

Unification of product formats

Position time series format

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Unified Working Group on Site Coordinate Time Series Format

IERS WG and IAG WG 1.1.1 of Sub-Commission 1.1 (Coordination of Space Techniques)

IERS: IERS Working Group on Site Coordinate Time Series Format

<http://iers.org/WGSCTSF>

IAG: WG 1.1.1: Creation of common geodetic coordinate time series

<http://iag.uni.lu/index.php?id=175>

WG established on April 2012 by IERS DB

First meeting in Dec 6, 2012, San Francisco, AGU meeting

2nd meeting on April 10, 2013, Vienna International Centre, EGU2013, Vienna

Goals and objectives:

- define a common exchange format for coordinates time series for the geodetic techniques (DORIS, GNSS, SLR, VLBI).

 - The format should provide a user-friendly presentation of coordinate time-series results for a potentially broader community of users.

- ensure that the format contains the necessary information (data and metadata) to be easily used or converted for the web tools of the IAG Services (GGOS, IERS, IDS, IGS, ILRS, IVS)

- the format must allow the comparisons of time series between GNSS, SLR, VLBI and DORIS, but also with other techniques such as tide gauges records.

 - Some of the issues that should also be addressed are, e.g., reference system, time unit, content description...

The final product of this working group will be recommendations on how the geodetic community should proceed in developing common positional time series and making such results readily available to the broad scientific community.

A common tool that can be used to display and compare these results will also be developed.

Members

The working group is composed by time series providers and users, with representatives from each technique combination centre, from the ITRS combination centre, and that the GGOS portal manager. There should also be representatives from the geophysics/geodynamics and oceanography communities who are seen as the primary uses of this product.

Bernd Richter (BKG), GGOS portal manager (S. Bachmann, O. Roggenbuck)

Thomas Herring (MIT), IERS Analysis Coordinator

Xavier Collilieux (IGN), ITRS Combination Center

Manuela Seitz (DGFI), ITRS Combination Center

Laurent Soudarin (CLS), IDS representative

Paul Rebischung (IGN), IGS representative

Erricos Pavlis (Univ. of Maryland, Baltimore County), ILRS representative

Axel Nothnagel (Uni. Bonn), IVS representative

Médéric Gravelle (Uni. La Rochelle), provider/user (SONEL)

Yehuda Bock (Scripps Institution of Oceanography), provider/user (SOPAC GPS webservice)

Simon Williams (Proudman Oceanographic Laboratory), provider/user (CATS software)

Xiaoping Wu (JPL), user

Geoff Blewitt (Nevada Geodetic Laboratory), provider/user (GPS network)

Existing formats

IAG services:

- IDS: [STCD format](#) ([ex](#))
- IGS: ?
- ILRS: ?
- IVS: ?
- IERS: ?

GPS providers:

- PBO: [format](#) ([ex](#)) format update to the station position file with more descriptive header sections as well as column headings (March 2013)
- NGL: [Env format](#) ([ex](#)), [Xyz format](#) ([ex](#))

Others?

[VOtable](#) XML-based format used for Virtual Observatory (VO corner on web sites of ITRF and EOP product Center at Obs. Paris)

Example of IDS STCD format (1/2)

- +FILE/REFERENCE
- DESCRIPTION CNES/CLS Analysis Center
- OUTPUT Weekly position residuals at observation epoch
- CONTACT Laurent Soudarin <laurent.soudarin@cls.fr> info-doris@cls.fr
- SOFTWARE GINS / DYNAMO (GRGS/CNES)
- HARDWARE SUN / IBM
- INPUT SPOT2, SPOT3, SPOT4, SPOT5, TOPEX, ENVISAT, JASON2, CRYOSAT2 DORIS data
- -FILE/REFERENCE
- *

- +FILE/COMMENT
- FIELDS - modified julian date, dX, dY, dZ, sX, sY, sZ, dEast, dNorth, dUp, sEast, sNorth, sUp
- FORMAT - 2x,f7.1,2(2x,3(1x,f6.1),3(1x,f5.1))
- UNITS - all position residuals in millimeters
- REFERENCE SYSTEM - ITRF2008
- EARTH ELLIPSOID - flattening factor: 298.257810 equatorial radius: 6378136.0 m
- -FILE/COMMENT
- *

- +SITE/ID
- *Code Pt __Domes__ T _Station Description__ _Longitude__ _Latitude__ _Height
- THUB A 43001S005 D Thule 291 10 34.9 76 32 15.0 41.0
- -SITE/ID
- *

Example of IDS STCD format (2/2)

```

• *
• +SOLUTION/APRIORI
• *Index_Type_Code Pt Soln_Ref_Epoch__ Unit S __Estimated Value____ _Std_Dev____
•   1 STAX THUB A  1 05:001:00000 m  2 0.53811051500000E+06 0.000000E+00
•   2 STAY THUB A  1 05:001:00000 m  2 -0.13890313640000E+07 0.000000E+00
•   3 STAZ THUB A  1 05:001:00000 m  2 0.61809945140000E+07 0.000000E+00
• -SOLUTION/APRIORI
• *
• 52626.5 -57.8 -26.0 18.6 3.8 3.6 3.9 -63.0 1.1 19.1 16.2 3.6 3.9
• 52633.5 -67.7 -7.4 29.5 3.5 3.3 3.5 -65.6 23.8 24.0 15.0 3.3 3.5
• 52640.5 -53.2 -21.9 20.4 3.4 3.2 3.5 -57.3 3.6 24.2 14.3 3.3 3.5
• 52647.5 -67.2 -31.7 21.4 3.4 3.2 3.4 -73.9 -0.1 23.1 14.2 3.2 3.5
• 52654.5 -61.1 -10.5 22.8 3.4 3.3 3.4 -60.6 17.2 21.3 14.3 3.3 3.5
• 52661.5 -73.6 -25.6 25.7 3.3 3.3 3.4 -77.6 8.6 23.5 14.1 3.3 3.5
• 52668.5 -60.2 -11.0 26.1 3.4 3.2 3.4 -59.9 17.2 21.8 14.2 3.2 3.5
• 52675.5 -67.1 -25.1 35.4 3.3 3.2 3.4 -71.4 9.1 35.1 13.9 3.2 3.4
• 52682.5 -54.9 -25.6 21.6 3.3 3.2 3.3 -60.3 1.2 24.9 13.8 3.2 3.4
• 52689.5 -68.1 -21.8 21.4 3.3 3.3 3.4 -71.1 9.1 22.9 14.1 3.3 3.4
• 52696.5 -58.2 -30.4 16.9 3.9 3.6 3.8 -65.0 -3.1 19.8 16.4 3.6 3.9

```

Data issues (1/2)

- -epoch: the time should be as specific as possible. It should be easily understood by users, precise enough for high frequency sampled series. A trade-off is not easy to find. Two time scales are probably needed, e.g. decimal MJD and YYYY MM DD HH MM SS.sss. Decimal year is not recommended as it can cause problems because of leap years (/365.25 or /366.). A certain flexibility of the format is necessary. For daily and weekly sampling, hours, minutes and seconds could be ignored. The sampling frequency could be indicated in the metadata.
- -time tag: middle of the span
- -accuracy of the series: a precision of 10^{-3} mm is used by NGL, PBO. However, such a precision is not required for fast event such as glacier (several m/year).

Data issues (2/2)

- -correlations between components? Provided by PBO and NGL.
- -how many stations per file? PBO VEL files include several stations. Raises several issues e.g. ties between stations.
- -substitution character when values non available: « N/A », other? separation with coma?

Meta data issues

- Site ID
- Provider ID
- Reference frame definition
- Time scale
- Links to external information: Sitelog, website, ...?

Meta data

A metadata search engine is included in the GGOS Portal

http://www.ggos-portal.org/lang_en/GGOS-Portal/EN/Discovery/Discovery.html.

The engine will provide access to the data for users via the defined metadata of the product. The Search is based on an opensource software called Geonetwork <http://geonetwork-opensource.org/>.

ISO standard 19115 from ISO/TC 211 is used for Geospatial metadata <http://www.isotc211.org/>

Catalog VO

Where to compare the series?

- GGOS portal (all the techniques) and/or Geodetic web services
- It should be possible from any visualisation tool (at least) of the geodetic services (IDS, IGS, ILRS, IVS, ITRF) (at least) for colocated sites.
This means that a user using a visualisation tool of one web service should be able to display on the same plot time series of stations of different techniques
For example, someone using the IDS Plottool to visualise the time series of one DORIS station should be able to see on the same plot the time series of the GPS station in one click.

How to do that?

- -a visualisation tool
- -a data base opened to external requests
- -a request system
- -formats related to the visualisation tools well defined and known by each service (unless one unique format)

Vizualisation tools based on Highcharts library

IDS web site

IGS Combination Center

In project:

ITRF (4 techniques from the ITRF2013)

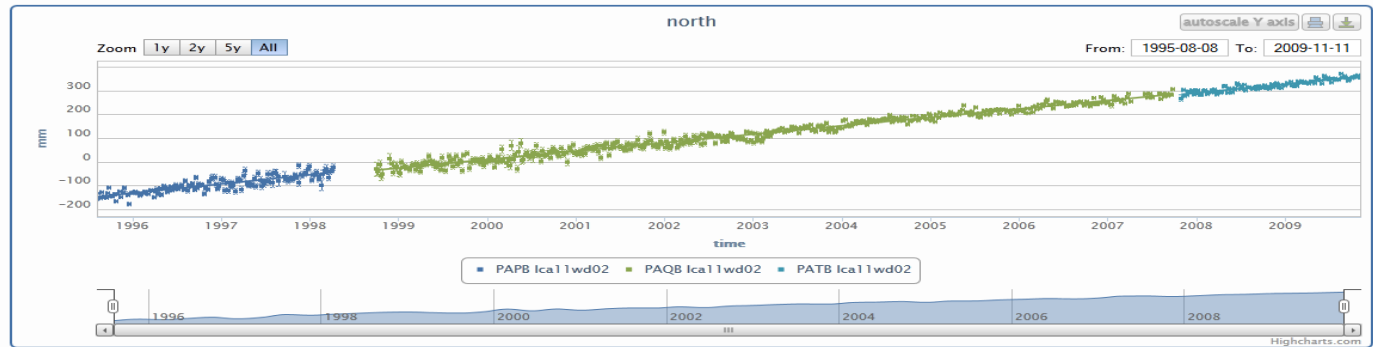
GRGS (4 techniques from GRGS Acs)

GRGS SLR AC

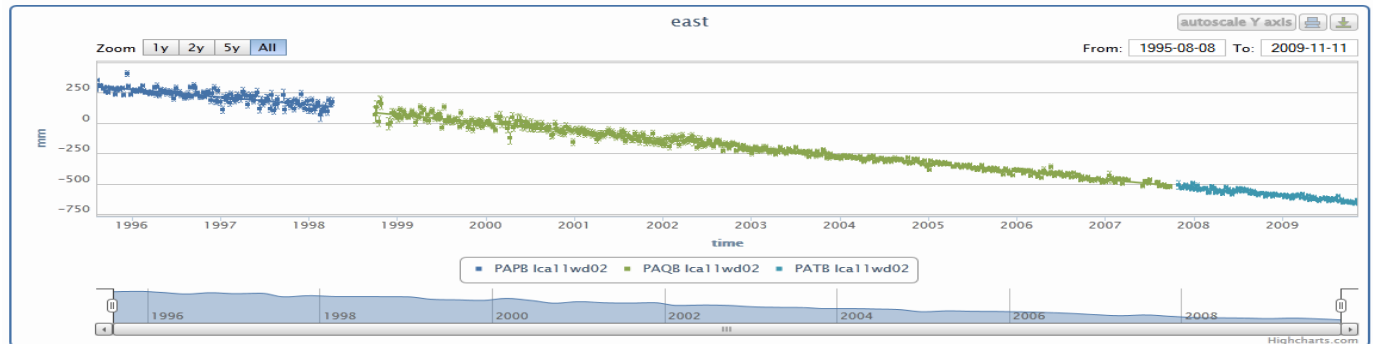
JCET (SLR)

Discussions just started between IDS (CNES/CLS), IGS CC (IGN) and ITRF (IGN)
to set up exchange of data files and to have common developments

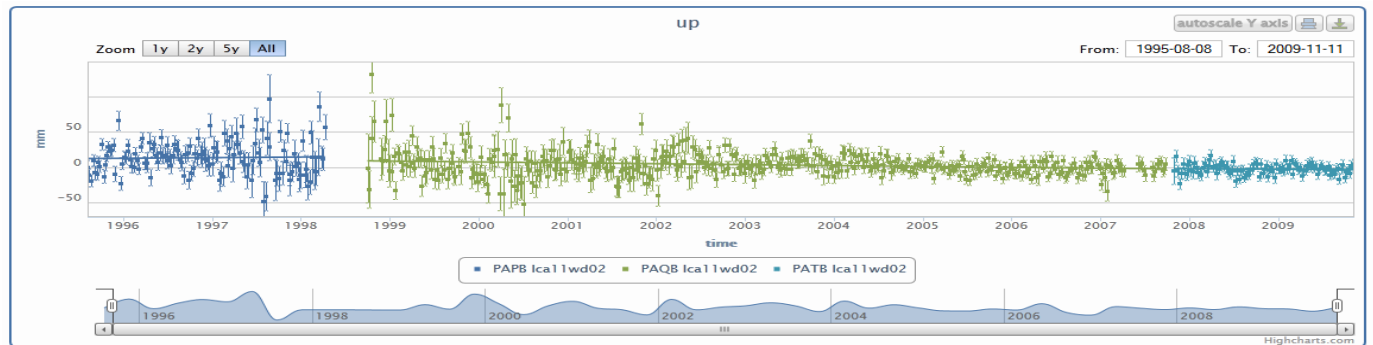
Exemple of time series for the site of Papeete (French Polynesia).



Apply formatting to the other graphs



Apply formatting to the other graphs



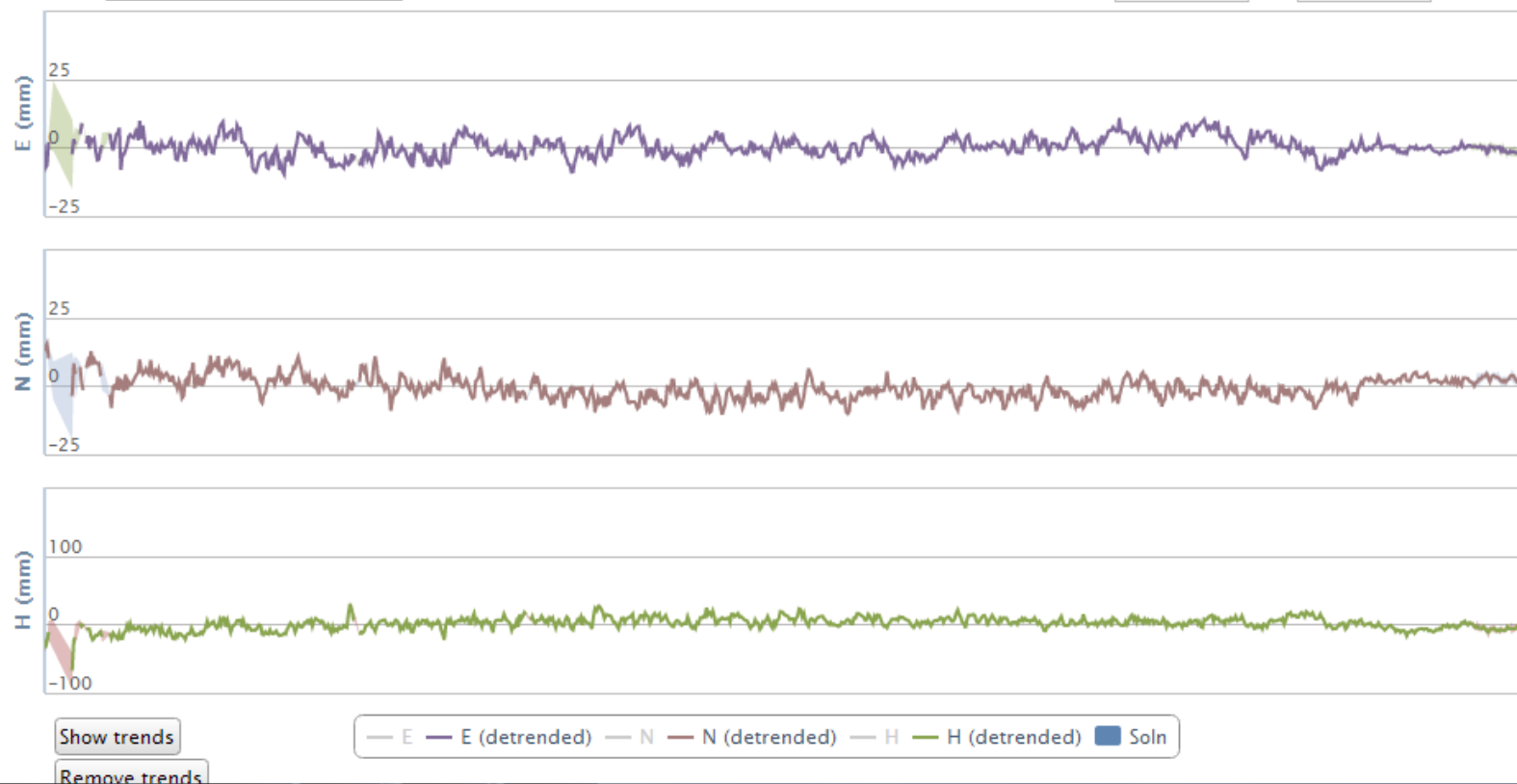
Apply formatting to the other graphs


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Zoom

SYOG-A-660065002

From: To:


SLR time series at GRGS AC (F. Deleflie)

