Management and dissemination of GNSS site log metadata using the new GeodesyML standard

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ROYAL OBSERVATORY OF BELGIUM

EUREF AC Workshop Brussels, Oct. 25-26, 2017

EPN GNSS metadata management

Maintenance of Metadata

- Preserve data quality
- Correct analysis and interpretation of the GNSS data

In the EPN the metadata management is getting more complex:

- EPN network has grown considerably in number of stations (More than 300 stations)
- New Independent networks (EPN, EPN densification, or EPOS) with common stations and with different Network requirements
- Increased the necessity for interoperability with other network (like IGS)

Proposed Solution

- The geodetic community requires a standard which makes data and metadata:
  - discoverable and interoperable,
  - easily transferable via web services, and
  - based on internationally recognised data exchange methods.
- Australia and New Zealand created the Geodesy Markup Language (GeodesyML)
- GeodesyML describes how geodetic data and metadata can be defined and transferred in XML format
- *GeodesyML is an example of a GML Application schema that* extends GML to meet the needs of a specific community of interest (e.g. Geodesy)

Introduction:

M3G gnss-metadata.eu

Metadata Management and distribution system for Multiple GNSS Networks

New requirements for the system

Should be able to:

- Handle the site log submission of a station to multiple networks in one place
- Handle the independent network requirements and validation process

- Handle Online Operational Center (OC) Form
- Handle the information common to several site logs once (Responsible agency)

- Handle Multiple site log updates within one day
- Separate the historical and current information during the update
  - Avoid changing historical information by accident
- Handle the individual exception rules for stations.

- Handle the new interoperability export/import format GeodesyML

GeodesyML – Pro/Cons

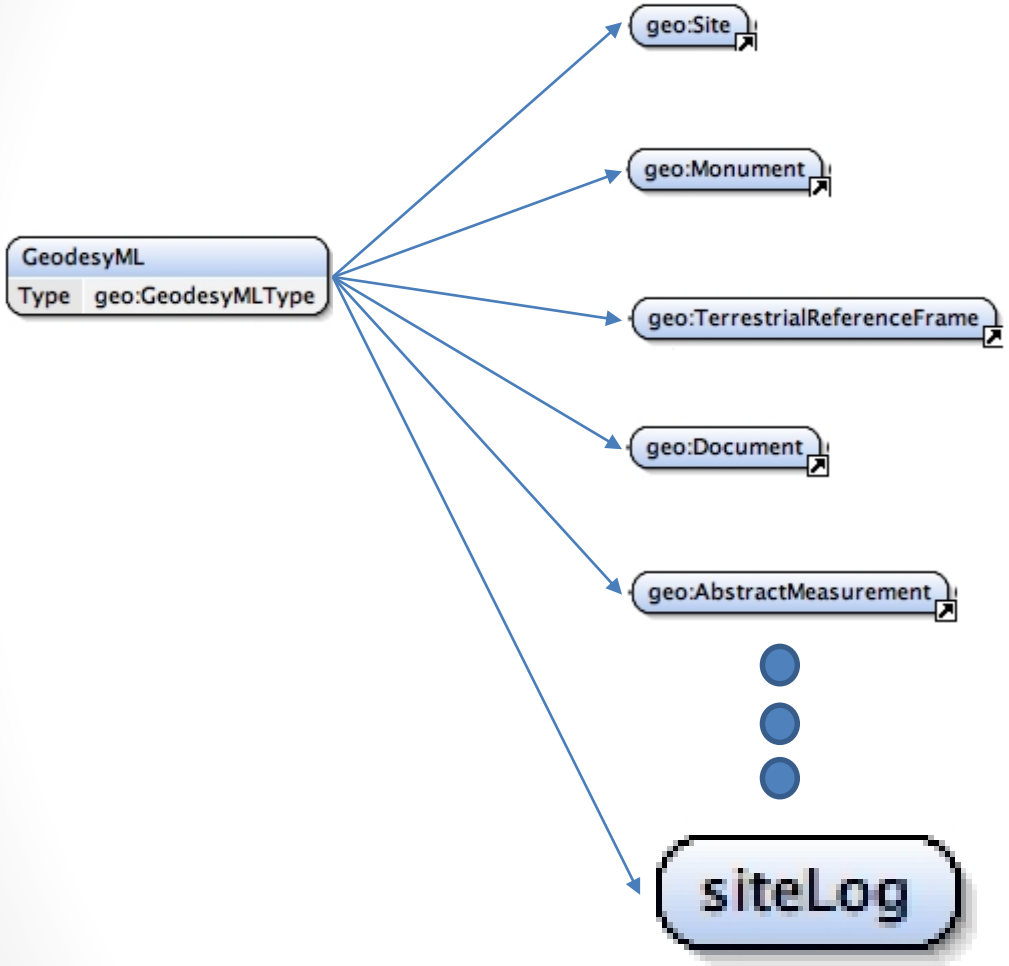
Pro of the GeodesyML:

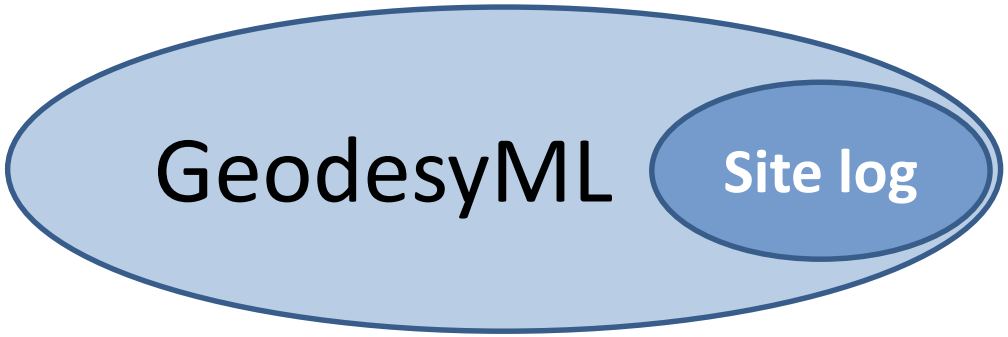
- Lot of third party tools (xmlint, W3C online validator) to validate it
- Using the GeodesyML standard, the metadata will be interoperable and reliable
- More useable for a machine-to-machine update
  - interoperable with IGS

Cons of the GeodesyML:

- Hard to read for Human and for manual editing
- For the implementation, it requires more background information about the formal specifications and the other standards (GML)
- Still under development
- No one-to-one relation between site log and GeodesyML

GeodesyML – Site log relation





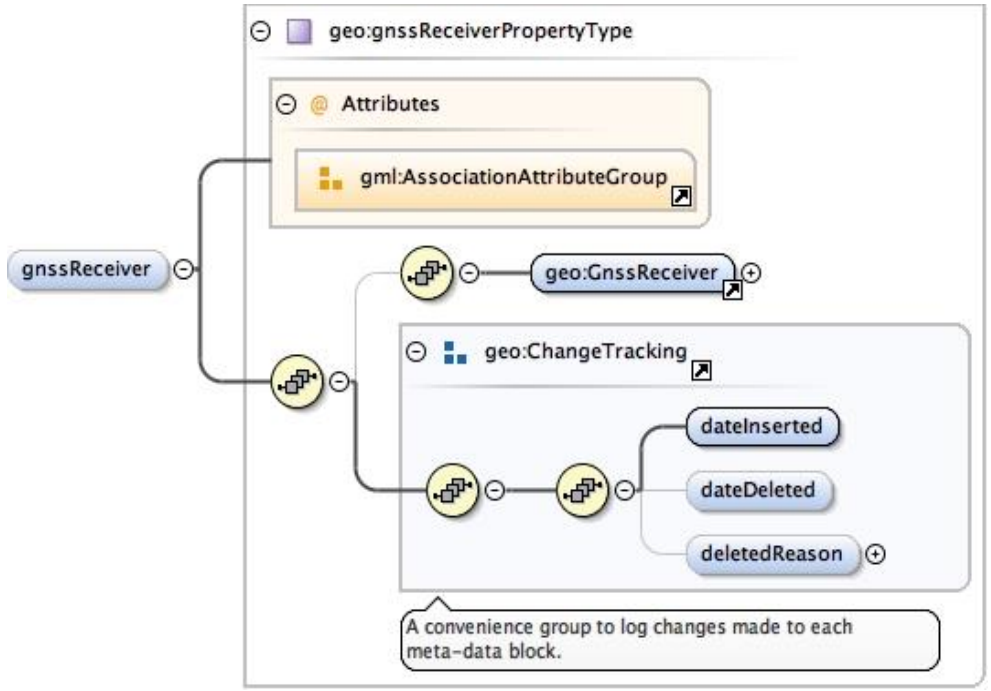
GeodesyML – Site log: Section Handling

IGS Site log

```
3.1 Receiver Type            : SEPT POLARX2
    Satellite System         : GPS
    Serial Number            : 1436
    Firmware Version         : 2.6.2
    Elevation Cutoff Setting : 0 deg
    Date Installed           : 2006-07-07
    Date Removed             : 2008-02-14T09:00Z
    Temperature Stabiliz.    : +/-0.1
    Additional Information   : hardware replacement of receiver
```

<

GeodesyML



GeodesyML

- Contains id information for each sub-section
- Contains extra change tracking information:
  - Extra time stamps for the records (For example: database insert/delete time for the receivers)
  - To keep the sections trackable
    - No physical delete (Just inactivate)
    - No direct modification (Instead inactivate the section and copy the content to a new subsection)

GeodesyML – Site log: Agency Information

- Agency information handling (Site Owner, Site Contact, Site Metadata Custodian)
  - Site Owner: (Mandatory) Responsible agency for the site (Section 12. in the IGS site log)
  - Site contact: (Optional) Point of contact for the site. (Section 11. in the IGS site log)
  - Site metadata custodian: (Mandatory) The agency/person responsible for maintaining the site metadata (Not in the IGS Site log). In M3G It is coming from the Operational Center Form
- Plus additional Information in the GeodesyML Site log
  - site Datastreams
  - site DataSource
  - site DataCenter (Who can provide the site log on behalf of the Site Owner)

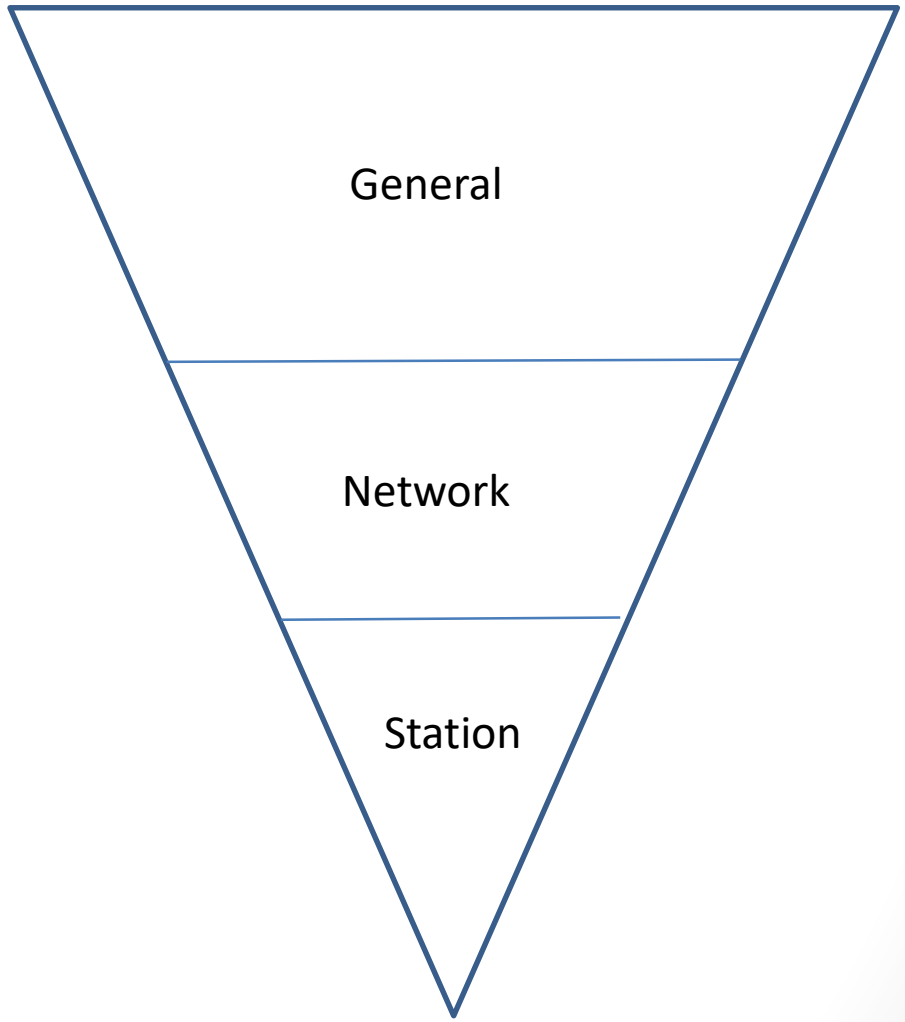
Relation between GeodesyML and the IGS Site log

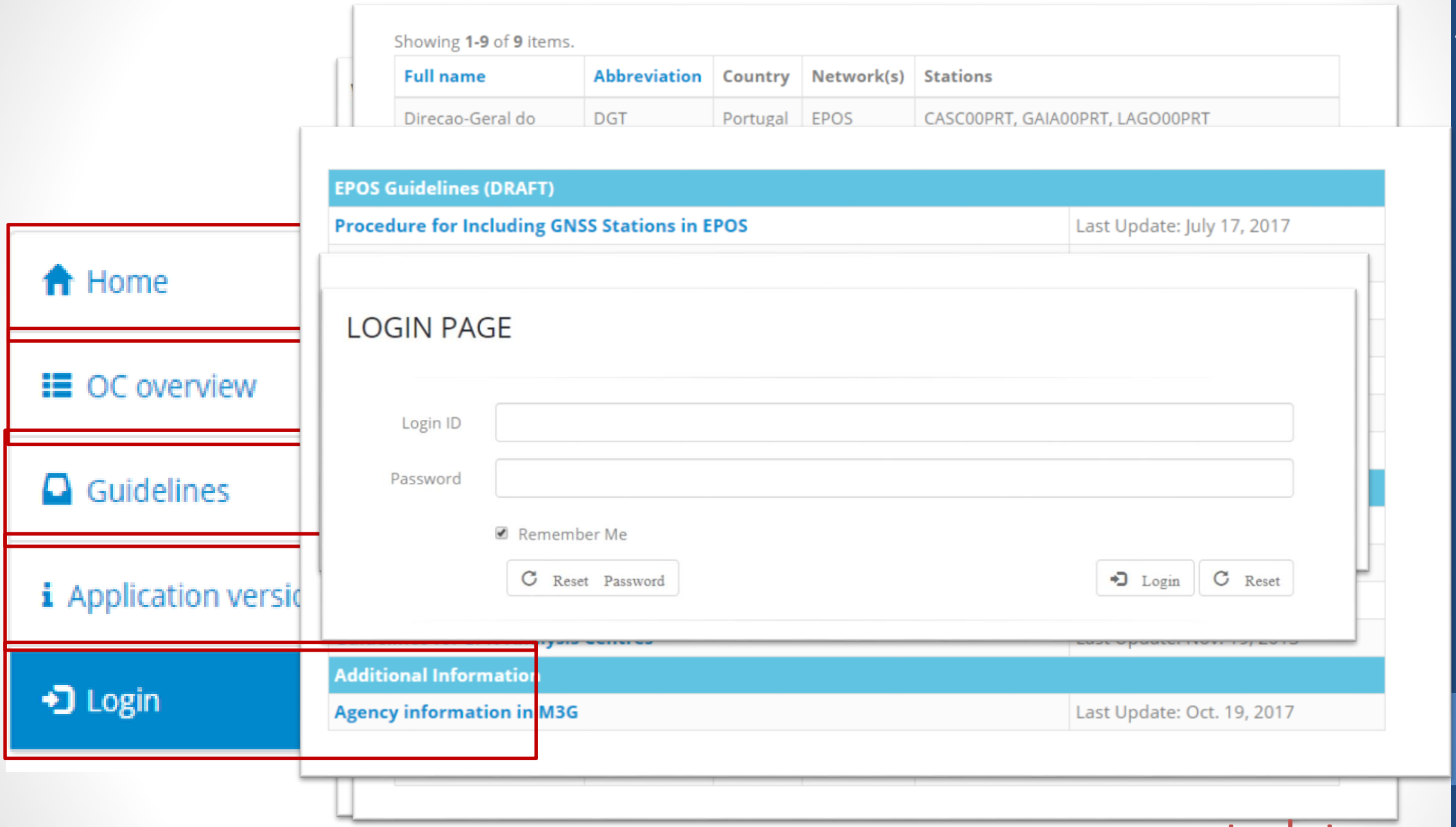
GeodesyML Site log → IGS Site log → GeodesyML Site log

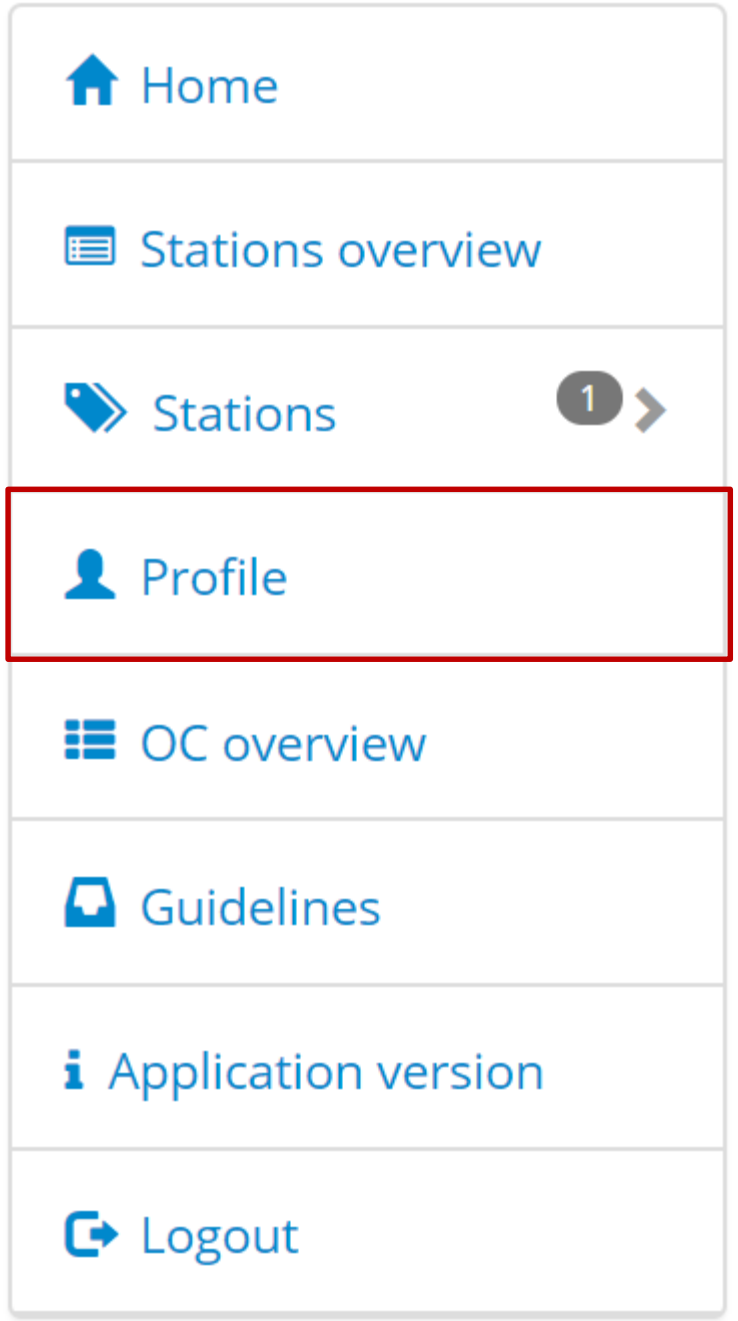
- Consequently GeodesyML site log can contain more information than the IGS Site log
  - risk to lose station metadata during the GeodesyML to IGS Site log conversion

Hierarchical Rules for validating the site logs:

- General rules: same for all networks
  - e.g. antenna type known by IGS
- Network Rules: depend on the network
  - e. g. elevation cut-off required for EPN but not for EPOS
- Station-dependent rules: to handle exceptions
  - e.g. historical antenna which do not fulfill present requirements




Showing 1-9 of 9 items.
Full name
Abbreviation
Country
Network(s)
Stations
Direcao-Geral do
DGT
Portugal
EPOS
CASC00PRT, GAIA00PRT, LAGO00PRT
EPOS Guidelines (DRAFT)
Procedure for Including GNSS Stations in EPOS
Last Update: July 17, 2017
Home
OC overview
Guidelines
Application versio
Login
LOGIN PAGE
Login ID
Password
Remember Me
Reset Password
Login
Reset
Additional Informatio
Agency information in M3G
Last Update: Oct. 19, 2017



Operational Center Form

Identify:

- stations that fall under OC responsibility
- which OC has committed to maintain metadata

OC FORM :ROYAL OBSERVATORY OF BELGIUM(ROB)

Agency Information	
Full name	Royal Observatory of Belgium
Abbreviation	ROB
Country	Belgium
Address	Avenue Circulaire 3 1180 Brussel
Registration	2017-10-20
Report note	

Stations

Operated Stations — Showing **1-1** of **1** item.

Station Name	EPOS	EPN
BRUX00BEL	Proposed	Proposed

Third Party Stations

Station Name	EPOS	EPN
No results found.		

Modify

Contacts	
Full name of the contact	Mr. Andras Fabian
E-Mail address	andras.fabian@oma.be
Primary Telephone number	
Secondary Telephone number	

Operational Center Form

Online Form

- Maintained by the site log manager
- No manual check by the EPN administrator
- Modify the responsible agency Information
- Modify the station list
- Propose stations to networks
- Extend the contact information

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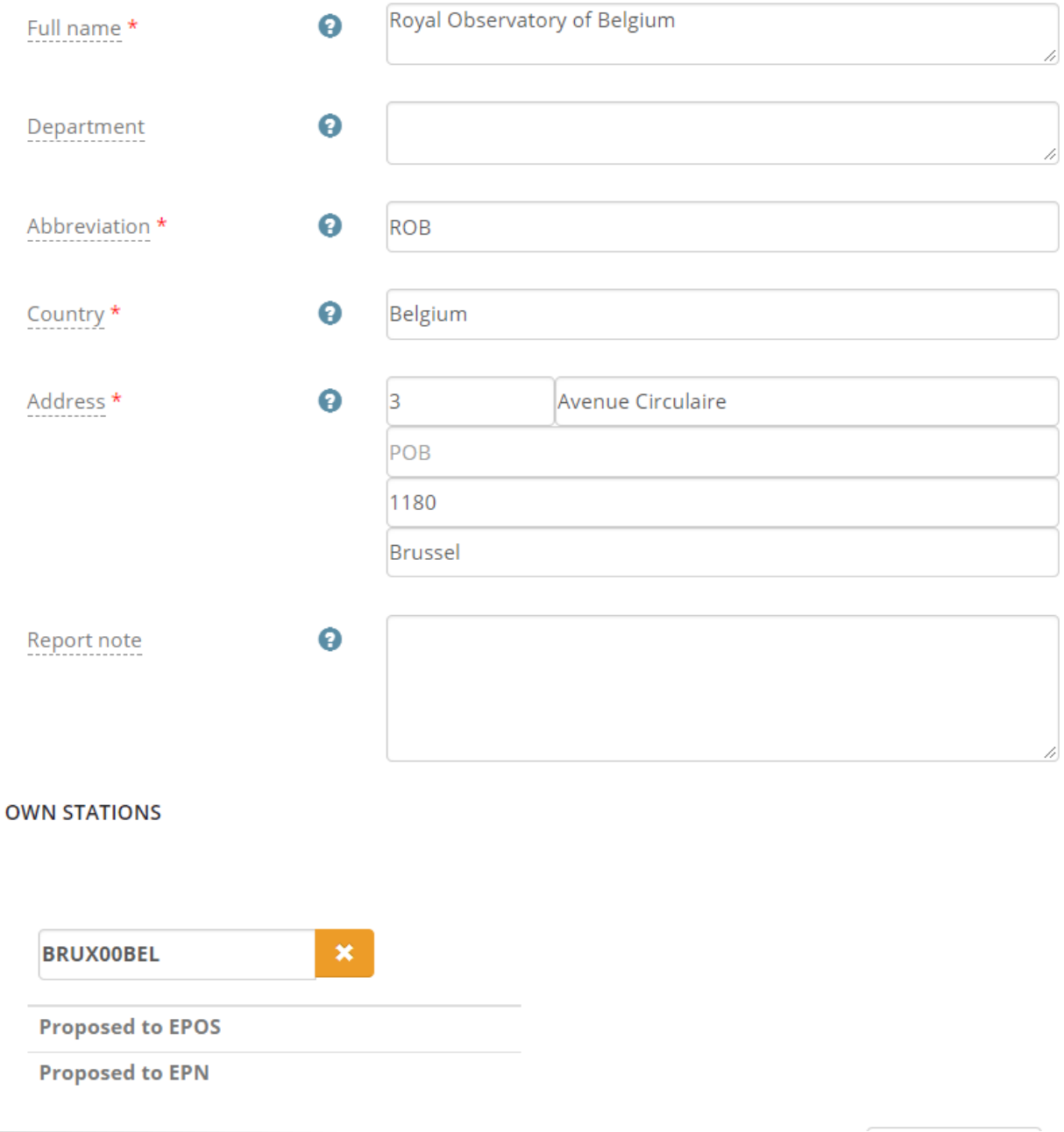

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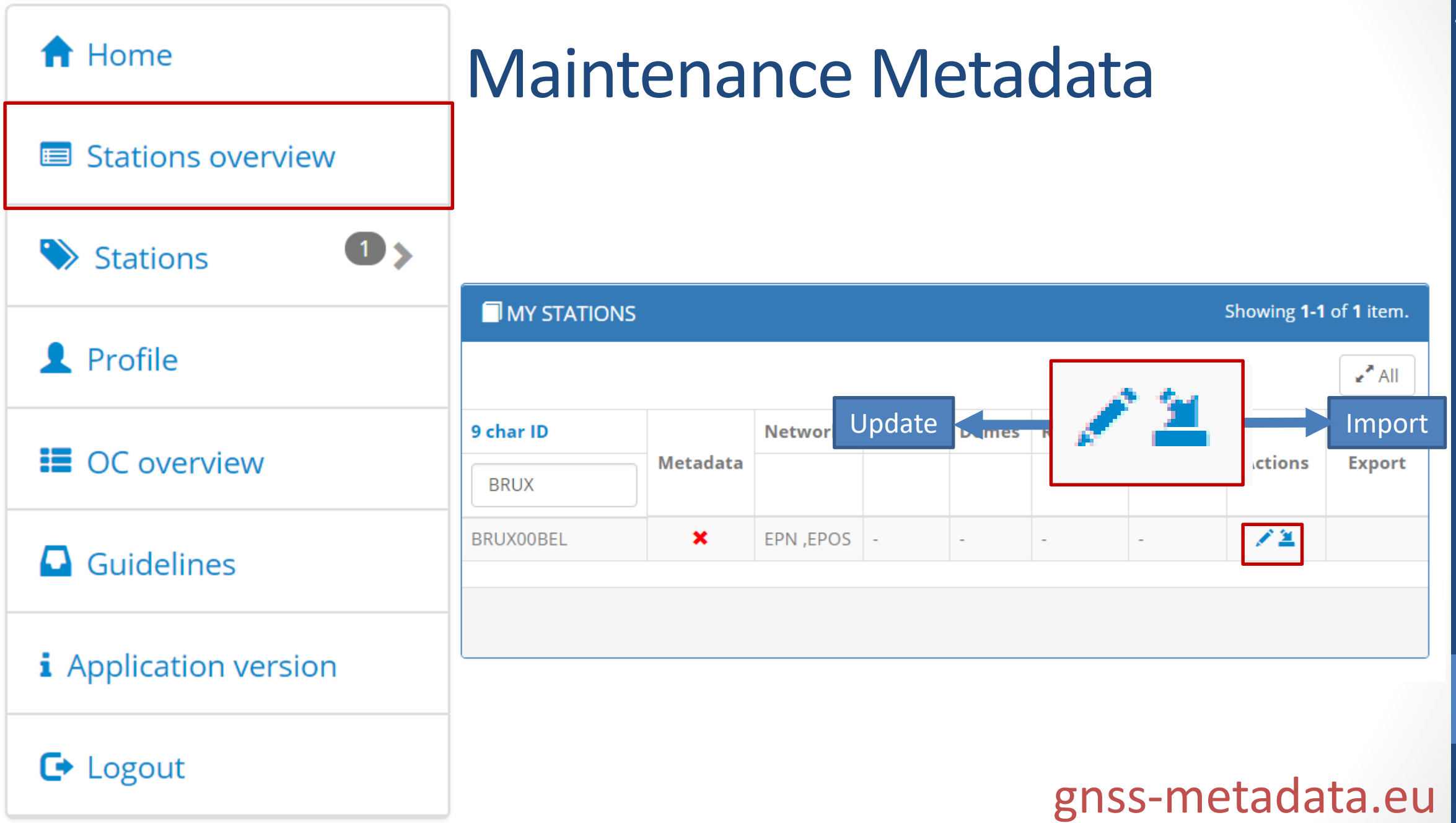
Maintenance Metadata



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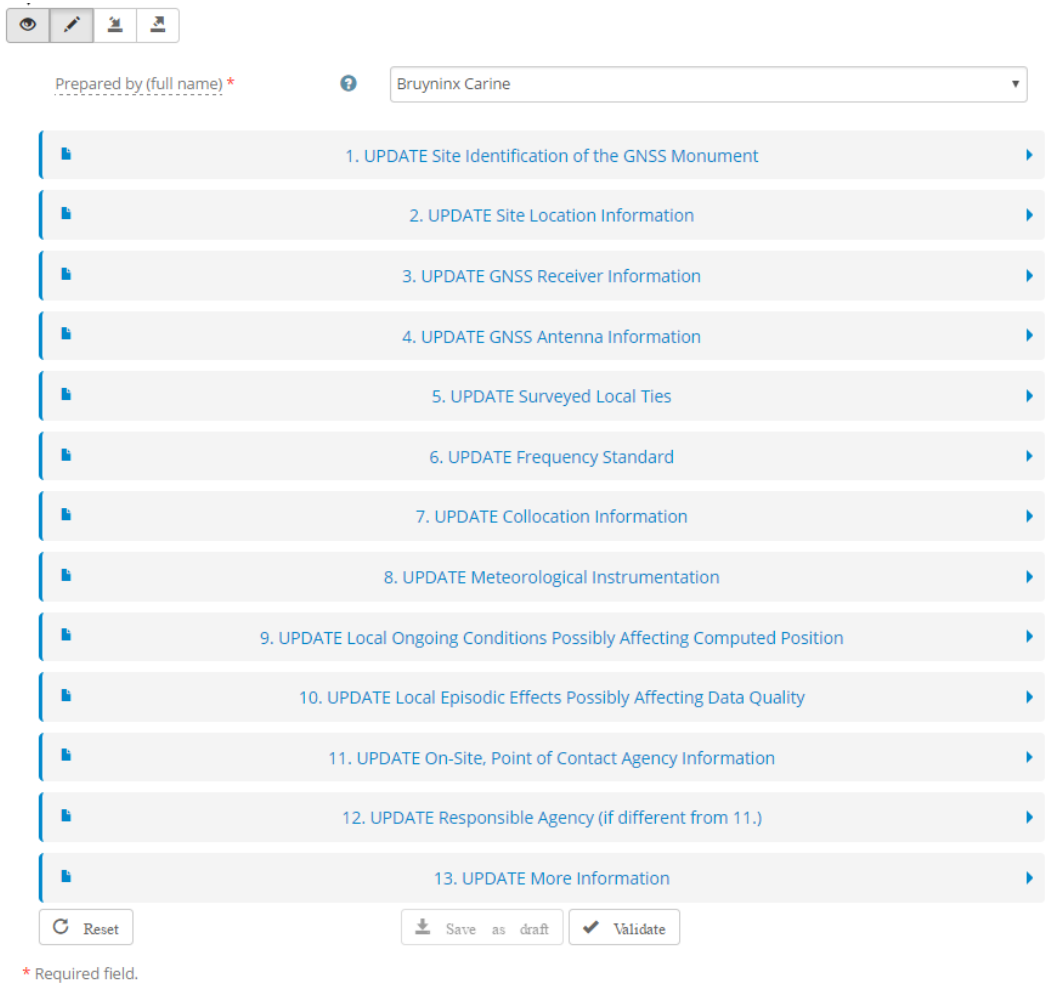

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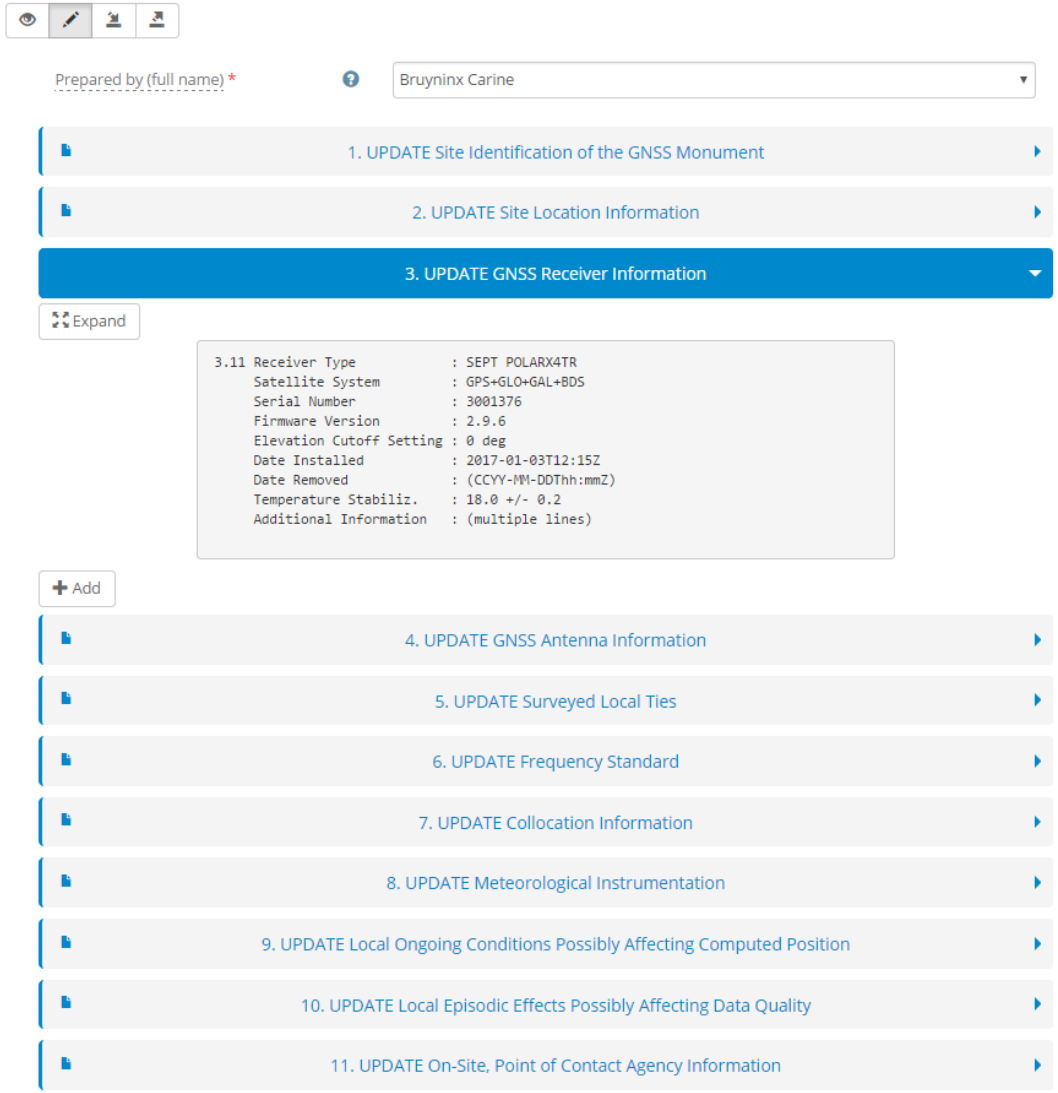

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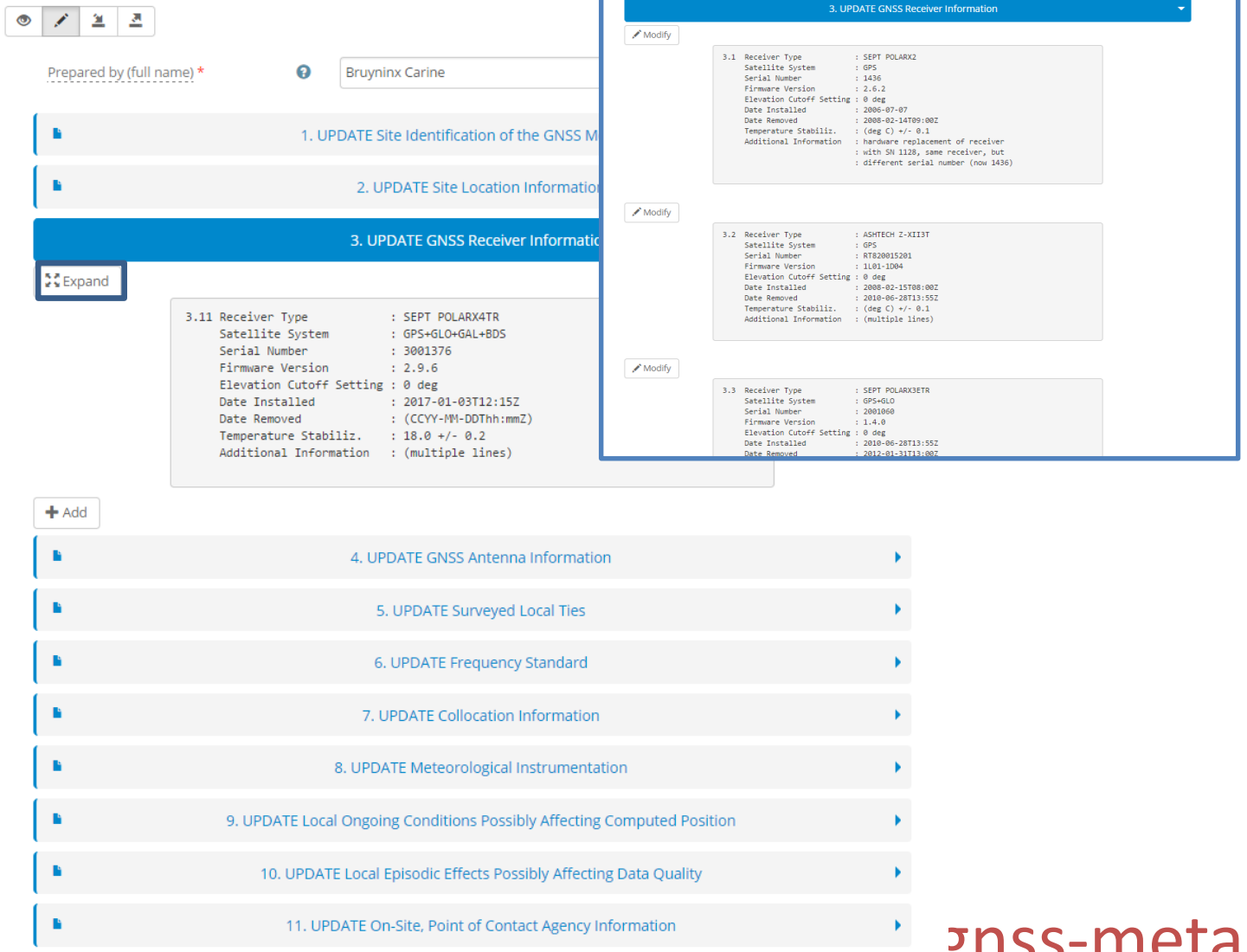

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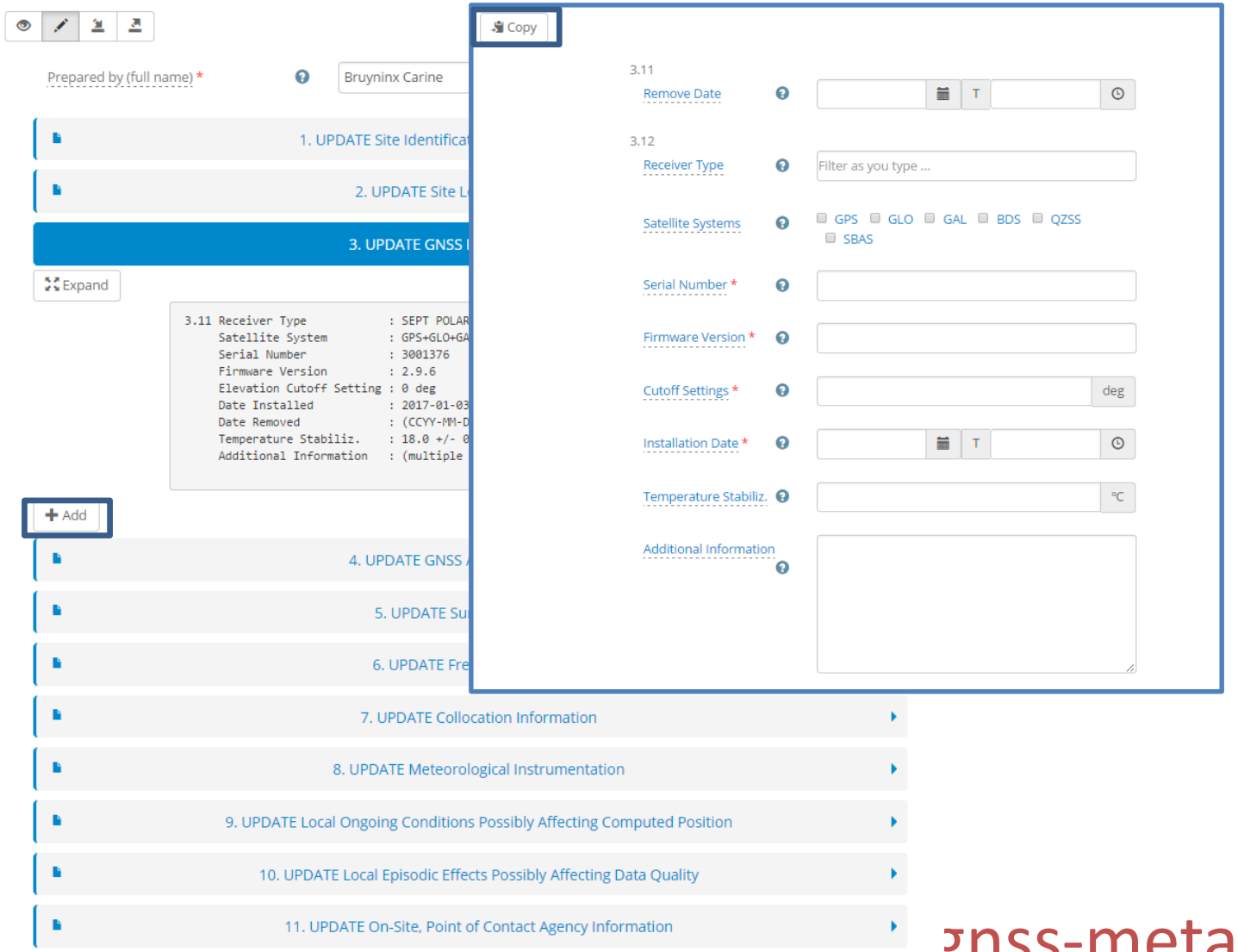

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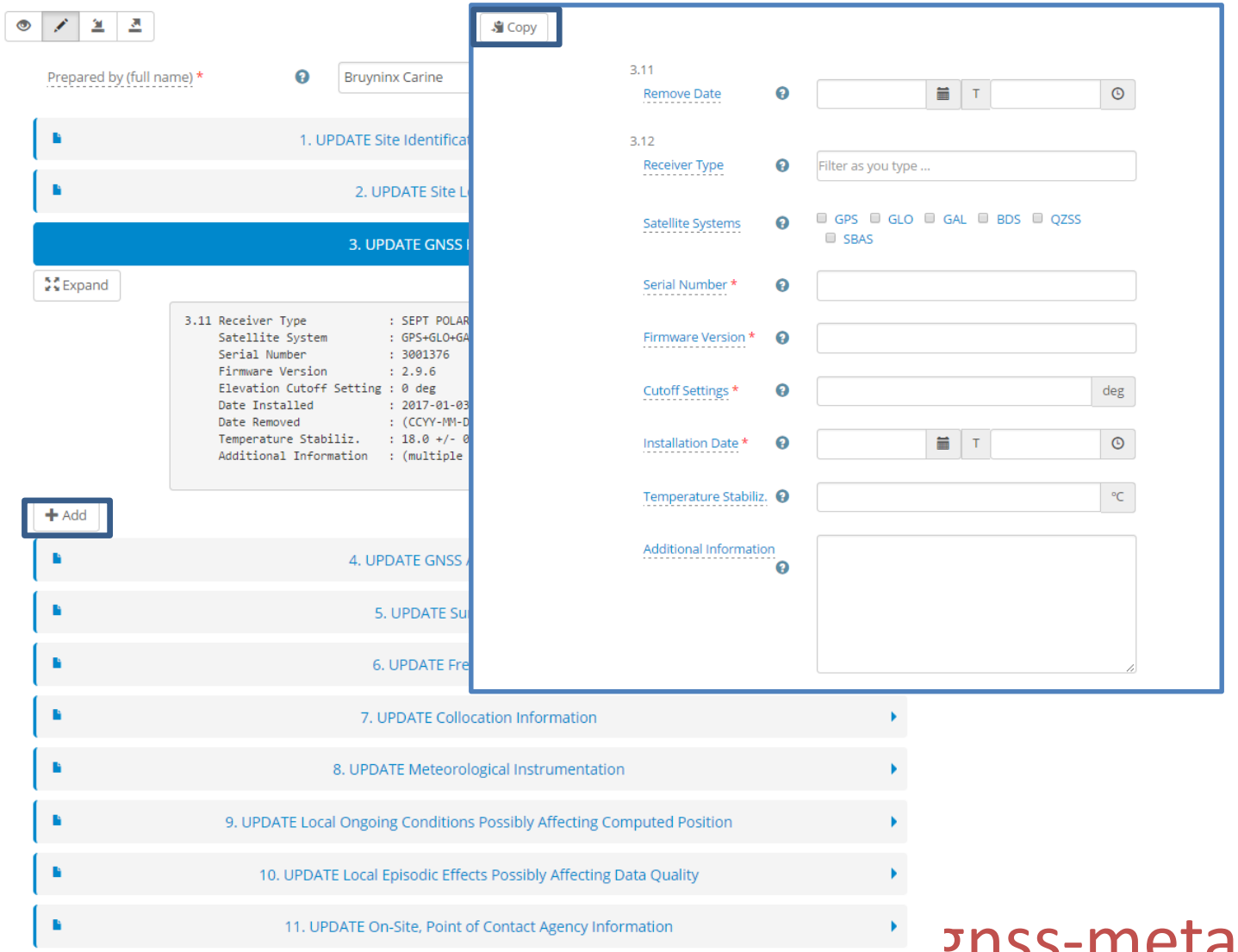

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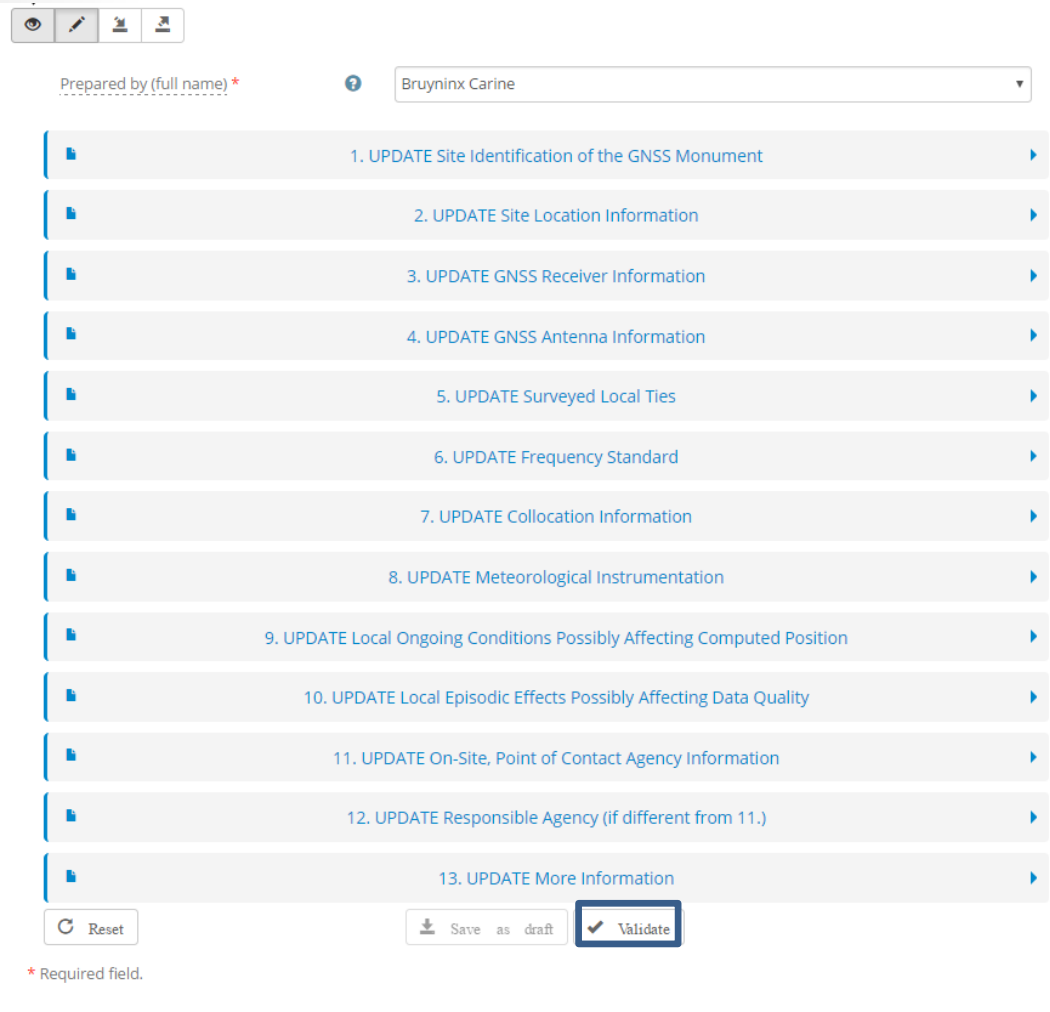

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Maintenance Metadata

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Maintenance Metadata

Metadata validator message: In order to fix the inconsistencies check the following(s):

- GNSS Antenna Information

Prepared by (full name) * Mr. Andras Fabian

- 1. Site Identification of the GNSS Monument
- 2. Site Location Information
- 3. GNSS Receiver Information
- 4. GNSS Antenna Information
- 5. Surveyed Local Ties
- 6. Frequency Standard
- 7. Collocation Information
- 8. Meteorological Instrumentation
- 9. Local Ongoing Conditions Possibly Affecting Computed Position
- 10. Local Episodic Effects Possibly Affecting Data Quality
- 11-12. Site point of Contact
- 13. More Information

Reset | Save as draft | Validate

4.8

Antenna *	JAVRINGANT_DM
Serial Number *	Serial Number cannot be blank.
Antenna Reference Point *	BPA: bottom of preamplifier
Marker->ARP Up Ecc. (m) *	0.4689 m
Marker->ARP North Ecc(m) *	0.0010 m
Marker->ARP East Ecc(m) *	0.0000 m
Alignment *	0 deg
Antenna Radome Type *	NONE
Radome Serial Number	Filling Radome Serial Number is recommended.
Antenna Cable Type	ANDREW heliax LDF2-50A

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Metadata validator message: Your **site log is valid** although it hasn't been saved. Check your changes and **click on the save** at the bottom of the page to accept it.

```
      BRUX Site Information Form (site log)
      International GNSS Service
      See Instructions at:
        ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt


0.    Form

      Prepared by (full name)  : Mr. Andras Fabian
      Date Prepared            : 2017-10-22
      Report Type              : NEW
      If Update:
       Previous Site Log       : (ssss_ccyymmdd.log)

                        •
                        •
                        •

        Height of the Monument : 8 m
      Antenna Graphics with Dimensions

JAVRINGANT_DM

                     ---------
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  +-------------------------------------------------+    <--  0.1015  T
  |                                                 |
  |                                                 |
  |                                                 |
  |                                                 |
+-+-------------------------------------------------+-+   <--  0.0379
+-------------------+-------------+-------------------+   <--  0.0345  E
                   |           |
                   |           |
                   +------x------+                      <--  0.0000  E

<--                    0.3800                    -->

ARP: Antenna Reference Point
L1 : L1 Phase Center                L2 : L2 Phase Center
TCR: Top of Chokering               BCR: Bottom of Chokering
BPA: Bottom of Preamplifier

All dimensions are in meters.
```

Reset | Edit | Save as draft | Save

* Required field.

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M3G V0.2 is released

- We released the V02 version of the M3G
  - https://gnss-metadata.eu
  - It is ready to use for the EPOS users
  - **Demo version for the EUREF user**
- **MAIN FEATURES**
  - In Online OC Form:
    - Maintenance the contact list
    - Propose station to a network
  - Station and OC overview
  - Upload an IGS site log to the database
  - Update the site log direct from/to the database
  - Export the GeodesyML 0.4 export format
  - Export IGS Site log format

M3G
https://gnss-metadata.eu

Thank you for your attention

Contact:

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B-1180 Brussels

BELGIUM

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