34th Directing Board Meeting – Summary Notes

Location: Penticton, BC, Canada
Date: 9 October 2015
Note taker: Dirk Behrend
Version history: 9 October 2015

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

Excused: Alexander Ipatov.

1. Welcome (Axel Nothnagel)

Axel Nothnagel welcomed the Board members.

2. Approval of Agenda

The Board approved the agenda for the 34th DB meeting.

3. Assessment of DB Retreat 2015 (all)

The Board considered the retreat very fruitful with the invited guests playing a vital role. Axel will start writing a draft retreat report.

Arthur mentioned that the number of R&D sessions per observing year were fixed and wondered whether that should be changed. The Board decided to give the OPC the mandate to increase the number of R&D sessions from now ten to up to fourteen sessions per observing year if indicated.

4. Approval of Minutes of the 33rd DB Meeting (Axel Nothnagel)

The Board approved the notes of the 33rd DB meeting.

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

A major activity was the preparation of the retreat. Other activities since the last Board meeting included:

- Letters to the National Land Survey of Finland and the Finnish Geospatial Research Institute encouraging to make Metsähovi a VGOS station.
- Letter to SHAO about AOV replacing APSG in the observing plan.
- Attending the IAG Executive Committee meeting in Prague on July 2, 2015. Axel was elected IAG representative to the IERS Directing Board.

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

Main activities since the last Board meeting:

- IVS 2014 Annual Report: The volume was completed at the end of July 2015 and posted online at the end of August 2015 (after publication approval at NASA). The print version was distributed in mid-September 2015. Due to a significant increase in production costs coupled with the heavy workload for editing (especially when coinciding with GM Proceedings), the Board agreed to go to Biennial Reports (alternating years between Annual Reports and GM Proceedings) and to continue having a printed version.
- An IVS Newsletter was published in August 2015. It featured the Syowa station and reports about the TOW and the EVGA meetings. The printed version of the Newsletter was distributed with a flyer for the General Meeting in South Africa.
- Organization of GM2016: The GM proper will be held March 13–17, 2016 in Johannesburg, South Africa. The First Announcement was sent on July 21, 2015. The Second Announcement was planned for October 15, 2015. The theme of the GM is "New Horizons with VGOS."
- A couple of IVS reports were given:
  - IAU General Assembly, Commission 19 report (given by O. Titov)
  - NASA SGP – Brazil meeting (given by C. Ma)

Other activities included:

- Dirk wrote the Board meeting notes from the Ponta Delgada meeting.
- Dirk helped prepare the current meeting.
- IVS Tri-fold: The Design Team prepared a very first draft of the layout in a tri-fold using the already available text and a template available in Word. This helped to get an indication on the available space for text and graphics.
- 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:

- Closure of Japanese GARNET stations: The smaller Japanese GARNET stations (i.e., Aira, Chichijima, and Sintotsukawa) were closed, as their main purpose of monitoring local crustal motion was replaced by GPS. GSI also discontinued the geodetic support for VERA Ishigakijima.

- Closure of Curtin correlator: Correlation at the Curtin correlator was discontinued at the end of September 2015. The initial plan was to shift correlation to Hobart (Univ. Tasmania); however, funding for geodetic correlation was taken out of the AuScope budget for the fiscal year starting in July 2015. As a consequence all AUST sessions from July onward had to be cancelled, because there was no correlator to process the data. For the observing year 2016, monthly AUST sessions were planned with correlation to be done at the Shanghai correlator.
- 512-Mbps R1 sessions: There will be one 512-Mbps R1 session per month using the CONT14 mode beginning in July 2015.
- Planning for 2016: The OPC approved the observing plan as prepared by the CC. The Bonn correlator requested the addition of "connector" telescopes for the R1 sessions; there were issues in calculating additive phases in R1 sessions when there was no larger dish connecting the AuScope/New Zealand array with the northern hemisphere. Possible larger "connector" dishes are Tsukuba, Kashima, or Kunming.
- Multi-tone vs. single-tone phase cal: Tests of using multi-tone and single-tone phase cal in the correlation process for CONT14 sessions showed on average better results for multi-tone. However, some stations exhibited large changes in the coordinate components (mostly vertical) in the cm range (e.g., Zelenchukskaya, Onsala) that are not understood. Further investigations are needed before making a change to multi-tone; unwanted consequences on the TRF need to be avoided.
- Wettzell North in the INT3 Intensives: The INT3 Intensives will continue to be scheduled with Wettzell North included.
- Purpose of ten R&D sessions in 2016: There are four proposals competing for the observing time: continuation of *Gaia*, determination of post-Newtonian parameter γ, improvement of scheduling INT1 Intensives, and further OCEL sessions. The OPC felt that there was not sufficient information about the merits and practicability of the proposals and decided to request further information from the proposers.
- State of the rapid-turnaround sessions (R1s and R4s): The rapid-turnaround sessions are not completed within the target 15 days from end of observing to product. USNO has a shortage of personnel and hopes to be back on track with the R4s with new hires in the immediate future.

7.2 Network Coordinator (Ed Himwich)

The data yield for 2015 was based on results through August 31 (144 of 166 sessions, 1002 station days). The overall correlator yield by station was about 88%, which is in line with historical yield (85–88%). About 3% of the loss was due to broadband testing. The overall data used by analysts was 69%, which was as expected more than double the loss at correlation (loss at one station affects more than one baseline, includes other issues detected by analysts). Among the most used stations, many operate at 80% data yield and above, which should be considered very good. All stations were doing pretty well. The largest losses were not due to station operations but rather caused by broadband testing as well as antenna and receiver issues.

Coordination items:

- Announced stations e-transfer data release policy in January
- e-transfer coordination is self-organized by the correlators

- Clock “summit” needed (review and reinforce consistent handling of station clock offset data by the correlators)

Other items:
- TOW2015 in May
  - Successful addition of broadband system
- VEX2 parser implementation in progress
  - some development of non-star source handling still needed
  - testing phase can begin soon

7.3 Analysis Coordinator (John Gipson)

John asked all IVS Analysis Centers to report on their activities.

IGG Bonn VLBI Group:
- Developing new software: ASCOT (Analysis, Scheduling, Combination Toolbox)
  - Interfaces with vgosDB
- Scheduling INT2B using impact factors
- CRF work including X/Ka
- Near field delay modeling

Onsala:
- Automated analysis INT01 with C5++
- vgosDB interface to C5++
- VLBI software comparison campaign
- Assessment of CONT11 and CONT14 ultra-rapid UT1

TU Vienna:
- Further development of VieVS
- VLBI to satellites
- CRF
- HF-EOP

DGFI:
- New VLBI analysis software DOGS-RI is near completion
- OCCAM reprocessing 24-hour sessions back to 2004
- participating in software comparison project

IAA:
- Support QUASAR and OCCAM/GROSS
- Work on reference frame, EOP, etc.

GSFC:
- VCS2 Work

- nuSolve
- vgosDBMake, vgosDBcalc, vgosDBlog
- Intensive improvement
- Support of VLBI/SLR combination
- Near-field Calc

General:
- Higher data rate
- Multi-tone: on hold because of lack of resources
- VGOS sessions
- ITRF2014P work

7.4 Technology Coordinator (Bill Petrachenko)

Broadband signal chain issues
- Front-end
  - Feed options: QRFH, Eleven, Yebes Conical, Noto
  - Cryogenics options: normal Helium cooler, Sterling Cycle
- Down conversion
  - UDC: 2–12 GHz, 2–14 GHz
  - Direct sampling: DBBC3-L (DBBC3-H), NICT
- Digital back ends
  - Channelized: RDBE (512 MHz, 1024 MHz), DBBC2010, DBBC3-L
  - Monolithic bands: Russian version, NICT version
- Recording
  - Removable media: MK6 vs. FlexBuff
  - Data rate: 8 Gbps, 16 Gbps

Correlator issues
- Automatic setup of correlator jobs
  - VEX2: definition complete but requires implementation
- Signal processing bottlenecks
  - Data input: intermediate step to local storage (scatter gather)
  - Network: significant shortfalls for full e-transfer implementation
  - Cores: eventually more will be required
- DiFX
  - Is coding of modes too complex: already discussed (stick with DiFX)
  - Who will do future development/maintenance?
- Spin-off of broadband operations to other correlators
  - Development: currently entirely at Haystack
  - Automation (and perhaps intermediate data storage) need to be in better shape before spin-off can be done efficiently

VGOS observing issues

- Broadband test campaigns planned for mid-2016
  - Frequency: every other week
  - Six stations: Westford, GGAO, Kokee, Wettzell, Yebes, Ishioka
- Other observing programs
  - Fast slewing antennas: S/X mode
  - S/X/Ka: Russia, Wettzell, Yebes/Santa Maria, Ishioka, DSN
- Source structure risk to broadband
  - Need long baselines to test this
  - Fall back options available: e.g., narrower input frequency range, improved 2-band system
- RFI
  - Each station is different: unique solutions required
  - VGOS frequency range: now set to 3–14 GHz to avoid S-band RFI

7.4.1 Proposal for new TC (all)

Gino Tuccari submitted a proposal for becoming the IVS Technology Coordinator. The Board unanimously approved Gino's proposal. Axel will inform Gino of the outcome.

VTC Chairmanship: Jim volunteered for being the chair of the VTC and agreed to stand as candidate. The Board unanimously elected Jim Lovell as the new VTC Chair. Jim accepted his election.

7.4.2 Correlation (Alessandra Bertarini)

At the IVS Retreat the establishment of an IVS Working Group on VGOS Correlation and Data Flow was suggested, which might also involve computer scientists. The Board unanimously voted for establishing such a WG and gave Alessandra the mandate to chair the working group, to draft a charter, and to establish an initial membership list.

7.5 VGOS

7.5.1 VGOS Technical Committee (Arthur Niell)

The broadband tests were suspended for GGAO being down. Westford was being tagged along to R1 sessions (R1708 being the first) as broadband station. Before GGAO went down, the tests were close to going to do a 24-hour session. Other stations will be added when they become available.

7.5.2 VGOS Project Executive Group (Hayo Hase)

Axel reported that not much happened in the last half a year. Hayo did not send a report.

7.6 Committee on Training and Education (Rüdiger Haas)

The activities of the CTE were mostly focused on organizing the VLBI School in South Africa.

2nd IVS VLBI Training School
- March 9–12, 2016, HartRAO
- Four days with 13 lectures and 6 exercises
- Target group: "the next generation", i.e., primarily young students at MSc and PhD level, but open for more senior researchers, too
- Aim: cover whole VLBI chain from technical equipment necessary, observations, correlation, and data analysis
- Address legacy S/X VLBI, but prepare as much as possible for VGOS
- Application deadline is 11 December 2015 (wk 50)

The program for the four days was already established and most of the teachers had agreed to come. Rüdiger was considering the option of filming the lectures and put them online after the school.

7.7 WG7 on Satellite Observations with VLBI (Rüdiger Haas)

The charter of the WG was accepted at the last Directing Board meeting. The desired outcomes of the WG are:
- Memos and other publications concerning the main requirements
- Initiate corresponding test sessions (once possible) to demonstrate the feasibility of the new type of cross-technique observations
- Validate and possibly provide an enhancement to the VLBI–GNSS combinations for the ITRF and EOP, the GNSS orbits and potentially even ICRF determinations shall be demonstrated
- First experience w.r.t. co-location in space shall be gained

The working group consists of 20 members, is chaired by Rüdiger and co-chaired by Alexander Neidhardt and Harald Schuh. The members represent different fields: stations, VEX/FS/antenna control, co-location satellites, scheduling and simulations, correlators, data analysis, IGS, GLONASS. There also nine WG correspondents.

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

8.1 Task Force on IVS Intensives (Rüdiger Haas)

Started writing draft version of the Task Force report. The goal is to have the draft ready by the IVS GM 2016.

8.2 Task Force on Seamless Auxiliary Data (Axel Nothnagel)

Axel received a few sentences from Alexander Neidhardt, the lead of this task force. Progress has been made. A student was available for about six months. The game plan is to first develop a prototype and then discuss what could be changed/improved.

8.3 New Working Group on Galactic Aberration (Dan MacMillan)

The proposed charter was distributed via email. Under the condition that the optical references be removed from the ToR and Guangli Wang be added as a member, the Board unanimously approved the creation of the WG on Galactic Aberration.

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

Harald reported that he met Markku Poutanen who stated that the probability for a VGOS antenna at Metsähovi is close to 100%.

10. Improving the Efficiency of the DB meetings (all)

In some past DB meetings the agenda was only half worked through by 4:30 pm. However, when the DB meeting was the last day of a series of meetings, working through the DB agenda was pretty much on the planned time schedule. To improve the efficiency a technical meeting (0.5–1 days long) should be organized prior to the actual Board meeting, when the DB meeting is not tagged on to a larger event (e.g., IVS GM, EVGA).

11. Marketing, outreach, public relations (all)

skipped

12. Safeguarding VLBI observing frequencies/CRAF (Hayo Hase)

skipped

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 IAG Executive Committee now has three IVS people. Axel was elected as Service Representative and Ludwig as At-Large member.

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

The IAG Services' Assessment started in 2014. The first round has been completed; the feedback was so-so. The IVS got a very good review. Each service had three reviewers to look at the questionnaire and the Web site. After the response from the services, a second round will be done (to see if changes have been made).

13.1.3 Nominations for election of service representative in Executive Committee (Axel Nothnagel)

Axel was elected as one of the three Services Representatives to the IAG Executive Committee. The other two are Riccardo Barzaghi and Ruth Neilan.

13.1.4 Newsletter contributions (Harald Schuh, Dirk Behrend)

A report about the IVS Retreat could be submitted to the IAG Newsletter.

13.1.5 GGOS (Harald Schuh)

The new and old GGOS Chair is Hansjörg Kutterer. There was a reorganization: the number of bureaus was reduced to two. Mike Pearlman chairs the Bureau for Networks and Observations, and Detlef Angermann chairs the Bureau of Products and Standards. The GGOS Science Panel used to be a panel with folks from other disciplines. Now each IAG Commission nominates two members of the Science Panel.

13.2 EVGA (Rüdiger Haas)

Activities since the last Board meeting include:

- EVGA Web page
  - Links to EVGA meetings and proceedings updated
  - New telescopes on the map
  - Links to IVS VLBI Web site
- Proceedings of the 22nd EVGA meeting

- Contributions collected
- Editorial work still ongoing
- Digital version expected for November
- Printed version early 2016

EVGA working meeting 2017

- A proposal by Chalmers/Onsala was received to host the EVGA 2017 in May 2017 in connection with the inauguration of the Onsala VGOS Twin Telescopes

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

The AOV created a logo and set up a Web site. The Web site is hosted at GSI in Japan and its address is: http://www.spacegeodesy.go.jp/vlbi/AOV

In 2015, six sessions were organized for the AOV with the scheduling shared between UTAS, GSI, and SHAO and the correlation being done at SHAO, GSI, or NGII.

An AOV meeting "A Vision for Science and Technology with the AOV", will be held in Hobart, November 19–20, 2015.

Other meetings in the region are:

- DiFX Meeting: Hobart, Tasmania, Australia, November 16–20, 2015
- IVTW: Auckland, New Zealand, November 23–26, 2015

Potential new members:

- National Astronomical Research Institute of Thailand (NARIT)
- Faculty of Earth Science and Technology, Institut Teknologi Bandung, Indonesia

13.4 IAU

13.4.1 IAU Division A (Patrick Charlot)

There were elections prior to the IAU General Assembly. The President of Division A (Fundamental Astronomy) is Anne Lemaître (Belgium) and the Vice-President is Daniel Hestroffer (France).

Division A has the following Participating Commissions:
A1 (Astrometry), President: Anthony Brown
A2 (Rotation of the Earth), President: Richard Gross
A3 (Fundamental Standards), President: Catherine Hohenkerk
A4 (Celestial Mechanics and Dynamical Astronomy), President: Cristian Beaugé

IAU General Assembly had two days of talks (Scientific Meeting) in the days between (Friday, Monday) the GA days. There was a business meeting for Division A. There are five Working Groups in Division A. Patrick was elected as the new chair of the ICRF3 Working Group. A separate meeting of the ICRF3 WG was held.

13.4.2 IERS (Rüdiger Haas, Chopo Ma)

There was not much activity. The IERS was waiting for the ITRF2014. The next DB meeting was to be held on the Sunday before the AGU in San Francisco. The Terms of Reference were updated to allow for substitutes; Brian Luzum will step down as co-leader of the IERS Conventions Centre by the end of the year.

13.4.3 ICRF3 (Patrick Charlot)

There were several presentations at the ICRF3 WG meeting in Honolulu. The plan for the next three years including the time frame to produce the next CRF were discussed. The charter needed updating (was not focused on observations).

13.5 EVN (Patrick Charlot)

Recording at 2 Gbps has become available at the EVN for a subset of telescopes (Onsala, Yebes, Effelsberg, QUASAR array); the other stations record at 1 Gbps. The correlation needs to be done in a mixed mode. There is a new class of e-VLBI observations ("e-VLBI trigger observations"), which are scheduled automatically when specific criteria are met replacing the normal operations (can be done within 10 minutes).

The Sardinia RT is available during the next session on a shared risk basis (RT under commissioning). Potential new partners: Kunming antenna, EISCAT antenna in Finland (32-m), Ventspils antenna in Latvia.

EVN Symposium: 19–20 September 2016 in St. Petersburg, Russia.

13.6 ICSU World Data System (Dirk Behrend)

The next WDS general assembly will be held in 2016. The dates and venue of the SciDataCon 2016 were still to be determined. Each year a WDS Data Stewardship Award is given out to early career scientists (40 years old or younger, less than ten years from PhD) for exceptional contributions to the improvement of scientific data stewardship.

14. Highlights of recent meetings

14.1 IUGG General Assembly

The IUGG XXVI General Assembly was held in June/July 2015 in Prague, Czech Republic. The assembly had the second highest participation in IUGG history with about 5300 participants. The next IUGG GA will be held in Montreal, Canada in 2019. The new president of the IUGG is Michael Sideris.

14.2 IAU General Assembly

(see above)

15. Upcoming Meetings

15.1 4th International VLBI Technology Workshop (all)

The workshop was to be held in Auckland, New Zealand.

15.2 IVS GM2016 Johannesburg (Ludwig Combrinck)

The Web site was set up. The venue was secured via deposit. Accommodation options included the resort at the lecture hall and another resort that is two kilometers away.

16. Summary of Action Items

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

17. Miscellaneous (all)

Axel reported that Per Erik Opseth triggered an email discussion with a few colleagues about possibly holding the GM2018 in Longyearbyen, Norway, together with the ILRS. The idea for the event originated from the plans of the inauguration of the Twin Telescope and an SLR system at Ny Ålesund.