41st Directing Board Meeting – Summary Minutes

Location: Bonn, Germany
Date: 30 September 2019
Note taker: Dirk Behrend
Version history: 30 September 2019

Attending Board members: Axel Nothnagel (Chair), James Anderson, Dirk Behrend, Patrick Charlot, Francisco ("Paco") Colomer, Alet de Witt, John Gipson, Rüdiger Haas, Hayo Hase, Nancy Kotary, Jinling Li, Evgeny Nosov, Chet Ruszczyk, Oleg Titov, Gino Tuccari.

Excused: David Hall, Ed Himwich.

1. Welcome (Axel Nothnagel)

Axel Nothnagel welcomed the Board members.

2. Approval of Agenda

The Board approved the agenda for the 41st DB meeting.

3. Approval of Minutes of the 40th DB Meeting (Axel Nothnagel)

The Board approved the minutes of the 40th DB meeting with some additional wording in Section 7.9 of the Detailed Minutes. The Board agreed.

4. Reports of Action Items of last DB meeting (Axel Nothnagel)

Eight Action Items (AI) were still open from the previous DB meeting. These were rolled over to the list of AI for the 41st DB meeting.

5. Comments and Questions on written reports

The activities of the various components were described in written reports provided to the Board members prior to the Board meeting. The following only reports on additional comments, if any.

5.1 IVS DB Chair's report (Axel Nothnagel): In 2015, the UN had adopted a resolution on "A global geodetic reference frame for sustainable development" under the auspices of the Committee of Experts on Global Geospatial Information Management (UN-GGIM) and prepared by its "Global Geodetic Reference Frame Working Group (GGRFWG)" as it was called then. Subsequently, a UN-GGIM Subcommittee on Geodesy (SCoG) [UN-GGIM WG1, http://ggim.un.org/UNGGIM-wg1] was established (replacing the GGRFWG), which has as its most important task the fostering of the Global Geodetic Reference Frame (GGRF). Five

working groups were established for reaching this goal (Governance, infrastructure, education and training, standards, and outreach).
Another entity on the horizon is the Global Geodetic Center of Excellence (GGCE), which may serve as a coordinating center for the GGRF. It still needs to be established at a host location and is expected to be staffed with some 10–12 people.
The IAG accepted the changes to the IVS ToR; the acceptance through the IAU still needed to be worked on.
5.2 IVS CC Director's report (Dirk Behrend): The GM2018 Proceedings were posted on the IVS Web site: https://ivscc.gsfc.nasa.gov/publications/gm2018/. The volume includes 59 papers from 98 possible ones (60% submission rate).
The editing work for the IVS 2017+2018 Biennial Report is in full swing. The plan is to complete the editing work by the end of October 2019.
Two IVS Newsletter issues were published (April 2019 and August 2019) as PDFs on the IVS Web site.
The 10th IVS TOW was successfully held at MIT Haystack Observatory from May 5–9, 2019. Directly following the TOW, a VGOS correlation/post-correlation workshop (1.5 days) was organized. The CC led the discussions of the Program Committee, established the class program, and assisted H. Johnson (MIT Haystack Observatory) with logistical items. The overall feedback of the workshop was very positive. In particular, it was mentioned that it was beneficial to have station and correlator personnel at the workshop.
The 11th IVS General Meeting will be held in Annapolis, MD, USA in the period March 22–28, 2020. The meeting Web site is available at: https://ivsgm2020.com/.
The submission rate of 60% to the GM Proceedings was considered rather low. The idea of going to the peer-reviewed IAG Symposia Series was rejected to keep the IVS GM Proceedings a format which serves the IVS better.
5.3 Observing Program Committee (OPC) Chair (Dirk Behrend): The OPC held five teleconferences during the report period. The OPC agreed that higher rate (e.g., 1 Gbps) OHIG sessions should be observed only close to the physical shipment date of media from Syowa. A rate increase to 256 Mbps or 512 Mbps may be sufficient.
The OPC initially agreed on organizing a CONT20 campaign and established a writing team to prepare the scientific rationale for the campaign. As an alternative to CONT20 suggested by John Gipson (now called R1-2020 Campaign), the OPC discussed an increase of the network size of the R1 sessions (to 14+ stations) for improved EOP estimation and a rebuilding of the R4 sessions with fast e-transfer stations to speed up the turnaround time. The available station resources limit the 14-station R1s to a cadence of every other week (26 sessions per year). The OPC recommended to not observe a CONT20 campaign but to observe the R1-2020 Campaign.
When competing for resources, the preference for sessions should be Intensives before R1/R4 sessions before VGOS sessions. The OPC unanimously supported the organization of a VGOS Intensive Pilot Project on the baseline Kokee–Wettzell.
The VGOS Test (VT) sessions will be integrated into the regular 24-hour Master Schedule in 2020 and renamed to reflect its operational status. For VGOS Intensives USNO favored to have at least two per week that are aligned with R1/R4 sessions. The amount of VGOS observing including a series of possible tie sessions (legacy with VGOS) is resource limited.
Topics of discussion in the DB were the long latency of the Syowa raw data, the sequence and configurations of OHIG sessions, and the idea of installing PIs for certain session types. No decisions were made.

5.4 ISC World Data System (WDS) (Dirk Behrend): Rorie Edmunds was still listed as Acting Director on the WDS Web site, that is, a new Executive Director had not been named yet.
There were no additional comments.
5.5 Technology Coordinator (Gino Tuccari): The TC visited Irbene in Latvia. The group there was interested in joining the VGOS network. They have a relatively fast 16-m telescope, which is outfitted with a BRAND receiver (BRAND includes VGOS).
5.6 VGOS Technical Committee (Gino Tuccari): VTC meetings were regularly held with a larger group of people using Zoom.
5.7 Observatory monitoring and control: on hold at the moment.
5.8 Network Coordinator (Ed Himwich): The network performance in 2019 so far (with results available for a little more than half the year's observations) was similar to previous years. So far in 2019, the stations delivered about 88% of the scheduled observations, about 71% of the scheduled observations made it into the final results. In the future, we expect to categorize the additional loss (17% this year) that typically occurs with new tools that will be developed using the vgosDBs. There were 35 of the total 48 stations that meet the criteria for having "very good" performance of delivering more than 80% of their observations. A list of spectrum manager contacts for all the stations was developed and will be included in a dedicated mail list next year.
Ed will leave the Directing Board around the end of the year. It would thus be required to find a new Network Coordinator. A general call for a new Network Coordinator will be drafted and disseminated.
5.9 Analysis Coordinator (John Gipson): Zuheir Altamimi of IGN France, responsible for the ITRF, asked the IVS to report the source position coefficients for his ITRF work in addition to the standard SINEX file content. It was decided that the IVS Analysis Coordinator enquires about the specific usage of this information in the ITRF work.
5.10 Committee on Training and Education (Rüdiger Haas): It was stated that the students of the VLBI School voiced their interest in having the school more often but was considered unfeasible for the time being. Three years were largely chosen because of the organizational efforts and the teaching load involved.
5.11 Distributed correlation (Gino Tuccari): no further comments.
5.12 WG7 on satellite observations with VLBI (Rüdiger Haas): no activity.
5.13 Task Force on seamless auxiliary data (Alexander Neidhardt): no activity.
5.14 European VLBI Group for Geodesy and Astrometry (Rüdiger Haas): no additional comments.
5.15 Asia-Oceania VLBI Group for Geodesy and Astrometry: A new chair will be elected soon.
5.16 IERS (Rüdiger Haas): no additional comments
5.17 IAU Division A, ICRF3, EVN (Patrick Charlot): The IVS Chair has a standing invitation to the EVN Consortium Board of Directors (CBD) meetings but P. Charlot typically reported on IVS activities at the EVN CBD meetings.
5.18 Committee on Radio Astronomy Frequencies (CRAF) (Hayo Hase): The frequency (protection) manager was already overloaded covering ITU Region 1 (Europe/Africa); at a global level, frequency management would be a severe challenge. The agenda for the World Radiocommunication Conference 2022 (WRC-22) of the ITU was already set. The Board will organize a stakeholders meeting (perhaps on the Sunday before the GM2020) to bring the message across that an IVS frequency manager is urgently needed and needs to be funded.

6. Discussions of

6.1 Usefulness of and need for IVS Resolutions

The DB discussed the introduction of IVS Resolutions to address issues in a formalized way to give IVS associates and others proper references.

6.2 DB Recommendation for telescope deformation surveys

The first resolution will be on telescope deformation surveys; it will state what the institutions running telescopes should actually provide. A reference document will be provided.

6.3 Proposals to the OPC (Dirk Behrend)

The general procedures for proposals to the IVS OPC were discussed. In addition, two proposals were discussed, one of which using VGOS resources. The outcome will be conveyed to the proposers.

6.4 IVS representatives to other entities

A list that summarizes the IVS representatives to other entities needs to be established to keep an overview of assignments. Robert Heinkelmann is the IVS representative in IAG Commission 1; Roelf Botha and Glenda Coetzer are on the GGOS Working Group on DOI. The IVS representatives on the IERS Directing Board are Rüdiger Haas and Sigrid Böhm. Johannes Böhm is the IAG Service Representative to the IAG Executive Committee. Hayo Hase is the IVS Service Representative on the GGOS Bureau of Networks and Observations. The position of a second representative is vacant and we are soliciting proposals of IVS associates.

Oleg Titov is the IAG Representative to the IVS DB. Patrick Charlot is the IAU Representative to the IVS DB.

6.5 Activities at the OOC (Nancy Kotary)

The new outreach Web site (https://vlbi.org) is tailored more towards the layman; there is a need to brag more about our achievements. A new logo will be discussed in the DB soon.

6.6 VGOS progress and open issues (alignment/coordination of developments, standards) (Chet Ruszczyk)

From a stations and correlation point-of-view, VGOS is ready. The VGOS processing was being passed on to other correlators. Haystack could become an R&D correlator while the operational correlation could be taken on by USNO, Bonn, and others.

6.7 Frequency allocation for VGOS, fixed vs. flexible (Hayo Hase)

see TOP 5.18

6.8 IVS scheme of operations, funding of components

To be addressed in a stakeholder meeting in conjunction with the GM2020.

6.9 IVS satellite observations, decision of DB

The question was discussed what the IVS should do with future proposals and activities towards observing satellites with IVS resources. For example, it was mentioned that there was an ESA proposal to put a VLBI beacon on one or more Galileo satellites. Also, the Geocon proposal within NASA (presented by Erricos Pavlis at the IUGG GA in Montreal) mentions that three cube satellites could have a VLBI beacon, requiring a ground network to observe these constellations. There was a need for an IVS general policy on how to deal with this. It is probably necessary to change the mandate of the IVS to include satellite observations. This will be another topic for a stakeholder meeting in conjunction with the GM2020.

6.10 Scheduling, improvements possible

For some time now, a new scheduling software (*VieSched++*) is available and triggered a closer look at the scheduling issues in general. Scheduling is critical for establishing a strong observing geometry and there is still a lot to do considering the varied quality of the current schedules. The R1 sessions are well controlled. In contrast, the R4 sessions lack feedback for improving the scheduling. However; a good geodetic schedule might not provide good imaging. In addition, introduction of quality monitoring scans of 2 to 5 minute lengths at least an hour into the sessions and an hour before the end, but ideally every three hours, was requested by several colleagues. For these reasons, IVS components producing observing schedules are asked to discuss common approaches and invest some efforts into improving their scheduling procedures.

Another issue is that the VEX files produced by the schedulers were often not correct. The correlators had to do a lot of hand editing to be able to use the VEX file for correlation. VEX2

and the respective parser are worked on, needing about a month to finish. However, while writing the parser some problems were uncovered in the format that needed to be addressed.

6.11 Data storage and transportation issues

Activities are under way to store raw correlator output data (visibility arrays) at CDDIS.

6.12 ITRF2020: Source positions in SINEX files?

see TOP 5.9

6.13 Reliability of IVS data and products

Some time ago the analysis chain was broken and the normal flow of data to the IVS Combination Center was reduced dramatically. This led to a severe reduction in quality of the combined IVS EOP series. It was agreed that IVS analysis procedures need to be strengthened to avoid such situations in the future.

6.14 Earth orientation parametrization

skipped

6.15 The role of the IVS w.r.t. astrometry

There are indications that the *Gaia* group is interested in having a WG on the celestial reference frame work in several frequencies. The IVS could support the S/X portion of this effort. The first step of drafting a proposal for a committee will be worked on.

6.16 VLBI nomenclature: Level 1, level 2, level 3 data analysis (Axel Nothnagel)

The DB proposes that, as a conventional nomenclature, analysis steps before the group delay stage, i.e., polarization combination and fringe fitting of the visibilities including any other necessary analysis steps at this stage be called *Level 1 data analysis*. The analysis steps working with (group and phase) delays and their rates and resulting in geodetic parameters be called *Level 2 data analysis*. This also includes work based on visibilities (amplitude and phase) for imaging. And consequently, the final combination work be *Level 3 data analysis.* Along the same line, *Level 0 data* are the recorded raw VLBI data, *Level 1 data* are the visibilities, *Level 2 data* are

the VLBI observables, *Level 3 data* are geodetic parameters of individual analyses and *Level 4 data* are then combined products.

6.17 Replacing the fall DB Meetings by video conferences?

The idea was brought up that the Directing Board meets in person only in conjunction with GeoVLBI conferences and convenes electronically in between to keep the sequence of two meetings per year but save on travel. The general opinion is that personal interaction in the sessions but also during coffee breaks was very important. In addition, there is a time zone issue which is quite severe for multi-hour meetings. It was agreed that the personal meeting sequence was kept but that short telecons could be done if needed.

6.18 Other items?

An analysis person should be present in the Correlator telecons and a suitable candidate will be sought.

The Analysis Coordinator was asked to organize that in the ITRF2020 computations also troposphere parameters were extracted and reported for subsequent use in climate studies.

7. Recent and upcoming Meetings

The Unified Analysis Workshop (UAW) is scheduled to be held in Paris during the week after the IVS Directing Board meeting. After that, also the Journées 2019 will be held in Paris.

The IVS General Meeting 2020 is planned for the last week of March (March 22–28, 2020) in Annapolis, MD, USA.

8. Summary of Action Items

There were some action items resulting from this Board meeting (separate document).

9. Next meeting: Annapolis, March 28, 2020

The next Directing Board meeting is scheduled for the end of the IVS General Meeting week in Annapolis on March 28, 2020.

10. Miscellaneous

The minutes of the Board meeting only report on activities at the meeting, which does not include the written reports that were submitted beforehand. For future meetings, the coordinators should give oral reports and the minutes should include the discussions and the most important points from the written reports.