

# Options and functions of the revised IVS combination website

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**Abstract** The world wide web is one of the most important communication and information exchange platforms today. Because of the high amount of users and the global accessibility, every business is interested in the internet. It opens up new possibilities of international cooperations. In Geodesy this aspect of international cooperations is of prime importance.

**Keywords** International Terrestrial Reference Frame 2014, IVS Combination Center, VLBI, Earth Orientation Parameter, Website

## 1 Introduction

The International VLBI Service for Geodesy and Astrometry (IVS, <http://ivscc.gsfc.nasa.gov/>) is a global association of institutions for the VLBI space technique. The IVS is responsible for the determination of the Earth Orientation Parameters (EOP), as well as the contribution to the International Terrestrial Reference-frame (ITRF) based on VLBI observations. A part of the IVS, the Combination Center (CCIVS) based at the Federal Agency for Cartography and Geodesy (BKG, Germany), is the central location for consolidating analyzed VLBI data. Two combined products are generated in an operational mode: a rapid and a quarterly solution.

For the publication of this official IVS products, the CCIVS maintains a website, which was recently revised. The new website was announced via the IVS mail list on december 2015. Details of the

combination were offered graphically and numerically at this web presence. Due to these changes more options and functions were added to the already available content, which will be presented in Section 3.

The website is available on the following link:

<http://ccivs.bkg.bund.de>

## 2 The Content Management System

The revision of the website was realized on the basis of the Content Management System (CMS) ‘GovernmentSiteBuilder’, which was developed by Materna especially for standardizations for websites of government departments, public authorities and other national institutions in Germany. For this purpose, the system offers a large extent of predefined options for language settings, usability and web accessibility. A login function, a registration mode, service functions or graphical styles are available and can be integrated or modified for each purpose. The system bundles the information and links it together, so it simplifies the administration effort and the updates of the content. Every step of process is recorded in layers, so that changes can be monitored individually. The content will only be published after all integrated data and links are available in the system. This security requirements will reduce potential errors.

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### 3 New functions

The existing content was expanded by more information and functions. Therefore the greatest importance was retaining the structure and the navigation of the initial website. Additional contents were added to the menu, e.g., quick links or separate menus.

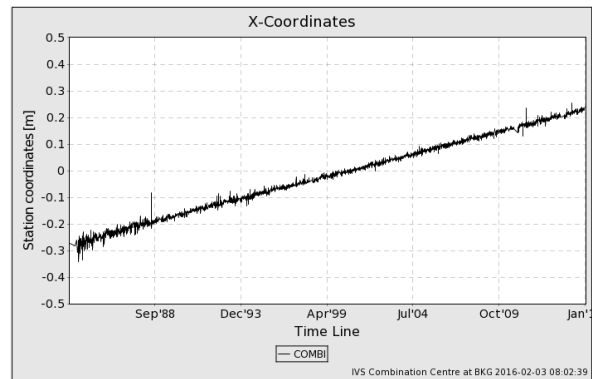
graphic representation	information
+ Scale of Helmert Transformation	+ combination report
+ ITRF2014 results	+ archive
+ station coordinates	+ news and activities
+ EOP	+ calender
+ baseline	+ publication and poster
	+ observatory map
	+ service functions
	+ sitemap
	+ glossary
	+ contact form
	+ print function
	+ search function

**Table 1** Added information and functions in the web content

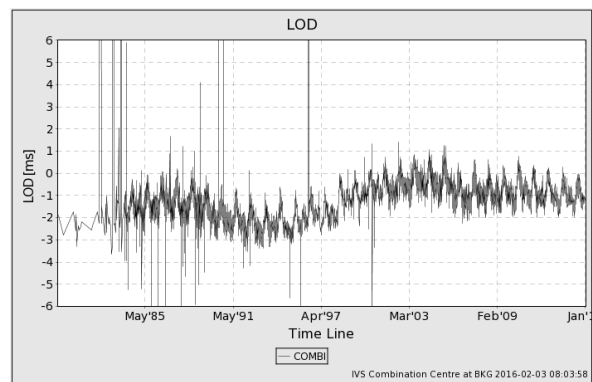
#### 3.1 ITRF2014 results

The International Terrestrial Reference Frame (ITRF) is being processed in regular time intervals and VLBI sessions since 1979 were taken into account. The latest version, the ITRF2014, was generated by results of 9 Analysis Centers with a total session amount of 5796 (Bachmann et al. 2016). The results of the VLBI contribution to the ITRF are presented under the menu point 'ITRF2014': station coordinates in X, Y, Z & North, East, Up, EOP, scale of the Helmert Transformation and baseline lengths. The data is being extracted from a database and prepared for the graphical plot tool, where each user can choose various settings. The results of the settings can be downloaded as numerical file.

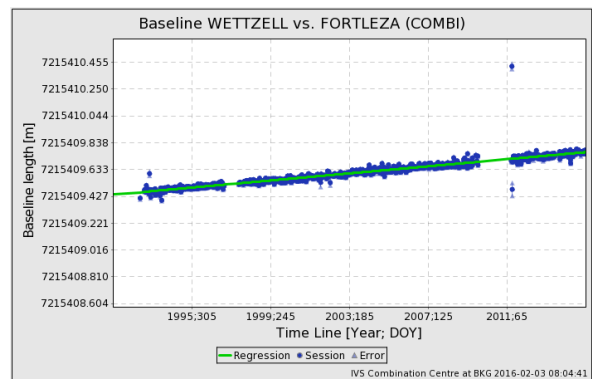
Figures 1-3 show examples from the IVS combination results for ITRF2014.



**Fig. 1** X-coordinate residuals of station Wettzell from IVS combination for ITRF2014



**Fig. 2** Session-wise LOD estimates from IVS combination for ITRF2014



**Fig. 3** Baseline length Wettzell - Fortaleza from IVS combination for ITRF2014

#### 3.2 Combination report

The combination report for the session-wise IVS combination was established to inform all contributing ACs and all interested parties. All required informations and

important details of every combination are individually assembled into a report (see Figure 4 for an example). The weight of each AC is given and a combination statistic for each AC is calculated. The combination report contains offset, rate and standard deviation parameters for the EOPs of each AC solution w.r.t. the combination. The estimated station coordinates and EOPs of the combination are also listed in the report. Further information can be added at any time. The SINEX file and the report can be found in the archive. <sup>1</sup>

The reports is going to be sent out via mail as feedback to every contributing AC.

```

Combination report
SOLUTION
Link to sinexfile
AC contribution
-----
AC      Session details      passed/no contribution/rejected
-----
final weighting factors in COMBI
final weighting factor for AC = 1.57433639536895
-----
COMBI ESTIMATE
-----
NUT_X ---- 13:331:23481 mas -1.48500938695768E-02  3.25226E-02
NUT_Y ---- 13:331:23481 mas  4.40258163545538E-01  3.33980E-02
UT       ---- 13:331:23481 mas  -5.67378509982609E+01  1.57231E-03
XPO ---- 13:331:23481 mas  5.82448514956613E+01  2.86124E-02
YPO ---- 13:331:23481 mas  2.92370255320331E+02  3.14550E-02
LOD ---- 13:331:23481 masD  1.38185802098187E+00  5.97590E-03
XPOR ---- 13:331:23481 masD -7.77877100174048E-01  1.11514E-01
YPOR ---- 13:331:23481 masD  7.68777061461013E-01  1.30833E-01
STAX 75S1 13:331:25820 m  1.2024631378082E+06  3.83632E-11
STAY 75S1 13:331:25820 m  2.52784526780822E+05  3.83632E-11
STAZ 75S1 13:331:25820 m  6.28776622516458E+06  3.83632E-11
-----
AC
-----
+SOLUTION/STATISTICS
NUMBER OF OBSERVATIONS      1418
NUMBER OF UNKNOWN          508
WEIGHTED SQUARE SUM OF O-C  2.47338392438026D+15
SQUARE SUM OF RESIDUALS (VT/PV) 9.70358975743183D+02
VARIANCE FACTOR             9.4375242222299D-01
WRMS OF POSTFIT RESIDUALS   2.27448074014065D-11
-----
-SOLUTION/STATISTICS
-----
Parameter | value
-----|-----
sc_off_xpol | 0.001372406666811724 |
sc_s_off_xpol | 0.003209468431714786 |
sc_rat_xpol | -0.007049568244237248 |
sc_s_rat_xpol | 0.005493173993903027 |
wrms_xpol | 0.04002459446517018 |
rms_xpol | 0.06168932655996299 |
sc_off_ypol | 0.002650322490411202 |
sc_s_off_ypol | 0.004111618342854179 |
sc_rat_ypol | 0.0032113557817661 |
sc_s_rat_ypol | 0.006867686282650366 |
wrms_ypol | 0.08211058623263343 |
rms_ypol | 0.07856887726178714 |
sc_off_dut1 | 0.0001179112867364595 |
sc_s_off_dut1 | 0.000217412814138504 |
sc_rat_dut1 | 0.0002985106888019018 |
sc_s_rat_dut1 | 0.0003685608833497504 |
wrms_dut1 | 0.002895801239099485 |
rms_dut1 | 0.003169096372250688 |
    
```

Fig. 4 Structure of the combination reports

### 3.3 Additional functions

The new generated calendar shows the important VLBI meetings of the present year. Every month is shown separately and the event day are affirmed clearly. Additionally, the meetings of each month are sorted alphabetically and if a meeting is missing, it can be announced by using the contact form.

Publications of the IVS combination center, e.g., presentations, posters, abstracts and proceedings can be found under the menu 'Publications & Poster'. Furthermore, a newspage introduces and informs all users about the activities of the IVS combination center and details of the latest combination are listed at this page, as well.

### 3.4 Service functions

#### 3.4.1 Contact form

The CMS offers already a wide scope of predefined functions including the contact form. Prescribed input fields makes it possible to get in contact with the IVS combination center easily. In this case the IVS combination center will receive the message with all indicated sender information. Wrong entries or incorrect information will be detected by the system automatically. For contact, please use the main mail address (ccivs@bkg.bund.de) of the IVS combination center preferably.

**Contact**

Your opinion matters ...

**Your data**

First name, Surname

Telephone

E-Mail:

your message \*

\*Mandatory field

Fig. 5 Contact form of the ccivs website

<sup>1</sup> [http://www.ccivs.bkg.bund.de/EN/FAQs/Archiv/archiv\\_node.html](http://www.ccivs.bkg.bund.de/EN/FAQs/Archiv/archiv_node.html)

### 3.4.2 Sitemap, glossary and search function

Also the sitemap, glossary and the search function are included in the system and expand the functionality of the website.

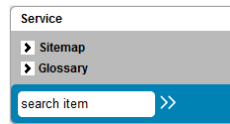


Fig. 6 Separated service menu of the ccivs website

These three functions are introduced to simplify the navigation between all pages. The sitemap is similar to a table of content and describes the structure of the website. Every page can be reached by selecting the menu posts. The glossary is like a digital dictionary, which can be extended in by the IVS combination center. It is served to describe all used abbreviations or technical terms in the page content. Coloured letters symbolize valid glossary entries. Missing entries can be pointed out to the IVS combination center by using the contact form.

The search function is provided for browsing or searching special words in the page content. For the search criterion following differences are considered: Individual search terms and logical interconnections can be used. To get one instance of the search criterion you can specify the words OR between two search terms. Wildcards (\*) stand for any letter and (?) for only one letter. The symbol (~) at the end of a search term provides a less precise search result.

### 3.4.3 Print function

The print function can be found at each page in the footer. With this, the information of the current page (full page) can be printed out externally. The function helps saving data or the user specific settings and the results of the plot tool.

## 3.5 Observatory map

The observatory map is an embedded Google Earth map for providing data of the VLBI stations. For using

this map, there must be installed a valid Google Earth version on your system. Informations like station coordinates, the responsible organisation, the location and if available, a link to the observatory website are displayed by choosing a station symbol. The map was realised to show the VLBI network graphically (see Figure 7 for an example).



Fig. 7 VLBI network observatory map by using a Google Earth Plugin

## 4 Conclusions

The reconstruction of the IVS combination center website was realised to standardize the web presence and to make the handling more convenient. The chosen system provides these necessary conditions and serves methods and functions to implement these features additionally. By this, the content and possible settings are increased.

## References

1. S. Bachmann, D. Thaller, O. Roggenbuck, M. Lösler, L. Messerschmitt (2016) IVS contribution to ITRF2014. J Geod, doi 10.1007/s00190-016-0899-4