The development of the SARCalNet database and website

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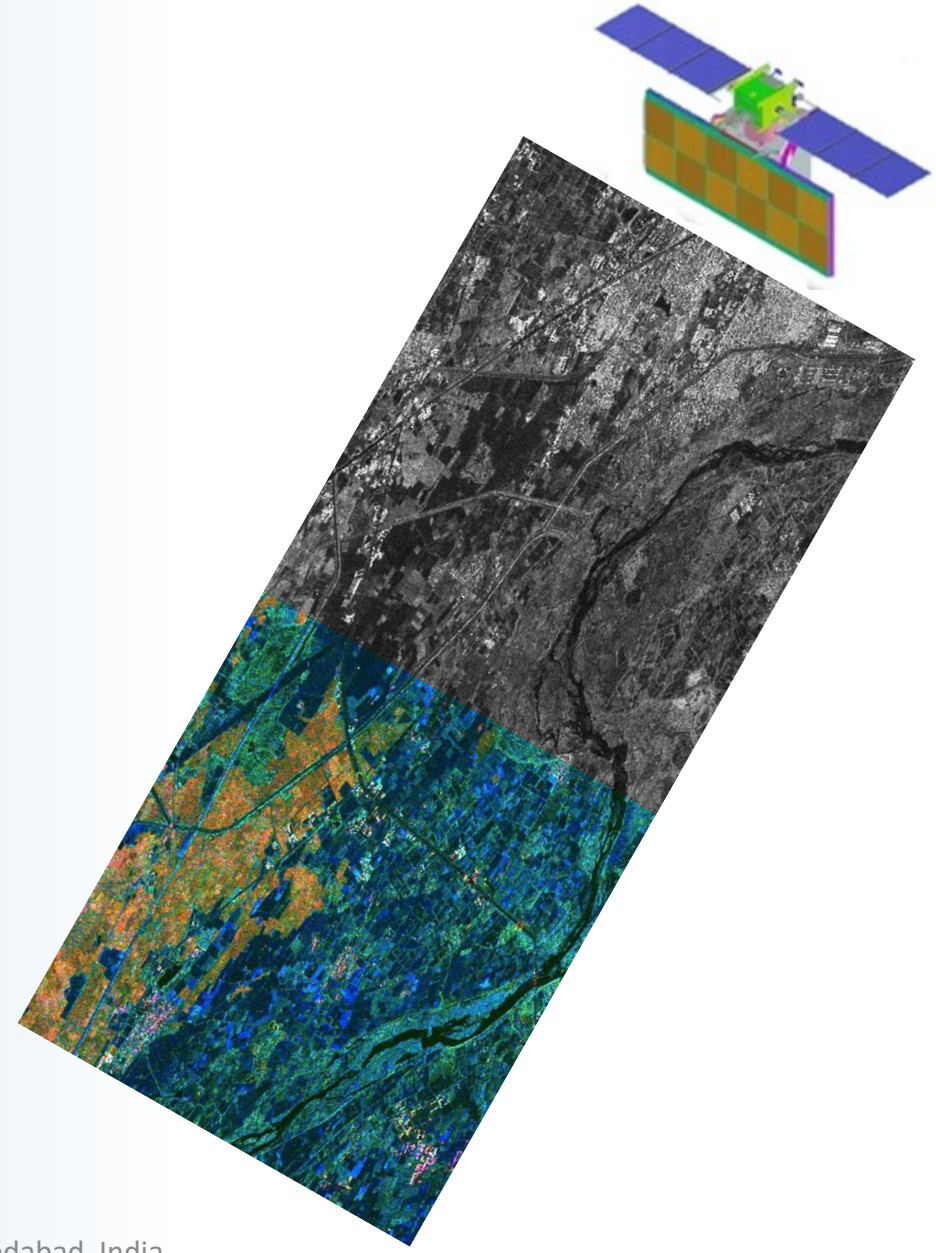
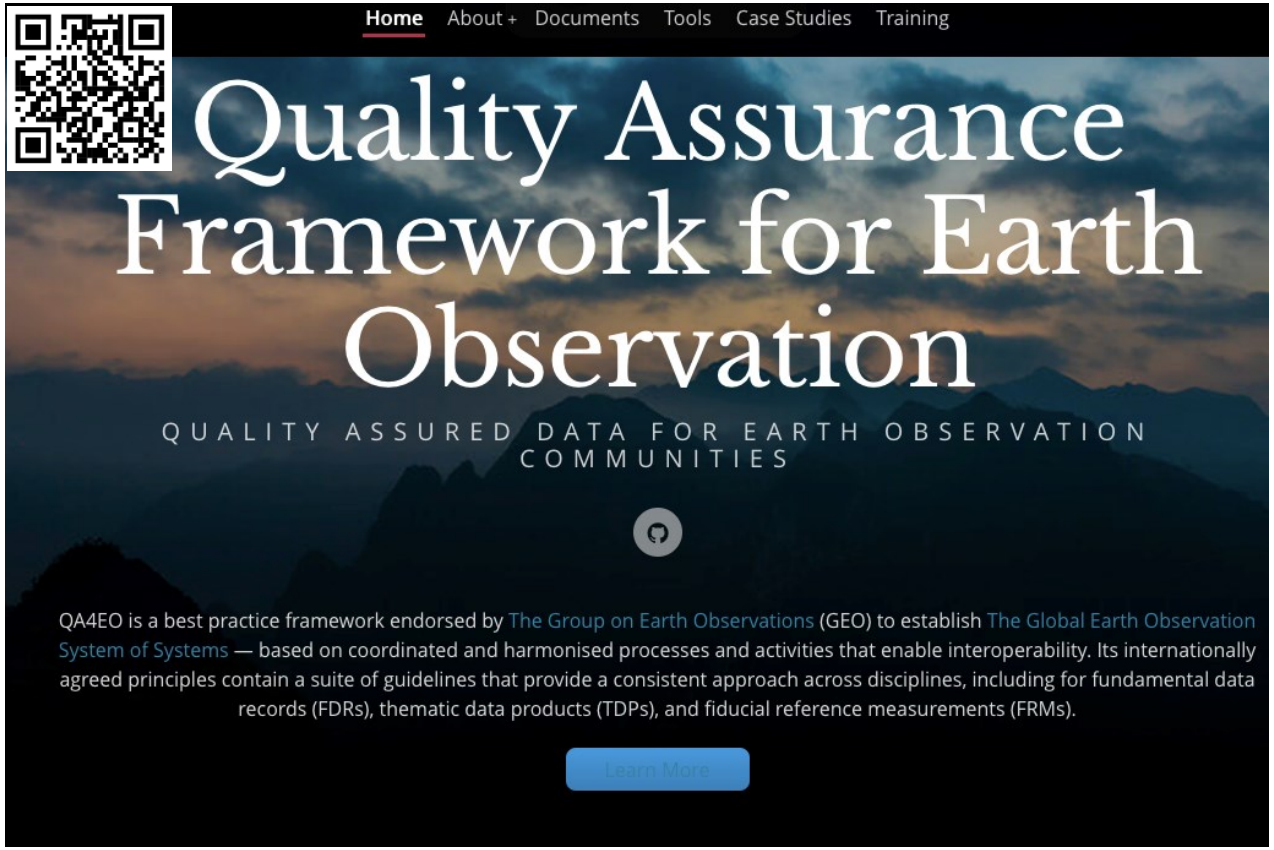


ESA and Cal&Val standards: QA4EO & FRM

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

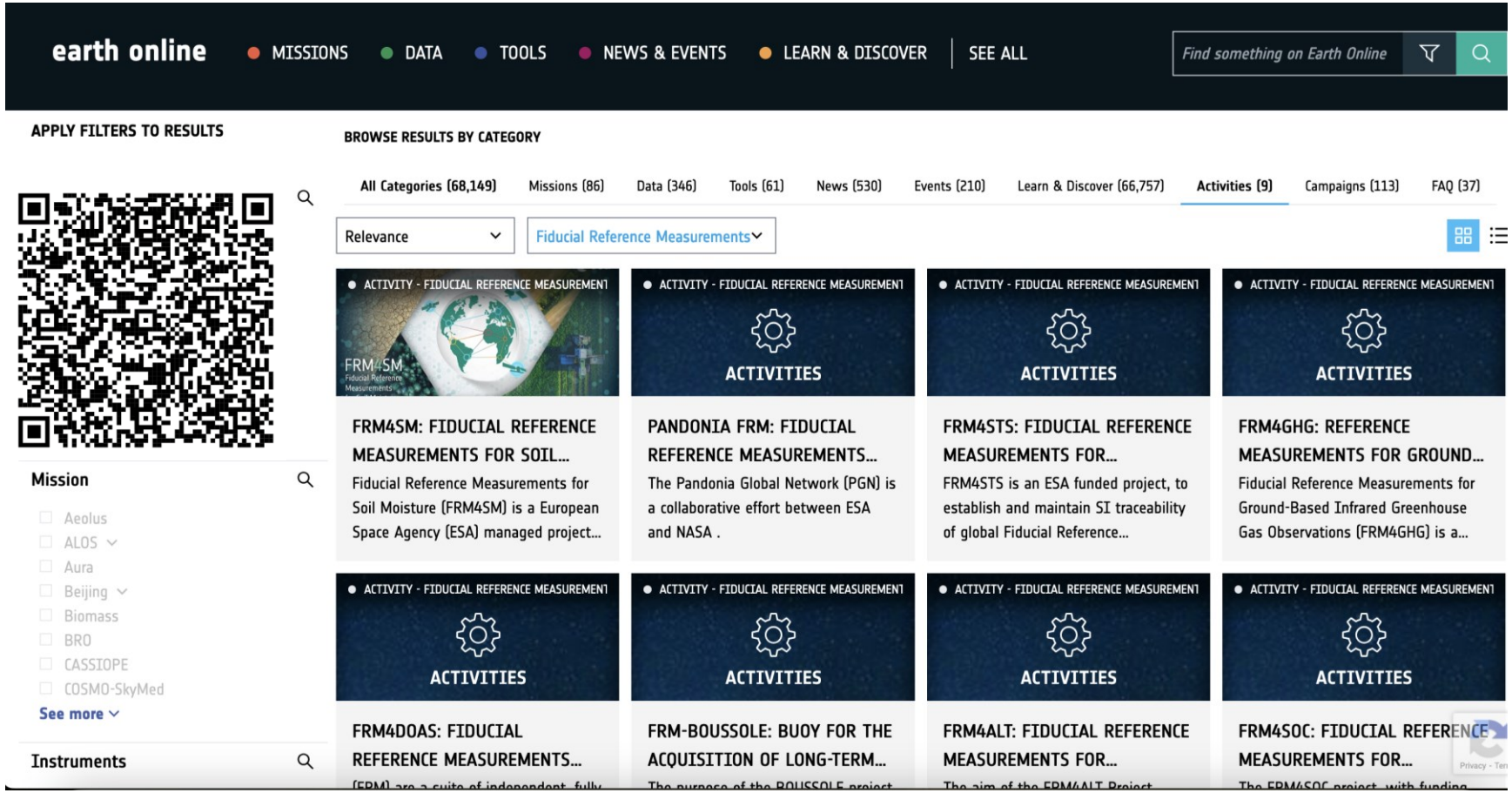
Key elements are **continuous** application of **standard and harmonized** cal/val practices, which consider of **metrology** and **Fiducial Reference Measurements (FRM)**



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



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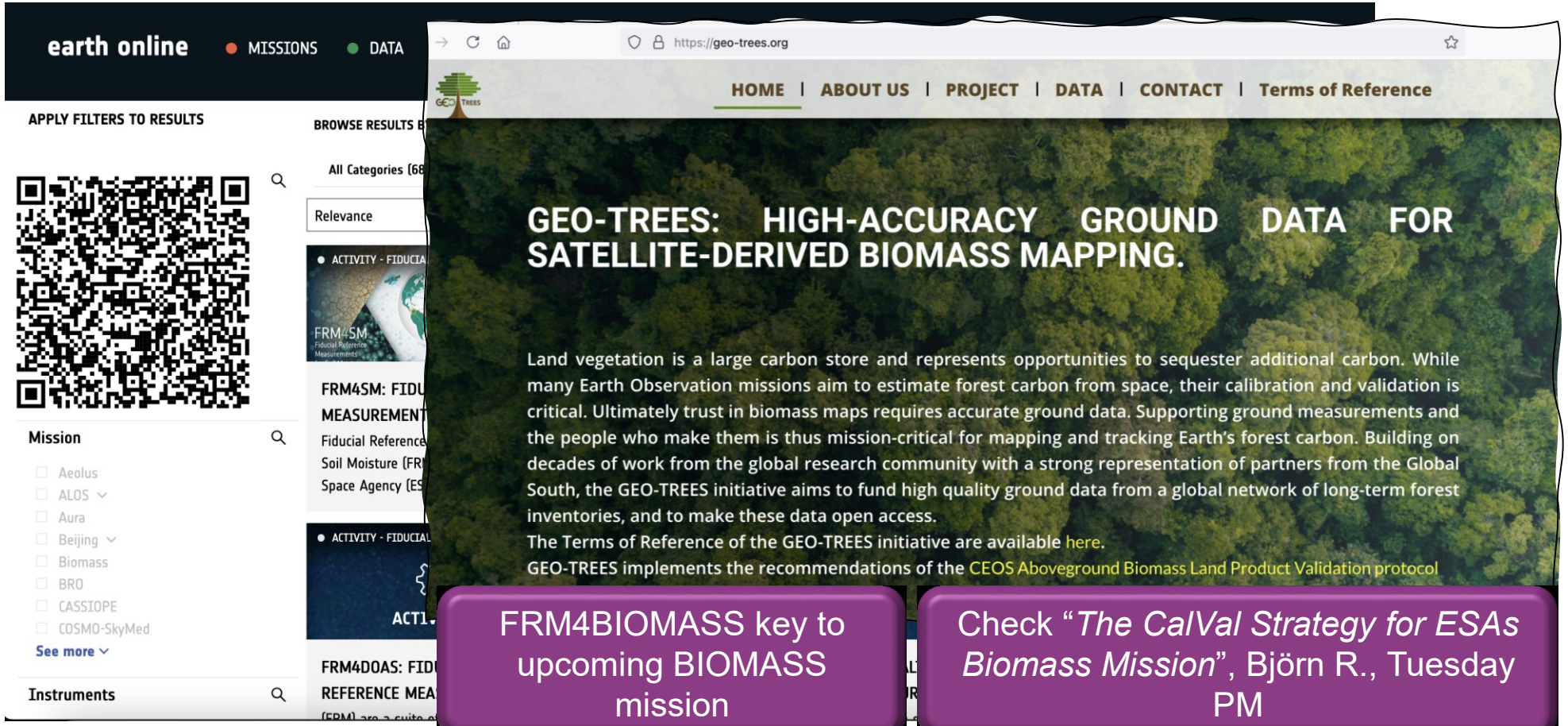


FRM4BIOMASS key to upcoming BIOMASS mission

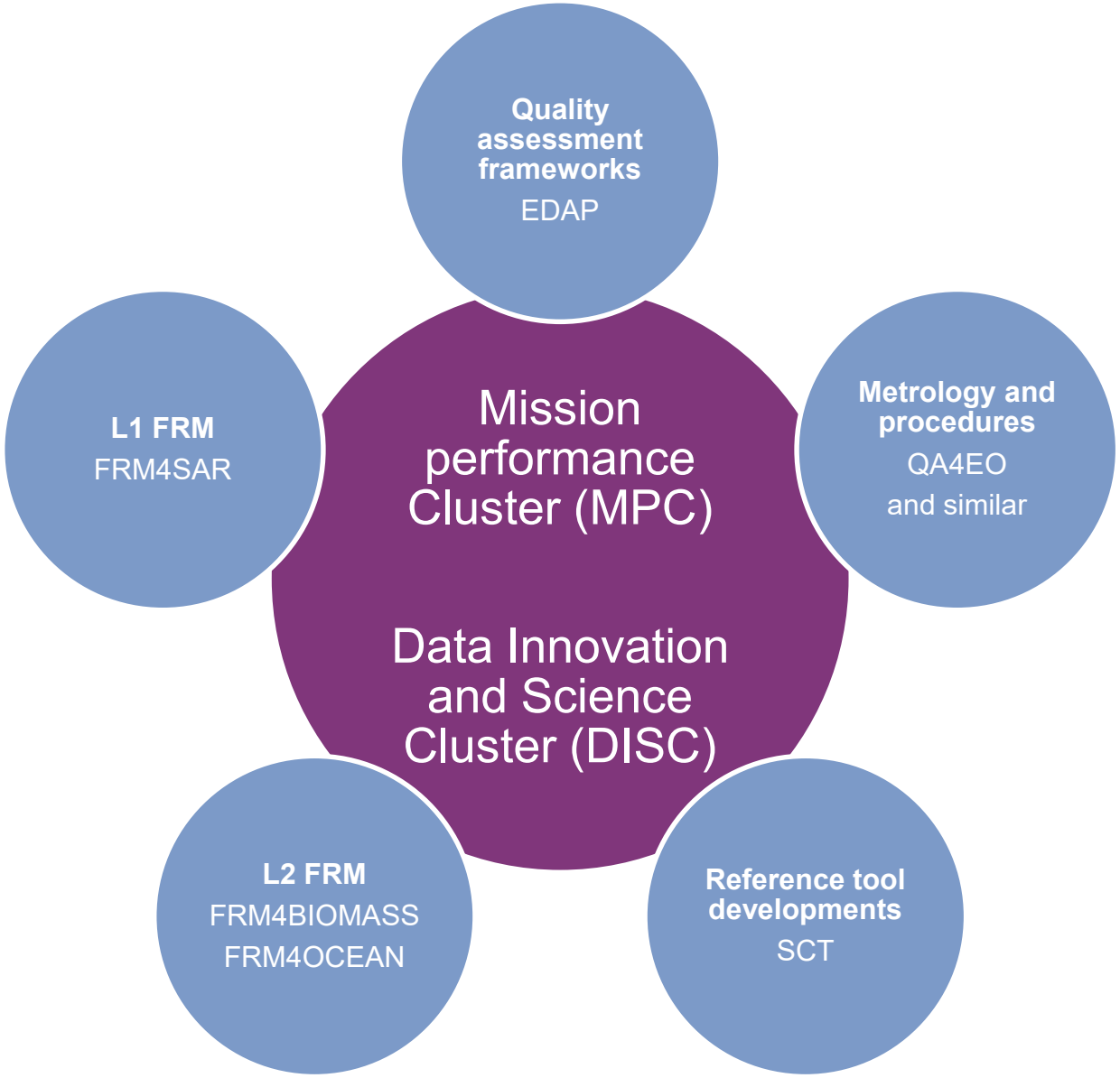
Check "*The CalVal Strategy for ESAs Biomass Mission*", Björn R., Tuesday PM

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



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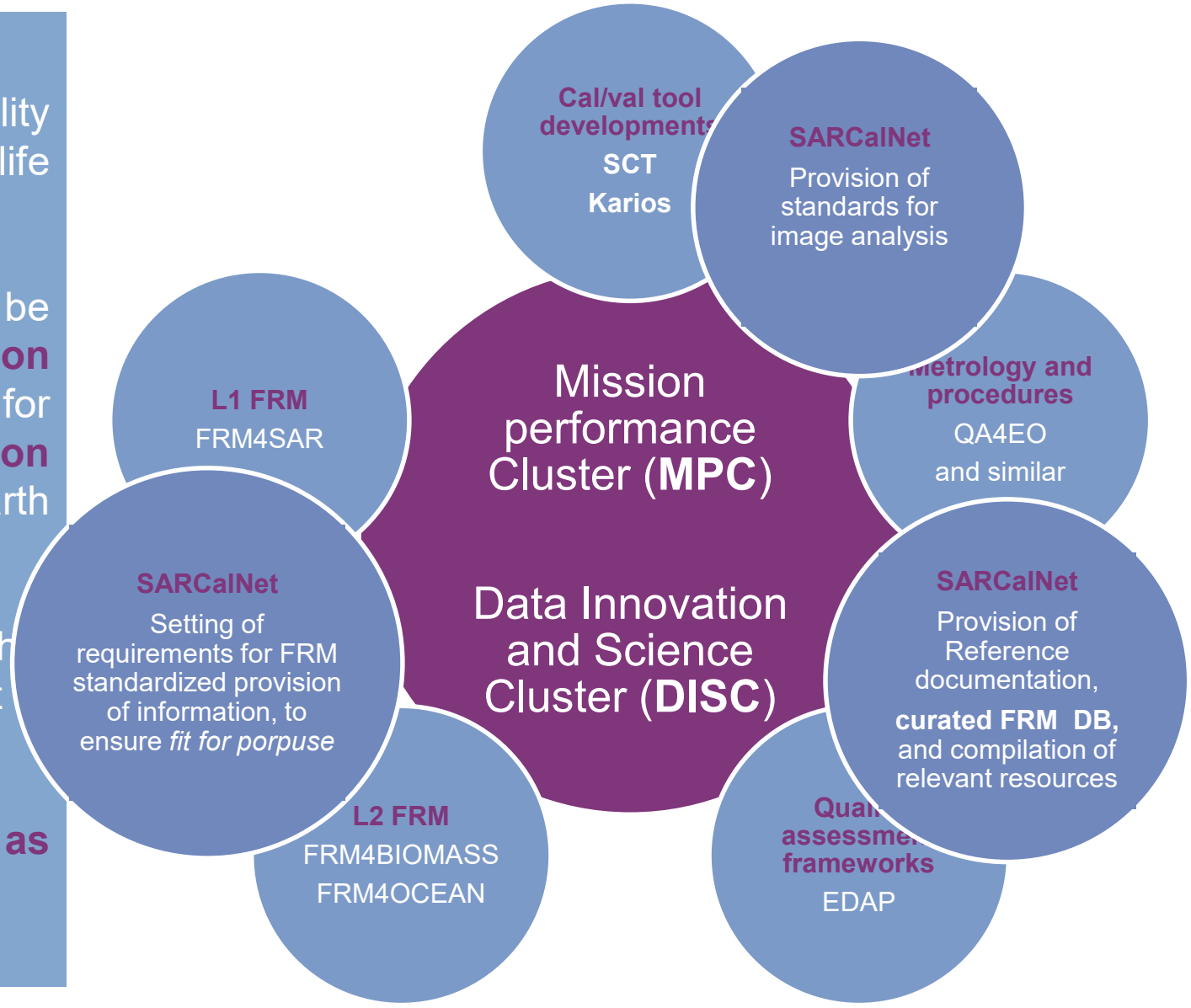
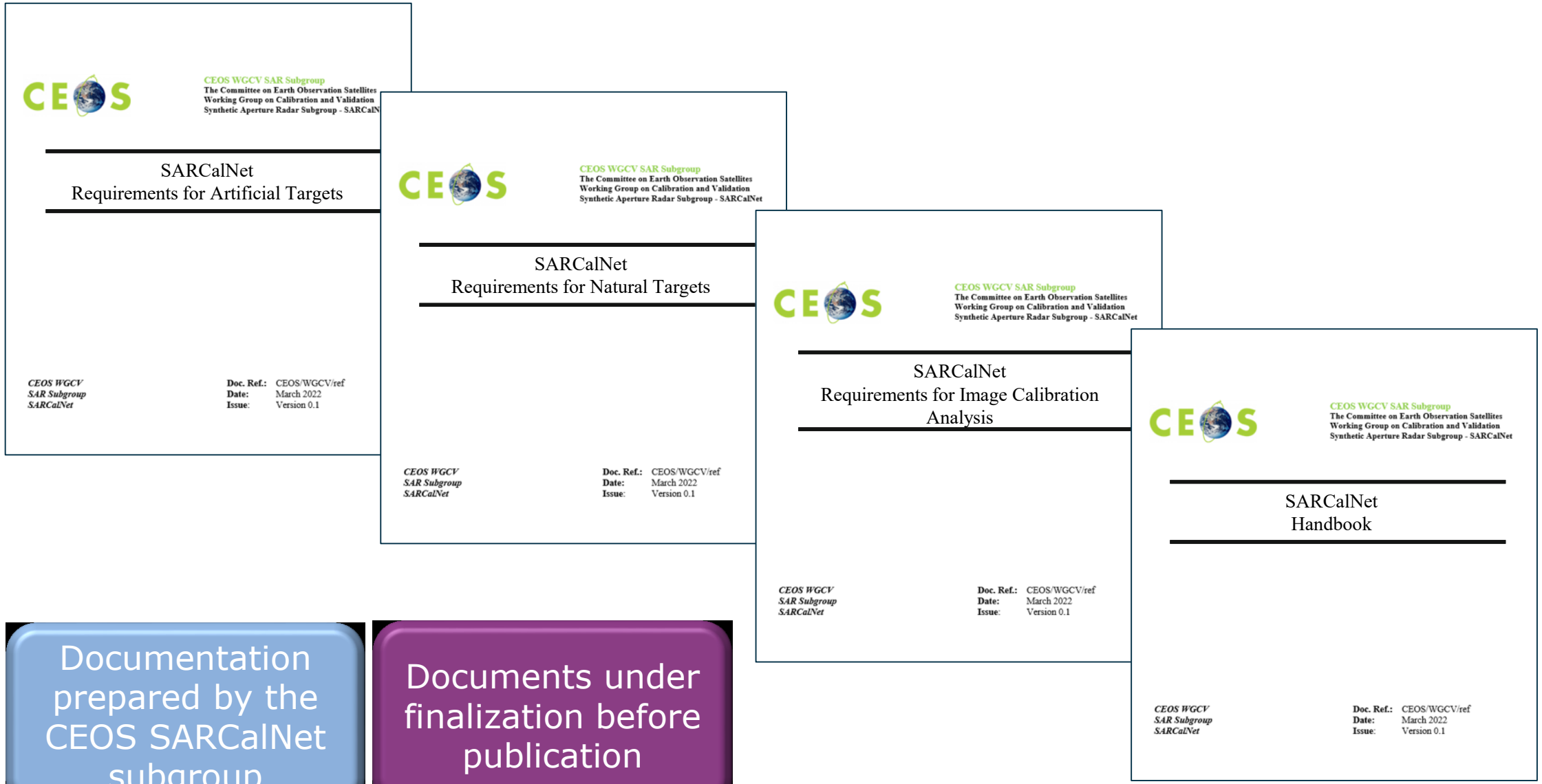
The CEOS SARCalNet initiative is seen as key element to support this strategy



The CEOS SARCalNet initiative: Documentation



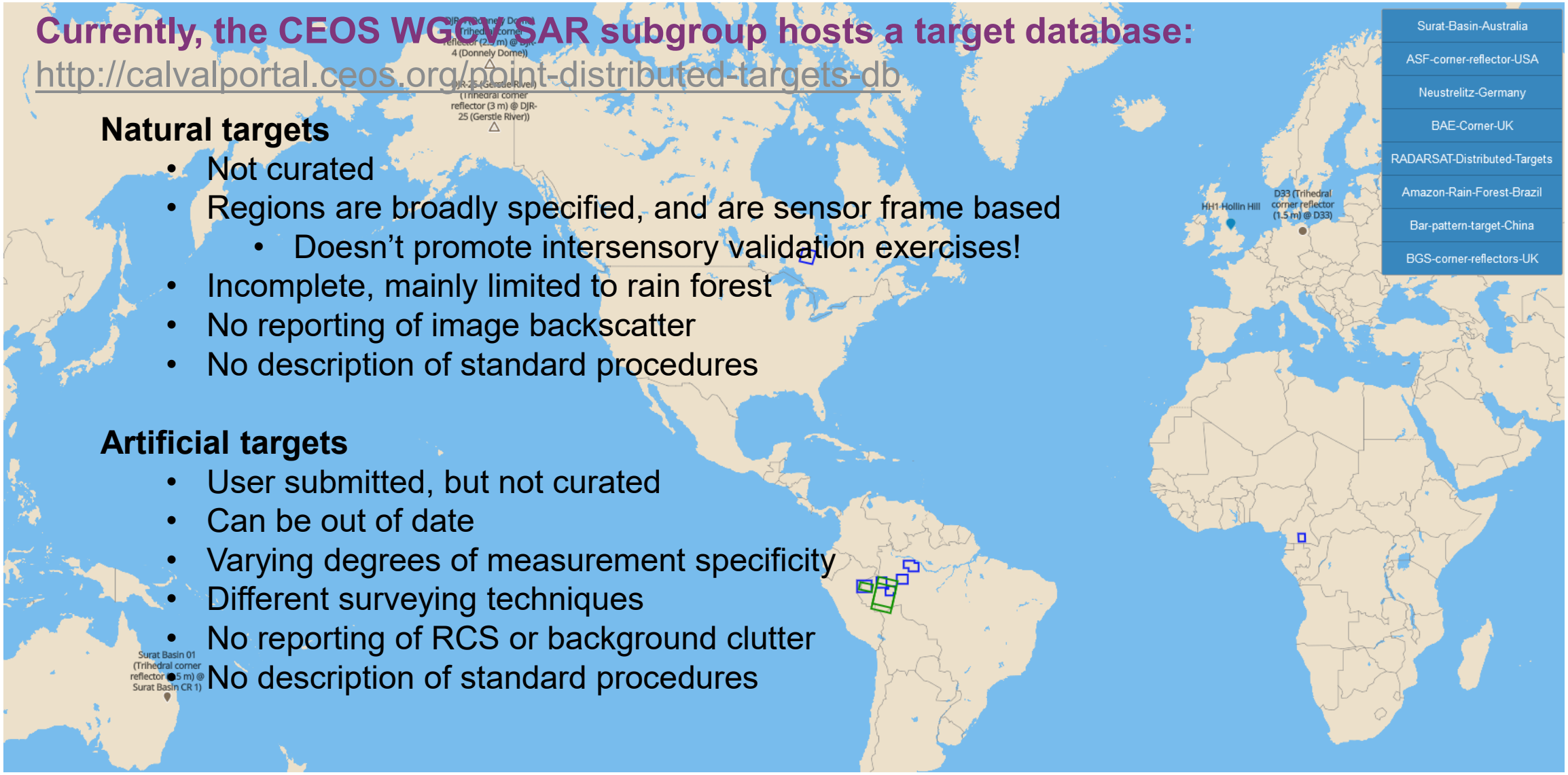
Documentation prepared by the CEOS SARCalNet subgroup

Documents under finalization before publication

The CEOS SARCalNet database: Where did we start…

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

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



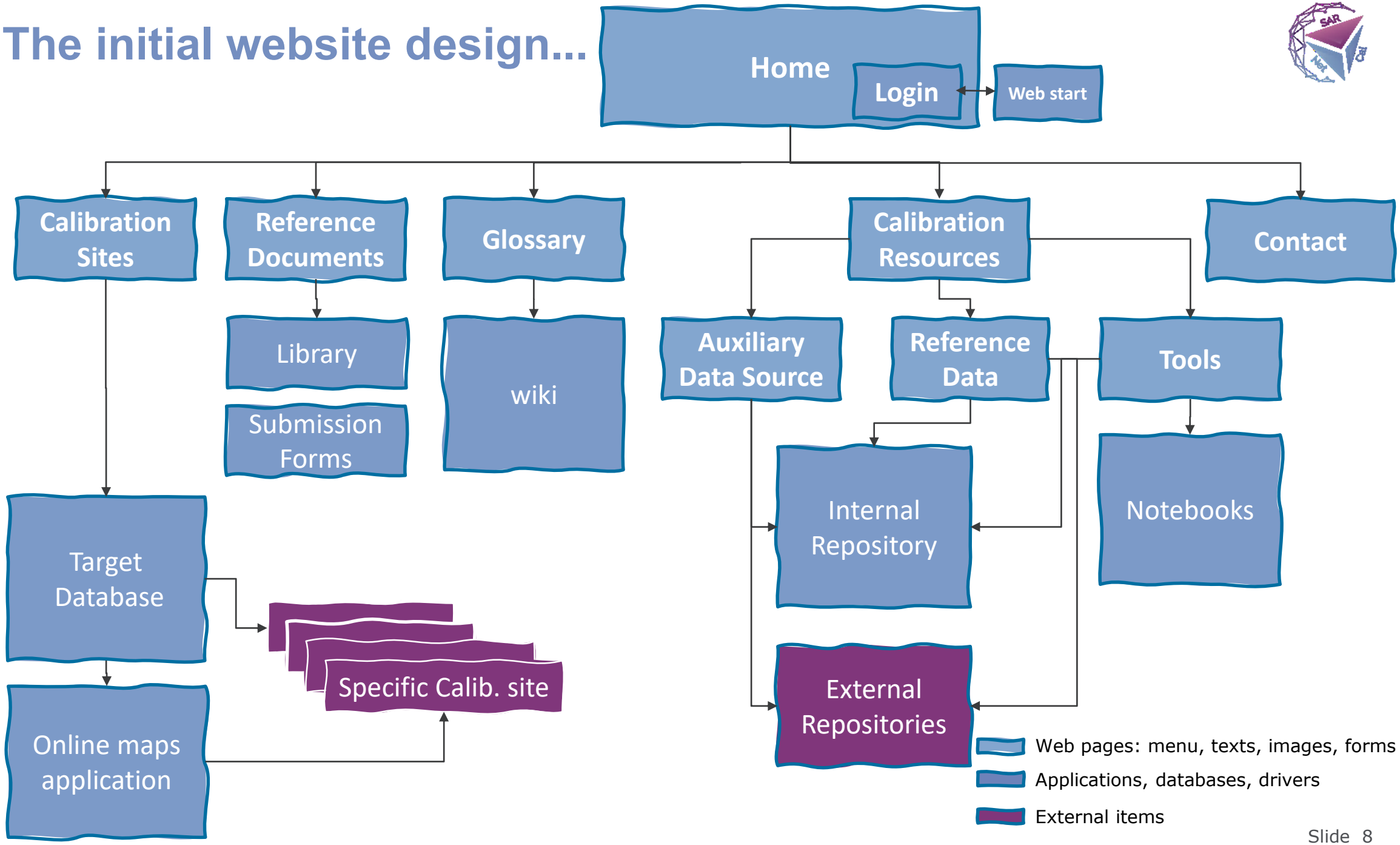
Natural targets

- 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

The initial website design...

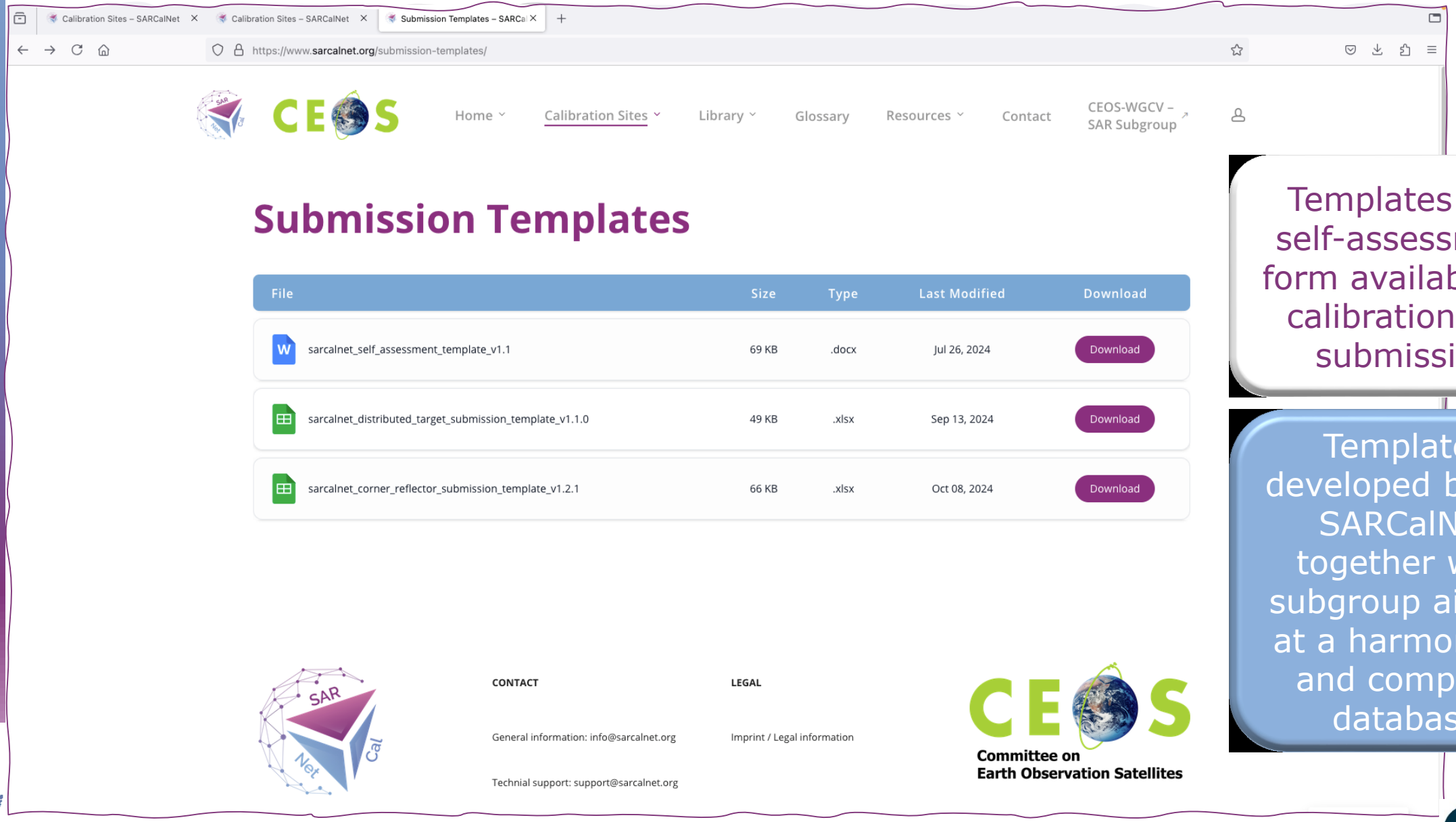


.. and where we ended up: The SARCalNet Website

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 SARCalNet Website



Templates and self-assessment form available for calibration site submission

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

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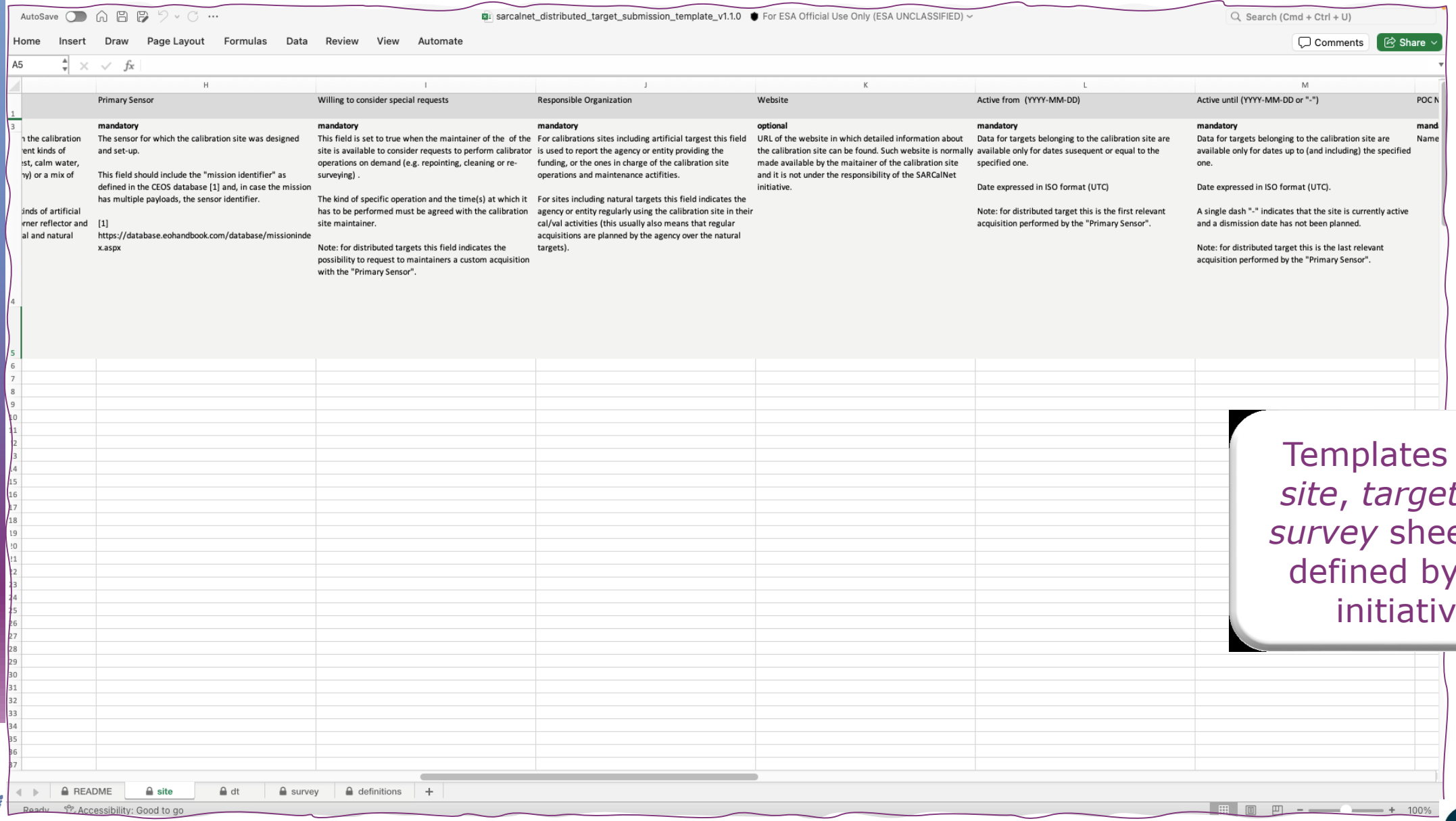
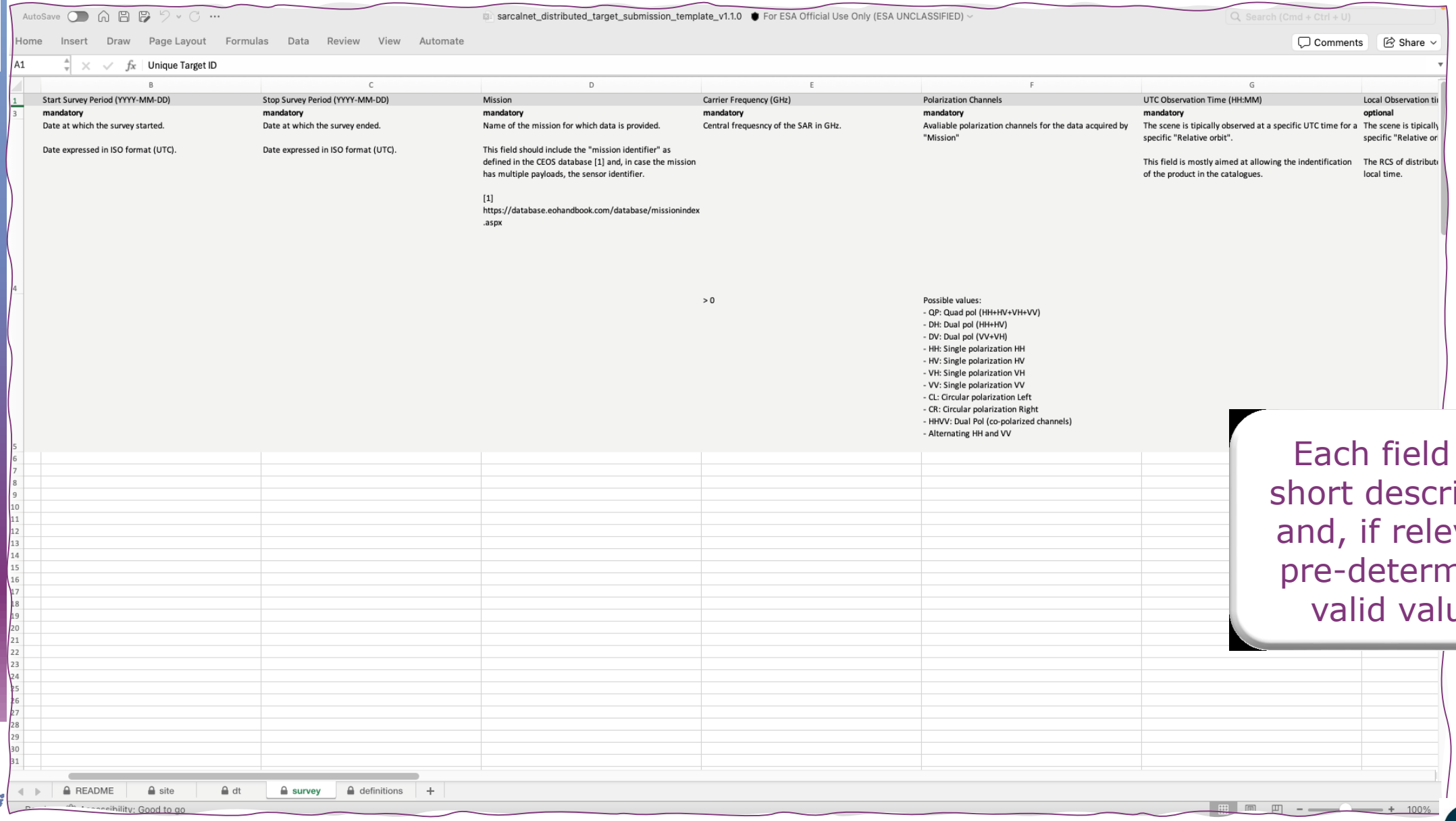


	H	I	J	K	L	M	
1	Primary Sensor	Willing to consider special requests	Responsible Organization	Website	Active from (YYYY-MM-DD)	Active until (YYYY-MM-DD or "-")	POC N
3	**mandatory** The sensor for which the calibration site was designed and set-up. This field should include the "mission identifier" as 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** This field is set to true when the maintainer of the of the site is available to consider requests to perform calibrator operations on demand (e.g. repointing, cleaning or re-surveying) . The kind of specific operation and the time(s) at which it has to be performed must be agreed with the calibration site maintainer. Note: for distributed targets this field indicates the possibility to request to maintainers a custom acquisition with the "Primary Sensor".	**mandatory** For calibrations sites including artificial targest 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 actifities. 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).	**optional** URL of the website in which detailed information about the calibration site can be found. Such website is normally made available by the maitainer of the calibration site and it is not under the responsibility of the SARCalNet initiative.	**mandatory** Data for targets belonging to the calibration site are available only for dates susequent or equal to the specified one. Date expressed in ISO format (UTC) Note: for distributed target this is the first relevant acquisition performed by the "Primary Sensor".	**mandatory** Data for targets belonging to the calibration site are available only for dates up to (and including) the specified one. Date expressed in ISO format (UTC). A single dash "-" indicates that the site is currently active and a dismission date has not been planned. Note: for distributed target this is the last relevant acquisition performed by the "Primary Sensor".	**mand** Name

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

.. and where we ended up: The SARCalNet Website



AutoSave · sarcalnet_distributed_target_submission_template_v1.1.0 · For ESA Official Use Only (ESA UNCLASSIFIED)

Home Insert Draw Page Layout Formulas Data Review View Automate · Comments · Share

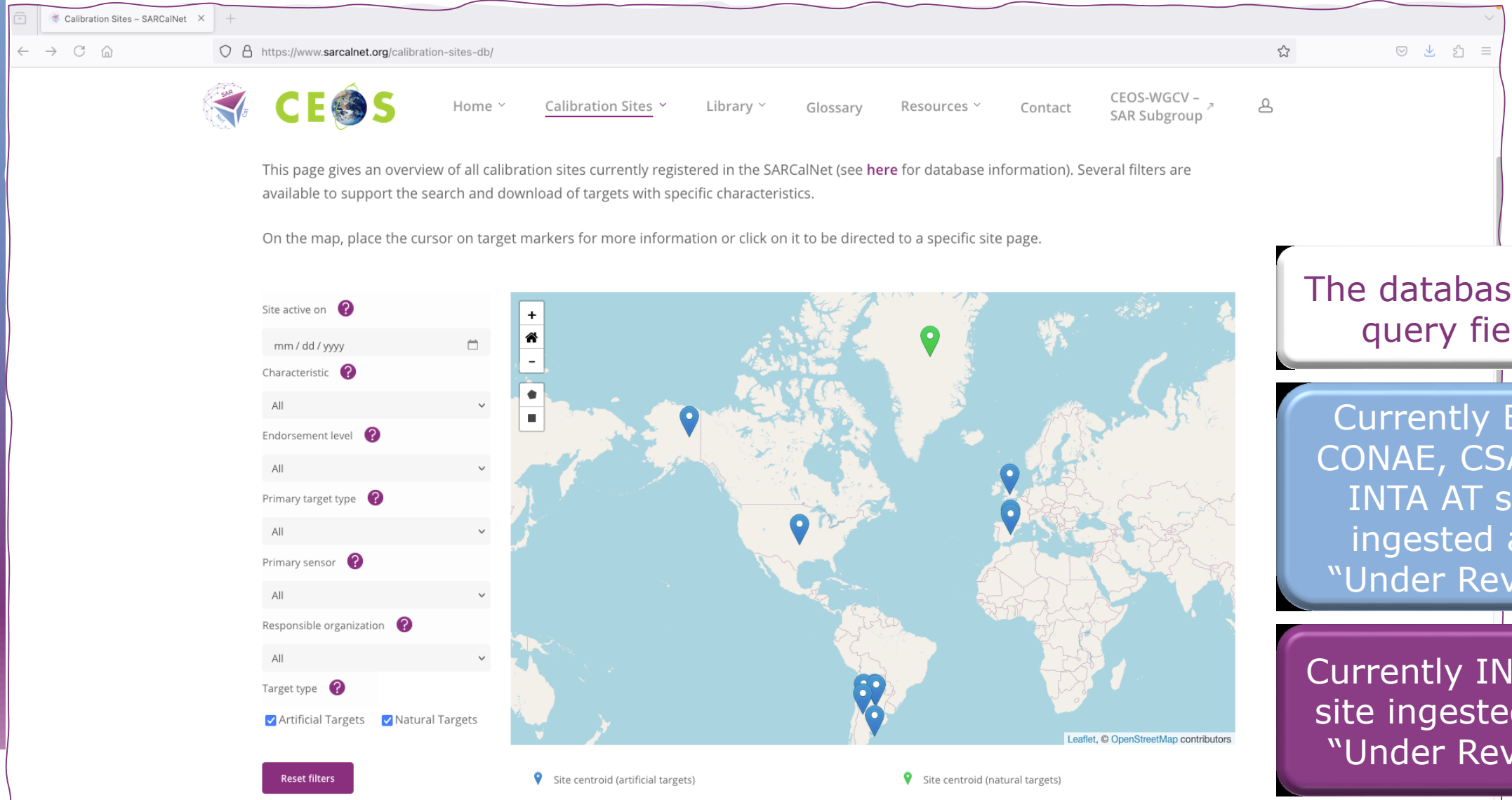
A1: Unique Target ID

	B	C	D	E	F	G	
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 ti
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 frequesncy of the SAR in GHz.	**mandatory** Avaliable polarization channels for the data acquired by "Mission"	**mandatory** The scene is tipically observed at a specific UTC time for a specific "Relative orbit". This field is mostly aimed at allowing the indentification of the product in the catalogues.	**optional** The scene is tipically specific "Relative or The RCS of distribut 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		

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

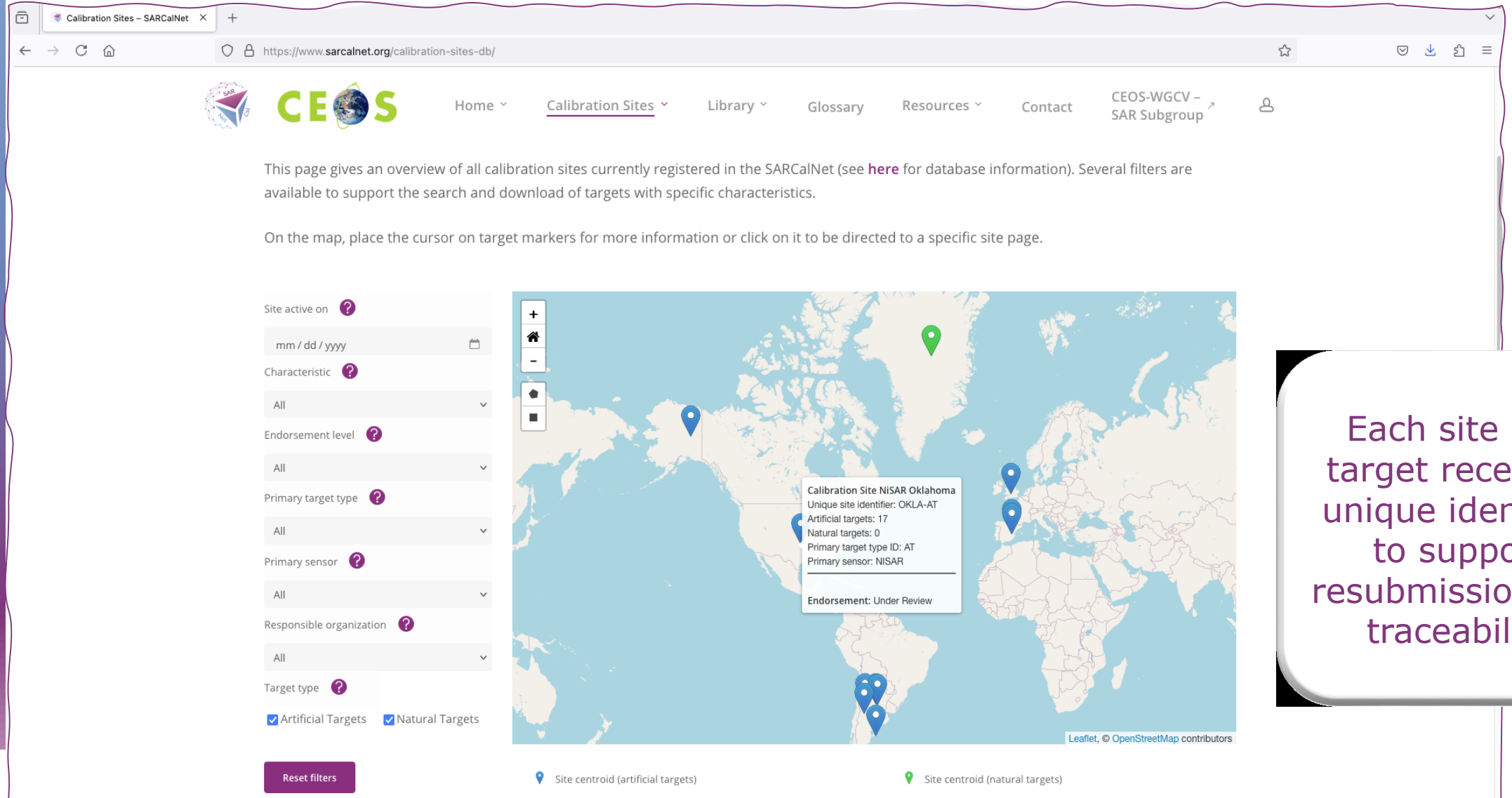


The database with query fields

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 SARCalNet Website



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

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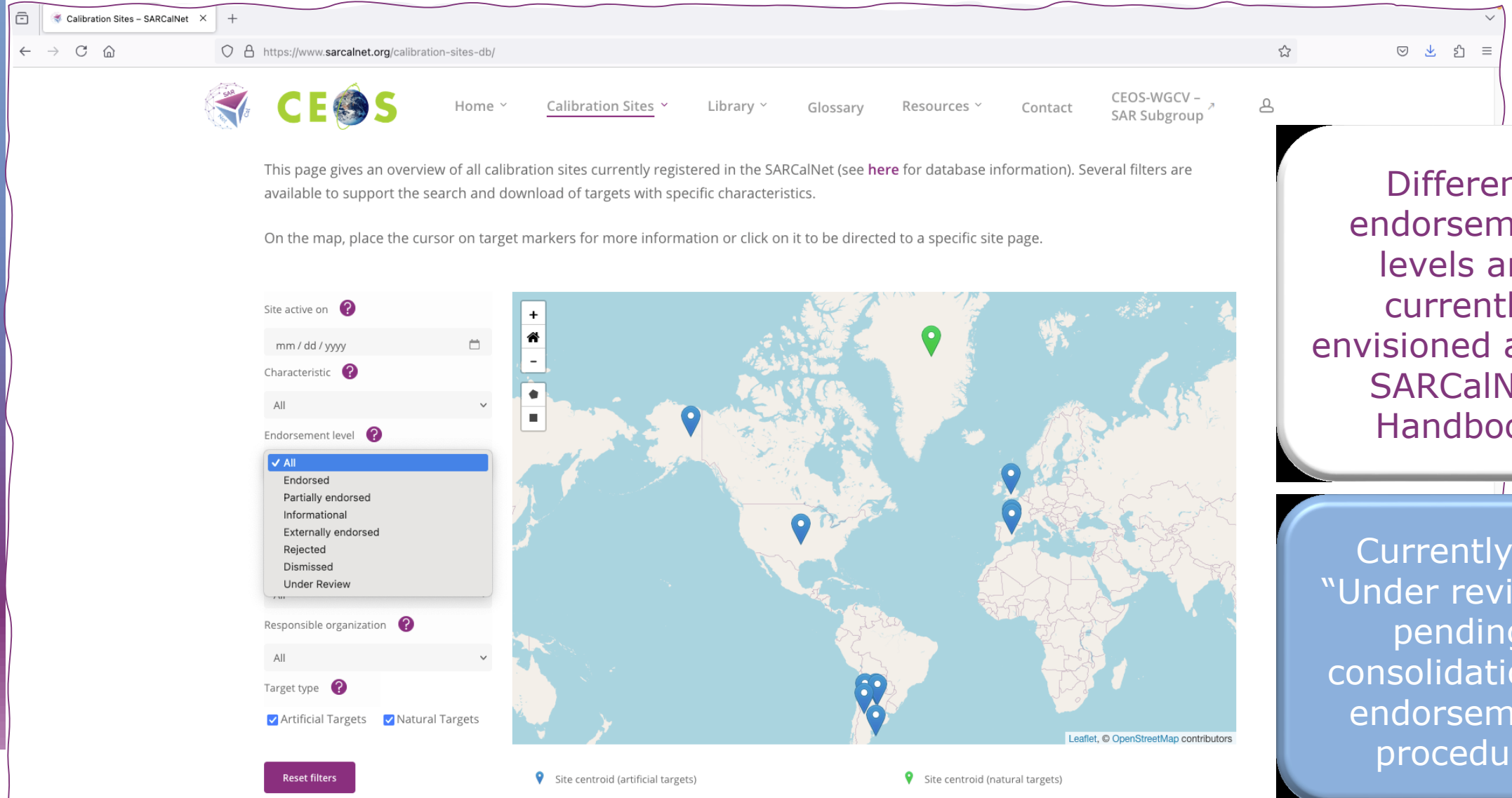

Different endorsement levels are currently envisioned as per SARCalNet Handbook

Currently all "Under revision" pending consolidation of endorsement procedure

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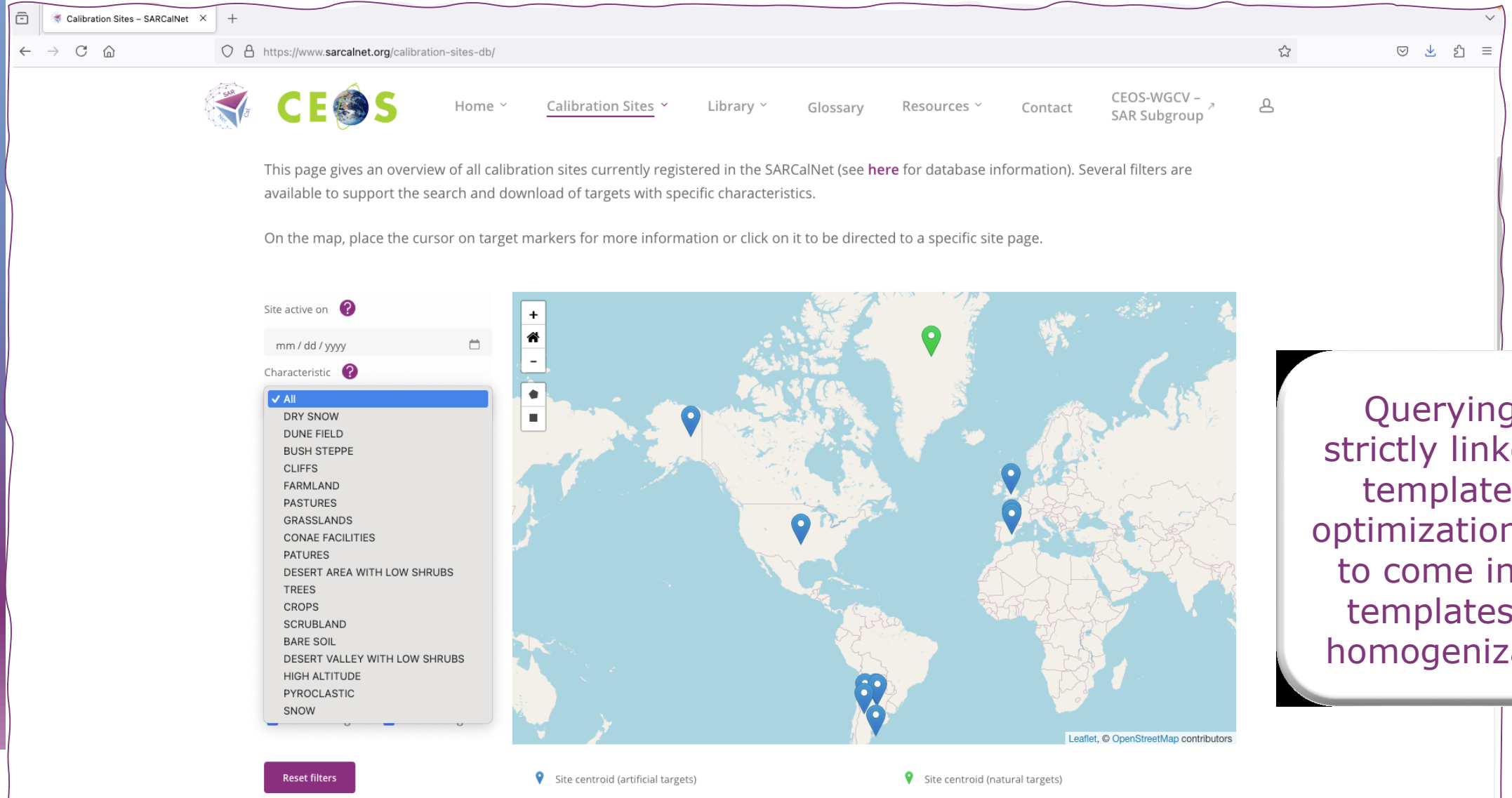

Querying is strictly linked to templates… optimizations still to come in the templates for homogenization

.. and where we ended up: The SARCalNet Website

Calibration Sites – SARCalNet | Calibration Sites – SARCalNet | Dynamic Calibration Site – SAR

https://www.sarcalnet.org/dynamic-calibration-site/?site_id=27

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

Calibration Site OKLA-AT

Geolocation

Back to sites overview

Operational | All directions | Side length ≥ 2.0

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

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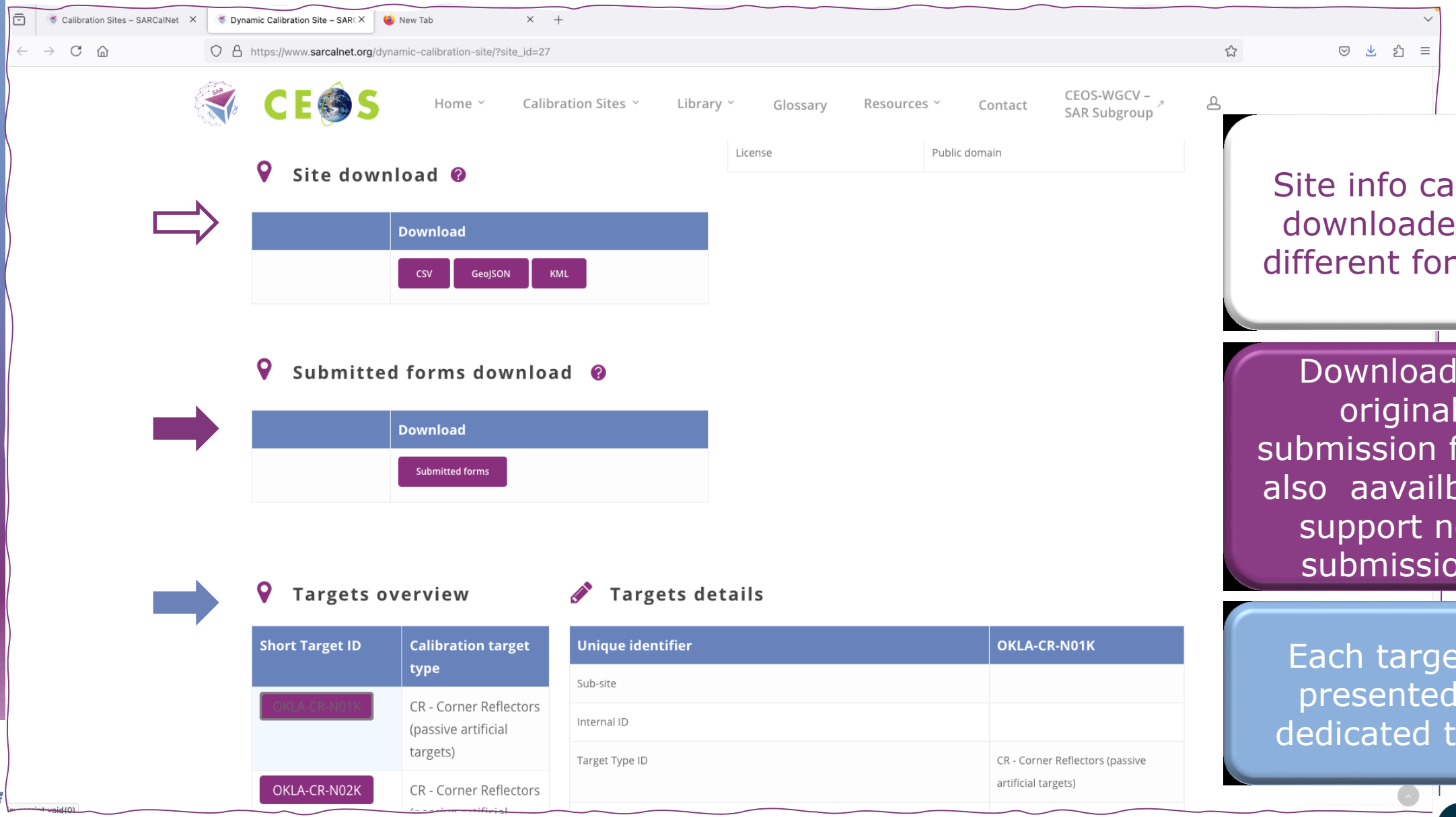

Site info can be downloaded in different formats

Download of original submission forms also aavailble to support new submissions

Each target is presented in dedicated table

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	(passive artificial targets)
OKLA-CR-N05K	CR - Corner Reflectors (passive artificial targets)
OKLA-CR-N06K	CR - Corner Reflectors (passive artificial targets)
OKLA-CR-N07K	CR - Corner Reflectors (passive artificial targets)
OKLA-CR-N08K	CR - Corner Reflectors (passive artificial targets)
OKLA-CR-N09K	CR - Corner Reflectors (passive artificial targets)
OKLA-CR-N10K	CR - Corner Reflectors (passive artificial targets)
OKLA-CR-N11K	CR - Corner Reflectors (passive artificial targets)
OKLA-CR-N12K	CR - Corner Reflectors

Approx. azimuth (deg)	359.31
Approx. boresight (deg)	89.31
Primary direction	EAST
Side length (m)	2.8
Photo	
Operational	Yes
Manufacturer	Performance WaterJet, Ontario, California
Purpose of target	Geometric calibation, 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

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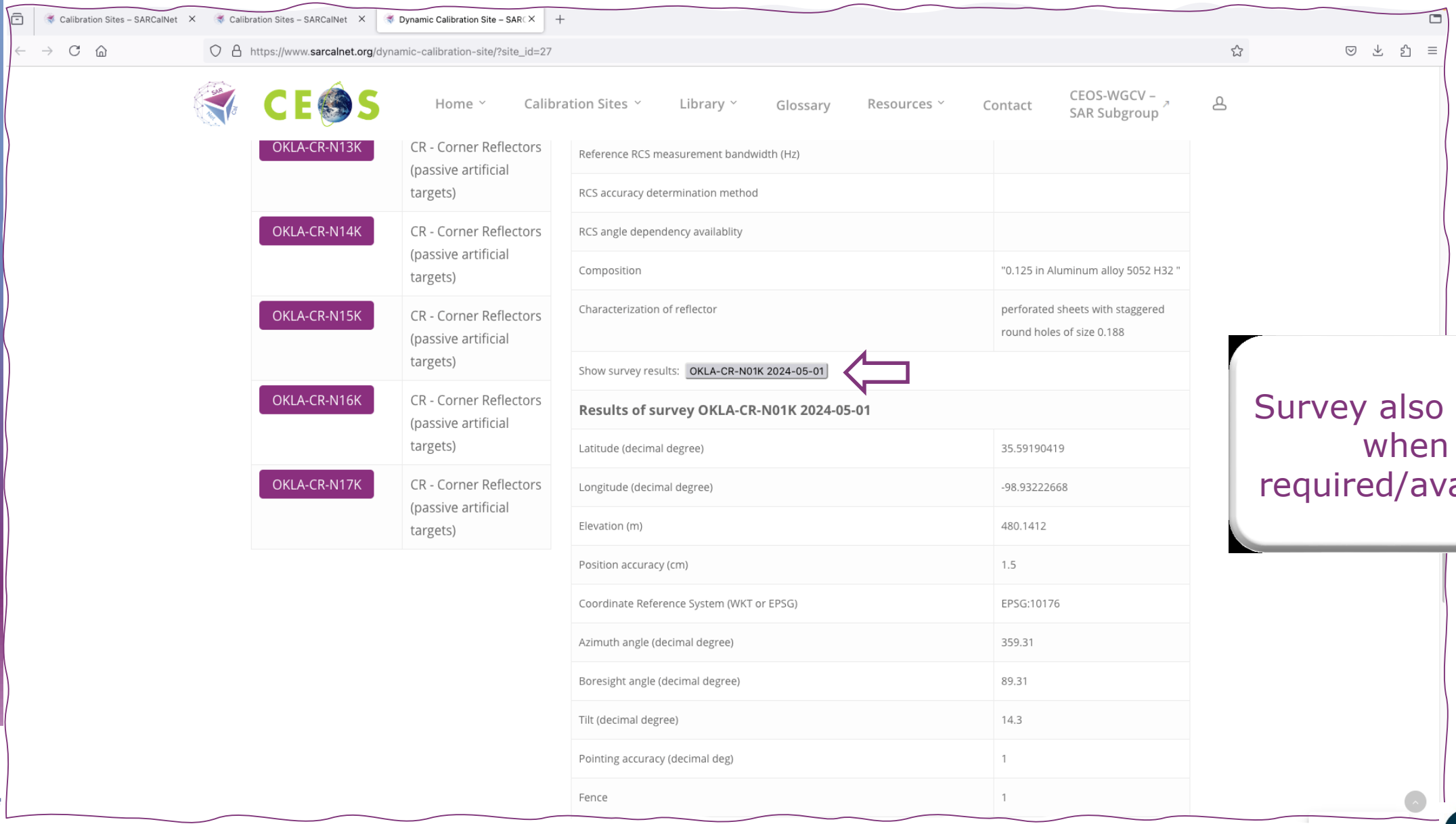

Survey also visible when required/available

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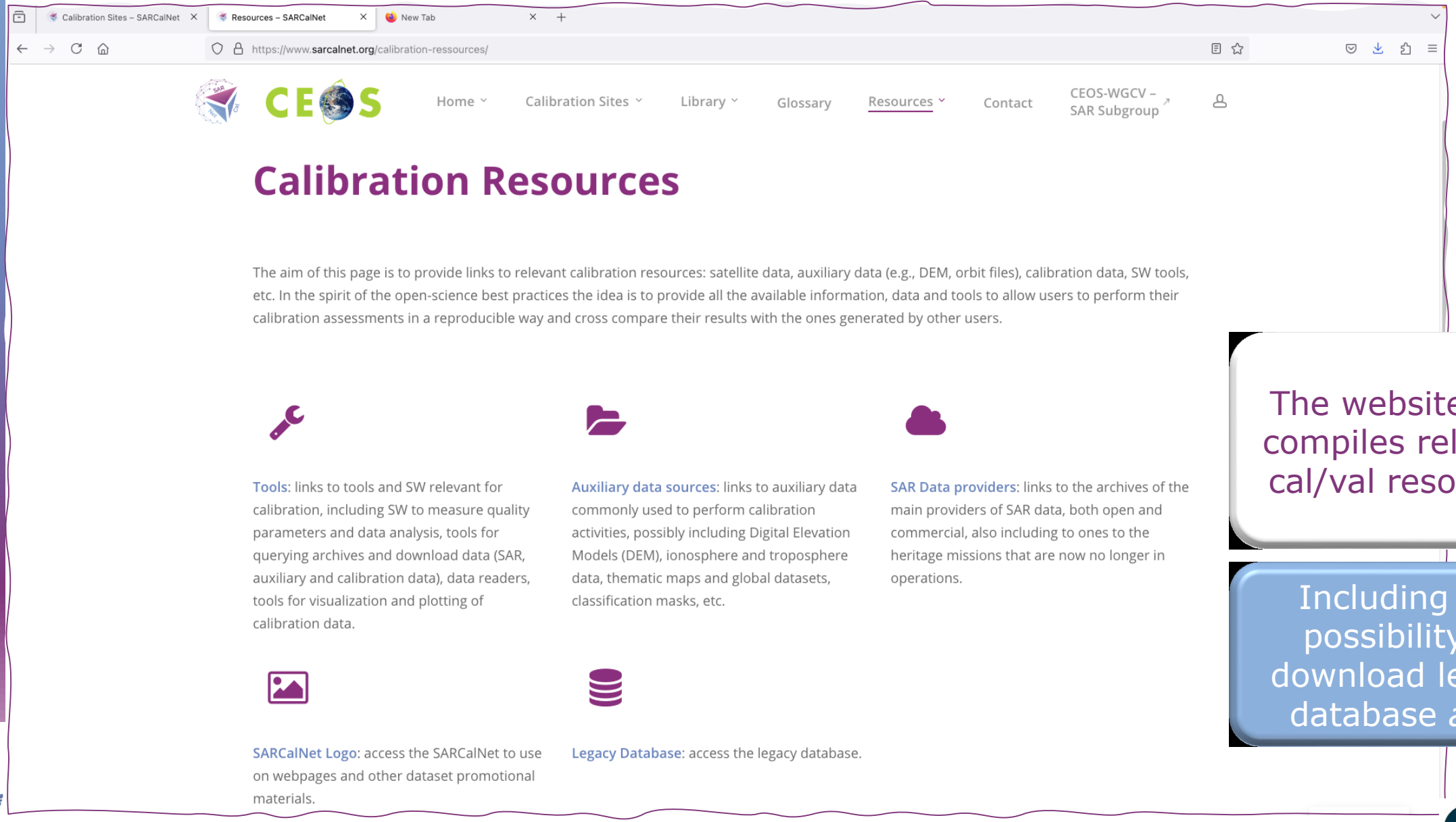

The website also compiles relevant cal/val resources

Including the possibility to download legacy database *as is*

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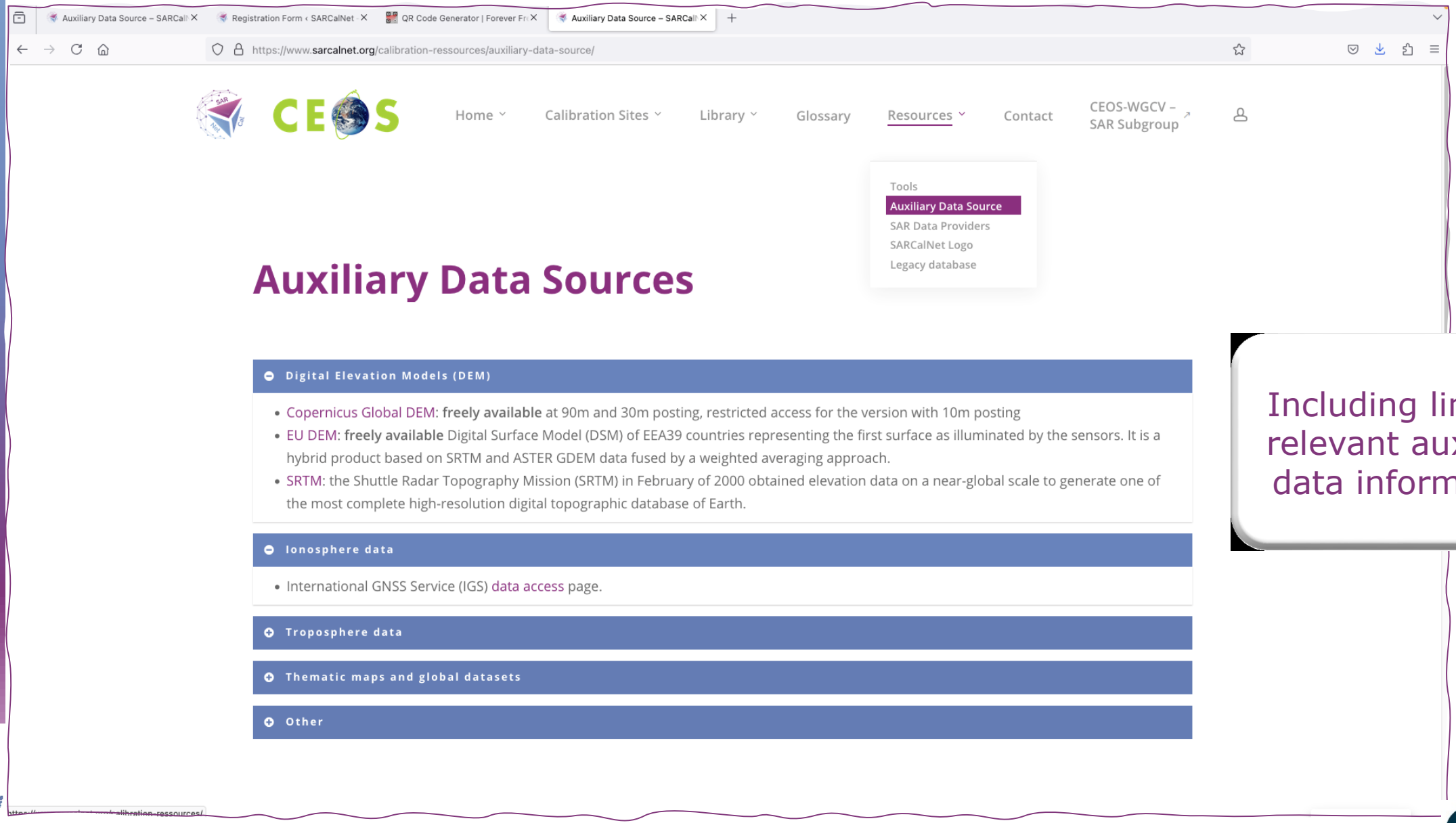

Including links to relevant auxiliary data information

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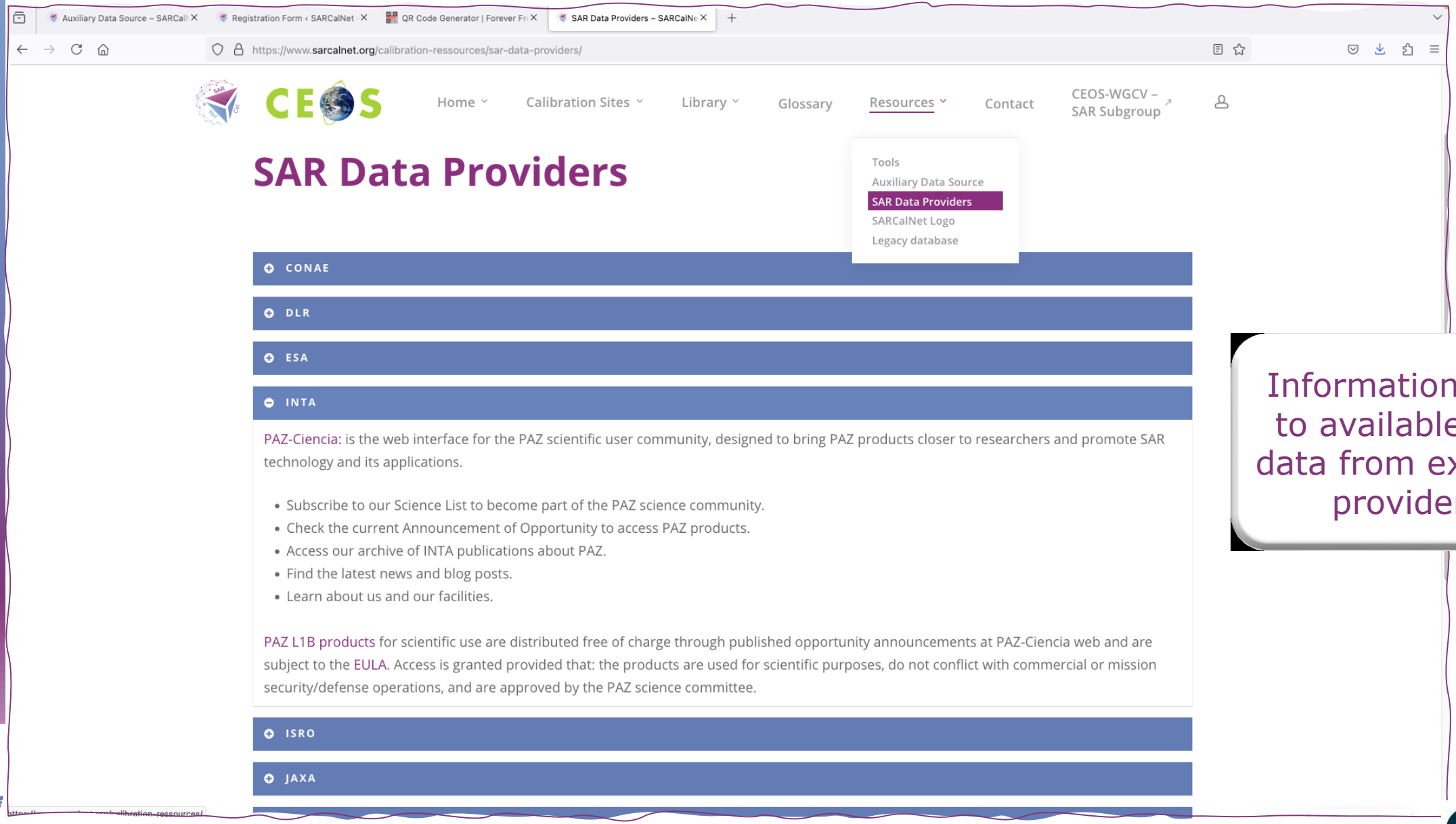

Information/links to available SAR data from external providers

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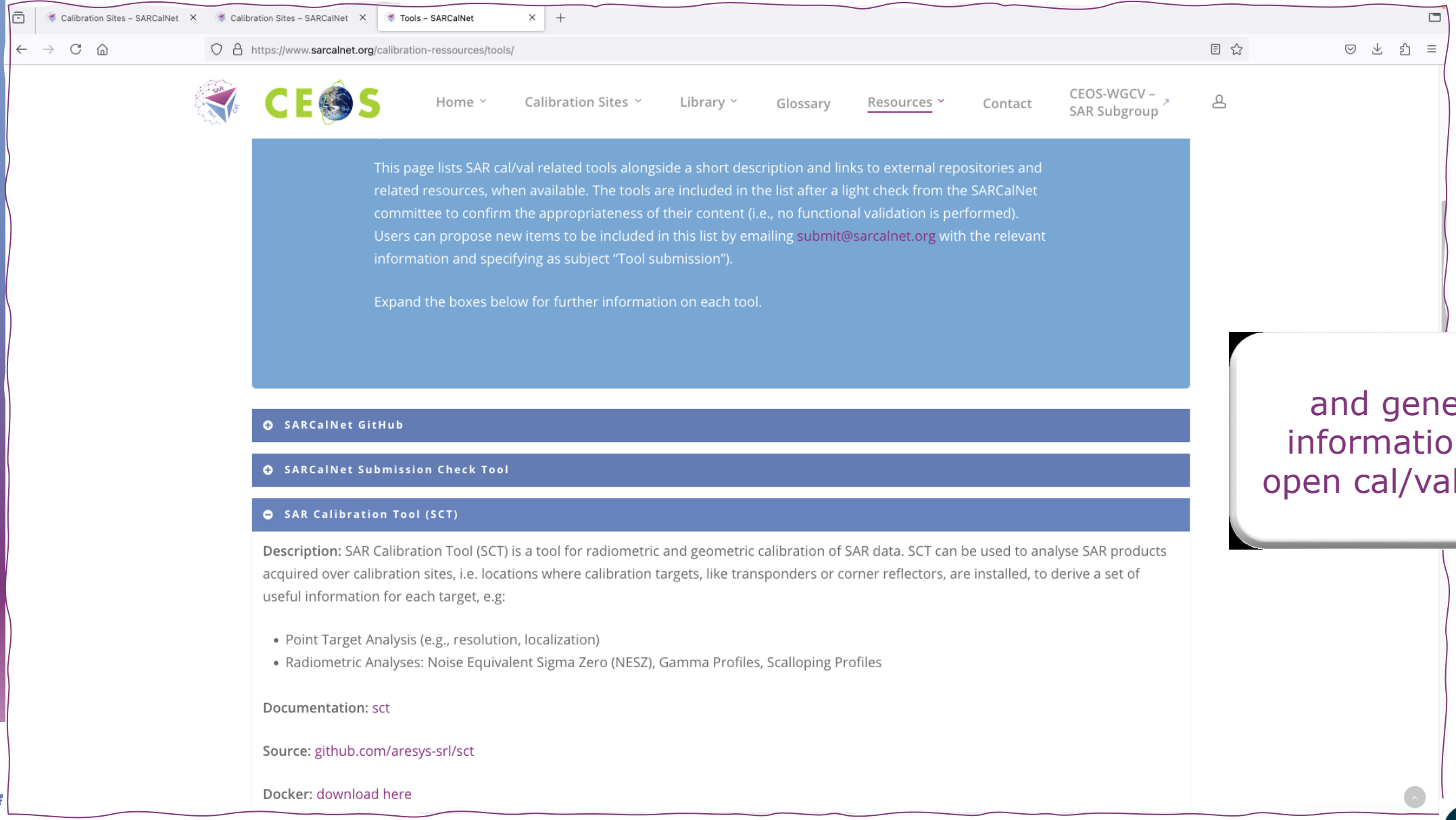

and general information on open cal/val tools

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!**