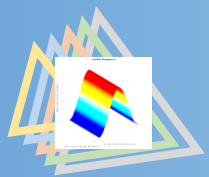
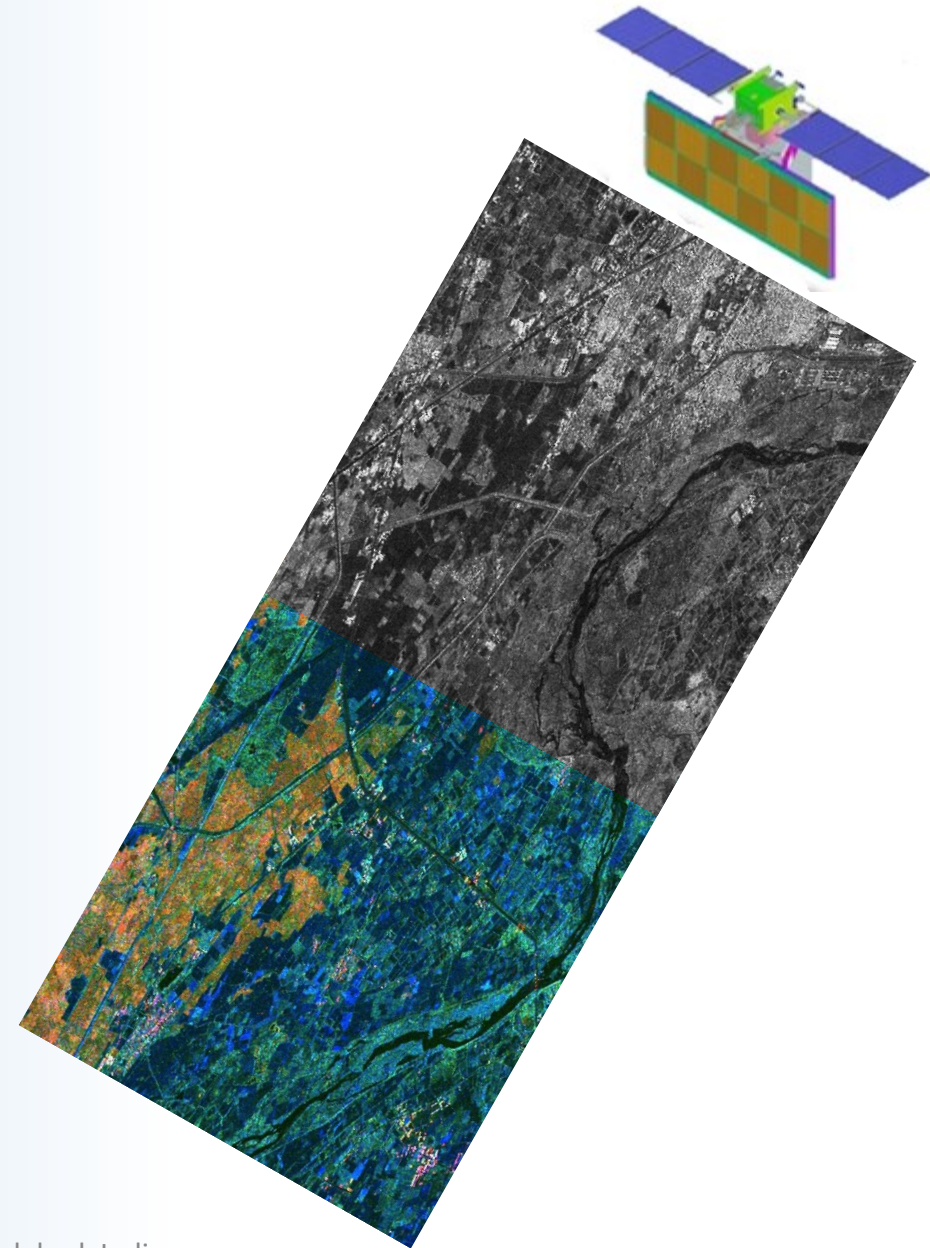


The development of the SARCalNet database and website

Muriel PINHEIRO^a, Antonio VALENTINO^b, Paolo Castracane^b

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bStarion for ESA, Via Galileo Galilei, 1, 00044 Frascati RM, Italy



ESA and Cal&Val standards: QA4EO & FRM

Calibration and validation (Cal/Val) activities are a **key component of an EO mission**, as it is the foundation for **Trustworthiness** for the mission data.

ESA/ESRIN is deeply engaged in the definition and implementation of generic cal/val approaches for the operations phase of several EO missions

Key elements are **continuous** application of **standard and harmonized** cal/val practices, which consider of **metrology** and **Fiducial Reference Measurements (FRM)**

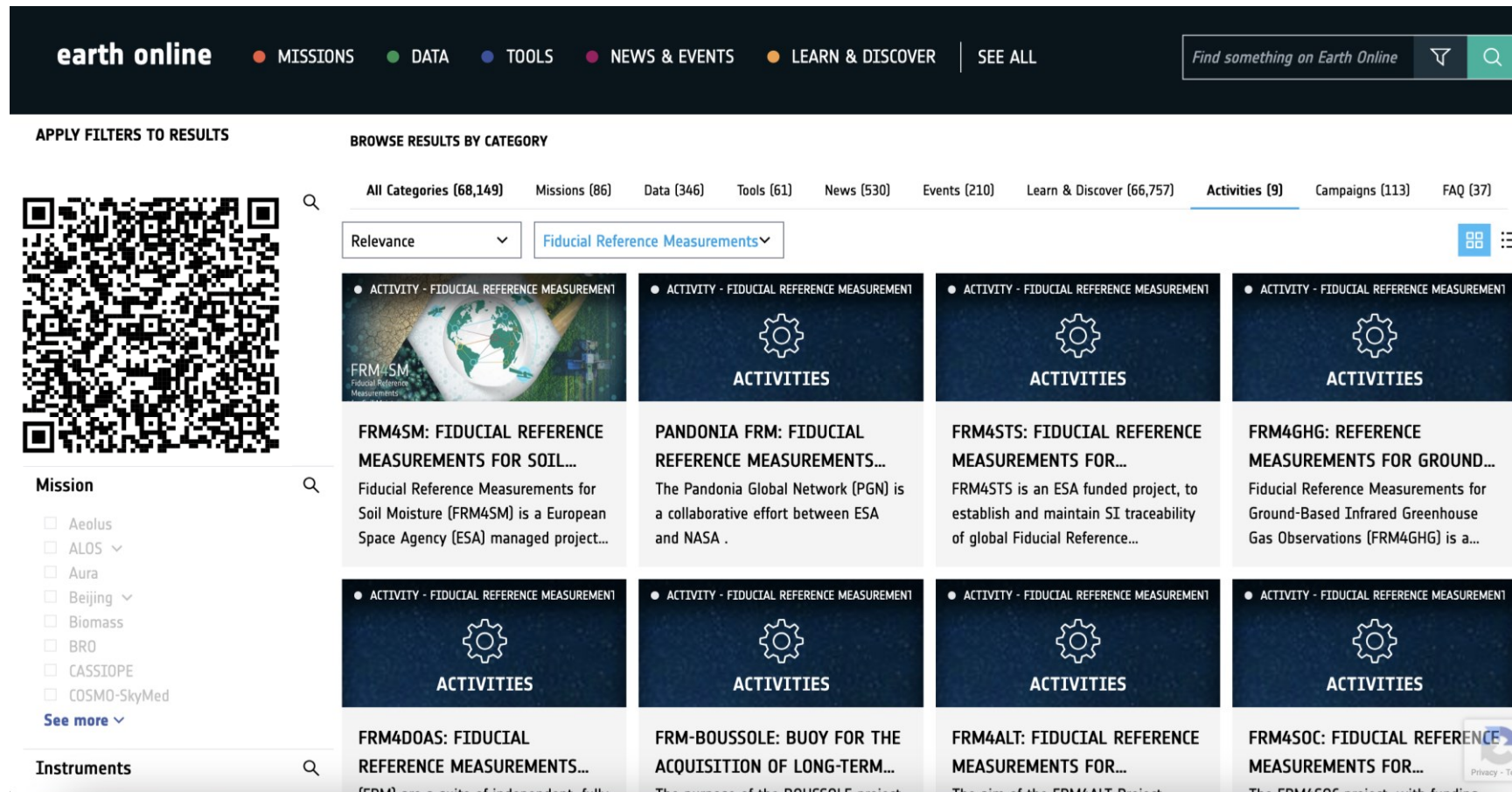


The screenshot shows the QA4EO website with a navigation menu (Home, About +, Documents, Tools, Case Studies, Training), a QR code, and the main title "Quality Assurance Framework for Earth Observation". Below the title is the tagline "QUALITY ASSURED DATA FOR EARTH OBSERVATION COMMUNITIES" and a GitHub icon. A paragraph describes QA4EO as a best practice framework endorsed by GEO, and a "Learn More" button is visible at the bottom.

QA4EO: framework for activities related to definition and application of metrology-based procedures for EO cal/val

ESA and Cal&Val standards: QA4EO & FRM

ESA has played a key role in the **FRM** concept definition and continues to put forward several activities dedicated to FRM consolidation and implementation



The screenshot shows the Earth Online website interface. At the top, there is a navigation bar with the 'earth online' logo and menu items: MISSIONS, DATA, TOOLS, NEWS & EVENTS, LEARN & DISCOVER, and SEE ALL. A search bar on the right contains the text 'Find something on Earth Online' and a magnifying glass icon.

Below the navigation bar, there are two main sections: 'APPLY FILTERS TO RESULTS' on the left and 'BROWSE RESULTS BY CATEGORY' on the right. The 'BROWSE RESULTS BY CATEGORY' section includes a search bar with 'Relevance' selected and a dropdown menu for 'Fiducial Reference Measurements'. Below this, there are several category links: All Categories (68,149), Missions (86), Data (346), Tools (61), News (530), Events (210), Learn & Discover (66,757), **Activities (9)**, Campaigns (113), and FAQ (37).

The main content area displays a grid of activity cards. Each card has a header 'ACTIVITY - FIDUCIAL REFERENCE MEASUREMENT' and a gear icon. The cards are titled as follows:

- FRM4SM: FIDUCIAL REFERENCE MEASUREMENTS FOR SOIL... (with a QR code to the left)
- PANDONIA FRM: FIDUCIAL REFERENCE MEASUREMENTS...
- FRM4STS: FIDUCIAL REFERENCE MEASUREMENTS FOR...
- FRM4GHG: REFERENCE MEASUREMENTS FOR GROUND...
- FRM4DOAS: FIDUCIAL REFERENCE MEASUREMENTS...
- FRM-BOUSSOLE: BUOY FOR THE ACQUISITION OF LONG-TERM...
- FRM4ALT: FIDUCIAL REFERENCE MEASUREMENTS FOR...
- FRM4SOC: FIDUCIAL REFERENCE MEASUREMENTS FOR...

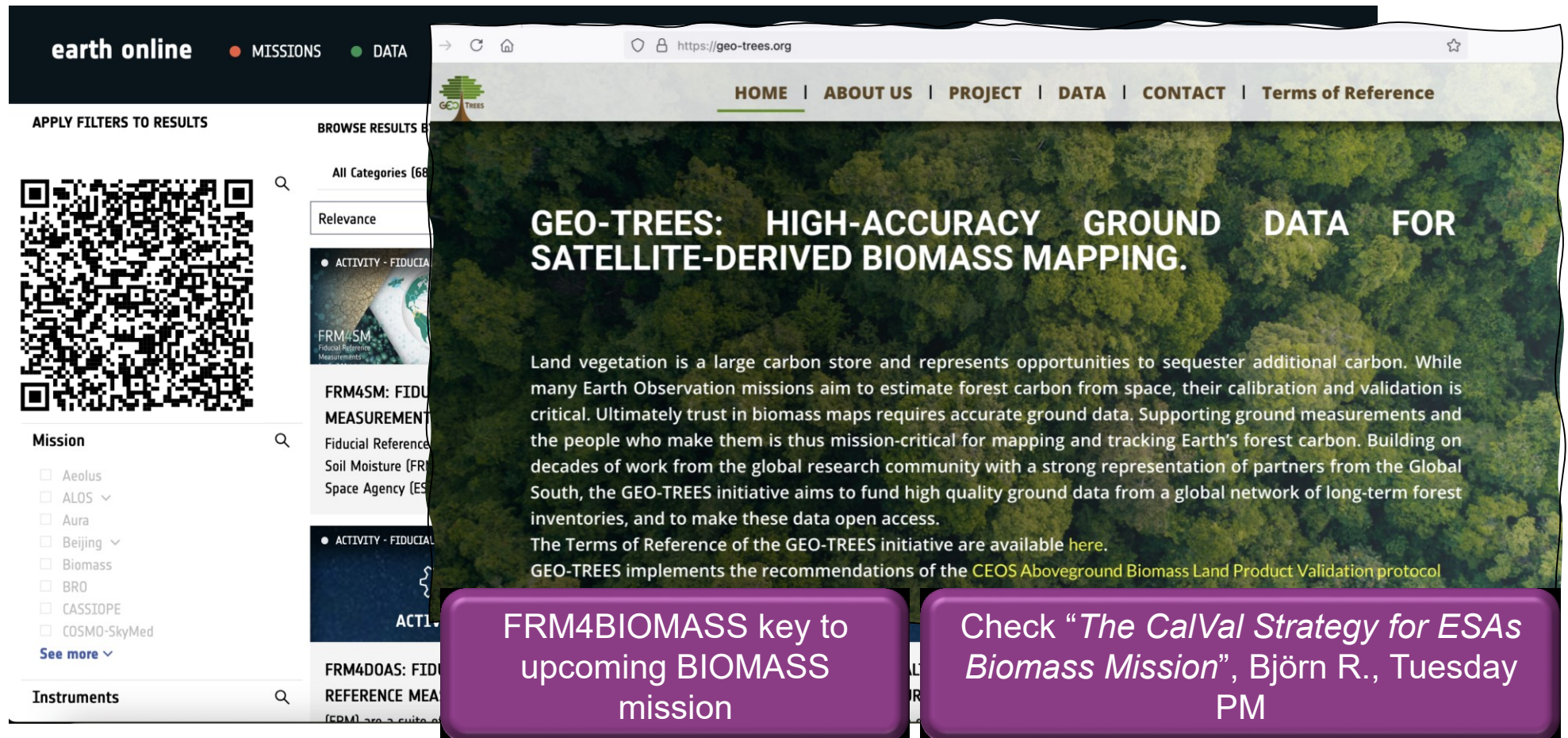
On the left side of the screenshot, there is a 'Mission' filter section with a search icon and a list of checkboxes:

- Aeolus
- ALOS
- Aura
- Beijing
- Biomass
- BRO
- CASIOPE
- COSMO-SkyMed
- [See more](#)

At the bottom left, there is an 'Instruments' filter section with a search icon. At the bottom right, there is a 'Privacy - Terms' link.

ESA and Cal&Val standards: QA4EO & FRM

ESA has played a key role in the **FRM** concept definition and continues to put forward several activities dedicated to FRM consolidation and implementation



The screenshot shows the GEO-TREES website interface. On the left, there's a search filter panel with sections for 'Mission' and 'Instruments'. The 'Mission' section includes checkboxes for Aeolus, ALOS, Aura, Beijing, Biomass, BRO, CASIOPE, and COSMO-SkyMed. The 'Instruments' section is partially visible. The main content area features a large header image of a forest with the text 'GEO-TREES: HIGH-ACCURACY GROUND DATA FOR SATELLITE-DERIVED BIOMASS MAPPING.' Below this, a paragraph explains the importance of ground data for forest carbon mapping and mentions the GEO-TREES initiative's goal to fund high-quality ground data. A purple callout box at the bottom left says 'FRM4BIOMASS key to upcoming BIOMASS mission'. Another purple callout box at the bottom right says 'Check "The CalVal Strategy for ESAs Biomass Mission", Björn R., Tuesday PM'. The website navigation bar includes links for HOME, ABOUT US, PROJECT, DATA, CONTACT, and Terms of Reference.

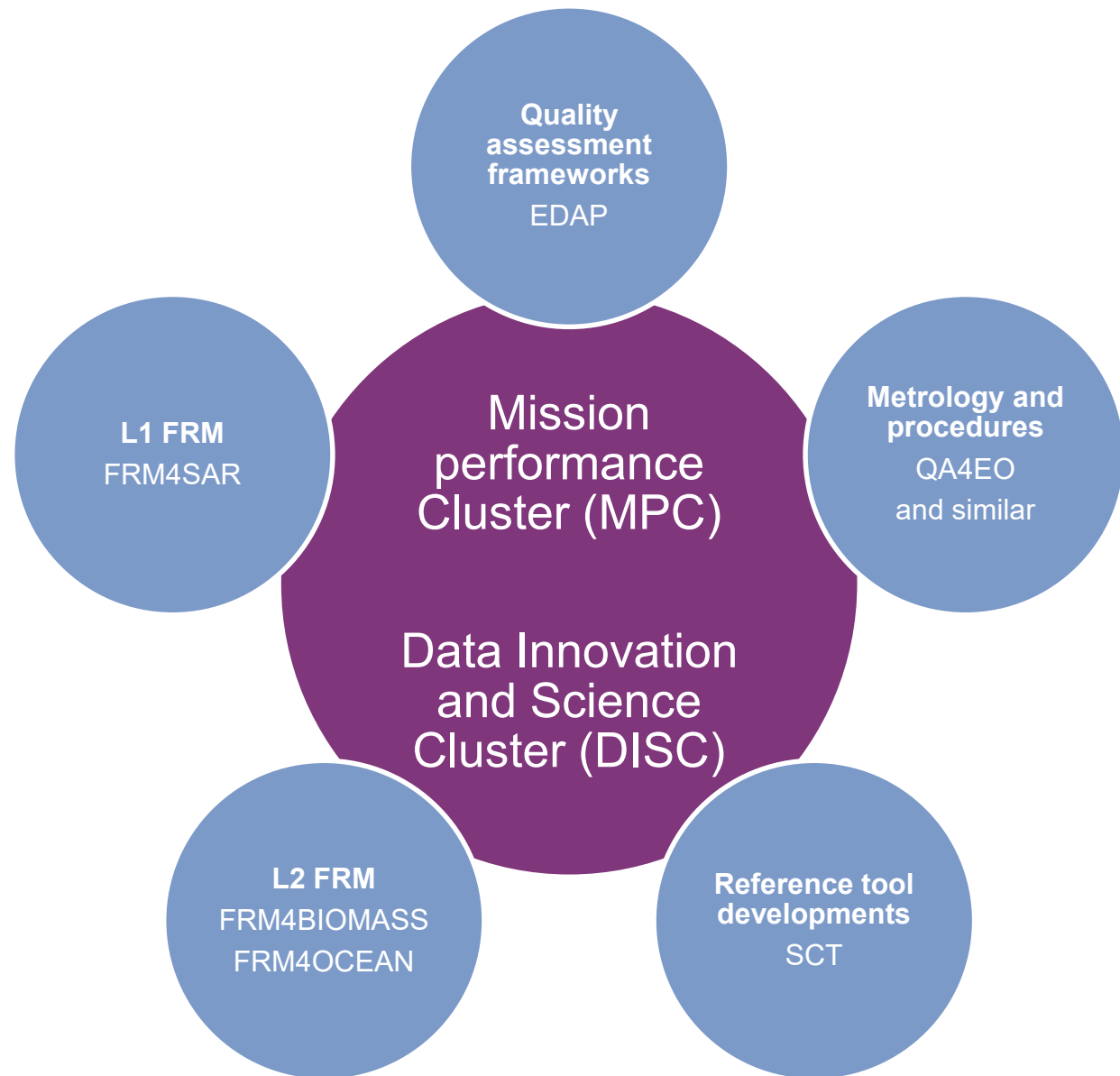
ESA and Cal&Val standard: SAR quality assurance



For us, it is fundamental to ensure quality assurance throughout the SAR mission life time, guided by QA4EO standards

For that a thorough cal/val has to be continuously executed by **Mission Performance Clusters (MPC)** for Copernicus missions and **Data Innovation and Science Clusters (DISC)** for Earth explorers

This is supported by several activities, within and outside of the clusters, which are put in place to support standardized SAR cal/val





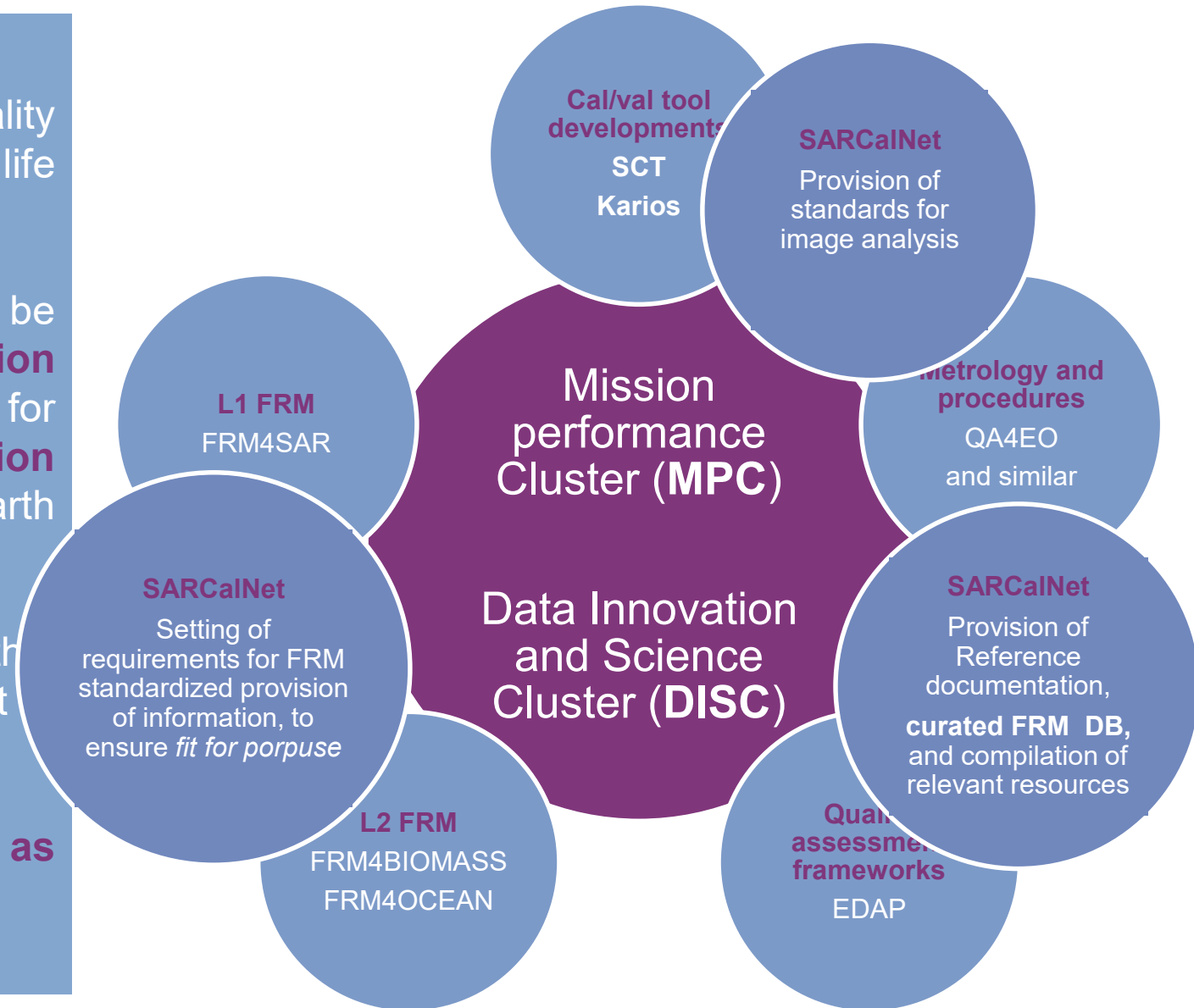
ESA and Cal&Val standard: SAR quality assurance

For us, it is fundamental to ensure quality assurance throughout the SAR mission life time, guided by QA4EO standards

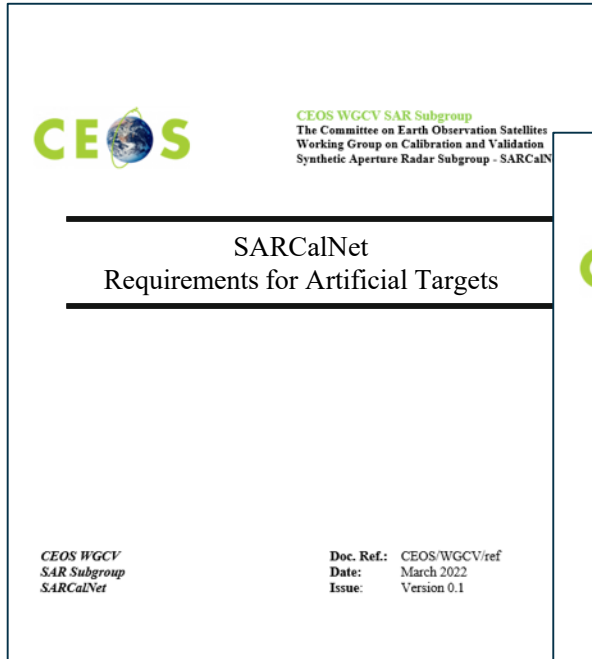
For that a thorough cal/val has to be continuously executed by **Mission Performance Clusters (MPC)** for Copernicus missions and **Data Innovation and Science Clusters (DISC)** for Earth explorers

This is supported by several activities, with and outside of the clusters, which are put place to support standardized SAR cal/val

The CEOS SARCalNet initiative is seen as key element to support this strategy



The CEOS SARCalNet initiative: Documentation

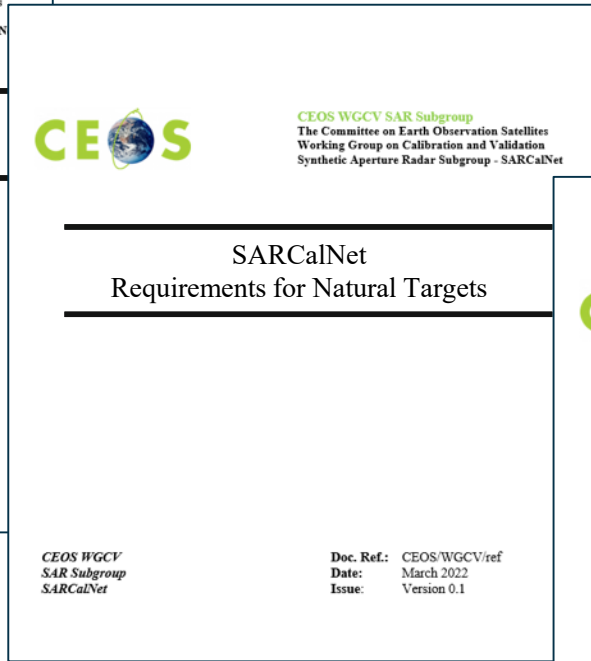


CEOS WGCY SAR Subgroup
The Committee on Earth Observation Satellites
Working Group on Calibration and Validation
Synthetic Aperture Radar Subgroup - SARCalNet

SARCalNet Requirements for Artificial Targets

CEOS WGCY
SAR Subgroup
SARCalNet

Doc. Ref.: CEOS/WGCY/ref
Date: March 2022
Issue: Version 0.1

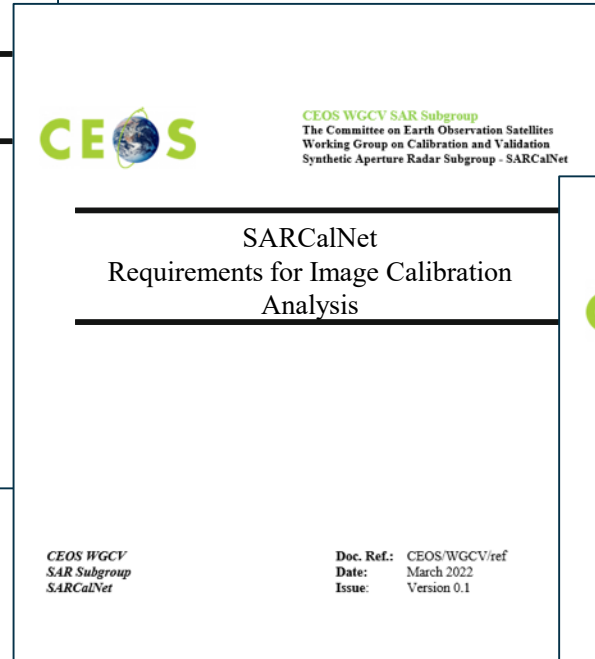


CEOS WGCY SAR Subgroup
The Committee on Earth Observation Satellites
Working Group on Calibration and Validation
Synthetic Aperture Radar Subgroup - SARCalNet

SARCalNet Requirements for Natural Targets

CEOS WGCY
SAR Subgroup
SARCalNet

Doc. Ref.: CEOS/WGCY/ref
Date: March 2022
Issue: Version 0.1

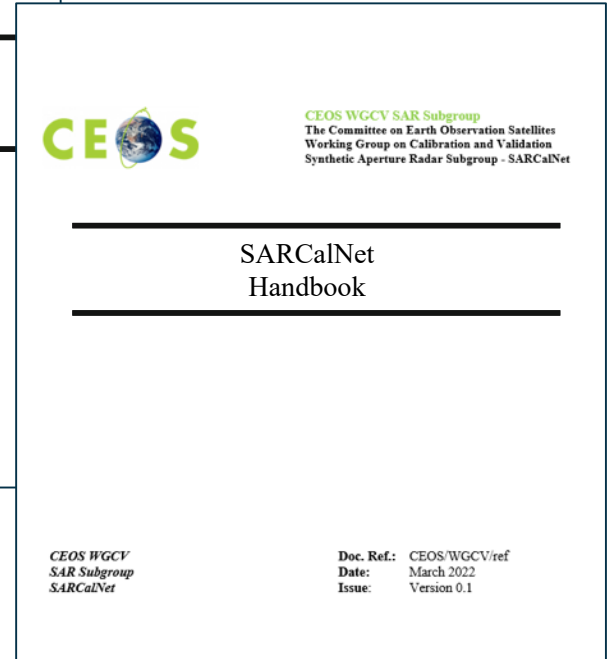


CEOS WGCY SAR Subgroup
The Committee on Earth Observation Satellites
Working Group on Calibration and Validation
Synthetic Aperture Radar Subgroup - SARCalNet

SARCalNet Requirements for Image Calibration Analysis

CEOS WGCY
SAR Subgroup
SARCalNet

Doc. Ref.: CEOS/WGCY/ref
Date: March 2022
Issue: Version 0.1



CEOS WGCY SAR Subgroup
The Committee on Earth Observation Satellites
Working Group on Calibration and Validation
Synthetic Aperture Radar Subgroup - SARCalNet

SARCalNet Handbook

CEOS WGCY
SAR Subgroup
SARCalNet

Doc. Ref.: CEOS/WGCY/ref
Date: March 2022
Issue: Version 0.1

Documentation prepared by the CEOS SARCalNet subgroup

Documents under finalization before publication

The CEOS SARCaNet database: Where did we start...

Currently, the CEOS WGOV SAR subgroup hosts a target database:

<http://calvalportal.ceos.org/point-distributed-targets-db>

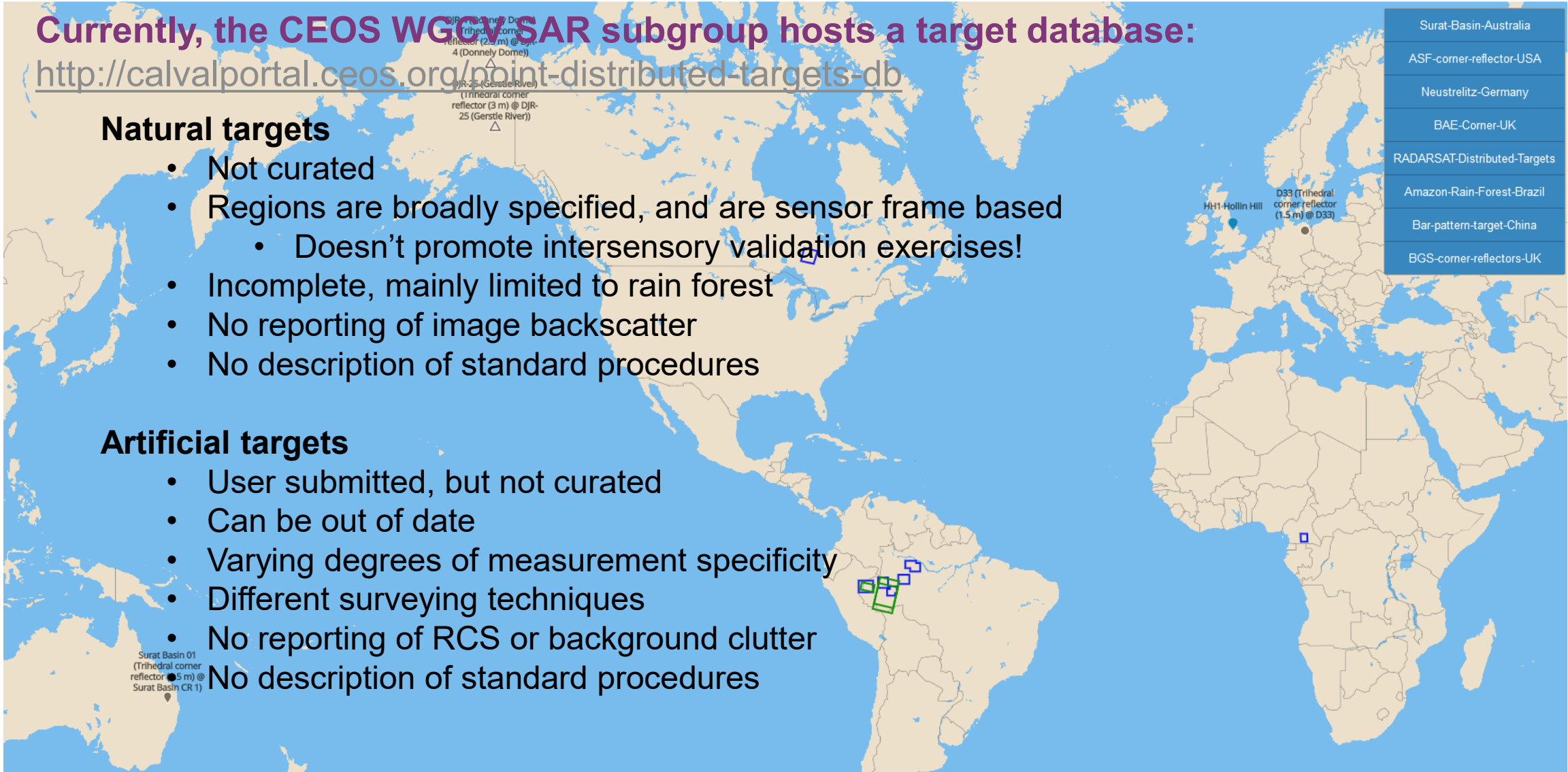
Natural targets

- Not curated
- Regions are broadly specified, and are sensor frame based
 - Doesn't promote intersensory validation exercises!
- Incomplete, mainly limited to rain forest
- No reporting of image backscatter
- No description of standard procedures

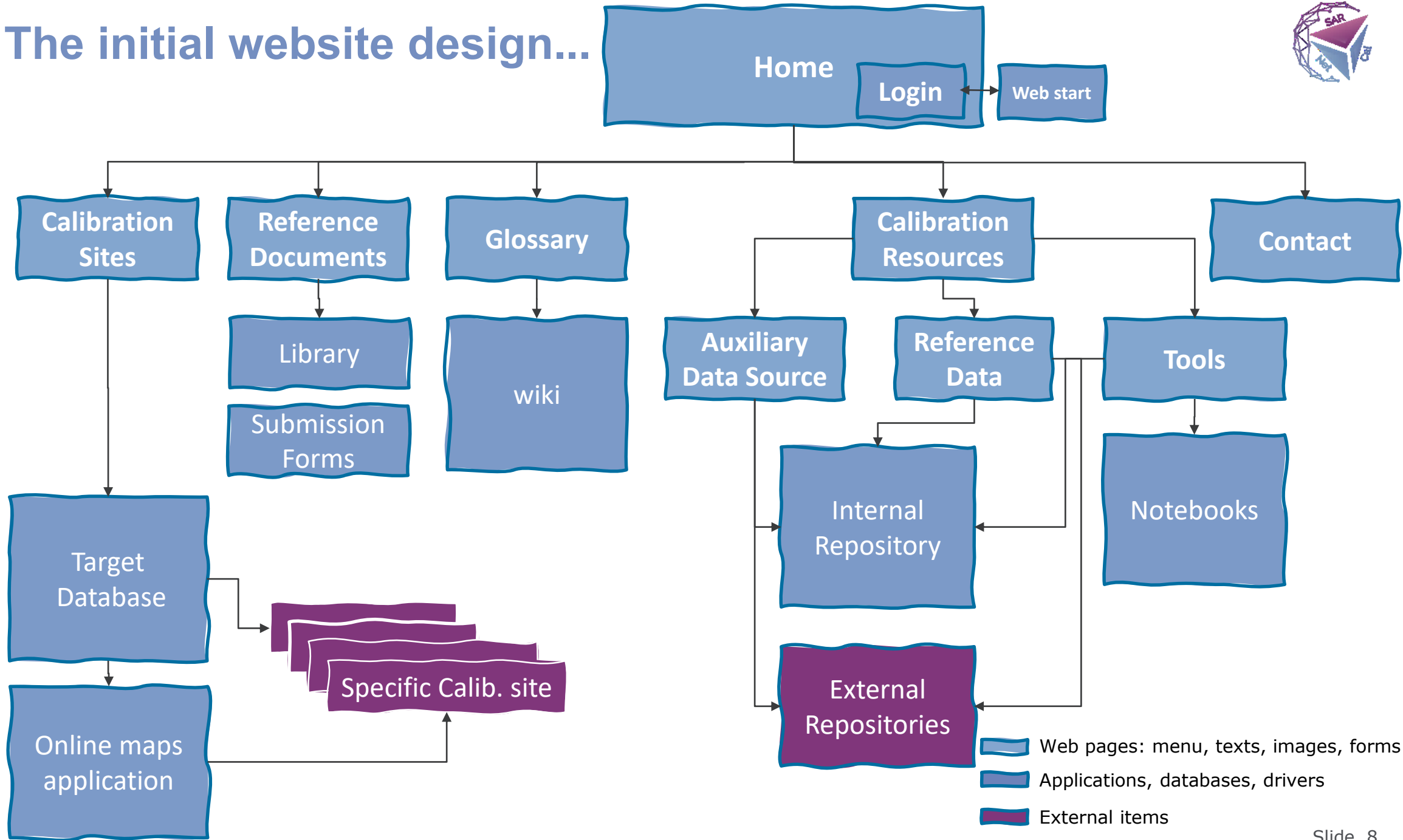
Artificial targets

- User submitted, but not curated
- Can be out of date
- Varying degrees of measurement specificity
- Different surveying techniques
- No reporting of RCS or background clutter
- No description of standard procedures


Surat-Basin-Australia
ASF-corner-reflector-USA
Neustrelitz-Germany
BAE-Corner-UK
RADARSAT-Distributed-Targets
Amazon-Rain-Forest-Brazil
Bar-pattern-target-China
BGS-corner-reflectors-UK



The initial website design...



.. and where we ended up: The SARCalNet Website



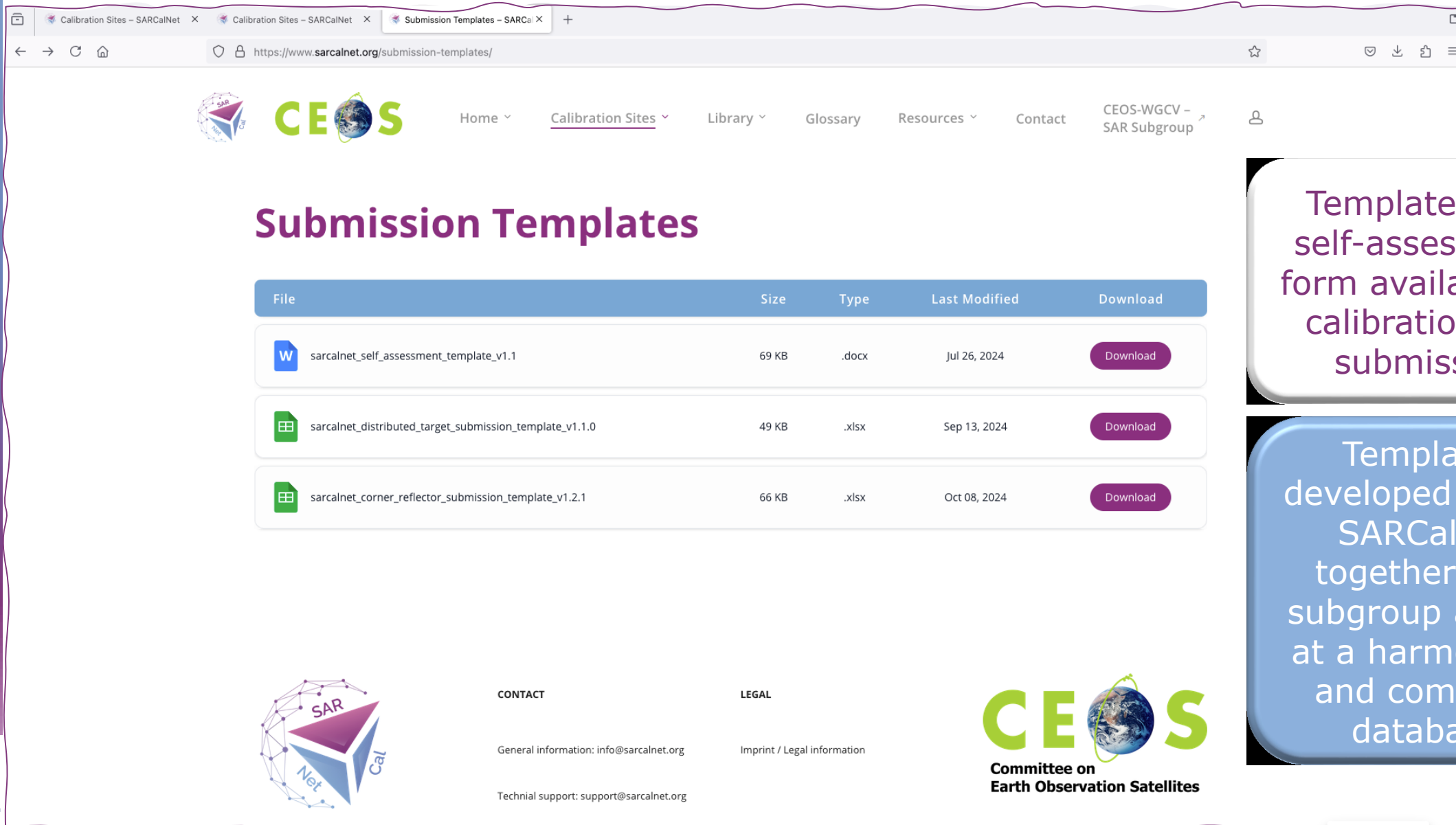
The screenshot shows the SARCalNet website homepage. The browser address bar displays 'https://www.sarcalnet.org'. The navigation menu includes 'Home', 'Calibration Sites', 'Library', 'Glossary', 'Resources', and 'Contact'. The 'Calibration Sites' menu is open, showing options for 'Database', 'Database Description', 'Cal Site Submission', and 'Submission Templates'. The main content area features a large blue banner with the text 'SARCalNet Network of Calibration Sites for SAR'. Below the banner is a satellite image with the text 'SAR Calibration and Validation' overlaid.

The main page introduces the SARcalnet initiative and website content




Cal/Val database and related info are in dedicated menu



.. and where we ended up: The SARCaNet Website

The screenshot shows the SARCaNet website's 'Submission Templates' page. The browser address bar indicates the URL is <https://www.sarcalnet.org/submission-templates/>. The page features a navigation menu with options like Home, Calibration Sites, Library, Glossary, Resources, and Contact. The main heading is 'Submission Templates'. Below this is a table listing three templates for download:

File	Size	Type	Last Modified	Download
 sarcalnet_self_assessment_template_v1.1	69 KB	.docx	Jul 26, 2024	Download
 sarcalnet_distributed_target_submission_template_v1.1.0	49 KB	.xlsx	Sep 13, 2024	Download
 sarcalnet_corner_reflector_submission_template_v1.2.1	66 KB	.xlsx	Oct 08, 2024	Download

At the bottom of the page, there is a 'CONTACT' section with the email info@sarcalnet.org for general information and support@sarcalnet.org for technical support. A 'LEGAL' section provides a link to 'Imprint / Legal information'. The footer includes the CEOS logo and the text 'Committee on Earth Observation Satellites'.

Templates and self-assessment form available for calibration site submission

Templates developed by the SARCaNet together with subgroup aiming at a harmonized and complete database



.. and where we ended up: The SARCaINet Website



AutoSave Home Insert Draw Page Layout Formulas Data Review View Automate sarcalnet_distributed_target_submission_template_v1.1.0 For ESA Official Use Only (ESA UNCLASSIFIED) Search (Cmd + Ctrl + U) Comments Share

	H	I	J	K	L	M	POC N
	Primary Sensor	Willing to consider special requests	Responsible Organization	Website	Active from (YYYY-MM-DD)	Active until (YYYY-MM-DD or "-")	POC Name
1							
2							
3	<p>the calibration site was designed and set-up.</p> <p>This field should include the "mission identifier" as defined in the CEOS database [1] and, in case the mission has multiple payloads, the sensor identifier.</p> <p>[1] https://database.eohandbook.com/database/missionindex.aspx</p>	<p>This field is set to true when the maintainer of the site is available to consider requests to perform calibrator operations on demand (e.g. re-pointing, cleaning or re-surveying).</p> <p>The kind of specific operation and the time(s) at which it has to be performed must be agreed with the calibration site maintainer.</p> <p>Note: for distributed targets this field indicates the possibility to request to maintainers a custom acquisition with the "Primary Sensor".</p>	<p>For calibrations sites including artificial targets this field is used to report the agency or entity providing the funding, or the ones in charge of the calibration site operations and maintenance activities.</p> <p>For sites including natural targets this field indicates the agency or entity regularly using the calibration site in their cal/val activities (this usually also means that regular acquisitions are planned by the agency over the natural targets).</p>	<p>URL of the website in which detailed information about the calibration site can be found. Such website is normally made available by the maintainer of the calibration site and it is not under the responsibility of the SARCaINet initiative.</p>	<p>Data for targets belonging to the calibration site are available only for dates subsequent or equal to the specified one.</p> <p>Date expressed in ISO format (UTC)</p> <p>Note: for distributed target this is the first relevant acquisition performed by the "Primary Sensor".</p>	<p>Data for targets belonging to the calibration site are available only for dates up to (and including) the specified one.</p> <p>Date expressed in ISO format (UTC).</p> <p>A single dash "-" indicates that the site is currently active and a dismissal date has not been planned.</p> <p>Note: for distributed target this is the last relevant acquisition performed by the "Primary Sensor".</p>	<p>Name</p>
4							
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37							

Ready Accessibility: Good to go

Templates with *site*, *target* and *survey* sheets as defined by the initiative



.. and where we ended up: The SARCaINet Website



AutoSave Home Insert Draw Page Layout Formulas Data Review View Automate sarcalnet_distributed_target_submission_template_v1.1.0 For ESA Official Use Only (ESA UNCLASSIFIED) Search (Cmd + Ctrl + U) Comments Share

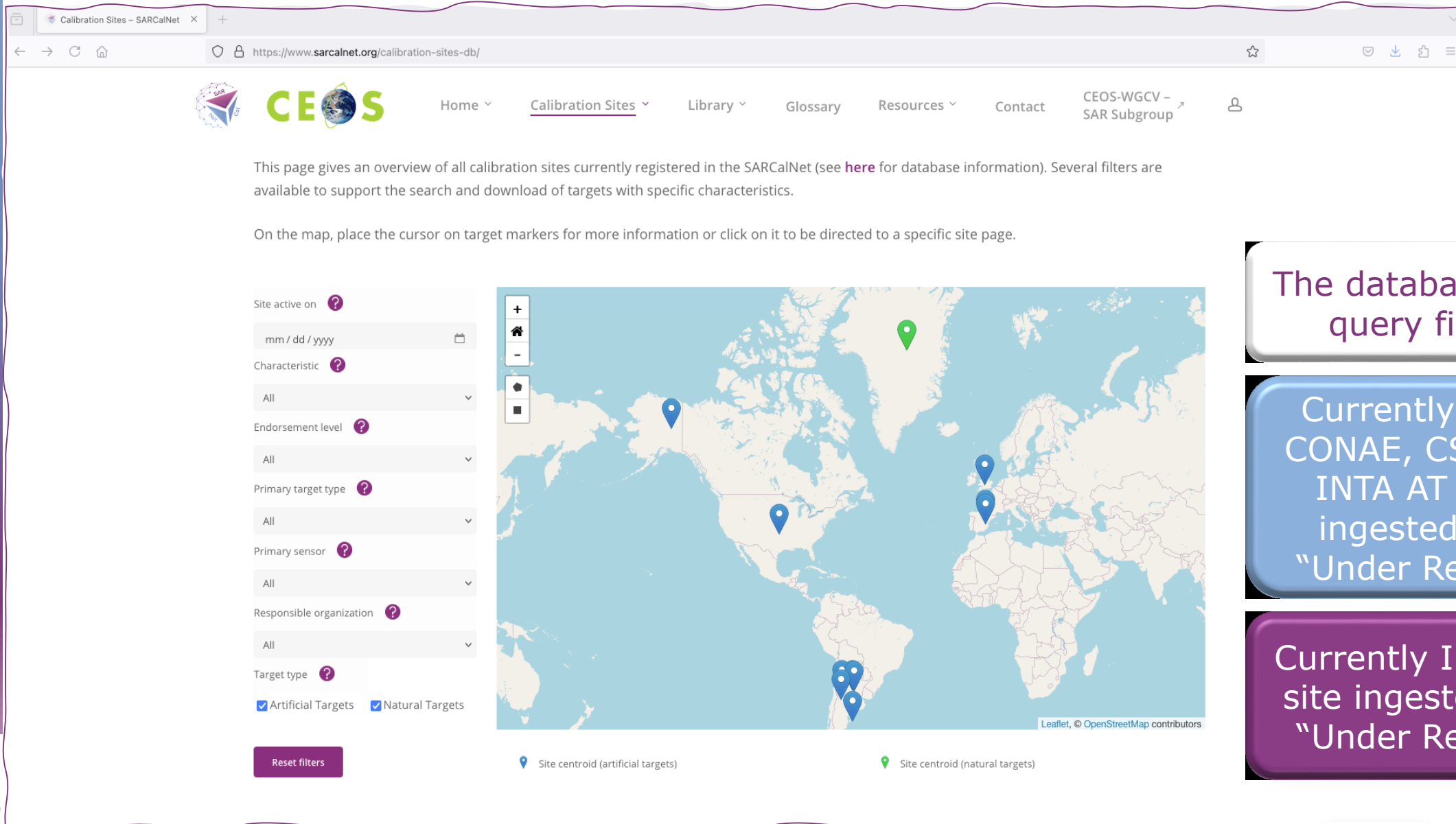
	B	C	D	E	F	G	H
A1	Unique Target ID						
1	Start Survey Period (YYYY-MM-DD)	Stop Survey Period (YYYY-MM-DD)	Mission	Carrier Frequency (GHz)	Polarization Channels	UTC Observation Time (HH:MM)	Local Observation time
3	mandatory Date at which the survey started. Date expressed in ISO format (UTC).	mandatory Date at which the survey ended. Date expressed in ISO format (UTC).	mandatory Name of the mission for which data is provided. This field should include the "mission identifier" as defined in the CEOS database [1] and, in case the mission has multiple payloads, the sensor identifier. [1] https://database.eohandbook.com/database/missionindex.aspx	mandatory Central frequency of the SAR in GHz.	mandatory Available polarization channels for the data acquired by "Mission"	mandatory The scene is typically observed at a specific UTC time for a specific "Relative orbit". This field is mostly aimed at allowing the identification of the product in the catalogues.	optional The scene is typically specific "Relative or The RCS of distributed local time.
4				> 0	Possible values: - QP: Quad pol (HH+HV+VH+VV) - DH: Dual pol (HH+HV) - DV: Dual pol (VV+VH) - HH: Single polarization HH - HV: Single polarization HV - VH: Single polarization VH - VV: Single polarization VV - CL: Circular polarization Left - CR: Circular polarization Right - HHVV: Dual Pol (co-polarized channels) - Alternating HH and VV		
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30							
31							

README site dt survey definitions +

Each field has short description and, if relevant, pre-determined valid values



.. and where we ended up: The SARCalNet Website

Calibration Sites – SARCalNet

https://www.sarcalnet.org/calibration-sites-db/

CEOS SARCalNet

Home ▾ Calibration Sites ▾ Library ▾ Glossary Resources ▾ Contact CEOS-WGCV – SAR Subgroup

This page gives an overview of all calibration sites currently registered in the SARCalNet (see [here](#) for database information). Several filters are available to support the search and download of targets with specific characteristics.

On the map, place the cursor on target markers for more information or click on it to be directed to a specific site page.

Site active on ?
mm / dd / yyyy

Characteristic ?
All ▾

Endorsement level ?
All ▾

Primary target type ?
All ▾

Primary sensor ?
All ▾

Responsible organization ?
All ▾

Target type ?
 Artificial Targets Natural Targets

Reset filters

Site centroid (artificial targets) Site centroid (natural targets)

The database with query fields

Currently BGS, CONAE, CSA and INTA AT sites ingested and "Under Review"

Currently INTA DT site ingested and "Under Review"



.. and where we ended up: The SARCaINet Website



Calibration Sites - SARCaINet

https://www.sarcalnet.org/calibration-sites-db/

Home Calibration Sites Library Glossary Resources Contact CEOS-WGCV - SAR Subgroup

This page gives an overview of all calibration sites currently registered in the SARCaINet (see [here](#) for database information). Several filters are available to support the search and download of targets with specific characteristics.

On the map, place the cursor on target markers for more information or click on it to be directed to a specific site page.

Site active on: mm / dd / yyyy

Characteristic: All

Endorsement level: All

Primary target type: All

Primary sensor: All

Responsible organization: All

Target type: Artificial Targets Natural Targets

Reset filters

Map showing calibration sites with a tooltip for "Calibration Site NISAR Oklahoma":

- Unique site identifier: OKLA-AT
- Artificial targets: 17
- Natural targets: 0
- Primary target type ID: AT
- Primary sensor: NISAR
- Endorsement: Under Review

Legend:
📍 Site centroid (artificial targets)
📍 Site centroid (natural targets)

Each site and target receive a unique identifier to support resubmission and traceability



.. and where we ended up: The SARCaINet Website



Calibration Sites – SARCaINet

https://www.sarcalnet.org/calibration-sites-db/

Home Calibration Sites Library Glossary Resources Contact CEOS-WGCV – SAR Subgroup

This page gives an overview of all calibration sites currently registered in the SARCaINet (see [here](#) for database information). Several filters are available to support the search and download of targets with specific characteristics.

On the map, place the cursor on target markers for more information or click on it to be directed to a specific site page.

Site active on: mm / dd / yyyy

Characteristic: All

Endorsement level:

- ✓ All
- Endorsed
- Partially endorsed
- Informational
- Externally endorsed
- Rejected
- Dismissed
- Under Review

Responsible organization: All

Target type:

- ✓ Artificial Targets
- ✓ Natural Targets

Reset filters

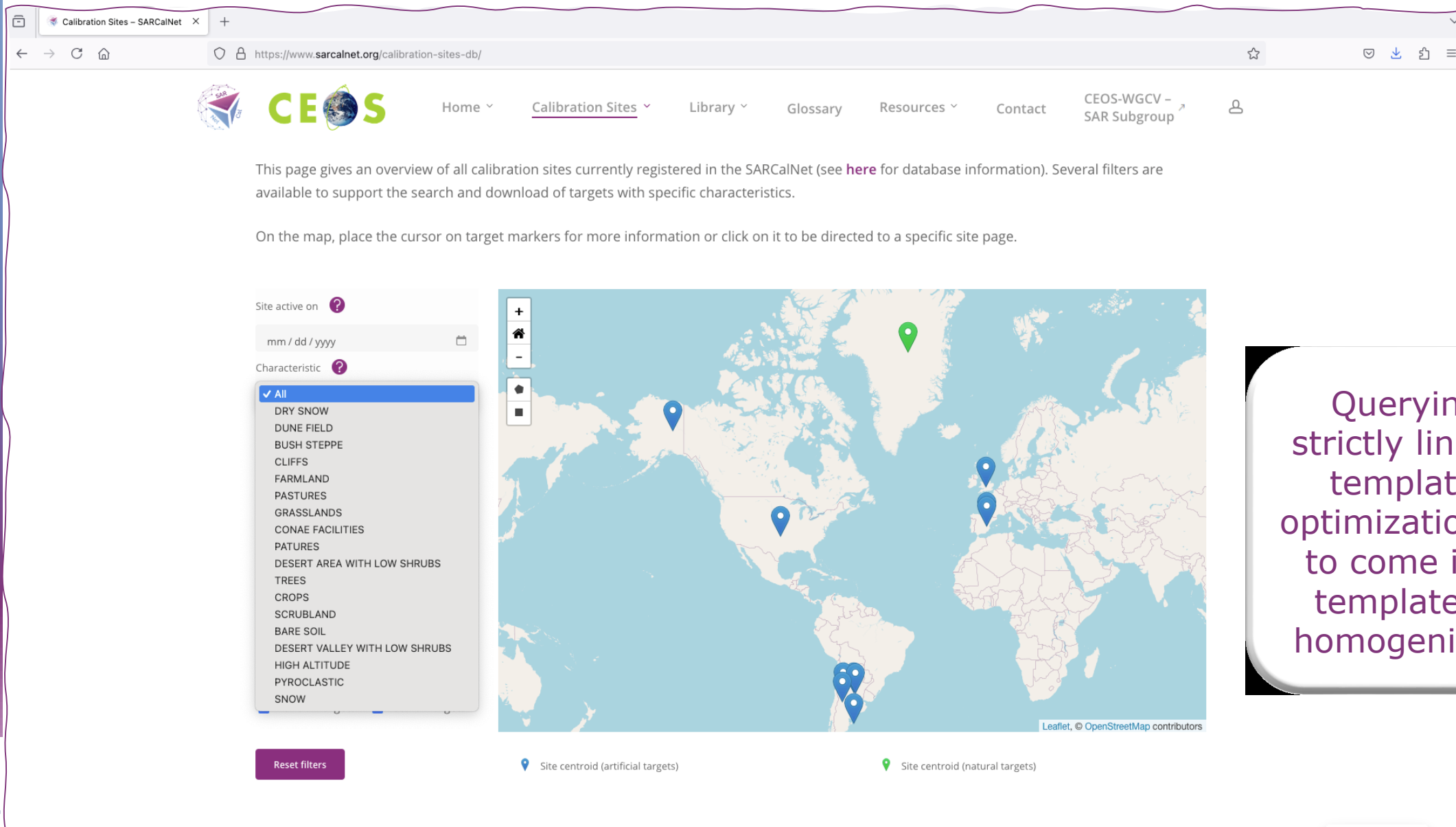
Site centroid (artificial targets) Site centroid (natural targets)

Different endorsement levels are currently envisioned as per SARCaINet Handbook

Currently all "Under revision" pending consolidation of endorsement procedure



.. and where we ended up: The SARCalNet Website

The screenshot shows the 'Calibration Sites - SARCalNet' web page. The browser address bar displays 'https://www.sarcalnet.org/calibration-sites-db/'. The website header includes the CEOS logo and a navigation menu with options: Home, Calibration Sites, Library, Glossary, Resources, Contact, and CEOS-WGCV - SAR Subgroup. A user profile icon is also visible.

The main content area contains the following text:

This page gives an overview of all calibration sites currently registered in the SARCalNet (see [here](#) for database information). Several filters are available to support the search and download of targets with specific characteristics.

On the map, place the cursor on target markers for more information or click on it to be directed to a specific site page.

Below the text, there is a filter panel on the left and a map on the right. The filter panel includes a date selector 'Site active on' (mm / dd / yyyy) and a 'Characteristic' dropdown menu. The dropdown menu is open, showing a list of site characteristics:

- ✓ All
- DRY SNOW
- DUNE FIELD
- BUSH STEPPE
- CLIFFS
- FARMLAND
- PASTURES
- GRASSLANDS
- CONAE FACILITIES
- PATURES
- DESERT AREA WITH LOW SHRUBS
- TREES
- CROPS
- SCRUBLAND
- BARE SOIL
- DESERT VALLEY WITH LOW SHRUBS
- HIGH ALTITUDE
- PYROCLASTIC
- SNOW

The map shows a world map with several location markers. A legend at the bottom of the map indicates:

- Site centroid (artificial targets) - represented by a blue pin
- Site centroid (natural targets) - represented by a green pin

At the bottom of the filter panel, there is a 'Reset filters' button.

Querying is strictly linked to templates... optimizations still to come in the templates for homogenization





Calibration Site OKLA-AT

Geolocation

Site description

Unique site identifier	OKLA-AT
Site name	NISAR Oklahoma
Country	USA
Province / State / Region	Oklahoma
Primary target type identifier	AT - Artificial Targets
Target types	Trihedral Corner Reflector
Primary sensor	NISAR
Willing to consider special requests	Yes
Responsible organization	NASA
Website	//uavsar.jpl.nasa.gov/cgi-bin/calibration-nisar.pl
Planned maintenance schedule	twice per year
Active from	2023-10-01
Active until	

Surveys download

Date	Download
2024-05-01	CSV GeoJSON KML

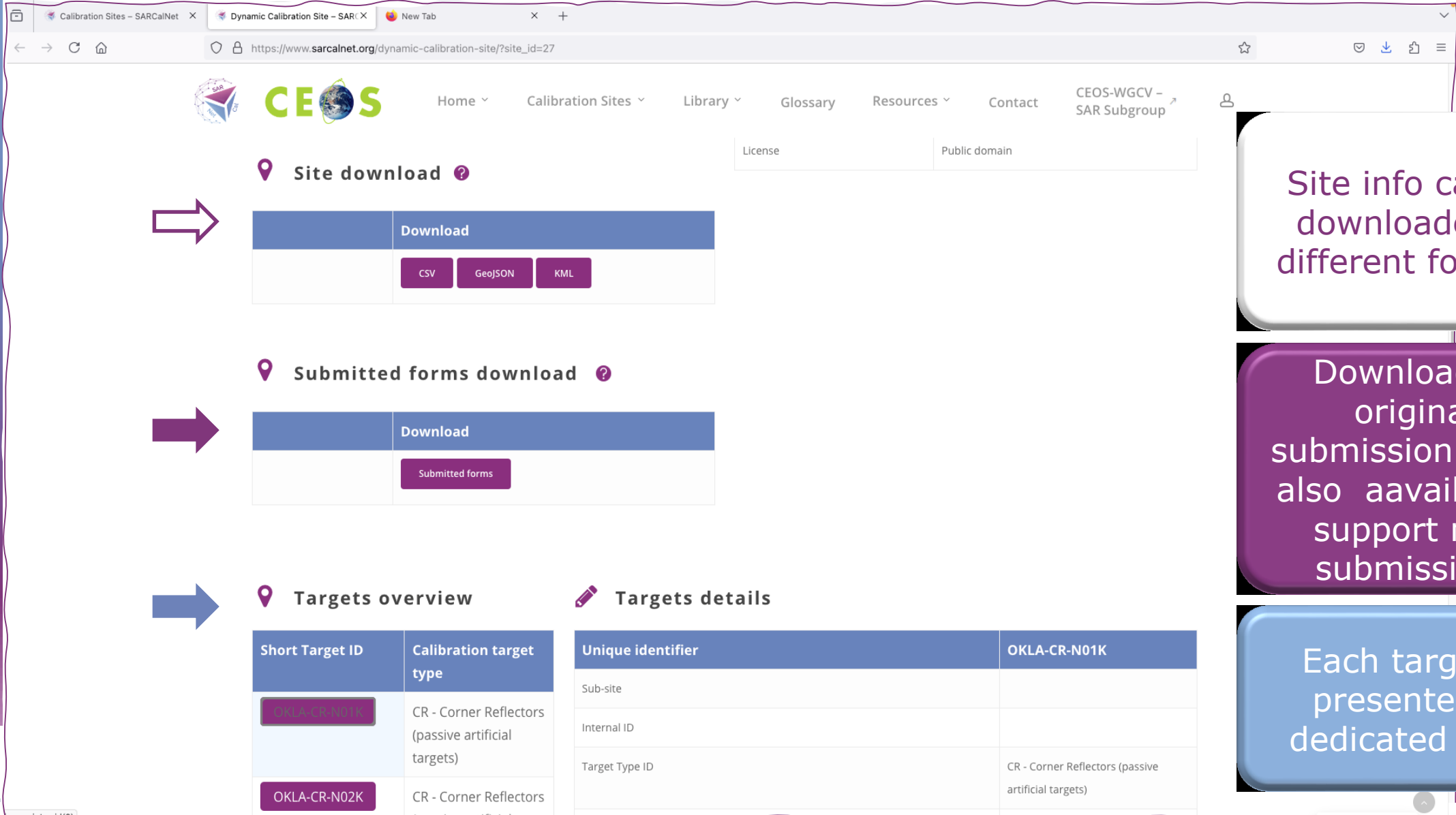
Each site has its own page and standard content

Possible to filter by most relevant target characteristics

And to download complete surveys



.. and where we ended up: The SARCalNet Website

The screenshot shows the SARCalNet website interface. At the top, there is a navigation menu with links for Home, Calibration Sites, Library, Glossary, Resources, Contact, and CEOS-WGCV - SAR Subgroup. Below the navigation, there are sections for 'Site download', 'Submitted forms download', and 'Targets overview'. The 'Targets overview' section contains a table with target information.

Short Target ID	Calibration target type	Unique identifier	OKLA-CR-N01K
OKLA-CR-N01K	CR - Corner Reflectors (passive artificial targets)	Sub-site	
		Internal ID	
OKLA-CR-N02K	CR - Corner Reflectors (passive artificial targets)	Target Type ID	CR - Corner Reflectors (passive artificial targets)

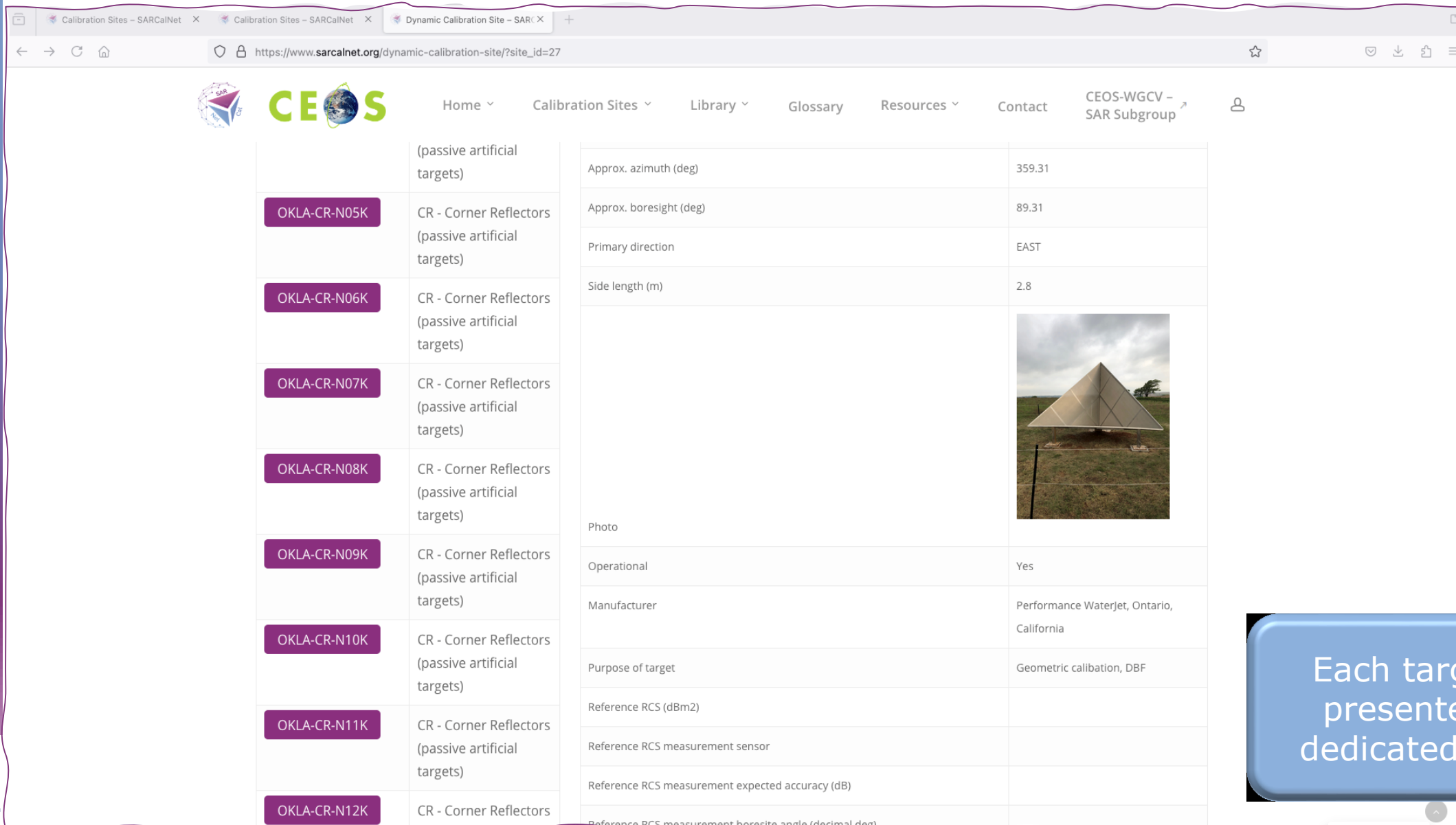
Site info can be downloaded in different formats

Download of original submission forms also available to support new submissions


Each target is presented in dedicated table



.. and where we ended up: The SARCalNet Website

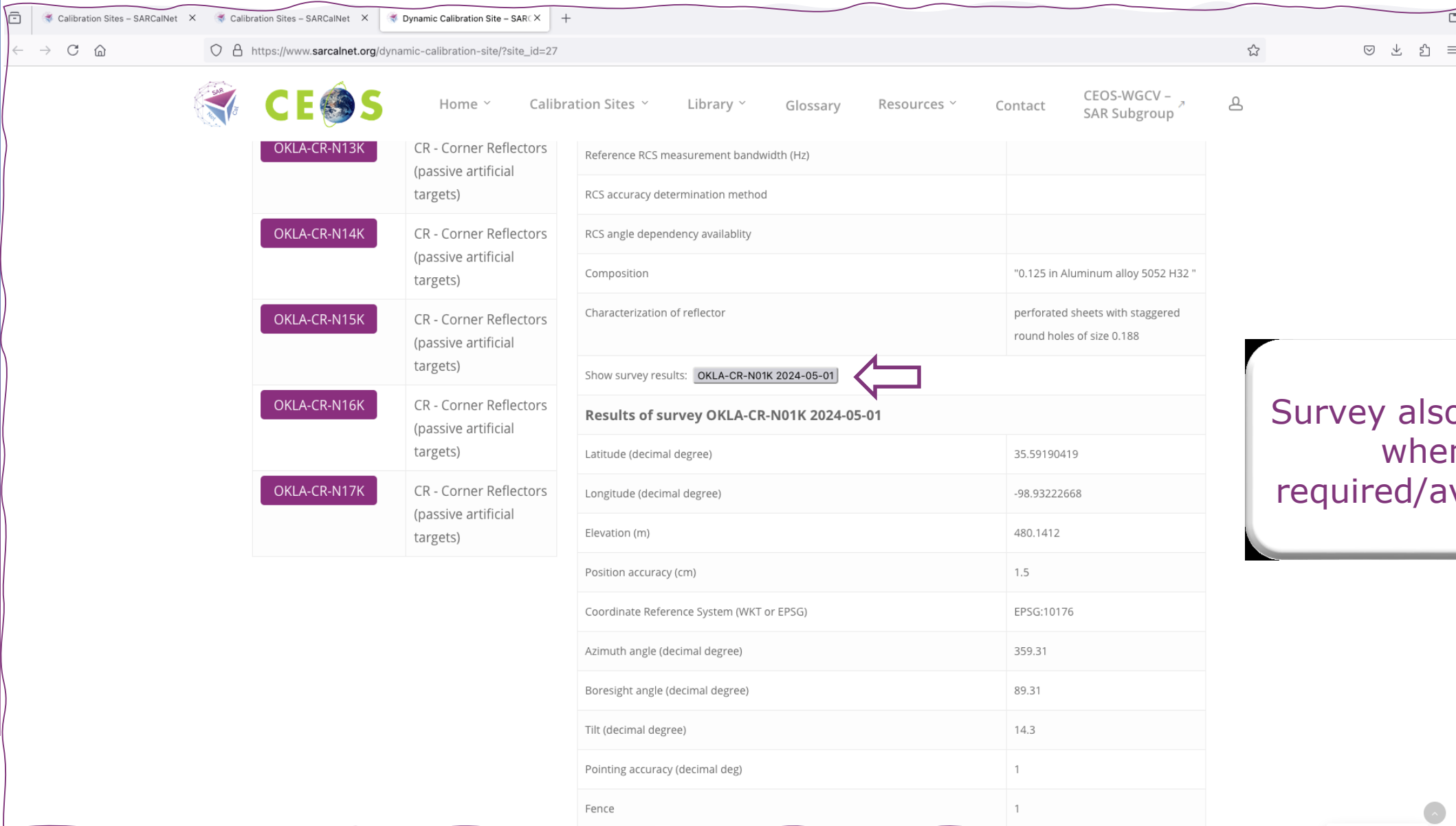
The screenshot shows the SARCalNet website interface. The top navigation bar includes links for Home, Calibration Sites, Library, Glossary, Resources, Contact, and CEOS-WGCV - SAR Subgroup. The main content area is divided into two columns. The left column lists several calibration sites, each with a purple button containing the site ID and a brief description: "(passive artificial targets)". The right column displays a detailed table for the selected site, OKLA-CR-N05K. The table includes fields for azimuth, boresight, primary direction, side length, a photo of the target, operational status, manufacturer, purpose, and reference RCS values.

OKLA-CR-N05K	CR - Corner Reflectors (passive artificial targets)	Approx. azimuth (deg)	359.31
OKLA-CR-N06K	CR - Corner Reflectors (passive artificial targets)	Approx. boresight (deg)	89.31
OKLA-CR-N07K	CR - Corner Reflectors (passive artificial targets)	Primary direction	EAST
OKLA-CR-N08K	CR - Corner Reflectors (passive artificial targets)	Side length (m)	2.8
OKLA-CR-N09K	CR - Corner Reflectors (passive artificial targets)	Photo	
OKLA-CR-N10K	CR - Corner Reflectors (passive artificial targets)	Operational	Yes
OKLA-CR-N11K	CR - Corner Reflectors (passive artificial targets)	Manufacturer	Performance WaterJet, Ontario, California
OKLA-CR-N12K	CR - Corner Reflectors (passive artificial targets)	Purpose of target	Geometric calibration, DBF
		Reference RCS (dBm2)	
		Reference RCS measurement sensor	
		Reference RCS measurement expected accuracy (dB)	
		Reference RCS measurement boresite angle (decimal deg)	

Each target is presented in dedicated table



.. and where we ended up: The SARCalNet Website

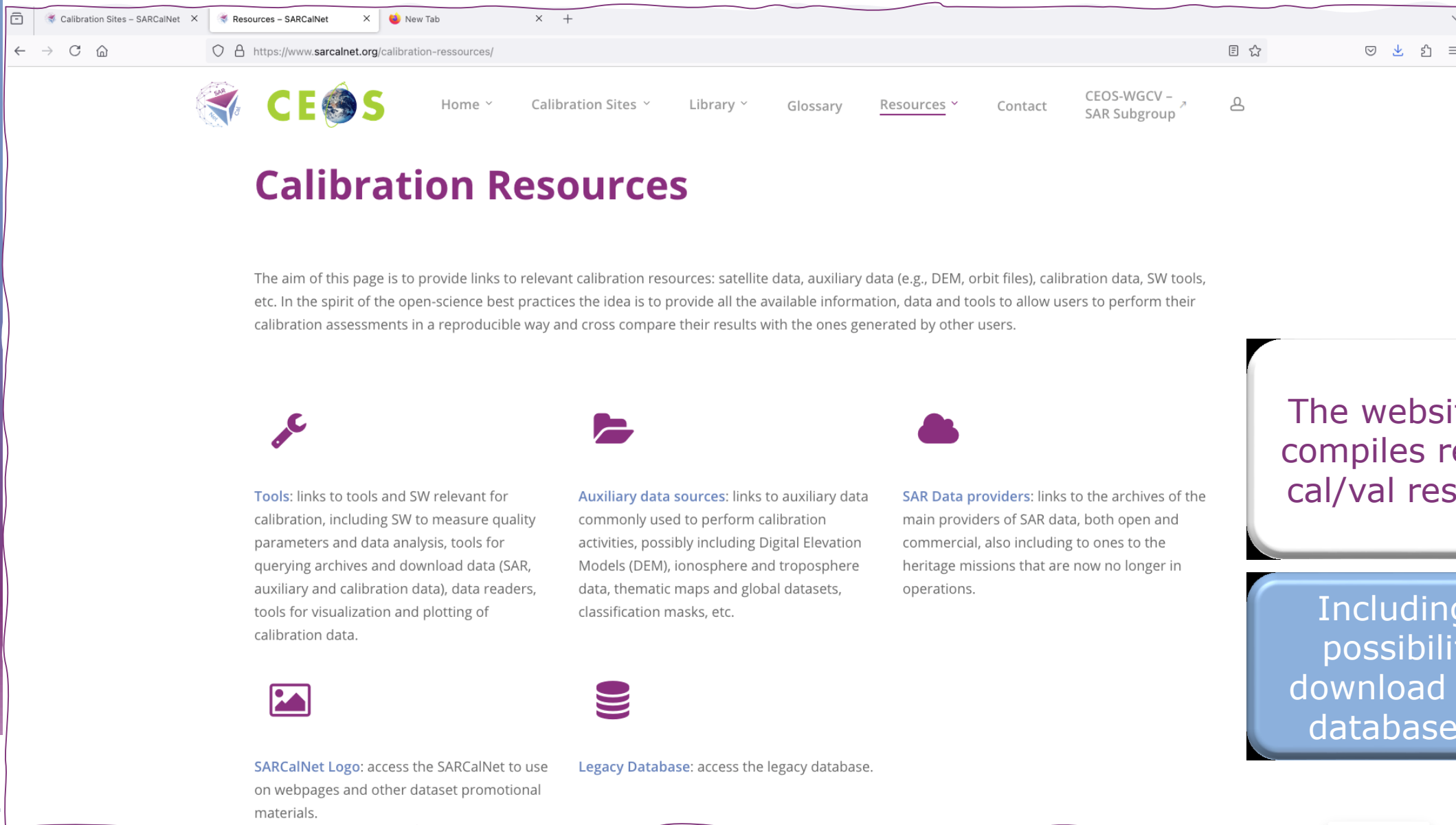
The screenshot shows the SARCalNet website interface. On the left, there is a list of calibration sites, each with a purple button containing the site ID and a description: "CR - Corner Reflectors (passive artificial targets)". The sites listed are OKLA-CR-N13K, OKLA-CR-N14K, OKLA-CR-N15K, OKLA-CR-N16K, and OKLA-CR-N17K. On the right, a detailed survey result is displayed for "OKLA-CR-N01K 2024-05-01", which is highlighted by a purple arrow. The survey results table includes the following data:

Results of survey OKLA-CR-N01K 2024-05-01	
Reference RCS measurement bandwidth (Hz)	
RCS accuracy determination method	
RCS angle dependency availability	
Composition	"0.125 in Aluminum alloy 5052 H32 "
Characterization of reflector	perforated sheets with staggered round holes of size 0.188
Show survey results: OKLA-CR-N01K 2024-05-01	
Latitude (decimal degree)	35.59190419
Longitude (decimal degree)	-98.93222668
Elevation (m)	480.1412
Position accuracy (cm)	1.5
Coordinate Reference System (WKT or EPSG)	EPSG:10176
Azimuth angle (decimal degree)	359.31
Boresight angle (decimal degree)	89.31
Tilt (decimal degree)	14.3
Pointing accuracy (decimal deg)	1
Fence	1

Survey also visible when required/available



.. and where we ended up: The SARCalNet Website

The screenshot shows a web browser window with the URL <https://www.sarcalnet.org/calibration-resources/>. The page features a navigation menu with options: Home, Calibration Sites, Library, Glossary, Resources (highlighted), and Contact. There is also a link for CEOS-WGCV - SAR Subgroup. The main heading is "Calibration Resources".

The aim of this page is to provide links to relevant calibration resources: satellite data, auxiliary data (e.g., DEM, orbit files), calibration data, SW tools, etc. In the spirit of the open-science best practices the idea is to provide all the available information, data and tools to allow users to perform their calibration assessments in a reproducible way and cross compare their results with the ones generated by other users.

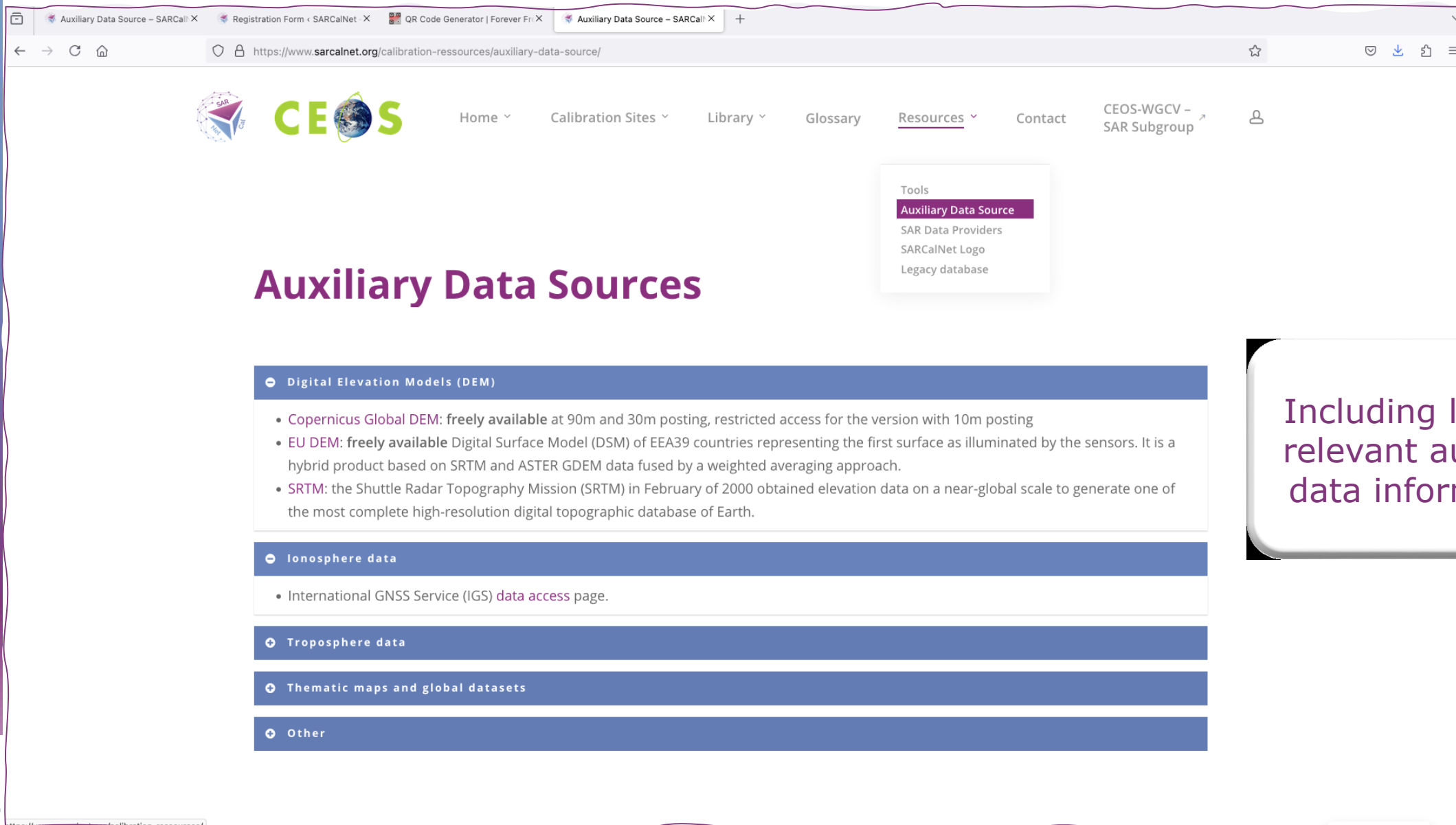
The page lists five categories of resources:

- Tools:** links to tools and SW relevant for calibration, including SW to measure quality parameters and data analysis, tools for querying archives and download data (SAR, auxiliary and calibration data), data readers, tools for visualization and plotting of calibration data.
- Auxiliary data sources:** links to auxiliary data commonly used to perform calibration activities, possibly including Digital Elevation Models (DEM), ionosphere and troposphere data, thematic maps and global datasets, classification masks, etc.
- SAR Data providers:** links to the archives of the main providers of SAR data, both open and commercial, also including to ones to the heritage missions that are now no longer in operations.
- SARCalNet Logo:** access the SARCalNet to use on webpages and other dataset promotional materials.
- Legacy Database:** access the legacy database.

The website also compiles relevant cal/val resources

Including the possibility to download legacy database *as is*



Browser tabs: Auxiliary Data Source - SARCalNet X, Registration Form - SARCalNet X, QR Code Generator | Forever Fr X, Auxiliary Data Source - SARCalNet X

Address bar: https://www.sarcalnet.org/calibration-ressources/auxiliary-data-source/

Navigation: Home, Calibration Sites, Library, Glossary, Resources (expanded), Contact, CEOS-WGCV - SAR Subgroup

Resources dropdown: Tools, **Auxiliary Data Source**, SAR Data Providers, SARCalNet Logo, Legacy database

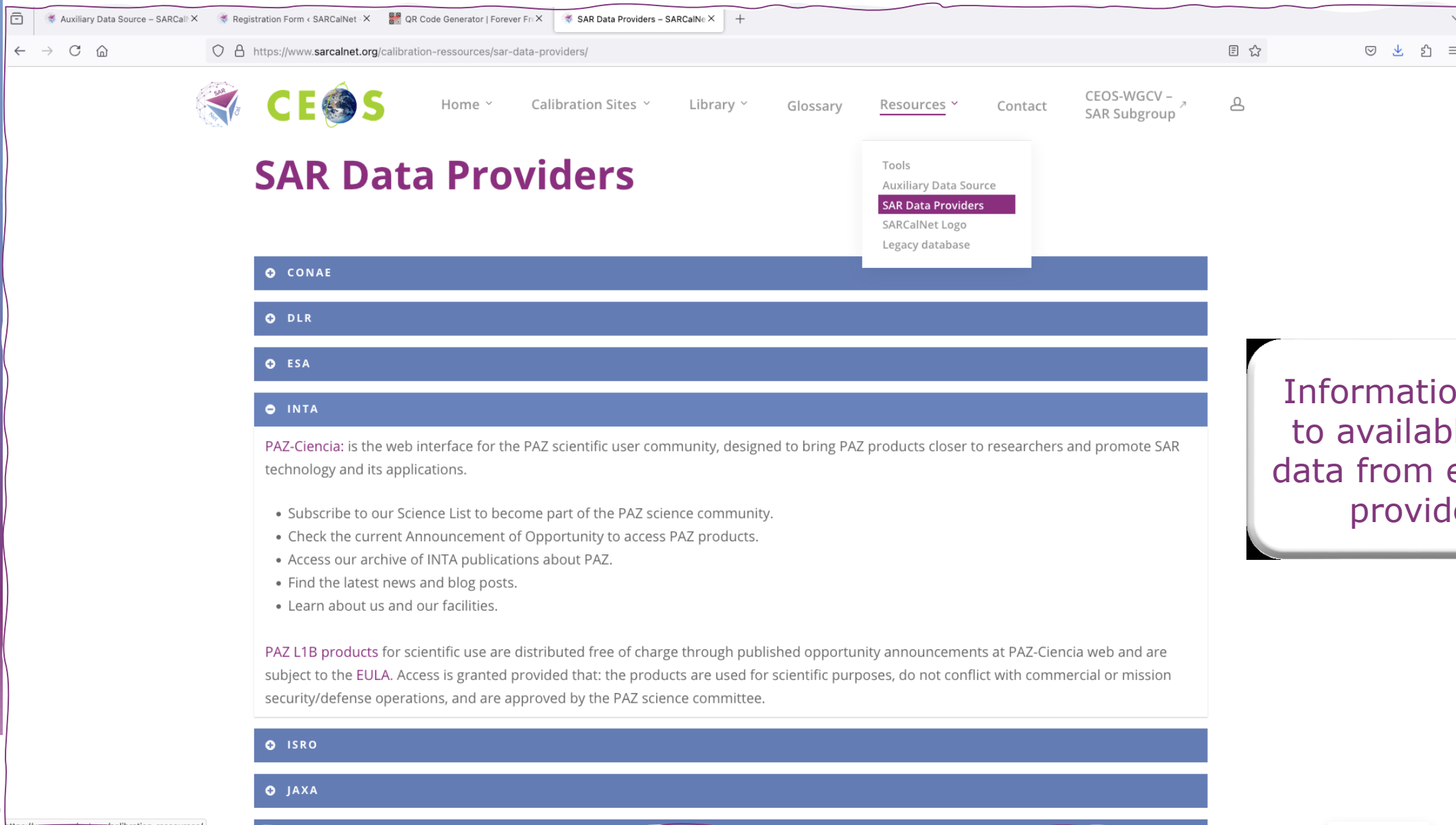
Auxiliary Data Sources

- Digital Elevation Models (DEM)**
 - Copernicus Global DEM:** freely available at 90m and 30m posting, restricted access for the version with 10m posting
 - EU DEM:** freely available Digital Surface Model (DSM) of EEA39 countries representing the first surface as illuminated by the sensors. It is a hybrid product based on SRTM and ASTER GDEM data fused by a weighted averaging approach.
 - SRTM:** the Shuttle Radar Topography Mission (SRTM) in February of 2000 obtained elevation data on a near-global scale to generate one of the most complete high-resolution digital topographic database of Earth.
- Ionosphere data**
 - International GNSS Service (IGS) [data access page](#).
- Troposphere data**
- Thematic maps and global datasets**
- Other**

Including links to relevant auxiliary data information



.. and where we ended up: The SARCalNet Website

Auxiliary Data Source - SARCalNet X Registration Form - SARCalNet X QR Code Generator | Forever Fr X SAR Data Providers - SARCalNet X

https://www.sarcalnet.org/calibration-ressources/sar-data-providers/

Home Calibration Sites Library Glossary Resources Contact CEOS-WGCV - SAR Subgroup

SAR Data Providers

- Tools
- Auxiliary Data Source
- SAR Data Providers**
- SARCalNet Logo
- Legacy database

CONAE

DLR

ESA

INTA

PAZ-Ciencia: is the web interface for the PAZ scientific user community, designed to bring PAZ products closer to researchers and promote SAR technology and its applications.

- Subscribe to our Science List to become part of the PAZ science community.
- Check the current Announcement of Opportunity to access PAZ products.
- Access our archive of INTA publications about PAZ.
- Find the latest news and blog posts.
- Learn about us and our facilities.

PAZ L1B products for scientific use are distributed free of charge through published opportunity announcements at PAZ-Ciencia web and are subject to the **EULA**. Access is granted provided that: the products are used for scientific purposes, do not conflict with commercial or mission security/defense operations, and are approved by the PAZ science committee.

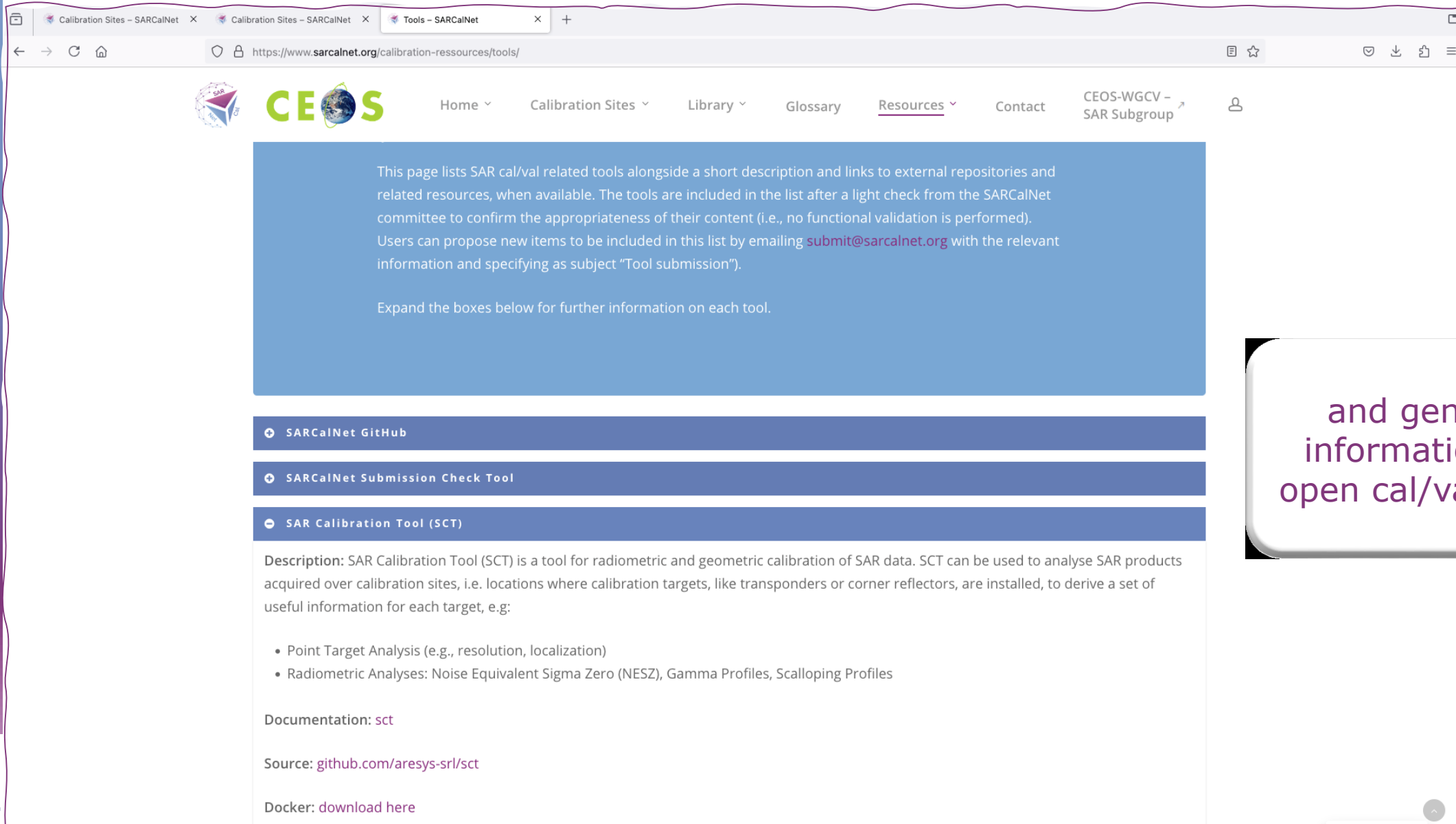
ISRO

JAXA

Information/links to available SAR data from external providers





.. and where we ended up: The SARCalNet Website

Calibration Sites – SARCalNet x Calibration Sites – SARCalNet x Tools – SARCalNet x

← → ↻ 🏠 🔒 https://www.sarcalnet.org/calibration-ressources/tools/ 📄 ☆ 📄 📄 📄

 **CEOS**  Home ▾ Calibration Sites ▾ Library ▾ Glossary Resources ▾ Contact CEOS-WGCV – SAR Subgroup ↗ 👤

This page lists SAR cal/val related tools alongside a short description and links to external repositories and related resources, when available. The tools are included in the list after a light check from the SARCalNet committee to confirm the appropriateness of their content (i.e., no functional validation is performed). Users can propose new items to be included in this list by emailing submit@sarcalnet.org with the relevant information and specifying as subject “Tool submission”).

Expand the boxes below for further information on each tool.

- SARCalNet GitHub
- SARCalNet Submission Check Tool
- ⊖ SAR Calibration Tool (SCT)

Description: SAR Calibration Tool (SCT) is a tool for radiometric and geometric calibration of SAR data. SCT can be used to analyse SAR products acquired over calibration sites, i.e. locations where calibration targets, like transponders or corner reflectors, are installed, to derive a set of useful information for each target, e.g:

- Point Target Analysis (e.g., resolution, localization)
- Radiometric Analyses: Noise Equivalent Sigma Zero (NESZ), Gamma Profiles, Scalloping Profiles

Documentation: [sct](#)

Source: github.com/aresys-srl/sct

Docker: [download here](#)

and general information on open cal/val tools



Summary and next steps



- Released to the public as of today.. This means:
 - No general password blocking the website open access areas
 - Existing accounts remain valid for password protected areas
 - Everyone is welcome to register **for full access!**

<https://www.sarcalnet.org/login/>



- Next steps
 - Maintenance and further evolution of the website (e.g., inclusion of API, extension of content, etc)
 - Finalization of documents and publication
 - Support to SARCalNet working group for submission of pilot sites
 - Consolidation of curation procedures
- Challenges
 - **Get site maintainers to submit!!! The process is a little demanding, but we are happy to help!**

