Paris Observatory (OPAR) Data Center

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Abstract This report summarizes the OPAR Data Center activities in 2021–2022. Included is information about functions, architecture, status, future plans, and staff members of the OPAR Data Center.

1 General Information

The Paris Observatory (OPAR) has been hosting a primary Data Center for the International VLBI Service for Geodesy and Astrometry (IVS) since 1999. The OPAR is one of the three IVS Primary Data Centers, along with BKG and CDDIS. Their activities are done in close collaboration for collecting files (data and analysis files) and making them available to the community as soon as they are submitted. The three Data Centers have a common protocol and each of them:

- has the same directory structure (with the same control file),
- has the same script,
- is able to receive all IVS files (auxiliary, database, products, documents),
- mirrors the other ones every three hours, and
- gives free FTP access to the files.

This protocol gives the IVS community transparent access to a Data Center through the same directory, as well as a permanent access to files in case of a Data Center breakdown (see Figure 1). The mirroring between OPAR and CDDIS has been made with the new secured LFTP SSL since October 2020.

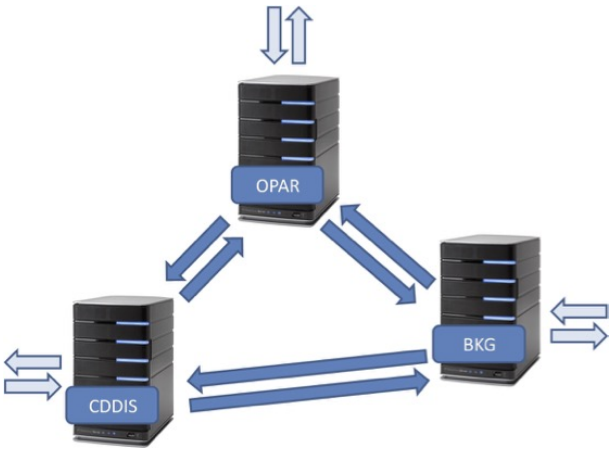

Fig. 1 The three Data Centers: dark blue arrows indicate the mirroring between them while the light blue arrows indicate the input and output data from other IVS components such as Analysis Centers or users outside the IVS.

2 Architecture

To be able to put a file in a Data Center, Operation and Analysis Centers have to be registered with the IVS Coordinating Center. The file names have to conform to the naming conventions. A script checks the file and puts it in the right directory. The uploading protocol to submit files to the ivsincoming directory of ivsopar assumes that cURL is set up on the client. For Windows users, cURL versions exist. You can, e.g., search for a

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version compatible with your version of Windows in https://curl.haxx.se/download.html.

Here is the submission protocol in use since 2017. The user is provided by us with a script named submitopar, for instance. To make the script active, the user has to replace the relevant two lines by the login and password that will be provided by us.

For UNIX-like system users, the following command submits files xxxyyyyz.eops and xxxyyyyz.eops.eops.txt to the Data Center (actually pushes them to ivsincoming):

```
submitopar –upload xxxyyyyz.eops
                   xxxyyyyz.eops.txt
```

To list the files that are currently present in the ivsincoming directory:

```
submitopar –display
```

For Windows users, the cURL command line is

```
curl.exe –k –u LOGIN:PASSWD –F
"fichier=@"FILENAME –F
"mode=upload"
https://ivsopar.obspm.fr/upload/
```

where LOGIN and PASSWD should be replaced by the provided login and password, and FILENAME is the name of the file the user wants to upload. Note that there is NO SPACE between '@' and the '"' (double quotes) sign before FILENAME. One can also submit files directly via a Web browser at the address https://ivsopar.obspm.fr/upload/. The script undergoes permanent improvement and takes into account the IVS components' requests.

The structure of IVS Data Centers is as follows:

- RECENT\ is used for the new mirror method,
- ivscontrol\ provides the control files needed by the Data Center (session code, station code, solution code...),
- ivsdocuments\ provides documents about IVS products,
- ivsdata\ provides files related to the observations,
- ivsdata\aux\ provides auxiliary files (schedule, master, log...),
- ivsdata\db\ contains observation files in database CALC format,
- ivsdata\vgosdb\ contains observation files in database VGOS format,
- ivsdata\ngs\ contains observation files in NGS format,
- ivsdata\sinex\ contains observation files in SINEX format,
- ivsproducts\ provides results from Analysis Centers,
- ivsproducts\eopi\ provides Earth Orientation Parameter results from Intensive sessions,
- ivsproducts\eops\ provides Earth Orientation Parameter results from 24-hour sessions,
- ivsproducts\crf\ provides Celestial Reference Frame results,
- ivsproducts\trf\ provides Terrestrial Reference Frame results,
- ivsproducts\daily_sinex\ gives solutions in SINEX format of Earth Orientation Parameters and site positions, mainly designed for combination,
- ivsproducts\int_sinex\ gives daily Intensive solutions in SINEX format, mainly designed for combination, and
- ivsproducts\trop\ contains tropospheric time series (starting July 2003).

3 Current Status

The OPAR Data Center has been operated actually on a PC server with a Debian 10 Linux operating system since October 2020 and is located at Paris Observatory. To make all IVS products available on-line, the disk storage capacity has been significantly increased to 500 Go. The OPAR server is accessible 24 hours per day, seven days per week through a 2 MBit/s Internet connection. Users can get the IVS products by using the new secured FTP protocol. Access to this server is free for users.

In August 2021, OPAR changed its validation scripts. We now use new common data ingest scripts written in python and developed by the BKG and CDDIS Data Centers. The new software is modular and replaces the original ivsincoming2ivs script. It contains a validation step to check file names submitted to the Data Center and reject files for which the test fails. At the end of 2022, OPAR updated validation scripts from the BKG version to take into account the updated version of the Master Schedule format V2 and the new naming convention for vgosDB and SINEX files.

You can look in Table 1 at Web and ftp data bandwidth used during these two years of OPAR activities.

Table 1 User activity of the OPAR Data Center.

	No. unique visitors	No. visits	No. hits	Bandwidth (Go)
2021				
FTP	825	10882	584,593	2,307
WWW	7,152	11,981	68,149	25
2022				
FTP	1,017	7,579	760,744	182
WWW	6,914	11,655	38,407	4

4 Future Plans

We will continue to update validation scripts using versions provided by the BKG and/or CDDIS Data Centers to ensure the consistency between the three centers. At the beginning of 2023, we will upgrade our OPAR server Linux system to Debian 11. The user activity of the OPAR Data Center is summarized in Table 1.

To obtain information about the OPAR Data Center, please contact ivs.opa@obspm.fr.