BKG Data Center

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Abstract This report summarizes the activities and background information of the IVS BKG Data Center for the years 2019 and 2020. In particular, VLBI sessions in vgosDb data format collected from all correlators and the CDDIS are made available at our server. We present the corresponding extension of the BKG Data Center, the current operational status, and future plans.

1 General Information

The BKG Data Center is hosted by the Federal Agency for Cartography and Geodesy (BKG) and constitutes one of three IVS Primary Data Centers. We collect and maintain all VLBI related data from all of the following IVS components: Operation Centers, Network Stations, Correlators, and Analysis Centers. Since the establishment of the BKG Data Center, the same script, developed by Frank Gomez, was used to fulfill the IVS Data Center duties. In 2019, new procedures were set up in addition to that script to gather the VLBI data in the vgosDb format. Also, the vgosDb data are received from the CDDIS Data Center as a part of the data mirroring process occurring several times per day. According to the IVS Data Center agreement, newly submitted data are synchronized by checking a designated directory. Besides, we screen the entire data set at the OPAR Data Center and compare it with our current data set. The sketch in Figure 1 shows the principle

of data mirroring. The assembled data are provided in open access for the IVS community and all interested parties.
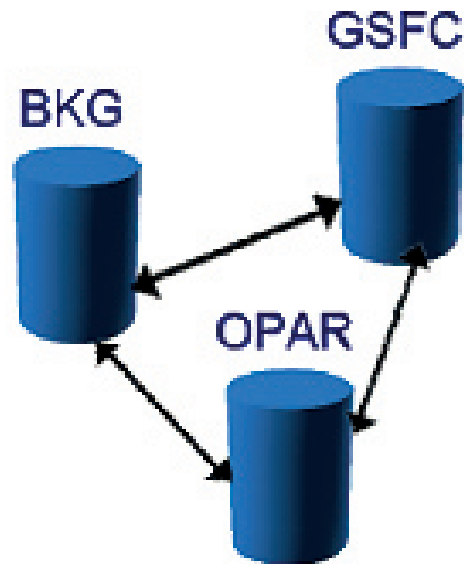

Fig. 1 Principle of data mirroring.

2 Component Description

IVS community members are free to submit their data to the BKG Data Center as well as to any other Primary Data Center. The data management is granted by Primary Data Centers in several steps. First, all uploaded data are received at the incoming area. The BKG in-

coming area is protected, and users need to obtain a username and password by contacting the IVS Coordinating Center or the BKG Data Center representative. Second, the data management script verifies new arrivals and categorizes them either to the appropriate Data Center directory or to the unknown data area in case of a recognition procedure failure. At the end of the operations, the incoming script writes a log report in the status directory. All activities of the Data Center are monitored to achieve data consistency and to control the data handling starting from the data arrival to the data display in open access.

The BKG Data Center is running under a Linux environment with 1 TB storage capacity. For the next few years the projected annual storage extension is 1 TB plus an additional extension of 10 TB for raw VLBI data. Public access to the BKG Data Center is available through FTP and HTTP:

```
ftp://ivs.bkg.bund.de/pub/vlbi/
```

```
http://ivs.bkg.bund.de/vlbi/
```

The BKG Data Center supports additional directories for vgosDb data handling:

```
ivsdata/
  vgosdb_bkg/ : vgosDb processed
                by the BKG
Analysis Center
from version 1
  vgosdb_bonn/: Bonn Correlator
  vgosdb_gsi/ : GSI Correlator
  vgosdb_shao/: SHAO Correlator
  vgosdb_usno/: vgosDb submitted
                by the USNO group
  vgosdb_utas/: UTAS Correlator
  vgosdb_wien/: Vienna Correlator
```

The structure tree of the BKG IVS Data Center is:

```
ivscontrol/     : control files for the Data Center
ivsdata/        : VLBI observation files
    aux/        : session supplementary data
    db/         : mk3db data storage
    ngs/        : NGS cards data storage
    vgosdb/     : CDDIS data holding
ivsdocuments/   : IVS documents
ivsformat/      : master-format
ivsproducts/    : analysis products
   crf/         : source coordinate products
   trf/         : station position products
   eops/        : Earth Orientation (24h sessions) time series
   eopi/        : Earth Orientation (Intensive sessions) time series
   daily_sinex/ : daily SINEX files (24h sessions)
   int_sinex/   : daily SINEX files (Intensive sessions)
   trop/        : tropospheric products
gsfc/           : software supplementary data
   ancillary/   : a priori station, EOP and source data
RECENT/         : most recent data from the incoming area
```

Note that initial data provided by correlators—wrapper file version 1—are not processed vgosDb data. All processed vgosDb data are located in `ivsdata/vgosdb`. Besides, the BKG Analysis Center (AC) submits its own processed vgosDb files, which are available only at the BKG Data Center. The BKG AC starts the analysis from vgosDb version 1. These data are expected to be merged with `ivsdata/vgosdb`.

3 Staff

The staff members during the report period were:

- Reiner Wojdziak, until June 30, 2020 (Data Center coordination, Web design)
- Anastasiia Girdiuk (data analysis, Data Center coordination, anastasiia.girdiuk@bkg.bund.de)
- Markus Goltz, since September 1, 2020 (Data Center, Web design, markus.goltz@bkg.bund.de)
- Gerald Engelhardt (data analysis, Data Center, gerald.engelhardt@ bkg.bund.de)
- Dieter Ullrich (data analysis, Data Center, dieter.ullrich@bkg.bund.de)

We unexpectedly lost our long-term staff member Reiner Wojdziak, who passed away on June 30, 2020.

4 Current Status

To ensure the synchronization between the three Primary Data Centers, the designated directory `RECENT` is mirrored with the same script four times a day. This script does not recognize vgosDb. vgosDb data are managed by our internal scripts: we collect and display all available data at the correlators and at the CDDIS. The BKG Data Center structure has been extended to include vgosDb data with the ultimate goal being to hold all of the IVS data including vgosDb. But this data structure is an intermediate solution. New software is being developed by the GSFC and CDDIS groups on the basis of the CDDIS internal procedures. In collaboration between the Primary IVS Data Centers (the CDDIS, OPAR, and BKG), we are adopting this software for use at BKG. This software is designed to manage all VLBI data types consistently. BKG and OPAR are expected to use this script for the incoming data management, and the CDDIS will perform a similar data handling as a part of their own internal service.

5 Future Plans

The most urgent matter is to implement the new software to ingest all VLBI data types, in particular to include the vgosDb data. The provision of the additional folder structure at the BKG Data Center will be discontinued once the vgosDb data can be merged into a single vgosDb database. At BKG we also intend to include raw data which requires additional storage capacity. For many reasons—such as new internal security protocols, the new ingest software, and the encrypted data access to the CDDIS—switching to encrypted protocols is on our agenda as well.