

33rd Directing Board Meeting – Summary Notes

Location: Ponta Delgada, Azores, Portugal
Date: 22 May 2015
Note taker: Dirk Behrend
Version history: 22 May 2015

Attending Board members: Axel Nothnagel (Chair), Dirk Behrend, Alessandra Bertarini, Patrick Charlot, John Gipson, Rüdiger Haas, Hayo Hase, Ryoji Kawabata, Jim Lovell, Chopo Ma, Arthur Niell, Bill Petrachenko, Harald Schuh, Torben Schüler, Fengchun Shu, Guangli Wang.

Absent: Ed Himwich, Alexander Ipatov, Shinobu Kurihara.

1. Welcome (Axel Nothnagel)

Axel Nothnagel welcomed the Board members.

2. Approval of Agenda

The Board approved the agenda for the 32nd DB meeting.

3. New WG on Galactic Aberration (Daniel MacMillan)

Daniel MacMillan, on invitation by the IVS Analysis Coordinator, John Gipson, prepared a proposal for a new IVS Working Group on Galactic Aberration. The purpose of the new working group would be to investigate issues related to incorporating the effect of aberration into IVS analysis, to consider arguments regarding a redefinition of the ICRS to account for aberration, to investigate what value of secular aberration to apply in an a-priori model of aberration, to study the problem of the effect of aberration on the radio-optical tie, and to formulate a recommendation to be conveyed to the IAU.

Justification:

- Several studies in recent years have shown that aberration can be estimated from VLBI data. Estimates are in the range 5–7 $\mu\text{s}/\text{yr}$.
- The VLBI estimates are close to independent estimates derived from parallax measurements (5–5.5 $\mu\text{s}/\text{yr}$).
- The effect is not negligible in terms of future μs -astrometry and current VLBI precision.
- The aberration correction to current catalogs of radio source positions at J2000 is as large as 40 μs .
- The systematic drift due to secular aberration drift of 5 $\mu\text{s}/\text{yr}$ leads to source position displacements as large as 100 μs after 20 years.

Desired outcome of the WG:

- Memos and other publications regarding the WG investigation
- A model of galactic aberration to be applied in VLBI analysis
- A recommendation and justification for an a-priori model to be applied to future CRF realizations to be proposed to the IAU.

Proposed WG members:

- Full members: Dan MacMillan (chair, NASA), John Gipson (ex officio, NASA), Chopo Ma (IERS rep, NASA), David Gordon (NASA), Chris Jacobs (JPL), Zinovy Malkin (Pulkovo Observatory), Sébastien Lambert (Paris Observatory), Oleg Titov (Geoscience Australia), Minghui Xu (SHAO), Alan Fey (USNO), Norbert Zecarias (USNO), Hana Krásná (TU Vienna).
- Correspondents: Ralph Gaume (NSF).
- Possible additional members or correspondents: George Kaplan (USNO), Valeri Makarov (USNO), a Gaia team member.

The Board gave Dan MacMillan the mandate to refine the ToR in order to formally establish the WG at the next Board meeting in October.

4. Approval of Minutes of the 32nd DB Meeting (Axel Nothnagel)

The Board approved the notes of the 32nd DB meeting.

5. IVS DB Chair's Report (Axel Nothnagel)

Activities since the last Board meeting included:

- IVS-related presentations:
 - Japanese VLBI Consortium (JVC) Symposium in Tsukuba, Japan on October 29, 2014
 - JIVE-ERIC Symposium in Dwingeloo, The Netherlands on April 20/21, 2015
- Letters to FFI, NAOJ, ASI, and IRA/CNR w.r.t. a clarification of their IVS membership status.
- Emails about station codes, CDP numbers, and DOMES numbers for the 13-m antennas at Badary (BADRT13V) and Zelenchukskaya (ZELRT13V).
- Emails about telescope dimensions of Sejong.
- Emails concerning the Task Force on Seamless Auxiliary Data.
- Communication with Per Erik Opseth regarding an inauguration event for the Ny Ålesund twin telescope in 2018 and a possible joint IVS/ILRS meeting.
- A letter to M.M. Kotyukov of the Federal Agency of Scientific Organizations, Moscow, Russia concerning data transport of Crimea VLBI and SLR data.
- Letter of support for converting the EISCAT 32-meter radio telescope at Sodankylä Geophysical Observatory, Finland to a VLBI telescope.

- Letter of thanks for hosting TIGO to Rector Sergio Lavanchy Merino of the Universidad de Concepción.
- Reporting to Tom Herring, IAG Service Representative.
- Activities within VPEG, mostly drafting and revising documents
- IVS At-Large elections

6. IVS CC Director's Report (Dirk Behrend)

Main activities since the last Board meeting:

- IVS 2014/15 Elections: The Coordinating Center (CC) assisted the Election Committee. The CC prepared the elections Web pages, organized the voting via SurveyMonkey, and updated the IVS member list as needed.
- Organization of TOW2015: The 8th IVS Technical Operations Workshop (TOW) was organized for the period May 4–7, 2015 at MIT Haystack Observatory. The CC was responsible for the Web site, the technical program, and the class assignments. There were 74 registered participants from 15 countries. Students' feedback and teachers' debriefing indicated a wish for more hands-on classes.
- IVS 2014 Annual Report: The editors are Bayer, Armstrong, and Behrend. The editing was expected to be completed by the end of May 2015.
- Two issues of the IVS Newsletter were published in December 2014 and April 2015.
- Several reporting requirements were fulfilled. These were the IVS contributions to:
 - IERS 2014 Annual Report,
 - IAG Travaux 2011–2015,
 - IAG Services' Assessment Questionnaire, and
 - WDS Member Activity Report.

Other activities included:

- IVS 2014 General Meeting Proceedings: The CC put the online version of the Proceedings volume on the IVS Web site.
- Dirk wrote the Board meeting notes from the Tsukuba meeting.
- Dirk helped prepare the current meeting.
- There was minimal progress on the IVS Tri-fold. The wording of the public outreach version was updated with input from the Board members.
- The CC was involved in the OPC, VPEG, and VTC.

7. Reports of the Coordinators and Committee Chairs

7.1 Observing Program Committee Chair's report (Dirk Behrend)

Issues discussed in the period since the last board meeting were:

- R&D proposal for Chang'E-3 lander observations (OCEL): The OPC approved a proposal for four R&D sessions in 2015 to observe the X-band transponder signal of the Chang-E-3

lander using VLBI. This was a follow-up proposal to an R&D proposal in 2014. Unlike the OCEL sessions in 2014, these sessions will be able to observe the DOR tones of the beacon for the full 24 hours of the session. In 2014, the beacon was switched on only for four hours.

- Correlator status: The Washington Correlator at USNO switched from the Mark IV hardware correlator to the DiFX software correlator. Shanghai started to correlate IVS sessions, starting with a CRF session. The Curtin correlator discontinued correlation of geodetic/astrometric sessions. The correlation capability for AuScope will be shifted to the University of Tasmania.
- Scheduling of DSN stations: The DSN stations are to be tagged along in the larger sessions, as their availability is not always secure.
- Results from OCEL sessions: The Bonn Correlator showed in test correlations that the phase can be kept stable for a few seconds now, while a complete scan of 37 s duration still suffered from an incomplete a-priori model. The Beijing Aerospace Control Center (BACC) successfully correlated data and found fringes for scans of RD1407. Preparations were underway at both correlators for a mass correlation.
- AOV sessions: The OPC agreed on adding six AOV sessions to the 2015 Master Schedule; the six sessions will be rebranded from AUST sessions and then extended with stations in the Asia Oceania region.
- Space-X observing: AuScope and Warkworth occasionally perform observing in support of Space-X. The observations are done on short notice. However, as they are also relatively short, the impact on IVS observing is benign, not requiring further action at this point.

7.2 Network Coordinator (Ed Himwich)

The station performance for 2014 indicated preliminary data yields based on results of 1404 station days from 154 out of 248 sessions. The overall correlator yield by station was about 88%. This value was slightly better than in previous years (81–88%), attributable mostly to improved DBBC and antenna performance. The CONT14 campaign had an overall correlator yield of 90%.

Mark 5 module issues caused some data loss. S-band RFI continued to be an issue. The South Korean station at Sejong was operating, but the sensitivity was worse than expected; the reasons were under investigation. Fringes to DSN station were possible again. Several stations were getting equipment for S/X/Ka observing. Alessandra reported that for S/X/Ka first tests were done between Wettzell and Effelsberg. A second test with Yebes and Wettzell was planned.

7.3 Correlation issues (Alessandra Bertarini)

The CONT14 campaign provided an indication of the correlator load involved in the VGOS processing. It also raised the question of necessary training of personnel at the IVS correlators. There is a significant risk of losing trained personnel, for instance, through retirement. The challenge was to maintain a sensible level of experienced correlator personnel.

Alessandra was against a new VGOS correlator because DiFX has proven to work. Some improvements were required for VGOS-readiness in the post-correlation software (difx2mark4).

There would be a need to have geodesists among the DiFX programmers. Arthur was concerned that the DiFX correlator might not be satisfactory for the VGOS purposes, due to lack of throughput or maintainability or both.

7.4 Analysis Coordinator (John Gipson)

There were two big things: ITRF2014 and ICRF3. The IVS contribution to ITRF2014 was submitted; it was the best IVS contribution to date. A lot of work was spent on the ICRF. At GSFC, an IVS bibliography was being compiled. Some inconsistencies were found between the Master Schedules and data bases. The Analysis Workshop was very useful. A suggestion was to go to higher data acquisition rates with the Intensive sessions.

7.5 Technology Coordinator (Bill Petrachenko)

The VGOS Observing Plan was about one year behind schedule. However, the right things were done in the past year: the VEX2 definition was completed; 1-hour tests were being observed every two weeks on the baseline GGAO to Westford; the broadband system was brought under FS control; operational procedures have been set up similar to the legacy operations (“parallel universe”). A number of antennas were completed, the focus shifted to implementing broadband systems. As many as nine antennas might be ready for operations by mid-2016. In a year from now, significant VGOS operations was expected. A change was made to the VGOS specifications: the frequency range for VGOS operations was set to 3–14 GHz; however, stations were still encouraged to go down to 2.3 GHz if possible. The Internet connection speeds emerged to be an issue. Currently most stations e-transfer their data. With full VGOS operations the needed speeds will be too high for the correlators to handle. A workaround would be to initially utilize shipment of modules; hence, stations are encouraged to continue to support module shipping.

At the VTC meeting it was discussed that a number of small antennas were available that can slew quickly (five antennas) and it was proposed to exploit this capability in S/X by using fast “slewing schedules.” Alexander Neidhardt took the task to organize this. There was a discussion on where the fringe fitting should happen: it should be at both the correlator and the analysis center. Other items concerned diagnostics for points that were edited out and how to gain experience with source structure.

7.6 VGOS

7.6.1 VGOS Technical Committee (Bill Petrachenko, Arthur Niell)

(see 7.5)

7.6.2 VGOS Project Executive Group (Hayo Hase; Bill Petrachenko)

Activities since the last Board meeting included two teleconferences and e-mail conversations about Syowa's plans for a new radio telescope as well as interests in VLBI in Thailand and Indonesia. Dirk and Chopo provided VGOS input (VGOS map and roll-out progress) to a GGOS splinter meeting in San Francisco.

The VGOS Operational Plan made progress: the VGOS Observation Plan was approved and published in 2014, the VGOS Data Transfer and Correlation Plan was approved and published in 2015, work on the VGOS Analysis Plan was underway.

Open issues were the technical questions of source structure corrections, connecting phase over observed bands, and mixed-mode scheduling and observation. For the radio telescope comparison sheet the performance measurements were missing (expected to be obtained in 2015).

Guangli reported that funding was approved for a VGOS station over a time span of three years. This year the construction of the antenna at Seshan could start.

7.7 VLBI Education and Training (Rüdiger Haas)

The members of the IVS Committee on Training and Education (CTE) are Rüdiger Haas (chair), Alessandra Bertarini, Johannes Böhm, Chris Jacobs, Chris Beaudoin, Fengchun Shu, Thomas Hobiger, Jim Lovell, Yuri Bondarenko, Mauricio Gende, and Alet de Witt.

The 2nd IVS VLBI Training School will be organized in Hartebeesthoek (South Africa) in March 2016 in conjunction with the 9th IVS General Meeting. It is planned to engage a number of teachers from the IVS community. The school should include VGOS, lectures on theory, and practical exercises. The plan is to hold the IVS school in connection with an AVN training school.

As with the previous school, we would like to provide financial support for students. Ludwig Combrinck was checking possibilities on the African side (e.g, AVN). HartRAO will support the school with rooms, computer access, accommodation, and miscellaneous items. We will prepare an application to the "EGU Training Schools." There could be travel support from the IAG for young researchers.

8. Short Reports of IVS Working Groups and other IVS assignments

8.1 Task Force on IVS Intensives (Rüdiger Haas)

Not much coordinated work was done in the task force. Niko Kareinen (PhD student at Chalmers) worked on automated analysis of the Intensives. The focus was on the INT1 series on the baseline Wettzell–Kokee for the period 2001–2014 using c5++. No significant difference was

found between using locally logged weather data or met data from weather models. No significant difference could be identified for using the VMF1 or GMF mapping functions. The cable data from the log files are important, the correction needs to be applied. The a-priori polar motion data deteriorate the UT1–UTC accuracy significantly when older than one day.

8.2 Task Force on Seamless Auxiliary Data (Axel Nothnagel)

Alexander Neidhardt gave a presentation about the planned task force at the EVGA meeting. The first step would be a proof-of-concept system at the Geodetic Observatory Wettzell. The Board unanimously approved the establishment of the Task Force on Seamless Auxiliary Data.

8.3 Proposal for Working Group on Satellite Observations with VLBI (Rüdiger Haas)

The proposed Terms of Reference (ToR) were updated incorporating the suggestions made at the last Board meeting. The Board unanimously approved establishing the WG on Satellite Observations with VLBI.

9. Reports of Action Items of Last DB Meeting (all)

Most action items were already covered in earlier agenda items and completed. The item on WG2 has become obsolete.

Harald reported on the Task Force for the Recognition of VLBI Elders. A medal (or certificate) could be awarded every two years to an outstanding VLBI expert. The Nomination Committee (consisting of the IVS Chair, the immediate past chair, and the Director of the Coordinating Center) could request nominations until three months prior to an IVS General Meeting (GM). The decision should be made two months before the GM. There should be a catch-up period over the next two GMs, where three people per GM should be awarded. The Board approved the composition of the Nomination Committee.

10. Balance of membership of DB (all)

Axel reported that in the discussion period of the last At-Large elections, some people proposed to extend the Board with more members. However, Axel suggested to keep the number of members at the current level. The current 16 members are dedicated to its activities; eight were elected members while the other eight ex-officio or permanent members. There are guests at most meetings. Thus the number is quite sufficient.

11. Marketing, outreach, public relations

The tri-fold was on the list, but was already covered.

12. Preparations of IVS DB retreat in October 2015 (Axel Nothnagel)

A major goal of the retreat is to develop a strategic plan on where the IVS should be in 2030 and how to get there: “IVS Strategy for the next decade.” Beyond the Board members the following guests will attend: Johannes Böhm, Daniel Gambis, Jesús Gómez González, Christine Hackman, Brian Luzum, Stephen Merkowitz, and Per Erik Opseth.

At the IUGG meeting in Prague, Axel and Harald intended to talk to some select scientists and heavy weights on what they would like the IVS to be or do (but never dared to bring forward). Some talks, such as the ones to Per Erik Opseth and Chris Rizos, were already scheduled.

The following Board members volunteered to prepare the retreat program: John, Harald, Axel, Rüdiger, and Patrick.

13. Items related to IAG, IAU, WDS, and related VLBI groups

13.1 IAG

13.1.1 Commission 1 and Sub-Commission 1.4, Commission 3 (Harald Schuh)

The IUGG General Assembly was to be held in Prague in June 26 – July 2, 2015. The IAG Elections were under way. The members of the IAG Council submitted their votes.

13.1.2 Service Assessment 2014/2015 of the IAG (Harald Schuh)

The IAG assessed all 13 Services. A service assessment questionnaire was filled in by the Services and was then evaluated by three reviewers (different reviewers for each Service). The reviewers’ comments were sent back to the Services by the IAG Secretary General H. Drewes. The IVS got an overall very positive review.

13.1.3 New IAG representative in IVS DB (Harald Schuh)

The 33rd meeting was Harald’s last IVS Directing Board meeting as IAG Representative. His term would end with the IUGG General Assembly in Prague. At that meeting he was anticipated to be elected President of the IAG.

13.1.4 Newsletter contributions (Harald Schuh, Dirk Behrend)

Possible topics for IAG Newsletter contributions could be the antenna inaugurations for Tsukuba and Santa María.

13.1.5 GGOS (Harald Schuh)

GGOS was still discussing the future role of GGOS including another re-structuring. The new structure has two Bureaus: the Bureau for Networks and Observations (chaired by Mike Pearlman) and the Bureau for Analysis and Standards (chaired by Detlef Angermann).

Chopo was willing to be the IVS representative to the Bureau for Networks and Observations. Hayo was nominated to be the alternate.

The resolution on the Global Geodetic Reference Frame for Sustainable Development (GGRF) was adopted by the United Nations General Assembly on February 26, 2015, submitted by Fiji and co-sponsored by 52 UN member states.

13.2 EVGA (Rüdiger Haas)

The 22nd Meeting of the EVGA was held May 17–21, 2015 and turned out to be a great meeting. An open question was the venue of the next meeting.

13.3 Asia-Oceania VLBI Group for Geodesy and Astrometry (Jim Lovell)

The AOV established an observing program, starting with six sessions in 2015. The correlation and analysis work is shared between member groups. The plan was to have a meeting in Hobart, Tasmania, Australia in November in connection with the DiFX meeting (which is held from November 19–20, 2015).

13.4 IAU

13.4.1 IAU Division A (Patrick Charlot)

There was an IAU Commission Reform. The new structure is:

- Division A officers:
 - President: Anne Lemaitre
 - Vice-President: Daniel Hestroffer
- New commissions formed:
 - Astrometry (A.1)
 - Rotation of the Earth (A.2)

- Fundamental Standards (A.3)
- Celestial Mechanics and Dynamical Astronomy (A.4)
- Radioastronomy (B.4)

The IAU XXIX General Assembly will be held in Honolulu, Hawaii in the period August 3–14, 2015. There are six symposia and 22 focus meetings planned. One symposium was co-proposed by Division A (IAUS 318 – Asteroids: New Observations, New Models), and two Focus Meetings were co-proposed by Division A (FM1 – Dynamical Problems in Extrasolar Planets Science, FM9 – Highlights in the Exploration of Small Worlds). Dedicated Division A meetings will be held on August 5 (Commission 8 / A1: Astrometry), August 6 (WG on ICRF3), August 7+10 (Division A scientific meeting), and August 12 (Commission 19: Rotation of the Earth).

13.4.2 IERS (Chopo Ma)

From the IERS Unified Analysis Workshop (UAW) there are two recommendations with relevance for the IVS (excerpt of items for IVS):

1. Resolving the VLBI/SLR/DORIS scale difference:
 - There should be a re-assessment of the relativistic formulations for VLBI and satellite based systems.
 - Explore possible systematic height errors from radio telescope deformations.
 - Re-accounting of atmospheric delay effects and pressure sensors.
 - Examine the temporal behavior of the scale within each technique to assess the variability of the scale estimates.
2. Geophysical Fluids – EOP:
 - Assessment of empirical and tide based models for diurnal and semidiurnal EOP variations.
 - Assess non-tidal, high-frequency EOP variations. Examine hourly estimates of EOP from VLBI and GNSS after removal of tide models to assess the magnitude and consistency between the techniques. IVS and IGS to coordinate with possible ILRS contributions.

13.4.3 ICRF3 (Chopo Ma)

There was a meeting of the WG on ICRF3 in Ponta Delgada, Azores, Portugal.

13.5 EVN (Patrick Charlot)

The EVN related activities/changes since the last Board meeting include:

- New EVN officers:
 - EVN Program Committee Chair (01/01/2015): Michael Lindqvist (Onsala)
 - EVN CBD Chair (01/07/2015): René Vermeulen (ASTRON)
 - EVN CBD Deputy Chair (01/07/2015): John Conway (Onsala)
- EVN Array: discussion about Kunming joining the network

- JIVE
 - ERIC entity created on 21 December 2014
 - ERIC Council established (30 January 2015)
 - JIV-ERIC inauguration on 21 April 2015
- RadioNet
 - Board meeting held in Bordeaux on 25 February 2015
 - Project ends 31 December 2015
 - Next project (under H2020) not to start before 2017 (gap of 1 year, coordinator elected is Anton Zensus)

13.6 ICSU World Data System (Dirk Behrend)

The Joint WDS/CODATA Conference SciDataCon 2014 (International Conference on Data Sharing and Integration for Global Sustainability, <http://www.scidatacon2014.org/>) was held in New Delhi, India in the period November 2–5, 2014. This was the first of a new series of joint biennial WDS–CODATA conferences. Prior to this conference, the WDS Members’ Forum was held on November 2, 2014.

14. Highlights of recent meetings

(mostly covered in previous agenda items)

15. Upcoming Meetings

15.1 IUGG General Assembly (all)

(see 13.1.1)

15.2 IAU General Assembly

(see 13.4.1)

15.3 4th International VLBI Technology Workshop

The 4th International VLBI Technology Workshop will be held in Auckland, New Zealand in the period November 23–26, 2015. The workshop directly follows the DiFX user workshop in Hobart, Tasmania, Australia.

15.4 IVS GM2016 Johannesburg

The General Meeting proper will be held from March 13 through March 17, 2016. There will be splinter meetings before and after the GM. The Board determined the following people as members of the Program Committee (PC): John Gipson, Ed Himwich, Bill Petrachenko, Ludwig Combrinck, Jonathan Quick, Dirk Behrend, Thomas Artz, Thomas Hobiger, Mamoru Sekido, Fengchun Shu, Jim Lovell, and Alessandra Bertarini. The non-Board members still needed to be contacted to verify their willingness to serve on the PC.

16. Summary of Action Items

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

17. Miscellaneous (all)

Hayo mentioned that he distributed to the Board via email a Resolution from the World Radio Conference 2012. He requested feedback to be sent to him in the next two months.