

CEOS WGCV SAR Subgroup

The Committee on Earth Observation Satellites

Working Group on Calibration and Validation Synthetic Aperture Radar Subgroup - SARCalNet

SARCalNet Handbook

CEOS WGCV
SAR Subgroup
SARCalNet

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1 INTRODUCTION

1.1 Purpose of the document

This document provides general information on the SARCalNet initiative, including the description of its organization and of relevant procedures.

1.2 Intended Audience

This document provides relevant information for

- the SARCalNet working group.
- the SAR Calibration site/targets maintainers
- the SAR community in general, specially to users who make use of reference targets for calibration and validation activities and might be interested to register to the SARCalNet website.

1.3 Document Overview

This document is divided into:

Section 1: Introduction

Section 2: About SARCalNet

Section 3: SARCalNet sites

Section 4: SARCalNet in situ data

Section 5: SARCalNet reference data

Section 6: SARCalNet tools

1.4 Acronyms

Acronym	Description
CEOS	Committee on Earth Observation Satellites
FITS	Flexible Image Transport System
IPR	Intellectual Propriety Right
MS	Microsoft
PDF/A	Portable Document Format
PNG	Portable Network Graphics
WGISS	Working Group on Information Systems and Services

1.5 Documents

1.5.1 Applicable documents

These documents were created as part of the SARCalNet initiative and contain relevant

information about sites, targets and procedures.

Applicable Document ID	**Document Title**
AD-1	CEOS SARCalNet Requirements for Artificial Targets, Issue 1.0 Draft
AD-2	CEOS SARCalNet Requirements for Distributed Natural Calibration Targets, Issue 1.0 Draft
AD-3	CEOS SARCalNet Requirements for Image calibration Analysis, Issue 1.0 Draft
AD-4	CEOS SARCalNet Requirements for Web Interface, Issue 1.0 Draft
AD-5	Database structure and data format

1.5.2 Reference Documents

The following documents, though not formally part of this document, amplify or clarify its content.

Reference Document ID	**Document Title**
RD-1	CEOS WGCV SAR Subgroup: https://calvalportal.ceos.org/sar_subgroup
RD-2	Target DB: https://calvalportal.ceos.org/point-distributed-targets-db
RD-3	RadCalNet Portal https://www.radcalnet.org
RD-4	SARCalNet website
RD-5	SARCalNet template for Point Targets calibrationsite submission
RD-6	SARCalNet template for Distributed Targets calibrationsite submission
RD-7	Creative Common licenses: https://creativecommons.org/licenses/

2 ABOUT SARCALNET

SAR instruments need external calibration targets to calibrate imagery and for long term monitoring of image calibration stability. Currently, most missions design their own external targets, typically a combination of natural and artificial calibration targets.

There is a known need from the SAR community to have an established network of calibration sites for SAR, similarly to the existing Radcalnet [RD-3] in the optical domain. The SARCalNet initiative was created within the CEOS WGCV SAR subgroup and aims for the establishment of such network (SARCalNet) which will promote the consistence dissemination of reliable information about SAR calibration sites, including basic information on targets as well their characterization continuously published on a curated database. The database should also include documentation created by the initiative containing specific requirements for calibration targets and image analysis, and sample datasets from various missions over different calibration sites in the database. In this way, SARCalNet should facilitate the use of multiple calibration sites by experts and non-experts, and also promote cross-validation between different SAR systems.

2.1 SARCalNet Organizational System

The SARCalNet initiative is composed by a chair and working group members. The chair is typically defined every two years according to a rotating procedure involving the different institutions and agencies in the working group. The up-to-date list of involved agencies/institutions is maintained in the SARCalNet website along with the information about the current chair, his/her/their agency/institution, and period mandate. The list is traversed in order of appearance, and, at each chair nomination event (just before the end of current mandate), the next agency/institution in line nominates a chair from said agency/institution.

The SARCalNet chair fosters the collaboration within the initiative, coordinating meetings and other SARCalNet activities and making sure that all SARCalNet themes are addressed have an associated Point of Contact (PoC). With the support of other working group members, the chair promotes SARCalNet usage to the wider SAR community within CEOS and beyond.

The SARCalNet working group is a team mainly dedicated to the production of documents related to the initiative (e.g. technical notes, guidelines, protocols and standards) as well as to the curation of the data which populates the SARCalNet database. The group meets periodically. SARCalNet working group affiliation is granted upon request by the SARCalNet chair, after consulting the working group current members.

The current information regarding chair and working group members is found in the SARCalNet website [RD-4].

2.2 SARCalNet Thematic Activities

The group devotes itself to thematic activities which are broadly divided into the following categories:

- Development and maintenance of the SARCalNet database
- Definition of requirements for artificial targets and corresponding submission templates
- Definition of requirements for natural targets and corresponding submission templates
- Definition of requirements for image analysis
- Curation of calibration sites and targets
- Curation of reference data and tools

For each theme a point of contact within the working group is identified. The current information regarding themes and corresponding PoCs is found in the SARCalNet website [RD-4].

2.3 SARCalNet Users

Users registered on the SARCalNet website are affiliated with the network. However, the main pages (*inter alia* home, index page for calibration sites and pages describing each calibration site) will be accessible without authentication. Hence, registration can be planned for different user profiles and for specific contents and pages, e.g., target database, reference data, and characterization data files.

Hereafter some options are mentioned, ordered from the lowest to the higher "level of access" that can be applied:

- Anonymous user.
- Self-registration: by providing personal data and email via a dedicated web form.
- Signing-in (still via web) and accepting “user access” protocol (user accepts some restrictions e.g. on data exploitation, re-distribution etc.).
- Through a formal request (e.g. email to the steering committee or website group or calibration site owner where the member candidate provides reasons and requests and shall obtain a formal approval – relevant if not all information will be available in the website).

The access level of the different users is defined in [RD-4].

The SARCalNet website shall be designed considering different user profiles with different rights with respect the accessibility of the website contents, in particular the following restricted contents shall be accessible by authenticated users with appropriated profile:

- target database,
- reference data,
- characterization data files.

Moreover, an area for curation of submitted sites shall be provided and accessible to authenticated users with appropriated profile.

From min to max, in terms of rights, the following types of users are proposed:

- anonymous user
- registered user
- site maintainer
- SARCalNet WG member
- Administrator

	Public sections	Restricted sections	Curation area	Permission (add user, change rights etc.)
Anonymous	View			
Registered	View	View		
Maintainer	View, Edit	View, Edit		
SARCalNet WG member	View, Edit	View, Edit	View, Edit	
Administrator	View, Edit	View, Edit	View, Edit	View, Edit

2.4 SARCalNet Site Owners

Owners are the point of contact of each SARCalNet calibration site. The information is provided at submission and displayed in the relevant webpage in the SARCalNet website.

2.5 SARCalNet Protocols and Rules

SARCalNet has established the following "Protocols" and "Rules" to guide the various aspects of its operations. These are collected and kept up-to-date in a dedicated page(s) of the website [RD-4].

The following protocols and rules are identified:

- SARCalNet: SARCalNet Chair Appointment (see Section 2.1)
- SARCalNet: Guidelines for site certification (see Section 3.3)
- SARCalNet: User Access and data management (see Section 4.5)
- SARCalNet: Database structure and data format (described in [AD-5])
- SARCalNet: Specification for Distributed Natural Targets (described in [AD-1])
- SARCalNet: Artificial Target Requirements (described in [AD-2])
- SARCalNet: Requirements for Image Calibration Analysis (described in [AD-3])
- SARCalNet: Website requirements (described in [AD-4])

2.6 SARCalNet Meetings and Reports

The plenary meeting of SARCalNet members takes place annually, preferably immediately before the annual CEOS SAR cal/val workshop, at the same location.

In every meeting, a list of actions and agenda are prepared by the SARCalNet Chair and discussed in detail. The minutes are archived on the on the SARCalNet website (under Reference Documents) and represent an important reference for users' activities and for the SAR community.

A summary of the meeting is presented at the CEOS WGCV meeting and in other contexts and events with the aim of promoting and highlighting the activities at an international level.

All the SARCalNet Annual Reports submitted by the site maintainers (via form or email) are archived on the SARCalNet website and serve as evidence to the maintenance status of a given SARCalNet site.

3 SARCALNET SITES

3.1 Overview

A SARCalNet site contains a set of in situ data (i.e., targets to be used for calibration and validation tasks) compliant with the requirements defined in [AD-1, AD-2]. A SARCalNet site is certified according to the procedure outlined in this document (Section 3.3) and its content must respect the requirements in [AD-1] or [AD-2] depending on the nature of the target.

3.2 Site Requirements

To become a SARCalNet certified site, the following general requirements must be fulfilled:

RQ-1	Targets included in the site shall be managed and have technical characteristics compliant with the guidelines provided in [AD-1] or [AD-2] depending on the nature of the target.
RQ-2	As defined in [AD-1] and [AD-2], a Person of Contact (PoC) shall be identified for each calibration site, and his/her/their contact shall be included in the dedicated section of the SARCalNet website.
RQ-3	An annual report containing the status of in-situ data shall be published in the dedicated section of the SARCalNet website.
RQ-4	Information which is changed periodically, as per definition in [AD-1, AD-2] shall be delivered via dedicated submission form (web form or excel template) to the SARCalNet portal [AD-5]. The periodicity of the delivery depends on the information and is also defined in [AD-1]. The data will be continuously stored in a database.
RQ-5	All relevant information shall be provided for publication on the SARCalNet portal using the dedicated submission form (web form or excel template) available on the SARCalNet website.
RQ-6	Dedicated external web page(s) describing the site and providing all the information necessary to use the site in practice can be provided optionally and will be linked in the SARCalNet dedicated webpage.
RQ-4	The data provided to SARCalNet shall be licensed according to sec. 4.4. If tailoring of this license is required, the SARCalNet group shall verify that the tailored license is complaint with the objectives of SARCalNet initiative.

3.3 Procedure for Site Curation

Each calibration site and each calibration target, if submitted independently to an already existing site, is subject to curation by the SARCalNet initiative, which will review the submission and label the site according to the fulfillment of relevant requirements and quality of submitted data.

The curation procedure is triggered by SARCalNet personnel as soon as the submission information has been uploaded to the database (see Section 4.5) by means of an email sent to the SARCalNet chair. The following steps are then performed:

- The chair verifies the submitted license terms ensuring that they are compatible with the SARCalNet initiative.
- The chair assigns the submission to the relevant SARCalNet PoC according to the nature of submitted target/site/data.
- The PoC coordinates with relevant working group members to:
    - Check compliance to mandatory requirements defined in [AD-1, AD-2, AD-3].
    - Check compliance to optional requirements defined in [AD-1, AD-2, AD-3].
    - Perform an expert quality and consistence check on submitted information, including the site *fitness for purpose*.
    - Review extra material provided by site owner, if applicable, not included in submission forms, e.g., results from image analysis performed by the site owner or other pertinent documentation and identifies possible blocking points.
- If necessary, the SARCalNet PoC interacts with calibration site PoC, eventually requiring further information until all pending issues are clarified.
- Depending on the results of the previous check the site is labeled as
    - "Fully Endorsed": All targets comply with all mandatory and optional requirements, no inconsistencies or blocking points are found during expert quality check and the data will be shared in the SARCalNet database.
    - "Endorsed": All targets comply with all mandatory requirements, no inconsistencies or blocking points are found during expert quality check and the data will be shared in the SARCalNet database.
    - "Informational": Targets do not comply with all mandatory requirements, but expert assessment is that provided information can be relevant for certain users.
    - "Externally endorsed": All targets comply with all mandatory requirements, no inconsistencies or blocking points are found during expert quality check. The data will not be shared entirely in the SARCalNet database some of them are directly distributed by the maintainer. Specific information on how to access or how to request data shall be provided in this case, and published in the calibration site web

page on the SARCalNet portal.

- "Rejected": Targets do not comply with mandatory requirements and information is not fit to be published in the SARCalNet website. In this case, the site will be dismissed and not archived in the database. The calibration site PoC is informed by the SARCalNet chair of the decision including justification of rejection.

- "Dismissed": the information of the site /target are no longer regularly updated but the historical data are still fully valid.

Note: during the curation procedure, before the check is completed, the site is labelled "Under review"

- The PoC informs SARCalNet personal of curation result.

In case information is to be provided in a regular basis, automatic checks are put in place to detect inconsistences. Additionally, the SARCalNet PoC will regularly monitor the quality of the provided information (in a lower frequency than the updates themselves, and typically yearly).

One of the objectives of SARCalNet is to make sure information of targets and sites remain up to date. Hence, the endorsement status shall be re-evaluated on a regular basis:

- Scheduled curation happens once a year, after PoC has submitted confirmation of information status after receiving automatic communication from SARCalNet.
- Non-scheduled curation happens when user reports problems with a given calibration site or target.

4 SARCALNET IN SITU DATA

4.1 Natural Targets

These targets are commonly used for different aspect of calibration and validation and might be of a distributed nature (e.g., tropical forests, doldrums, deserts, etc), or might exhibit point-like characteristics at a certain resolution (e.g., man-made or natural targets with point-like response). The requirements on the natural targets to be published in SARCAlNet are provided in [AD-2].

4.2 Artificial Targets

These targets are designed and built for the porpoise of SAR calibration and can broadly divided into active or passive. The requirements on the artificial targets to be published in SARCAlNet are provided in [AD-1].

4.3 Data Format

Data submission:
The information regarding calibration sites and targets is collected through web forms or XLSX templates like [RD-5] and [RD-6]. They include:

- a section dedicated to the calibration site description, also including information about contact points, and general information about the location and purpose,
- a section dedicated to targets. The information provided in this section may differ depending on the actual target type (e.g. Corner Reflector or distributed targets). Moreover, some of the fields coulde be required or not depending on the primary use of the target (e.g. radiometric or geometric calibration).

The collected information are stored into the SARCalNet DB whose structure (still to be finalized) resembles quite closely the one of the XSLX templates.
Finally, the data can be queried and downloaded both via web interfaces and via web API in a standard file format (e.g. JSON, XML, CSV, etc.). Details of the content are still under definition and, in any case may vary depending on the users' requests.

4.4 Data Policy

The data policy is defined in [AD-4] with a specific protocol that shall be agreed by the site maintainer. This data policy is based on the Creative Common CC systems [RD-7], the types of CC license are reported from the most open CC0 to the least open CC-BY-NC-ND. These different licenses are briefly described here below:

1) CC0: no rights reserved and data users may freely build upon, enhance and re-use the data for any purposes without restriction under copyright or database law.
2) CC-BY: This license lets others distribute, remix, tweak, and build upon licensor data, even commercially, as long as they credit licensor for the original creation.

3) CC-BY-SA-4.0: This license lets others remix, tweak, and build upon licensor data even for commercial purposes, as long as they credit licensor and license their new creations under the identical terms.
4) CC-BY-NC: This license lets others remix, tweak, and build upon the licensor data non- commercially, and although their new data/works must also acknowledge licensor and be non-commercial, they don't have to license their derivative works on the same terms.
5) CC-BY-NC-SA: This license lets others remix, tweak, and build upon licensor data non- commercially, as long as they credit licensor and license their new creations under the identical terms.
6) CC-BY-ND: This license lets others reuse the data for any purpose, including commercially; however, it cannot be shared with others in adapted form, and credit must be provided to licensor.
7) CC-BY-NC-ND: This license allows others to download licensor data and share them with others as long as they credit licensor, but they can't change them in any way or use them commercially.

The instrument principal investigators (PIs) would have the choice to select one of the CC license among the SARCalNet recommended license types. The selected license will be reported on correspondence of each site.

The webtool to select type of license is available at the following link:
https://creativecommons.org/choose/?lang=en

4.5 Procedures

This section describes the procedures need to submit the request for the inclusion of a new calibration site and all the necessary steps up to the approval.

Procedures for the initial upload, the update of calibration data and request for disposal are also described in this section.

Prerequisite for the submission of any request is the registration to the SARCalNet portal.

4.5.1 Registration

The registration of a new user in the SARCalNet portal in performed by the user following the instructions provided in the "Registration" page of the portal itself.
A dedicated online form is filled by the user to provide basic information like:

- User (real) name
- A valid email address
- Affiliation (optional)

The user is also requested to set a personal password that should satisfy the security criteria specified in the registration form.
To finalize the registration the email address must be verified.
After the registration the user will be part of the group of "registered user" with

minimal permissions (see section 2.3).
The user can request to upgrade his account to have a higher level of access by sending a request via email to support@sarcalnet.org.

4.5.2 Submission of a proposal for a new site or new calibration targets

This procedure describes how to submit a proposal for the inclusion of a new calibration site in the SARCalNet portal or a new target in an existing calibration site.

The first step of the procedure is in charge to the user (proponent) and consists in filling the following online forms (or templates):

- (Only for calibration sites) Form for Calibration site description. This form is specific for different calibration site types (Artificial point targets, distributed targets, etc.) and includes high level information like the
    - Site identification
    - Approximative coordinates of the location
    - Identification of the site maintainer (if applicable) and the contact information
- Form for target information. Also in this case, the form (or template) is specific for each target type.
- Form for the identification of the terms of use (this could include a signature loop, TBD). For new calibration targets in an existing site it is only necessary to confirm that the terms of use identified for the calibration site also apply to the new target.
- (Only for calibration sites) Form with the basic contents for the calibration site page on the SARCalNet portal (including links to the maintainer web page).

By filling these forms, the user also commits to maintain the information updated according to the requirements specified in [AD-1] and [AD-2] (TBC).

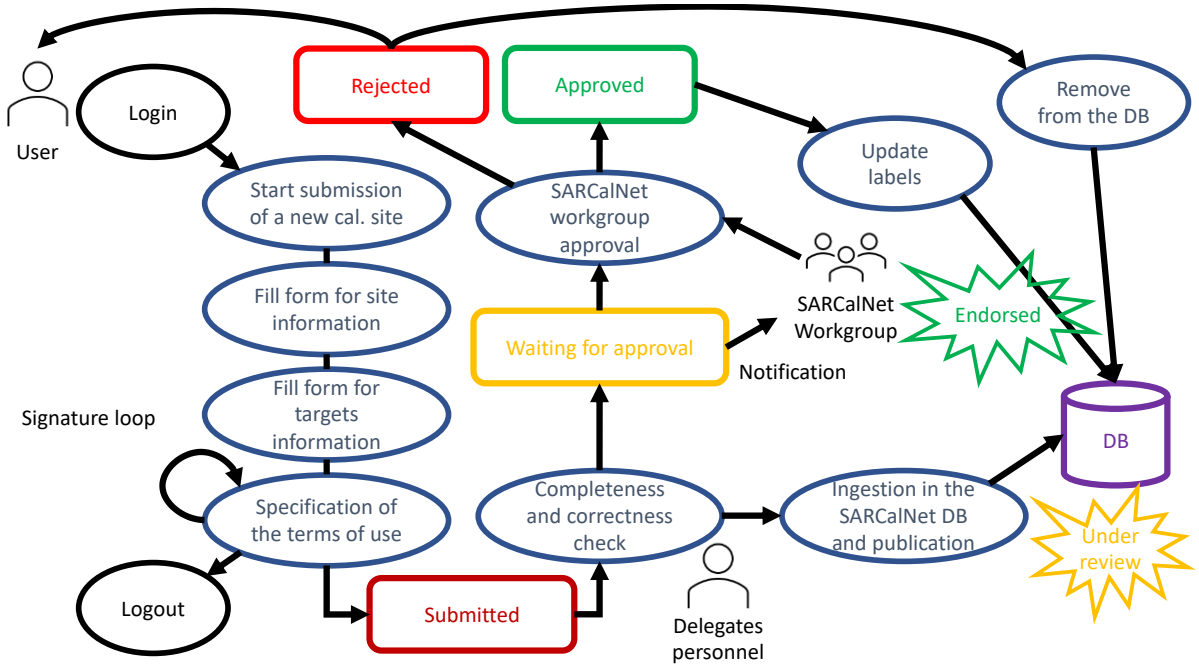
Once all the forms have been properly filled the request is submitted and labeled as "Submitted".

The submitted information is duly reviewed by SARCalNet personnel to check both completeness and correctness. If necessary, the user could be contacted and asked to clarify/integrate the provided information. Once all checks have been completed the request is labeled as "Waiting for approval" and a notification is sent to the SARCalNet workgroup. At this stage, the provided information is ingested into the SARCalNet database and made available to the user through the portal (according to the agreed sharing policy) tagged with label "Under review". The submitted site and each target submitted within a site receive a unique identification as described in AD-5.

The approval of the inclusion of a new calibration site in the SARCalNet typically happens during one of the SARCalNet workgroup meetings.

Once approved the request is labeled as "Approved", and the user is notified. At this stage, the information ingested into the SARCalNet is labeled with one of labels described in Section 3.3 (e.g., "Fully endorsed", "Endorsed" or "Submitted").

If for any reason the request is rejected (label "Rejected") a clear description of the motivations is provided to the user that can then modify and resubmit the request or withdraw it. If the user decides to withdraw the request, the information is removed from the database bypassing the procedure in Section 4.5.5.



4.5.3 Data Upload

This procedure is used by the calibration site maintainer to upload updated target information for the calibration site and/or related targets. It basically consists in filling the relevant web forms or templates (see also the previous section) for the "Calibration site Description" and/or "Target information" for the relevant target type.

Forms are only checked automatically, and no formal approval is needed.

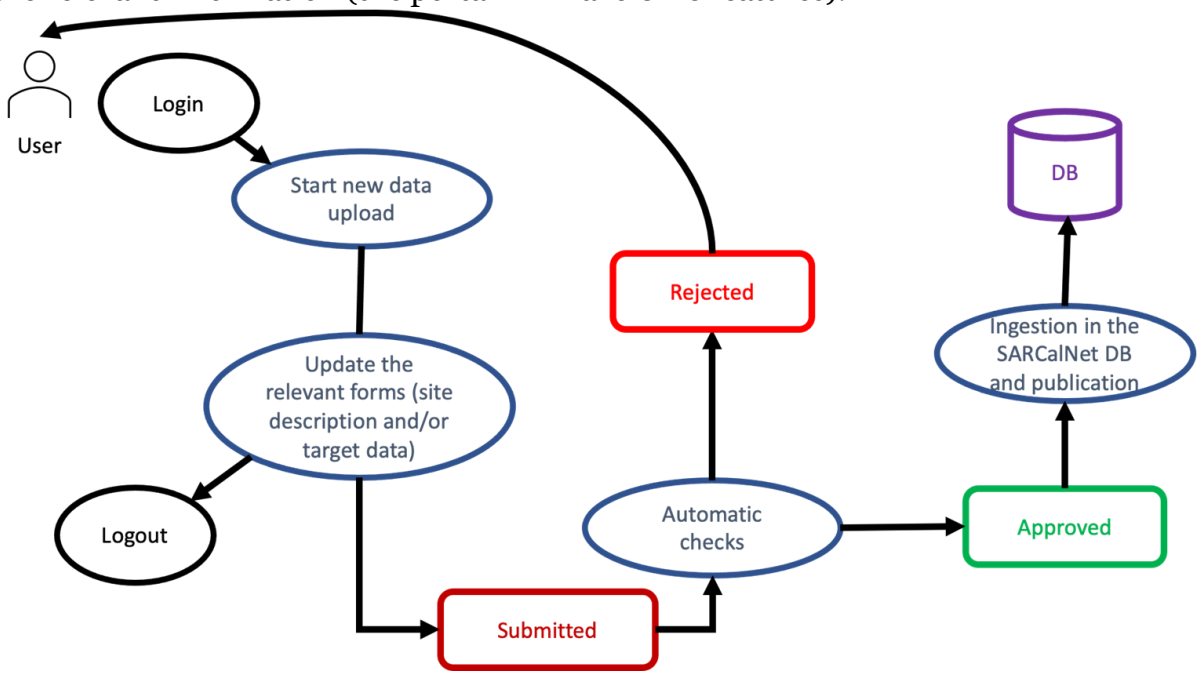
If the contents of the forms pass automatic checks, they are immediately ingested into the SARCalNet database and published according to the agreed sharing policy.

The only exception is the case in which there is a change in the fields related to the site-maintainer. In this case the form is subject to direct inspection by SARCalNet personnel.

Please note that forms containing information for calibration sites or new calibration targets that are not already in the SARCalNet database (and identified by a unique ID) are automatically rejected. Forms including information for new targets are subject to more stringent automatic checks, in particular, for what concerns the geographic location and target type.

It is also possible for the site maintainer to request for the activation of automatic scripts for the ingestion of updated target information (only targets, this is not possible for calibration sites). This kind of request shall be sent via email to the following e-mail address support@sarcal.net (TBC) and details of the automatic procedure are agreed with the site maintainers on a case-by-case basis. Please note that, also in this case, provided data are subject to the same automatic checking process described above.

Please note that for the update of the web pages dedicated to calibrations sites hosted on the SARCalNet portal the site maintainers can directly login into the portal and edit the relevant information (the portal will have CMS features).



4.5.4 Calibration site or target dismission

When a target or a calibration site is no longer maintained, or the site maintainer is no longer willing to provide updates for that site or acting as a point of contact then the site is considered dismissed (or not active).

Please note that information related to dismissed site are not removed from the archive, just the site is

- labeled as “Dismissed” (or not active) both in the DB and on the calibration site page,

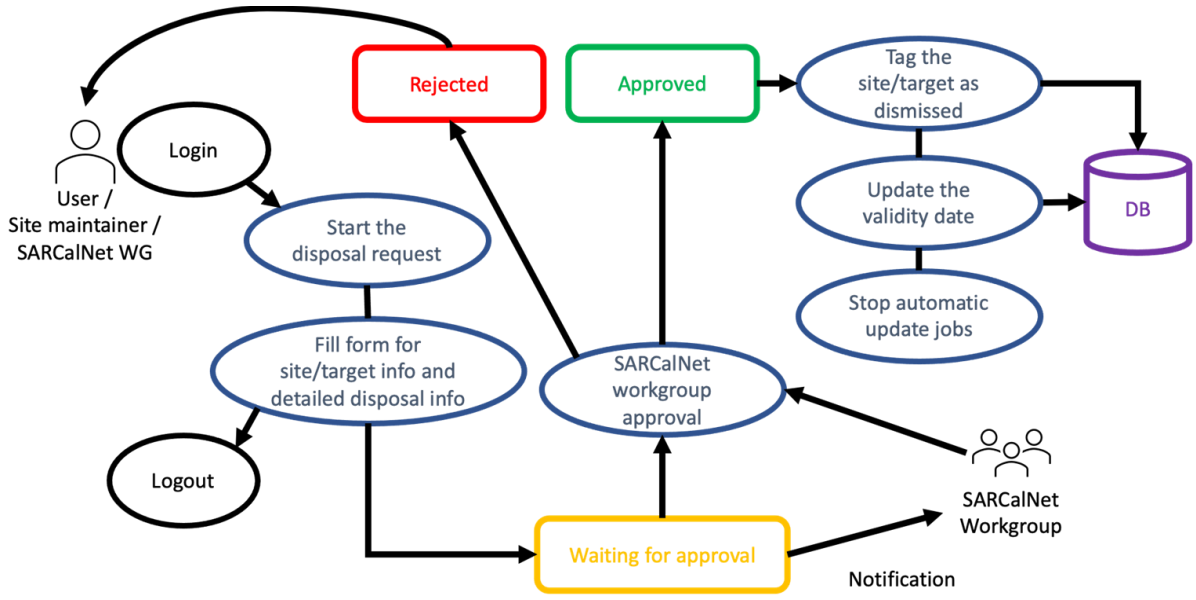
- the relevant fields indicating the time validity of the information related to the site are properly set (both in the DB and on the calibration site page), and
- possible automatic jobs for the update of target information are disabled.

The main reason for keeping data of a dismissed calibration site online is that the information can still be used for SAR products acquired during the period in which the calibration site was active and maintained (e.g. in case of a re-processing campaign or for the development of new products and algorithms that could be also validated on archive products).

The procedure can be initiated both by the calibration site maintainer or by the SARCalNet personnel if the monitoring activity shows that foreseen periodic updates of the calibration site/target data are not provided, and the calibration site maintainers no longer reply to communication attempts. If user communication reaches the user support indicating that the information of a certain site is invalid, SARCalNet personnel shall contact the site maintainer for clarification, which will eventually trigger data upload or dismissal procedures.

The calibration site or target dismissal procedure consists in:

- Fill the dedicated request form on the SARCalNet website
- The request is reviewed by the SARCalNet workgroup that can approve it or request additional actions
- If the request is approved the relevant information is updated in the database (by the SARCalNet website maintainer) as described above.



4.5.5 Calibration site or target information removal

This procedure shall be used only in exceptional cases. Indeed, in most of the cases the

procedure for "Calibration site or target dismission" shall apply and data should not be removed from the archive.

There could be, anyway, circumstances in which it is deemed appropriate to remove some data from the archive:

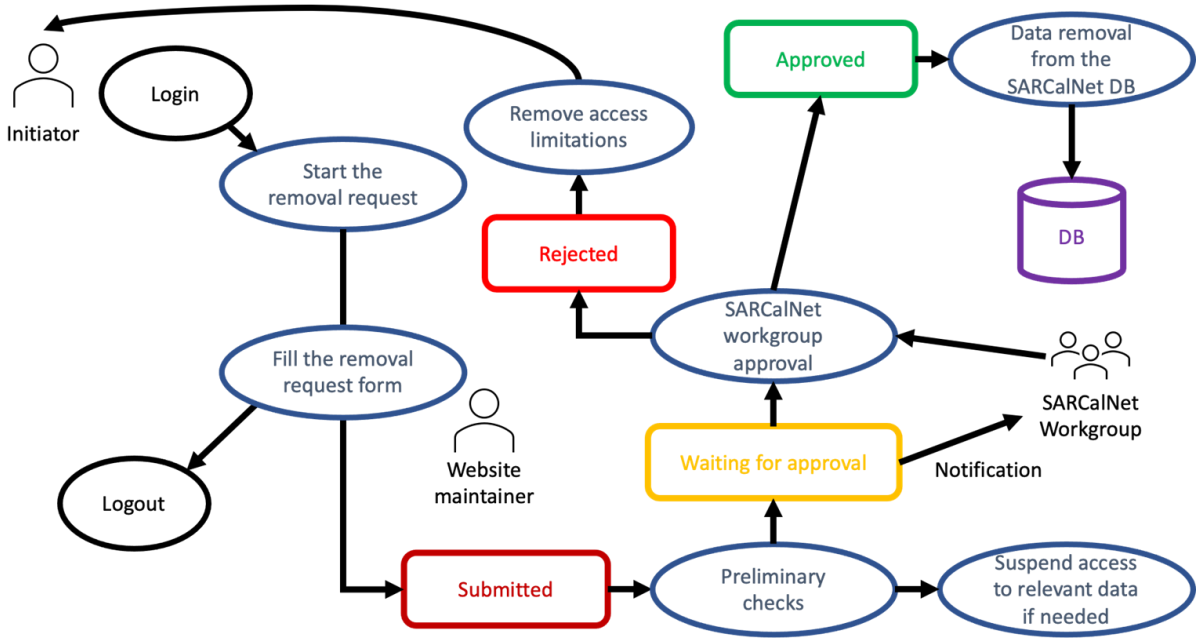
- Incorrect data erroneously ingested in the DB (for which the "Data Update" procedure is not applicable)
- Licensing or legal reasons
- Other

The procedure can be initiated by the calibration site maintainer, by the SARCalNet workgroup or website maintainers, or by any SARCalNet user.

The procedure consists in:

- The initiator fills the dedicated form on the website and provides all the relevant information including a detailed justification of the request
- The website maintainers perform preliminary checks on the request to verify if it is applicable, if it falls into known typologies for which specific operative procedures exist, and to verify if serious urgency conditions exist, in which case the access to affected data can be temporarily suspended for all users.
- The SARCalNet workgroup is always notified of information removal requests. In cases in which an approved procedure has not been already applied to resolve the request, then the SARCalNet workgroup reviews the request and approves/rejects it
- In case the request is approved the SARCalNet website maintainer performs the actual removal of the data form the archive, otherwise possible limitations to the data access, triggered by the request, are removed. In any case the originator is notified.

In the second and third steps of the procedure, contacts with the originator are possible to request additional information or clarifications.



4.5.6 Labels applicable to procedures and service requests

Labels applicable to procedures and service requests

- Submitted: the user has provided all the requested information and the system have taken in charge the request. If a human action is required a notification is sent to the relevant people.
- Waiting for approval: automatic and preliminary checks on the request have been completed and the request is ready to be reviewed and approved. The SARCalNet WG is notified.
- Approved: the request has been reviewed and considered in line with the requirements (at least the mandatory ones). The request is approved, and the originator is notified. Relevant labels are properly set on the data.
- Rejected: the request has been reviewed and considered **not** in line with the requirements (at least the mandatory ones). The request is rejected, and the originator is notified with a clear description of the motivations. Submitted data are removed from the DB.

4.5.7 Quality checks

Automatic checks of the submitted information:

- Completeness of the (mandatory) fields of the web form/template
- Formal correctness on the contents according to the pre-defined data types, validity ranges or list of possible values.

- Consistency of the provided information (e.g. all the targets belonging to a calibration site shall be located withing the geographic boundaries specified for the site itself).
- Unicity, it is verified that the provided information is not already in the SARCalNet DB or in another request still waiting for approval (e.g. duplicated requests)

Checks performed by delegated personnel (SARCalNet WG members of web-site maintainers)

- Additional completeness, correctness and consistency checks that is not possible or hard to implement in an automatic way.
- Deeper check on licensing (and signatures, if needed)

Checks performed by the SARCalNet committee:

- see section 3.3

4.5.8 Notification

The procedures described in previous sections for adding, f/removing or modifying calibration data in the SARCalNet database already identify specific cases in which notifications are sent to specific users/ groups.

In addition, the SARCalNet website will allow to user to define what kind of "informative" notification she/he wants to receive and also to subscribe specific events like:

- publication of a new calibration site
- update of the general information or target information corresponding to a specific calibration site
- update in the SARCalNet documentation database (new documents, new issues of existing documents, etc.)

4.5.9 Unique identifiers

Each calibration site and calibration target shall have a unique identifier associated to it. Rules to define such unique identifiers are described in the following sub-sections.

4.5.9.1 Unique identifiers for calibration sites

The identifiers for calibration sites shall have the following format:

SSSS-YY

where:

- SSSS: is a unique short site identifier defined by the site maintainer during the submission of the proposal for a new site (it must not conflict with short sit identifiers already used for other calibration sites). I in a fixed length identified of 4 (four) alpha numerical characters. Only capital letters and digits are allowed.
- YY: is the primary target type identifier for the site. A calibration target can, in general, include different target types. The primary target type is the most common one in the site of the one which better represents the primary purpose of the calibration site. The primary target type identifier is an enumeration with a fixed length of 2 characters. It can have one of the following values:
    - AT – for Artificial Targets
    - DT - for Distributed Targets (e.g. rain forest or deserts)
    - MX – for sites containing multiple types of targets

4.5.9.2 Unique identifiers for calibration targets

The identifiers for calibration targets shall have the following format:

SSSS-TT-DDDD

where:

- SSSS: is a unique short site identifier defined by the site maintainer during the submission of the proposal for a new site (it must not conflict with short site identifiers already used for other calibration sites). It is a fixed length identified of 4 (four) alpha numerical characters. Only capital letters and digits are allowed (see also description above)
- TT: is the target type identifier. It is an enumeration with a fixed length of 2 characters. It can have one of the following values:
    - TP – for Transponders (active artificial targets). This also includes Polarimetric Active Radar Calibrators PARCs)
    - CR – for Corner Reflectors (passive artificial targets)
    - LB – for Low Backscatter targets (e.g. calm sea)
    - SI – for Snow/Ice
    - OC – for Ocean
    - FR - Forest
    - DE – Desert
    - PS – Persistent Scatterer
    - The list could be updated if more relevant categories are identified in the future
- DDDD: is the short target identifier provided by the site maintainer when the

proposal for the inclusion of the target in the SARCalNet database is submitted. It must be unique within the calibration site. The short target identifier can be:

- ~~**Option 1:** an arbitrary identifier (e.g. the same one used internally by the site maintainer) having a maximum length of 20 characters and "normalized" to not include spaces or special characters (only upper/lower case letters, digits and the "_" character are allowed)~~
- **Option 2:** a numerical identifier having a fixed length of 4 digits (padded with leading zeros if necessary). The guideline, in this case, is to use progressive numbers starting from "1".

Note: for corner reflectors, it corresponds to the column "E" ("short_target_id") of the submission template (sheer "cr")

4.6 Data Download

A detailed description of the Data Policy can be found in section 4.4 Data Policy. In general the access to data is regulated by two main factors:

- the agreed policy according to which data have been shared by the owner (provider or site maintainer), this corresponds to a specific labeling of each information item, and
- the level of access of the user which is defined according to the group associated to the user itself:
  - unauthenticated/anonymous (lower privileges)
  - normal user
  - possibly other specific users/ groups
  - …
  - site maintainer
  - SARCalNet workgroup members
  - SARCalNet website administrators

If the access level of the user is compatible with the data policy associated to the specific item to be downloaded then the download is possible or directly from the website of FTP area, or programmatically through the API.

5 SACALNET REFERENCE DATA

This section will be completed as reference data become available.

6 SARCALNET TOOLS

Reference tools are calibration and validation tools submitted either by members of the SARCalNet initiative or the SAR community. The tools don't follow the same rigorous curation process of the calibration sites and targets and are only lightly checked by the curation team for content fitness, i.e., no tool validation is performed and the tools are provide *as available*.