

CSIRO's NovaSAR-1 Operational Updates and its CEOS-ARD NRB Access

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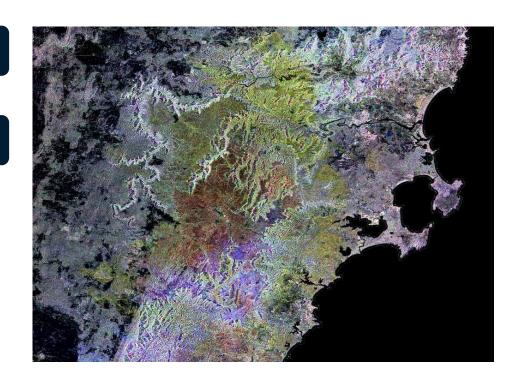
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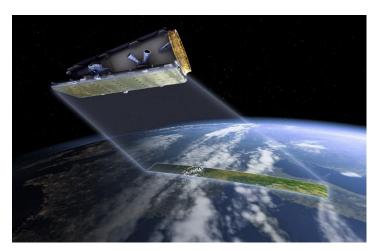
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NovaSAR-1

- a low-cost SAR technology demonstrator by Surrey Satellite Technology Ltd, UK (SSTL), and Airbus DS, funded by the UK Space Agency



(Image credit: SSTL)

CSIRO acquired a 10% share in the acquisition and tasking capacity of this new satellite, providing the nation with a first-ever sovereign civilian EO satellite capability

Parameter	Value		
Imaging frequency band	3.1-3.3GHz (S-band)		
Antenna	Microstrip patch phased array (3m x 1m)		
No. of phase centers	18		
Peak RF power	1.8kW		
Polarisations	HH, HV, VV		
Imaging polarization	Single, dual, tri- or quad polar		
Design life	7 years		
Mass	<400kg		
Optimum orbit	583km		
Propulsion system	Xenon		
Payload duty cycle	2-4min per orbit		
Payload data memory	Up to 544GBytes		
Downlink rate	400Mbps		
TTC frequency band	S-band (2025-2110MHz, 2200-2290MHz)		
Downlink frequency band	X-band (8.025-8.4GHz)		

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Satellite Status

SSTL are happy with the current health and are proposing a 3-year extension to the contract which currently runs until Dec 2026.

Calibration is ongoing with annual campaigns

Orbital maintenance manoeuvres currently occur weekly due to reaching a solar maximum mid 2024 and to sync with the S-1 satellite





Image Tasking Requests

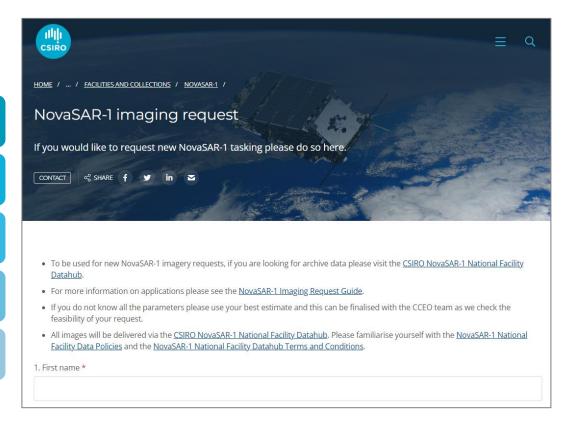
Always online form replaces the OPAL structure of open and closed submission periods

Requests are assessed on their feasibility and accepted, adjusted or rejected

Allows for faster response time

Fits better with other factors i.e. project timelines, budget cutoffs

Reviewed periodically by the team



https://www.csiro.au/en/about/facilities-collections/NovaSAR-1/image-request https://research.csiro.au/cceo/novasar-1-imaging-request-guide/



Capacity Share Usage

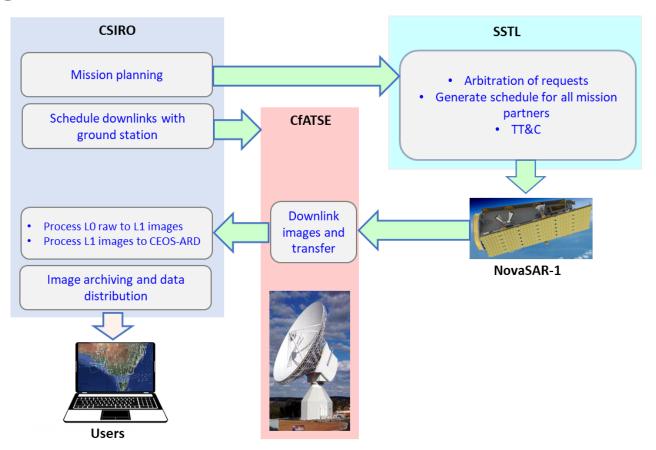
Image Type	Average % of daily allocation Dec 22 – Nov 23
CSIRO activities including TERN and Calibration	16%
Science projects	48%
Background	31%
Disaster	1%

Daily allocation is split across the following four categories in order of priority:

- 1. Disaster acquisitions (Ad-hoc)
- 2. Merit-based Science projects
- 3. CSIRO activities
- 4. Background mapping



Ground Segment - Mechanism





Downlinks



Centre for Appropriate Technology Satellite Enterprises (CfATSE) operate the ViaSat Alice Springs antenna

- Australia's first and only Aboriginal owned and operated space service provider
- Testing occurred in March and April 2022
- PR announcement followed operational acceptance
- Contract renewal underway
- Analysis of need for ARQ

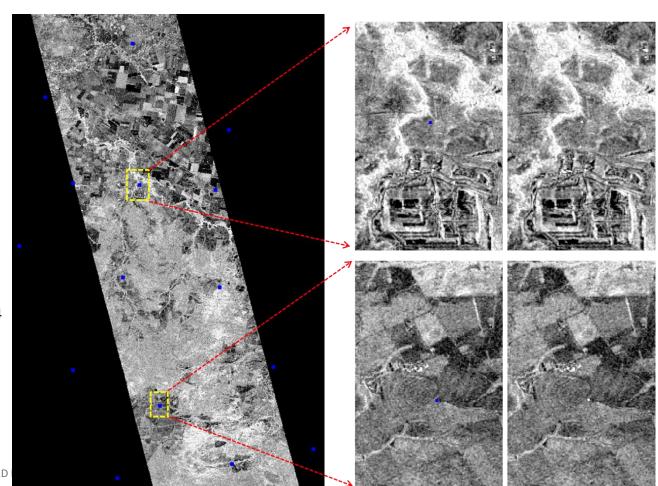


Cal/Val

Cal Sites:
QCRA - Queensland Corner
Reflector Array
WA Geodetic Station
Future possible in Antarctica

Partial corner reflectors of QCRA are shown as blue dots on top of HH image of

NovaSAR_01_33068_scd_220418_00564 4_HH_HV.zip (left), two zoomed-in subsets for the left yellow dashed-line rectangles with the blue dot of a corner reflector (middle) and the zoomed-in subsets for the left yellow dashed-line rectangles without the corner reflector location mark (right).



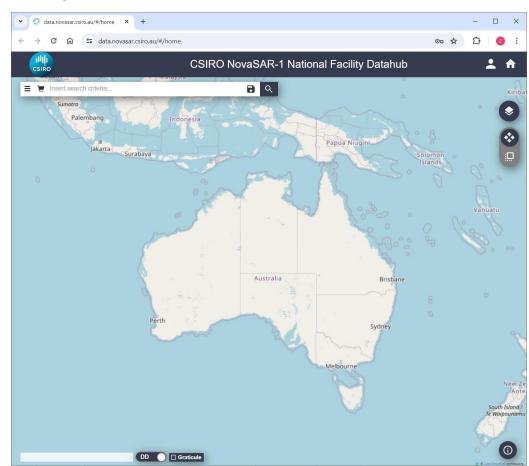
NovaSAR-1 National Facility (NNF) Datahub

The CSIRO NovaSAR-1 catalogue is available for free download online

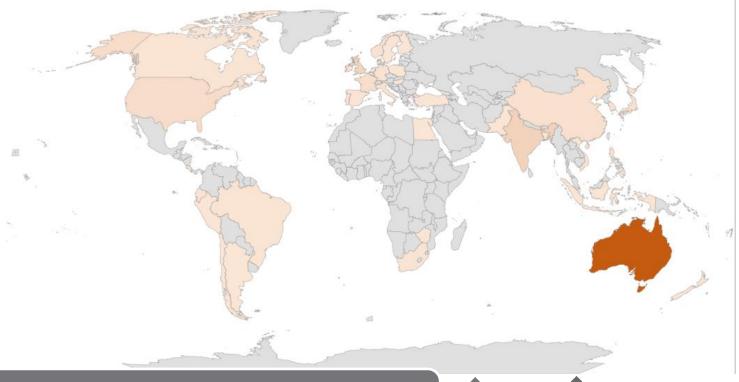
4800+ L1 products

2680+ CEOS-ARD NRB products (currently for acquisitions in Australia only)

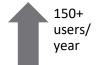
https://data.novasar.csiro.au/#/home

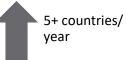


Datahub – User Locations



On 3rd April 2024: 596 users registered from across 49 countries. 348 of these are Australian



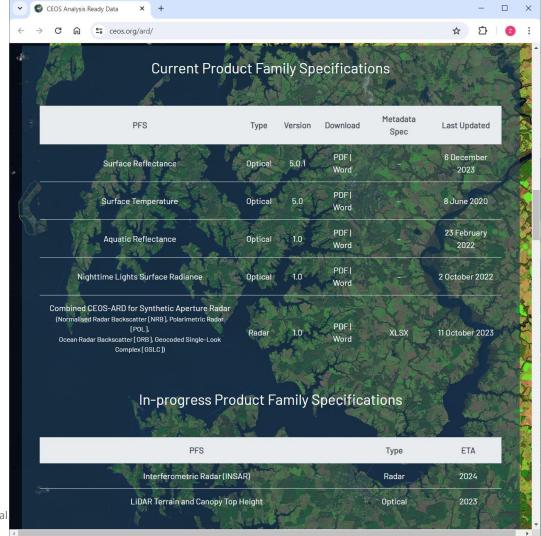




CEOS-ARD PFS

CEOS Analysis Ready Data (CEOS-ARD) are satellite data that have been processed to a minimum set of requirements and organized into a form that allows immediate analysis with a minimum of additional user effort and interoperability both through time and with other datasets.

CSIRO aims to process NovaSAR-1 source images to ARD products under the requirements of CEOS-ARD NRB (Normalised Radar Backscatter) PFS (Product Family Specifications) version 5.5.



NovaSAR-1 CEOS- ARD Status







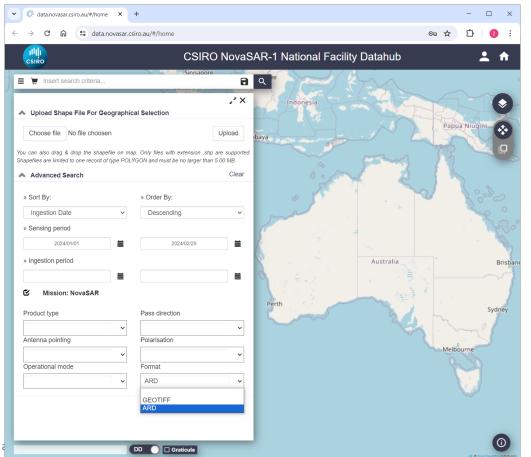


All archive NovaSAR-1
SCD (excluding
Maritime mode) and
GRD data acquired in
Australian region have
been processed into
ARDs

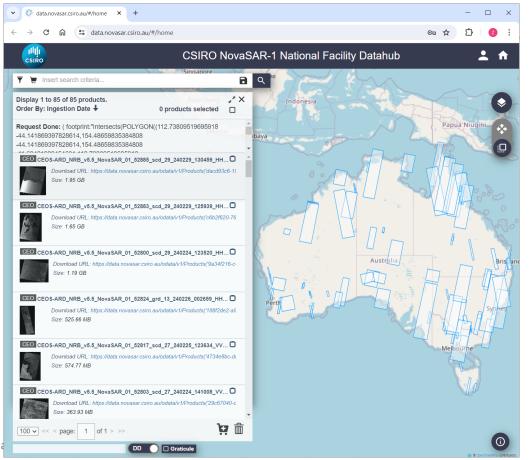
Submitted CSIRO selfassessment for CEOS-ARD NRB PFS v5.5 compliance review to CEOS in August 2023 CEOS Review results
were released on 5
October 2023: 14
CSIRO NovaSAR-1 NRB
products have been
evaluated as CEOSARD compliant at the
threshold level

On 21 March 2024, the processed archive completed ingestion to the datahub and the AWS processing was integrated into the NovaSAR-1 image processing chain

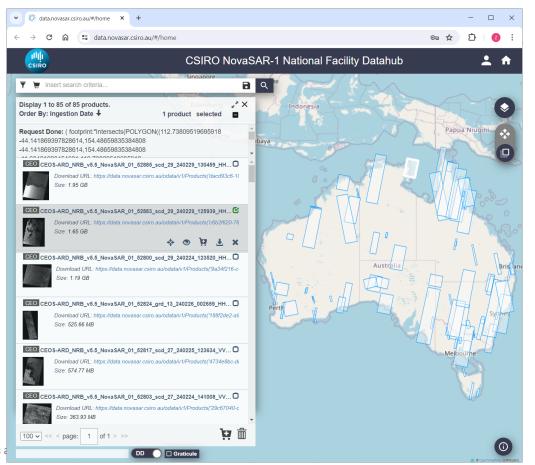
NovaSAR-1 CEOS-ARD compliance self-assessment reports, ARD samples & application demos can be found from previous LSI-VC-13 and 14 meetings



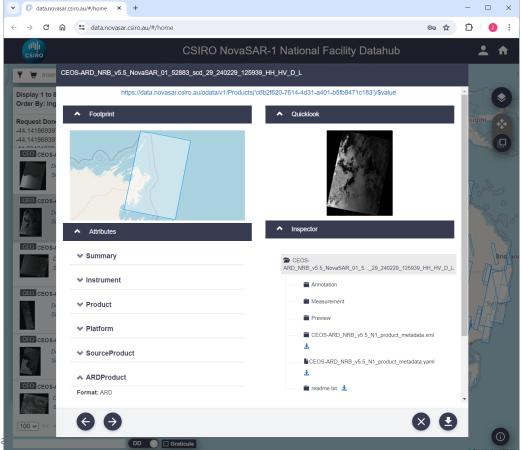




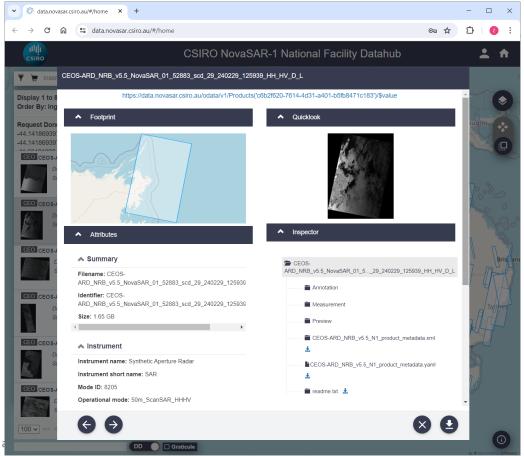




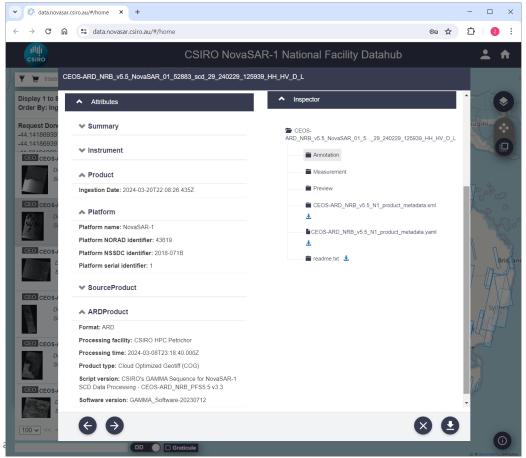




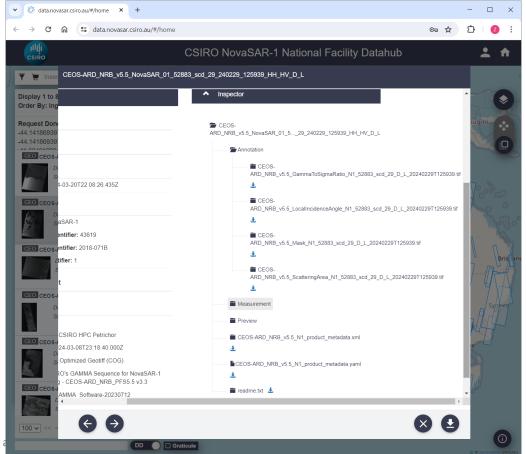




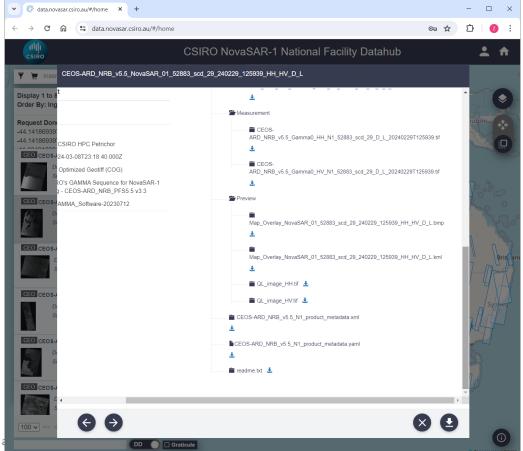




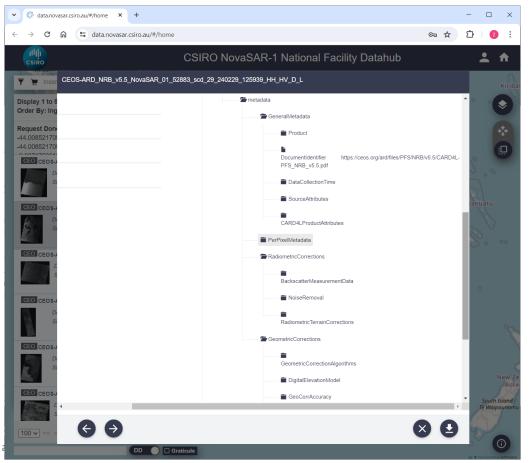














Access to Other Partners NovaSAR-1 data

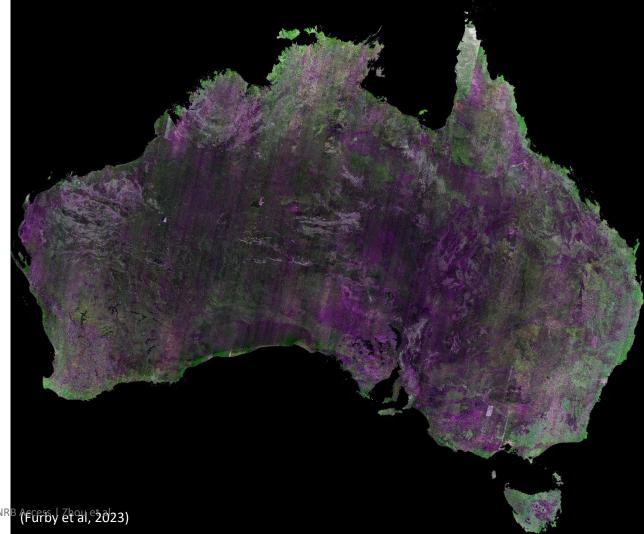
Acquisition Mode	Polarisation	Resolution (m)	Swath Width (km)	Incidence Angles	Number of Looks
Stripmap	Single: HH	6	20	16.0 - 25.38°	- 3 (1 range, 3 azimuth)
			13 - 20	21.29 - 31.20	
	Single: VV	6	20	16.0 - 25.38°	- 3 (1 range, 3 azimuth)
			13 - 20	21.29 - 31.20	
ScanSAR	Single: HH	20	100	15.0 - 24.660	- 4 (2 range, 2 azimuth)
			50	24.51 - 28.94°	
	Single: VV	20	100	15.0 - 24.66°	4 (2 range, 2 azimuth)
			50	24.51 - 28.94°	
	Single: HH	30	150	11.29 - 25.930	- 4 (2 range, 2 azimuth)
			55	27.35 - 32.01°	
	Single: VV	30	150	11.29 - 25.930	4 (2 range, 2 azimuth)
			55	27.35 - 32.01°	

- In Jan 2024 ESA shared a NovaSAR-1
 Announcement of Opportunity to use Airbus
 % share via the Third Party Mission (TPM)
 Programme
- Allows tasking over UK priority area and surrounding countries
- https://earth.esa.int/eogateway/catalog/nova
 sar-1-new-tasking



Current Status and Next Steps

- Expand availability of ARDs outside of Australia
- Include CSIRO share in ESA TPM offering
- Promote 2023 mosaic to highlight NovaSAR-1 coverage
- Impact Reporting



Impact Reporting



An impact study will be important when considering the SSTL extension proposal



Aligns with new Chief Executive focus



Please share any outputs using NovaSAR-1 data with novasarinfo@csiro.au

We'd love to know of any:

- Publications
- Workshops
- Conferences
- Reports
- Case studies
- etc



Thank you

Data61

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