

## Guidelines for the submission of GNSS products to the Product Portal in the scope of the EPOS project

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## Introduction

In the scope of the EPOS-OP project, UBI will host the product portal where GNSS products created by the EPOS and EUREF analysis centres (EPOS-AC) can be searched and downloaded (<http://gnssproducts.epos.ubi.pt>). The architecture of the product portal is shown in Figure 1. The analysis centres upload their products to the sftp-server located at UBI. Once new products have been uploaded, these will be parsed, moved to their final location, subjected to quality control and finally inserted into the database. The database is read by the GLASS Framework which in its turn can be accessed using web-queries by ICS and the product portal website. In this document guidelines are presented how analysis centres should upload their products to the sftp-server.

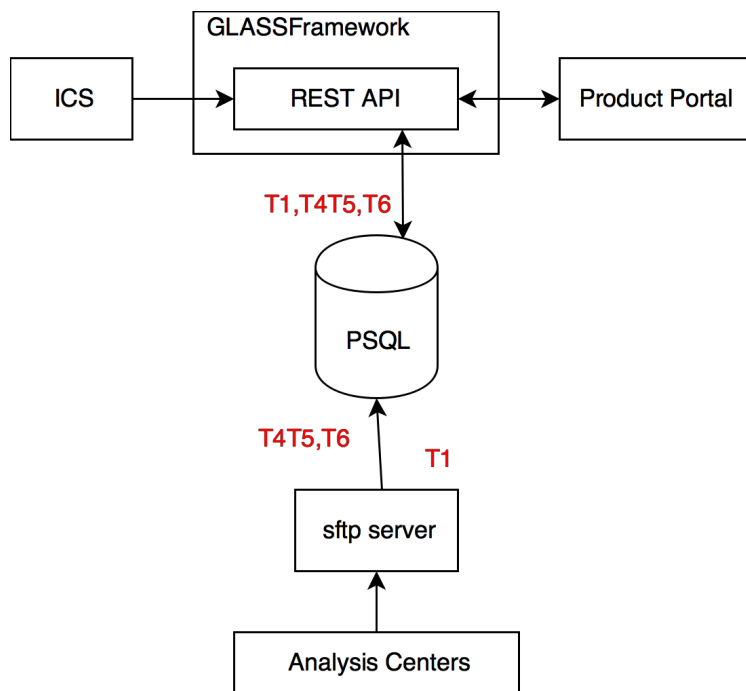


Figure 1 Architecture of the Product Portal

### Station T1 Meta-Data

GNSS time series and the derived velocities are associated to stations. To be able to import time series or estimated velocities, the analysis centres must first provide the metadata of the stations. There are two methods for doing this. The first one, and the preferred one, is to submit the station log-files at the M3G website (<http://gns-metadate.oma.be>) where they are validated. The inserted metadata (T1) is sent to the Data Gateway ([http://glass.unice.fr:8080/epos\\_validation](http://glass.unice.fr:8080/epos_validation)). Afterwards it is synchronised with the database at the product portal. These stations are designated as EPOS stations.

All other stations are designated as non-EPOS stations. If these stations are missing at the product portal, it is necessary to provide the following (minimal) set of metadata to be included in the GLASS database of the Product Portal:

Table 1 Mandatory and optional fields that need to be filled in and send to the product portal in order that these non-EPOS stations are included in the T1 database.

Table	Field	Type
Station	Site Name	(string) <b>mandatory field</b>
	Site Marker	(size limit 4 characters) <b>mandatory field</b>
	Country	
	Code	(size 3 characters)
Coordinates	X	(numeric format) <b>mandatory field</b>
	Y	(numeric format) <b>mandatory field</b>
	Z	(numeric format) <b>mandatory field</b>
Agency	name	(string) <b>mandatory field</b>
	abbreviation	(string)

	address	(string)
	www	(string)
	infos	(text field with no size limit)
Contact	name	(string) <b>mandatory field</b>
	title	(string)
	email	(string)
	phone	(string)
	gsm	(string)
	comment	(text field with no size limit)
	agency	(string) <b>mandatory field</b>
	role	(string)
Network	name	(string) <b>mandatory field</b>
	contact	(string) <b>mandatory field</b>

In Table 1 we mean with ‘agency’ the operational centre that runs the station and is responsible for maintaining the log-files.

This information should be uploaded in an Excel file to the Product Portal to the directory ./uploads/T1\_nonEPOS\_{date}.xls (template is available at: <https://docs.google.com/spreadsheets/d/1rdveXjl3NLKot58cD4vDumy5a56TCvz07s6pJf9Jlck/edit#gid=980517444>)

where {date} is used to track when a new file has been uploaded.

### Access Product Portal

To upload the GNSS products, one has to use sftp.

The authentication and protocol details are:  
sftp -P8101 [providers\\_XXX@193.136.66.29](#)  
password: provider

where ‘XXX’ stands for the name of an agency (ingv, uga-cnrs, wut, bfhk or rob). After login, you will see the directory ‘uploads’ in which the products can be uploaded.

### List of T4 products

Within EPOS-IP, it was decided to offer the GNSS positions/time series during EPOS-OP as shown in Table 1.

*Table 2 Coordinate/Time series accepted by Product Portal*

<b>EPOS ANALYSIS CENTRE</b>	<b>PRODUCT</b>	<b>IDENTIFICATION</b>	<b>UPLOAD DIRECTORY</b>
BFKH	Daily combined time series	Products.GNSS.Combined.Positions WP10-DDSS-011	./uploads/Ts
BFKH	Weekly combined Time series	Products.EUREF.Combined.Positions WP10-DDSS-022	./uploads/TS_dens
INGV	Daily coordinates	Products.EPOS.PPP.Positions WP10-DDSS-007	./uploads/Coor
INGV	Daily time series	Products.EPOS.PPP.TimeSeries WP10-DDSS-009	./uploads/TS (ITRF2008) ./uploads/TS_EU (relative to EU plate) ./uploads/TS_loose (full covariance matrix)
UGA-CNRS	Daily coordinates	Products.EPOS.DD.Positions WP10-DDSS-008	./uploads/Coor
UGA-CNRS	Daily time series	Products.EPOS.DD.TimeSeries WP10-DDSS-010	./uploads/TS
WUT-EUREF	Daily & Weekly coordinates	Products.EUREF.Combined.Positions WP10-DDSS-016	./uploads/Coor
ROB-EUREF	Daily & Weekly time series	Products.EUREF.referenceframe WP10-DDSS-018	./uploads/TS

The preferred format of these files is SINEX. The filename convention is: AAAWWWW.D.snx. Here WWW is GPS week and D the day of week (0-6). If D is 7, then weekly values are assumed. The abbreviations of the EPOS analysis centres are listed in Table 2. All files are uploaded to these directories, without creating sub-directories to sort the files by year and/or GPS week. Once the content of these files have been validated, the SINEX files with time series will be moved to the public sftp-directory where the standard year and GPS week sub-directories will be created.

*Table 3 Abbreviations used for the SINEX file names*

<b>EPOS ANALYSIS CENTRE</b>	<b>AAA</b>
BFKH	EPO
INGV	ING
UGA-CNRS	UGA
WUT-EUREF	EUR
ROB-EUREF	EPN

The other accepted format is PBO. The file name for this format for each station is simply XXXX.pos where XXXX is the four-letter code of the station.

To insert the information in these files into the database, additional information is needed to fill all the tables. For example, information about the reference frame and creation date is needed. In Table 4 we have listed the necessary fields (all mandatory) and their possible values. In case the DOI is unknown, then the value “unknown” can be used. If you want to insert another value, please contact us and we will add it to this list.

*Table 4 Extra information that should accompany the submission of the products in order to be able to automatically insert the values into the database.*

<b>Field</b>	<b>Type</b>
ReferenceFrame	[IGS08, IGS14, free-network, IGB08, INGV_EU]
EpochOfFrame	(timestamp format DD/MM/YYYY HH:MM:SS)
CovarianceMatrix	[full, block-diagonal, diagonal]
AnalysisCentre or CombinationCentre	[UGA, INGV, WUT-EUREF, BFHK, ROB-EUREF]
Software	[Bernese GNSS Software 5.2, GIPSY-OASIS, CATREF]
SINEX_version	number
CutOffAngle	number
OTLModel	[FES2004, GOT4.10c, FES2014b]
AntennaModel	[epn_14_1958.atx, igs08_www.atx, epn_14.atx]
DOI	(characters) “unknown” is also accepted
CreationDate	(timestamp format DD/MM/YYYY HH:MM:SS)
ReleaseNumber	(integer)
SamplingPeriod	[daily, weekly]

This information should be put into the FILE/COMMENT block of the SINEX files. To facilitate this task, we have written a Python script, called include\_comments\_SINEX.py, that asks the users to select the value for each field and afterwards reads all SINEX files in a specified

directory and adds these fields into the FILE/COMMENT block. The program can be found on gitlab ([https://gitlab.com/segalubi/EPOS\\_Python\\_scripts/tree/master](https://gitlab.com/segalubi/EPOS_Python_scripts/tree/master)) and the documentation is listed on the product portal. One of the advantages of using this script is that it ensures that every EPOS analysis centre uses the same notation for certain parameters.

For the PBO files simple text files containing this information must be provided. This information will be inserted in the database of the product portal to allow advanced searching of these products. An example of such a text file is:

```
ReferenceFrame          IGS14
EpochOfFrame           1/1/2005 00:00:00
CombinationCentre       WUT-EUREF
CovarianceMatrix        full
Software                Bernese GNSS Software 5.2
SINEX_version           2.02
CutOffAngle             3
OTLModel                FES2004
AntennaModel            epn_14_1958.atx
DOI                     unknown
CreationDate            6/10/2017 00:00:00
ReleaseNumber           1
SamplingPeriod          weekly
```

If this information is the same for all PBO files, only file (for example called “metadata.txt”) with this information is required.

## Offsets

SINEX files containing estimated reference positions and velocity, see next section, implicitly contain information about offsets since it provides a nominal bias and linear trend for each time segment. From this information the time and size of offset between two segments can be extracted. However, for the PBO files this information needs to be provided. UGA only provides the time of offset in the following format:

```
AQUI 2001.65342
ARGR 2011.249315
ATFO 2011.873973,2015.441096
AULL 2004.45765,2005.484932,2006.369863,2007.427397,2008.808743,2013.600000
AUTN 2009.671233,2013.427397
AXPV 2009.035616,2011.802740
BADH 2009.210959,2012.715847
BANN 2012.371585
```

Thus, 4 letter station name followed by a list of times of offsets in year fractions. Inside our scripts this format is converted to one that can be used by the Hector software.

## List of T5 products

The GNSS velocity products in EPOS-OP are shown in Table 5. The preferred format of these files is SINEX. The filename is not yet standardised but preferably should start with the name of the Analysis/Combination centre as listed in Table 3. In addition, again some extra metadata is necessary to ensure the products can be inserted correctly into the database, see Table 6.

*Table 5 Reference positions and estimated velocities accepted by Product Portal*

<b>EPOS CENTRE</b>	<b>ANALYSIS</b>	<b>IDENTIFICATION</b>	<b>UPLOAD DIRECTORY</b>
BFKH		Products.EPOS.Combined.Velocity WP10-DDSS-014	./uploads/CombinedVel
BFKH		Products.EUREF.densification WP10-DDSS022	./uploads/Vel
INGV		Products.EPOS.PPP.Velocity WP10-DDSS-013	./uploads/Vel
INGV		Products.EPOS.Combined.Velocity WP10-DDSS-014	./uploads/CombinedVel
UGA-CNRS		Products.EPOS.DD.Velocity WP10-DDSS-0012	./uploads/Vel
ROB-EUREF		Products.EUREF.referenceframe WP10-DDSS-018	./uploads/Vel

*Table 6 Extra information that should accompany the submission of the velocity products in order to be able to automatically insert the values into the database.*

<b>Field</b>	<b>Type</b>
ReferenceFrame	[IGS08, IGS14, free-network, IGB08, INGV_EU]
EpochOfFrame	(timestamp format DD/MM/YYYY HH:MM:SS)
AnalysisCentre or CombinationCentre	[UGA, INGV, WUT-EUREF, BFKH, ROB-EUREF]
DOI	(characters) "unknown" is also accepted
CreationDate	(timestamp format DD/MM/YYYY HH:MM:SS)
ReleaseNumber	(integer)

Besides SINEX, we accept the MIDAS format. All MIDAS output lines should be collected into one single file. An example of the first few lines of such a file is:

```
ACER MIDAS4 2007.5247 2015.9986 8.4740 3003 3003 5286 0.023425 0.019240 0.000360 0.000164 0.000153 0.000564 0.000003 -0.001313 -0.001289 0.080 0.076 0.062 0.001520 0.001423 0.005278 0
ACOR MIDAS4 2000.0014 2015.9986 15.9973 5516 5516 10304 0.020790 0.016460 -0.002190 0.000126 0.000124 0.000437 0.004773 0.005634 -0.007686 0.068 0.066 0.081 0.001646 0.001616 0.005652 0
```



```
AGDE MIDAS4 2007.6753 2015.9986 8.3233 2793 2793 4907 0.019630 0.016605 -0.
000378 0.000204 0.000301 0.000514 -0.000720 -0.004676 0.001164 0.069 0.073
0.061 0.001832 0.002696 0.004638 0
```

Again, the filename should start with the the EPOS Analysis/Combination centre abbreviation listed in Table 3.

## T6 Strain rate maps

So far we assume simple ASCII text files with strain rate for each grid point given on each row. The various types of strain are given in the columns. The exact format is under discussion.

## Glossary

OP Operational Phase

IP Implementation Phase

AC Analysis Centre