 3 chars for CycLe number in the mission, each cycle represents 12 days, zero padded, starting at 001. [RD1]
- *REL* – 3 chars for RELative orbit track number within a cycle, resets to 1 with a cycle number increment, zero padded. Valid values: 001-173. [RD1]
- *P* – 1 char for direction of movement of the satellite at the time of imaging [RD1]:
 - **A** for Ascending
 - **D** for Descending
- *FRM* – 3 chars for track frame number, a segment of an orbital track corresponding to the product, zero padded Valid Values: 001-176 on each track. See sec 4.5
- *MODE* – 4 chars for Bandwidth Mode Code of Primary and Secondary Bands:
 - **40, 20, 77, 05, or 00** (only if the secondary band is missing)
- *POLE* – 4 chars for Polarization of the data for the primary and secondary bands. Each band uses a two character code among the following:
 - **SH** = HH – Single Polarity (H transmit and receive)
 - **SV** = VV – Single Polarity (V transmit and receive)
 - **DH** = HH/HV – Dual Polarity (H transmit)
 - **DV** = VV/VH – Dual Polarity (V transmit)
 - **CL** = LH/LV – Compact Polarity (Left transmit)
 - **CR** = RH/RV – Compact Polarity (Right transmit)
 - **QP** = HH/HV/VV/VH – Quad Polarity
 - **NA** if band does not exist
 - **XX** = Indicates an off-nominal set of polarizations as might happen due to downlink failures. User should refer to the metadata to identify actual content. (One example is when the H-receive polarizations of a QP acquisition are unavailable. In that case the product would contain only HV and VV.)

For example, a “quasi-quad” polarization mode would be noted **DHDV** while a “quasi-dual” polarization mode would be noted **SHSV**.
- **S** – 1 char for source of data for the product
 - **A** = Acquired source of the observation, single mode
 - **M** = Mixed source of observations, mixed mode
- *StartDateTime* – 15 chars for Radar Start Time of the data processed as zero Doppler contained in the file as YYYYMMDDTHHMMSS, UTC

- *EndDateTime* – 15 chars for Radar End Time of the data processed as zero Doppler contained in the file as YYYYMMDDTHHMMSS, UTC
- *CRID* – 6 chars for Composite Release Identifier
 - Format of EPMMmm. See section 4.1
- *A* – 1 char for Product Accuracy or Fidelity of the Orbit Ephermis and Radar Pointing:
 - **P, M, N, F or X**, See section 4.2
- *C* – 1 char as Coverage Indicator: **F** for Full or **P** for Partial. See section 4.3
- *LOC* – 1 char to represent the location of the Science Data System. J for JPL, recommends I for ISRO. See section 4.6
- *CTR* – 3 chars for Product Counter (zero padded). See section 4.4
- *EXT* – 1 to n chars for Extension: **h5, met, log**

NOTES:

- 17 spacing characters: 16 for underscores plus one period
- Total number of characters: **91** excluding extension

Examples:

```
NISAR_L1_PR_RSLC_001_005_A_219_4020_SVNA_A_20220104T182346_20220104T183426_P01101_M_F_J_001.h5
NISAR_L2_PR_GSLC_001_005_A_219_4020_SVNA_A_20220104T182346_20220104T183426_P01101_M_F_J_001.h5
NISAR_L2_PR_GCOV_001_005_A_219_4020_SHNA_A_20220104T182346_20220104T183426_P01101_M_P_J_001.h5
NISAR_L3_PR_SME2_001_005_A_219_4020_DHDV_M_20220104T182346_20220104T183426_P01101_M_P_J_001.h5
NISAR_L3_PR_SME2_001_005_A_219_4020_SHXX_M_20220104T182346_20220104T183426_P01101_M_P_J_001.h5
```

3.8 RIFG, RUNW, GUNW, ROFF, GOFF

Syntax:

*NISAR_IL_PT_PROD_CYL_REL_P_FRM_SCY_MODE_PO_RefStartTime_RefEndTime_
SecStartTime_SecEndTime_CRID_A_C_LOC_CTR.EXT*

CRID_A_C_CTR.EXT

Where:

- *NISAR* – 5 char for mission: **NISAR**
- *I* – 1 char for Instrument: **L** for L-SAR, **S** for S-SAR
- *L* – 1 char for Processing Level: **1** or **2**
- *T* – 2 char for Processing Type:
 - **PR** – Production
 - **UR** – Urgent Response
 - **OD** – Science On-Demand
- *PROD* – 4 chars for Product ID: **RIFG, RUNW, GUNW, ROFF, GOFF**
- *CYL* – 3 chars for CycLe number in the mission, each cycle represents 12 days, zero padded, starting at 001. [RD1]
- *REL* – 3 chars for RELative orbit track number within a cycle, resets to 1 with a cycle number increment, zero padded. Valid values: 001-173. [RD1]
- *P* – 1 char for direction of movement of the satellite at the time of imaging [RD1]:
 - **A** for Ascending
 - **D** for Descending
- *FRM* – 3 chars for track frame number, a segment of an orbital track corresponding to the product, zero padded. Valid Values: 001-176 on each track. See sec 4.5
- *SCY* – 3 char for the second CycLe number
- *MODE* – 4 chars for Bandwidth Mode Code of Primary and Secondary:
 - **40, 20, 77, 05, or 00** (only if the secondary band is missing)
- *PO* – 2 chars for Polarization:
 - where the polarization pair notation refers to the transmit and receive polarizations, respectively of the main band and the side band of the reference (e.g., HV refers to H transmit and V receive)
 - **SV** = VV – Single Polarity
 - **SH** = HH – Single Polarity
 - **DH**=HH/HV – Dual Polarity
 - **DV**=VV/VH – Dual Polarity
 - **CL** = LH/LV – Compact Polarity
 - **CR**=RH/RV – Compact Polarity
 - **QP**=HH/HV/VV/VH – Quad Polarity
 - **QH**=HH/HV + VV/VH – Quasi Quad Polarity
 - **QV**=VV/VH + HH/HV – Quasi Quad Polarity
 - **QD**=HH/VV Quasi Dual Pole
 - **XX** = Indicates an off-nominal set of polarizations as might happen due to downlink failures. User should refer to the metadata to identify actual content. (One example is when the H-receive polarizations of a QP acquisition are unavailable. In that case the product would contain only HV and VV.)

- *RefStartDateTime* – 15 chars for the data from the reference listed cycle contained in the file as YYYYMMDDTHHMMSS, UTC
- *RefEndDateTime* – 15 chars for the data from the reference listed cycle contained in the file as YYYYMMDDTHHMMSS, UTC
- *SecStartDateTime* – 15 chars for the data from the secondary listed cycle contained in the file as YYYYMMDDTHHMMSS, UTC
- *SecEndDateTime* – 15 chars for the data from the secondary listed cycle contained in the file as YYYYMMDDTHHMMSS, UTC
- *CRID* – 6 chars for Composite Release Identifier
 - Format of EPMMmm. See section 4.1
- *A* – 1 char for Product Accuracy or Fidelity of the Orbit Ephermis and Radar Pointing:
 - **P, M, N, F or X**, See section 4.2
- *C* – 1 char as Coverage Indicator: **F** for Full or **P** for Partial. See section 4.3
- *LOC* – 1 char to represent the location of the Science Data System. J for JPL, recommends I for ISRO. See section 4.6
- *CTR* – 3 digit number for Product Counter, zero padded . See section 4.4
- *EXT* – 1 to 4 chars for Extension: **h5, met, log**

NOTES:

- 19 spacing characters: 18 for underscores plus one period
- Total number of chars: **123** excluding extension

Examples:

```

NISAR_L1_PR_RIFG_001_005_A_219_220_4020_QP_20220116T182346_20220116T182539_20220104T182346_20
220104T182539_P01101_M_F_J_001.h5
NISAR_L1_PR_RUNW_001_005_A_219_220_4020_QP_20220116T182346_20220116T182539_20220104T182346_20
220104T182539_P01101_M_P_J_001.h5
NISAR_L2_PR_GUNW_001_005_A_219_220_4020_QP_20220116T182346_20220116T182539_20220104T182346_20
220104T182539_P01101_M_F_J_001.h5
NISAR_L1_PR_ROFF_001_005_A_219_220_4020_QP_20220116T182346_20220116T182539_20220104T182346_20
220104T182539_P01101_M_P_J_001.h5
NISAR_L2_PR_GOFF_001_005_A_219_220_4020_QP_20220116T182346_20220116T182539_20220104T182346_20
220104T182539_P01101_M_F_J_001.h5
NISAR_L2_PR_GOFF_001_005_A_219_220_4020_XX_20220116T182346_20220116T182539_20220104T182346_20
220104T182539_P01101_M_F_J_001.h5

```

4 Definitions

4.1 CRID (*Composite Release Identifier*)

- Definition: A version identifier to document the Product Generation Executable (PGE) algorithms and data system used to create a product. Values monotonically increase. Coordinated by the SDS System Engineer (SE).
- Format: **EMMmmp**
 - **E**: Environment
 - Definition: The environment or venue the product was produced on.
 - Format: Single character
 - A – ADT
 - D – Development
 - P – Production
 - T – Integration and Test (I&T)
 - S – Science On-Demand
 - R - Reprocessing
 - **MM**: Major Release
 - Definition: Indicates a major change in a product. The Major Release indicator is a composite of all algorithms versions and may include some PGE updates and selection rules. It signifies a major change to one or more algorithms or processing approach that impacts the data content. Individual algorithm versions will be retained in the product metadata. Determining the quality of a product is a coordinated effort with the development and science team and is captured in an external file that tracks all versions of the system for a CRID and communicated to the users. The software may not be backwards compatible.[AD3]
 - Format: Two numeric digits
 - Monotonically increases
 - Valid Values: [0...99]
 - **m**: Minor Release
 - Definition: Indicates a *minor* change in a product or any change in the data system. The Minor Release signifies a minor change to the data system other than those that qualify as a Major update including minor algorithm changes like bug fixes that do not have significant bearing on the science content of the products, but may have small functional updates. Minor version may nor may not be backwards compatible manner.
 - Format: Two numeric digit
 - Monotonically increases

- Valid values: [0-9]
- Reset to zero when Major Release is updated
- **p**: Patch Release
 - Definition: Indicates a patch update to a release. This signifies an update after the software has gone through the System Deployment Review to provide a fix to a critical bug. Patch version is incremented for backwards compatible bug fixes. Can also increment for an algorithm parameter update.
 - Format: One numeric digits
 - Monotonically increases
 - Valid Values: [0..9]
 - Reset to zero when Major Release or Minor Release is updated

4.2 Product Accuracy

- Definition: The *accuracy* or fidelity of the Orbit Ephemeris and Radar Pointing Attitude data used to produce the product indicated by “A” in the filename syntax. The value will be the minimum fidelity of the 2 inputs. For example, if MOE and PRP is used, the value will be “M”.
- Format: Single character
 - **P**: Precise accuracy based
 - Precise Orbit Ephemeris (POE) and Precise Radar Pointing (PRP) used in processing
 - **M**: Medium accuracy based,
 - Medium Orbit Ephemeris (MOE) and Precise Radar Pointing (PRP) used in processing
 - **N**: Near Real-Time accuracy based,
 - Near real-time Orbit Ephemeris (NOE) and Near real-time Radar Pointing (NRP) used in processing
 - **F**: Forecast accuracy based,
 - Forecast Orbit Ephemeris (FEO) and Forecast Radar Pointing (FRP) used in processing
 - **T**: Telemetry accuracy based,
 - Values are from the Science Telemetry HST/DRT fields; used for LOB product processing
 - **X**: Special request accuracy based,
 - Values from a manually generated version, rarely done

4.3 *Product Coverage*

The product Coverage field, contained in the L1-L3 products, indicates the coverage of a granule. The values are "F" for full coverage and "P" for partial coverage. Data collection is continuous over land, but between mode changes and file closures, data, of approximately 2 seconds, is lost. Therefore, if 75% of the granule is contained in the product, the coverage is considered to be a full product otherwise it will be marked as partial.

4.4 *Product Counter*

- Definition: *ProductCounter* is used to version data products generated multiple times from the same SDS venue deployed. The counter starts with 001 and increments for subsequent generation of the same granule of any particular product type. This versioning is valid within an SDS venue. It is reset to 001 upon deployment of a new CRID. Product Counter is referred to as CTR in the file naming conventions. The CTR will be incremented based on full file naming convention which includes the CRID.
 - Format: three-digit number, leading zero padded

4.5 *Cycle, Track, & Frame*

The science data collected can be uniquely identified by cycle, track and frame for level 1, level 2, and level 3 products. [AD3]

- **Repeat Cycle** – SAR data collected covering the globe with identical timings and geometry over a 12-day period, and repeated every 12 days.
- **Orbital Track** – A ground track pattern which lays down swaths on the globe in a non-contiguous order within the 12-day repeat cycle called an orbital track. There are 173 orbital tracks in 12 days for NISAR. Orbital tracks are referred as relative orbits in the file naming conventions (REL token).
- **Orbital Track Frame** – A 240 x240 km consistent and unique segment of a NISAR orbital track. There are 176 frames within a single NISAR orbital track. The NISAR specific track frames are defined by ADT in geoPackage format [RD2].

4.6 *Processing Location*

The L-SAR data maybe processed by different science data systems. Products produced by the JPL Science Data System shall be tagged with the letter 'J'. The products generated by other

locations are not governed by this document; however, JPL recommends that the letter 'I' to be used by products generated by the India Space Research Organisation (ISRO).

5 Acronyms:

ADT	Algorithm Development Team
ASF	Alaska Satellite Facility
COP	Coordinated Observation Plan
CRDS	Calibration from Raw Science Data
CRID	Composite Release ID
DAAC	Distributed Active Archive Center
EASE	Equal-Area Scalable Earth
FOE	Forecast Orbit Ephemeris
FRP	Forecast Radar Pointing
GDS	Ground Data System
GCOV	Geocoded Polarimetric COVariance
GOFF	Geocoded OFFset
GSLC	Geocoded Single Look Complex
GUNW	Geocoded UNWrapped Interferogram
HST/DRT	Health and Status Telemetry, Detailed Radar Telemetry
ISRO	Indian Space Research Organisation
I&T	Integration and Test
JPL	Jet Propulsion Laboratory
L-SAR	L-Band SAR
LRCLK	L-SAR Radar Clock
MLD	Multi Look Detected
MOE	Medium Orbit Ephemeris
MS	Mission System
NASA	National Aeronautics and Space Administration
NEN	Near Earth Network
NISAR	NASA ISRO SAR
NOE	Near Real-Time Orbit Ephemeris
NRP	Near Real-Time Radar Pointing
OASIS	Offline Algorithm Staging and Input System
PCM	Processing Control and Data Management
PGE	Product Generation Executable
POE	Precise Orbit Ephemeris
PRP	Precise Radar Pointing
QA	Quality Assurance
RCOV	Range-Doppler Polarimetric COVariance
RINT	Range-Doppler INTerferogram
ROFF	Range-Doppler OFFset
RRST	Radar Raw Signal Telemetry
RRSD	Radar Raw Signal Data
RSLC	Range-Doppler Single Look Complex
RTLTM	Radar Telemetry for Engineering

RUNW	Range-Doppler UNWrapped Interferogram
S-SAR	S-Band SAR
SAR	Synthetic Aperture Radar
SE	Systems Engineer
SDP	Standard Data Product
SDS	Science Data System
SIF	SSR InterFace
SLC	Single Look Complex
SME2	Soil Moisture based on a 200-meter global EASE Grid projection
SMAP	Soil Moisture Active Passive
SSR	Solid State Recorder
TBC	To Be Confirmed
TBD	To Be Determined
UTC	Coordinated Universal Time
VCID	Virtual Channel ID