

28th Directing Board Meeting – Summary Notes

Location: MIT Haystack Observatory, Westford, MA, USA
Date: 20 October 2012
Note taker: Dirk Behrend
Version history: 20 October 2012

Attending Board members: Harald Schuh (Chair), Dirk Behrend, Alessandra Bertarini, Patrick Charlot, Rüdiger Haas, Jesús Gómez González, Hayo Hase, Ed Himwich, Shinobu Kurihara, Chopo Ma, Axel Nothnagel, Fengchun Shu, Oleg Titov, Gino Tuccari, Alan Whitney.

Attending guests: Arthur Niell and Bill Petrachenko.

1. Welcome (Harald Schuh)

Harald Schuh welcomed the Board members and attending guests.

2. Approval of Agenda

The Board approved the agenda for the 28th DB meeting.

3. Approval of Minutes of the 27th DB Meeting (Harald Schuh)

The Board approved the notes of the 27th DB meeting.

4. IVS DB Chair's Report (Harald Schuh)

Harald gave several talks about VLBI and the IVS during his summer travel through Asia. On this trip he made stops in India, Thailand, Indonesia, Singapore, and China. He wrote several letters and a couple of reports about the IVS.

Harald participated in the activities of the VLBI2010 Project Executive Group (V2PEG) and was in contact with various groups which are interested in VLBI2010.

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

Activities since the last Board meeting were:

- Publication of the April and August Newsletters.

- Prepared and posted online version of the 2011 Annual Report.
- Maintained mailing lists and Web site.
- Support of GGOS and WDS activities.
- Observing program coordination.
- Support of VLBI2010 Committee (V2C).
- Support of VLBI2010 Project Executive Group (V2PEG).
- Worked on Proceedings volume of GM2012.

Correspondence:

- Letter to Pascale Ferrage (IDS) concerning the compatibility of DORIS and geodetic VLBI.
- Letter to the European Metrology Research Programme (EMRP) supporting the Joint Research Program (JRP) proposal to SRT-s09 “Metrology for Long Distance Surveying.”
- Letters to the Director General Douglas Bancroft of Natural Resources Canada regarding Bill Petrachenko becoming the IVS Technology Coordinator.
- Welcome letters to new components: SHAO (Correlator), Metsähovi (Network Station), and NGII (Sejong, South Korea; Network Station).
- Letter to SHAO with a station performance evaluation for Seshan.
- Letter to IAA about the contribution of the QUASAR stations to IVS.

Activities for the next several months include:

- Publication of December and April Newsletters.
- Publication of 2012 Annual Report.
- Publication of 2012 General Meeting Proceedings.
- Preparation of Directing Board elections.
- Coordination of 2013 Technical Operations Workshop.
- Support GGOS activities.
- Support WDS activities.
- Coordinate next Directing Board meeting.

The Board decided not to trademark the VGOS acronym.

6. Reports of the Coordinators and Committee Chairs

6.1 Observing Program Committee Chair’s report (Dirk Behrend)

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

- 2013 planning: The OPC approved the 2013 Master Schedule.
- Proposal for radio-to-optical link (ICRF2–GAIA link sources): The OPC approved a proposal from the Bordeaux group for observing and monitoring GAIA link sources.
- R&D sessions:

- 2012: All R&D sessions in 2012 were used to investigate ‘ γ ’ and the Sun corona. The sessions were scheduled with *sked* or *VIE_SCHED*. The latter helped improve the *VIE_SCHED* scheduling software.
- 2013: The R&D sessions for 2013 will test the broadband system in ‘mixed mode’ and mixed ‘mixed mode’.
- DSS13 and Simeiz: both stations did not yield useful VLBI data in the past two years or so. E. Himwich and R. Strand were working with DSS13 staff to remedy situation. Similar efforts might be needed at Simeiz.
- CONT14: The Continuous VLBI Campaign 2014 (CONT14) will be organized in the April/May 2014 time frame.
- Intensives:
 - Kokee replaced Tsukuba in Int2 sessions while Tsukuba was repaired.
 - Westford replaced Kokee in Int1 sessions while Kokee was down.
- OHIG: The OPC decided to keep the OHIG session name for the southern hemisphere TRF sessions, even if O’Higgins is not participating.

6.2 Publication about IYA Super Session (Patrick Charlot)

There were initial problems with imaging the data of the Very Large Astrometry Session observed for the International Year of Astronomy (IYA) as reported at the last Board meeting. These problems could be resolved and now there are data for almost all sources. The work on the publication was still ongoing.

6.3 Analysis Coordinator’s report (Axel Nothnagel)

For the combination solution, four Calc/Solve solutions, one Occam solution, and one QUASAR solution were used. Oleg was working on getting SINEX data input running in Occam. The NMA solution showed about double the WRMS w.r.t. the other solutions. At Vienna the polar motion representation in VieVS was different to other software packages. The combination process could accept the different format now. Axel was working closely with the IERS SINEX Working Group, which was chaired by Daniella Thaller.

6.4 Network Coordinator’s report (Ed Himwich)

Rich Strand was hired as right hand to Ed and did most of the monitoring of the station performance. The data yield for 2012 was based so far on results from 90 sessions and covered the year up to approximately the end of August. The overall yield by station was about 87%. This was comparable to previous years.

Several stations had issues that were being worked on. The issues included maser problems, receiver failures, BBC issues, RFI-related problems, gearbox issues, and general antenna issues. A number of issues could be resolved/repared in the report period.

6.5 Technology Coordinator's report (Alan Whitney)

Broadband system progress:

- GGAO–Westford testbed used for multiple broadband test experiments at 8 Gbps, plus some at 16 Gbps
- Considerable mechanical work to improve receiver mounting and focus adjustment
- Broadband phase-cal system exercised
- Paths through DiFX correlator to HOPS have been greased and capabilities significantly expanded
- Ionospheric estimation over multiple broadband channels allows ionosphere-free group delay estimate
- Development continues to be very active

VLBI Transport Protocol (VTP):

- Standardizes e-VLBI transmission protocol and accompanying metadata
- VTP proposal accepted November 2011 at South Africa e-VLBI workshop (some details still being worked out)

VEX2

- Lots of progress, but a few issues still to settle
- Enhanced capabilities of VEX2:
 - Generalized support for more complex systems
 - VDIF support
 - Ethernet connection support recording/e-VLBI
- Early November 2012 face-to-face meeting VEX2 task force planned

DiFX / Mark IV Progress

- In varying degrees of completion/support
- All Mark IV correlators expected to be shut down within ~1 year (last one will probably be USNO)

e-VLBI progress

- Fast connection to Fortaleza fixed
- Server installed at FIU to act as buffer between fast source sites and slow sink sites (USNO)
- Jason SooHoo working to support many simultaneous e-VLBI transfers at high speed (has demonstrated 5 stations at aggregate ~1.5 Gbps sustained for hours)

DBE testing

- DBE compatibility workshop being held following Haystack Technical Workshop next week
- 5 systems scheduled for test: Europe, Japan, China, Russia (but can't make it), U.S. (Haystack)
- Lab has been set up for zero-baseline testing
- Will use primarily (maybe exclusively) DiFX correlator

Thoughts about Validation of Correlators (Alessandra Bertarini)

Alessandra outlined avenues for comparing and validating new and/or existing correlators. This included a possible workplan and the manpower involved.

6.6 VLBI2010 Committee report (Bill Petrachenko, Arthur Niell)

Arthur reported on the advances in the Haystack–NASA VGOS systems at GGAO12M and Westford. A couple of geodetic sessions have been observed. In May 2012 a six-hour session with 30 scans/hour and 30-second scans was successfully observed yielding position uncertainties of approximately 2/3/9 mm (E/N/U). On October 4-5, 2012 two six-hour sessions (one with SLR radar active and the other with the SLR radar off) yielded fringes on both days. Post-correlation would be done once the DiFX correlator could correlate the sessions.

Other VGOS development included Haystack's plan of installing the signal chain at Kokee 20-m by next summer, the NASA Request for Information (RFI) for (up to 10) core sites, which was responded to by HTSI/Haystack for a combined VLBI/SLR/GPS/DORIS site as well as a separate Haystack response for the provision of the VLBI system, and the proposal for a 12-m antenna at Kazan, Russia.

The signal chain development included the RDBE-Q (input four 512-MHz Ifs, output 2 x 2 Gbps or 2 x 4 Gbps, output in VDIF with complex samples, and tested with test vector generator and test tone inputs), Mark 6 (currently 8 Gbps to one module, anticipate first observations in December), and RDBE-X (design begun, ROACH2 based, four 1-GHz Ifs, 16 Gbps).

Bill reported about the organizational side of the V2C. The broadband system development and tests were spearheaded by Arthur Niell, Chris Beaudoin, and Gino Tuccari. The RFI survey results were analyzed by Bill Petrachenko, Chris Beaudoin, and Brian Corey; they were also involved in the development of barriers for the GGOS prototype site. Source structure was being investigated by Richard Porcas and Arnaud Collioud: seven core-shift sources were observed in September. John Gipson was working on the full automation from scheduling to final products: Sked→VEX→Correlator, DBCAL (met, cable cal). VEX2 was under development with new features to support broadband observations. Optimum schedules were being looked into by Jing Sun and John Gipson, while Dan MacMillan led the antenna deformations and site ties investigation.

A V2C Wiki was established:

- Organized by Brian Corey using MIT Web site
- Wiki at: <https://wikis.mit.edu/confluence/display/V2C/home>
- To contribute to the Wiki:
 - Create Touchstone Collaborative Account
 - Login to <http://wikis.mit.edu>
 - Inform Brian of email address used for login
- Wiki is still a shell (content to be added shortly)

VLBI2010 TecSpec Post-workshop Tasks:

- V2PEG RFI survey (replies from Japan, Korea, Argentina, Finland, Russia, and Spain; most require additional information for full interpretation; can be used to evaluate saturation of receiver chain but not sensitive enough for noise degradation)
- Feed comparison table (four feeds compared: Eleven, QRFH, S/X/Ka Callisto, S/X/Ka RAEGE; still require efficiency numbers for the Eleven and QRFH; data sheets not yet provided by any)
- DBE comparison table (DBBC and RDBE complete; missing data for CDAS, ADS3000, Russian DBE; will pursue missing data at the DBE intercomparison)

The Board approved Jinling Li (SHAO) as new V2C Member.

6.7 VLBI2010 Project Executive Group Chair's report (Hayo Hase)

The V2PEG had several telecons and a face-to-face meeting since the last Board meeting. There was an extensive e-mail discussion with Fukuzaki-san from GSI. An article was published in the IAG Newsletter about the launch of VGOS. Hayo and Arthur went to the 50th anniversary event of Shanghai Observatory and gave invited talks about VLBI2010.

The VLBI2010 Workshop on Technical Specifications (TecSpec) resulted in a few action items that the V2PEG had been working on (as already mentioned by Bill). It was planned to distribute the DBE comparison table and the feed comparison table by the end of October 2012. Bill deserved credit for doing most of the work in compiling these tables.

Proof-of-concept work is done on the baseline GGAO–Westford. Open issues include the demonstration of the full data flow from taking broadband observations, to correlating the broadband data, to performing the broadband analysis including phase connection.

Another open issue is the impact of radio frequency interference (RFI). There is an increasing commercial use of the bandwidth of 2–14 GHz. An RFI survey of the VLBI2010 sites has been initiated and incoming information is analyzed by Chris Beaudoin, Brian Corey, and Bill Petrachenko. Mitigation efforts have become part of the proof-of-concept work. Broadband feeds will become available at Westford, GGAO, Wettzell, and Ishioka. Triband feeds will be available at Wettzell, Yebes, Ishioka, and possibly Shanghai.

6.8 Short Reports on Status and Progress of VLBI2010 Projects

Jesús showed various photos about the progress made within the RAEGE project. The photos covered the construction sites at Yebes and on Santa María (Azores) as well as the manufacturing site in Asturias (Northern Spain).

Rüdiger reported on the status of the Onsala Tvilling Teleskop (OTT) project. The current timeline foresees the installation of the telescopes in 2014, first test observations in 2015, and regular operations in 2016. There were two possible scenarios for the placement of the OTT: one option put OTT closer to the 20-m telescope, the other option put it close to the 25-m telescope.

Kurihara-san reported that the VLBI2010 project at Ishioka had started. In July, three companies were contracted. The system development was ongoing. The initial time plan was to complete the construction of the antenna in March 2013; this date was postponed to March 2014.

Chopo shortly reported about the NASA status. The Space Geodesy Group was putting together a project plan. The implementation would depend on the future budget. The location of VLBI2010 sites could be on U.S. territory but also on other continents depending on host options.

Fengchun reported that SHAO prepared a proposal for four stations, but the proposal was not approved. A partner organization in Xi'an (NISM, the Chinese 'BKG' or 'GSI') had a proposal with six stations.

6.9 RFI at IVS Stations (DORIS and SLR Radar Interference) (Arthur Niell, Bill Petrachenko)

At GGAO the employment of a filter down to the 2 GHz edge was planned. The RFI survey was under way, spearheaded by the V2PEG. For the intra-technique RFI, side-lobe measurements were taken; absorber panels were being built and tested at GGAO under the leadership of Larry Hilliard (GSFC) and Chris Beaudoin (MIT Haystack Observatory).

7. Reports of the IVS Working Groups

7.1 IVS WG4 on VLBI Data Structures, Chair's report (John Gipson)

[Written report submitted and distributed to the Board.]

7.2 IVS WG5 on Space Science Applications, Chair's report (Axel Nothnagel, Patrick Charlot)

Axel had volunteered to prepare a draft of the report. He got input from Hayo, Harald, and Lucia Plank. The report was well advanced and was to be distributed among the WG5 members. The next step would be the distribution of the draft to the Board. The plan was to get the report approved at the next DB meeting.

7.3 IVS WG6 on VLBI Education and Training, Chair's report (Rüdiger Haas)

The Working Group 6 (WG6) Web page was moved to the EVGA Web site at the URL http://www.evga.org/ivs_wg6.html. There was some existing teaching material available on the Web page (from Chalmers, TU Vienna, and Chris Jacobs). The list with contacts at educational institutions was extended.

An EGU and IVS Training School for the Next Generation Geodetic and Astrometric VLBI was planned for March 2–5, 2013 at Aalto University, Helsinki, Finland. The school would directly take place prior to the EVGA meeting at the same location and would be supported by the EGU, RadioNet3, Aalto University, and the IVS. Announcements were posted at various locations: IVS, EVGA, EGU, and RadioNet.

8. Report of Task Force on IVS Intensives (Rüdiger Haas)

Activities since the last Board meeting were:

- UR.dUT1 (ultra-rapid dUT1)
 - Several sessions during 24-h experiments of the IVS series R1, RD, and T2 using the baseline Onsala-Tsukuba
 - EOPI files
- UR.EOP (ultra-rapid EOP)
 - Several Sessions during 24-h experiments of the IVS series R1, RD, and T2 using a network consisting of Onsala, Tsukuba, Hobart and HartRAO
- A dedicated four-station UR.EOP experiment was planned for December 17/18, 2012

Other work related to Intensives:

- Automated dUT1 analysis with VieVS
- Automated multi-baseline ambiguity resolution
- Uniform sky strategy
- Influence of source constellation
- Ray-tracing for Intensive analysis
- Simulation of Intensives with twin telescopes

Harald suggested the publication of a peer-reviewed paper (e.g., a four-pager in GRL).

9. Items related to IAG, IAU, WDS, and Related VLBI Groups

9.1 IAG

9.1.1 GGOS (Harald Schuh, Dirk Behrend)

Axel and Dirk are members of the GGOS Consortium. The Coordinating Board, consisting of 16 people, meets twice a year. There are three themes: Theme 1: Unified Height System; Theme 2: Natural Hazards; Theme 3: Understanding and Forecasting Sea-level Rise and Variability. A GGOS Retreat was held in Frankfurt in June. The IVS products are also GGOS products.

9.1.2 IAG Newsletter Contributions (Dirk Behrend)

In the IAG Newsletter an article about the “Launch of VGOS” was published. In the journal ‘GIM International’ a one-pager was published about VLBI, IVS, and VGOS.

9.1.3 IAG Commission 1 and Sub-Commission 1.4 (Chopo Ma, Harald Schuh)

There was nothing to report since the last DB meeting.

9.2 EVGA (Axel Nothnagel)

The next EVGA meeting would be held in Helsinki, Finland on March 6-7, 2013. The IVS Directing Board meeting would take place on March 8, 2013. The EVGA meeting would have a fairly tight schedule; also an IVS Analysis Workshop was planned.

Axel announced that he would step down as the EVGA Chair in Helsinki. For that reason, an EVGA business meeting was planned as well.

The EVGA Web site has now the Proceedings of all EVGA Working Meetings at the URL <http://www.evga.org/meetings.html>.

9.3 IAU (Patrick Charlot)

The 28th IAU General Assembly 2012 was held in Beijing, China from 20–31 August 2012. Several resolutions passed:

- Resolution B1: on guidelines for the designations and specifications of optical infrared astronomical photometric passbands
- Resolution B2: on the re-definition of the astronomical unit of length:
1 au = 149 597 870 700 m (SI unit)

- Resolution B3: on the establishment of an International NEO early warning system
- Resolution B4: on the restructuring of the IAU divisions

The new IAU divisions were:

- Division A: Space and Time Reference Systems
- Division B: Facilities, Technologies, and Data Science
- Division C: Education, Outreach, and Heritage
- Division D: High Energies and Fundamental Physics
- Division E: Sun and Heliosphere
- Division F: Planetary Systems and Bioastronomy
- Division G: Stars and Stellar Physics
- Division H: Interstellar Matter and Local Universe
- Division J: Galaxies and Cosmology

A restructuring of the Commissions and Working Groups was upcoming.

ICRS and ICRF:

- Proposal by Division A to create two working groups
 - WG on ICRS: to investigate the need for possible improved and standardized theoretical and numerical models for the definition of the Celestial Reference System in multiple wavelength regimes
 - WG on ICRF: to produce a detailed implementation and execution plan for the formulation of the third realization of the ICRF and to begin the process of executing that plan.
- 1st organizational meeting of WG on ICRF in Beijing: Arias, Charlot, Gaume, Jacobs, Ma, Malkin, Titov
- 2nd organizational meeting of WG on ICRF in Bordeaux (12 October 2012): Arias, Bourda, Charlot, Gaume, Jacobs, Lambert, Ma (telecon)
 - WG charter and membership finalized
 - WG chair selected: Chris Jacobs

9.4 EVN (Patrick Charlot)

The 11th EVN Symposium was larger than previous symposia with 130 participants, 72 talks, 45 posters, 11 scientific sessions, and 1 EVN users meeting. The scientific sessions were Nearby galaxies and low-luminosity AGN, AGN surveys, VLBI and high-energy properties of AGN, Astrometry and planetary science, Star formation, Structure of the Milky Way, Late stages of stellar evolution, Pulsars and interstellar scattering, VLBI at extremely-high angular resolution, AGN jets, and Current & future facilities and international cooperation

Proposal trend:

- Totals nearly doubled in 6 years – dominated by increases in proposed EVN time – e-VLBI stabilized at ~20% of total
- Oversubscription rate: ~2.2
- Significant number of proposals new request the QUASAR network

- Scheduling constrained by disk availability (highly-rated proposals usually ask for 1 Gbps)

The JIVE review in March 2012 resulted in excellent ratings. The reviewers gave a score of 24/25. They were impressed with the breadth of science and stated that the work could not be done more effectively with JIVE constituting an essential part of EVN. The reviewers fully endorsed the technical development program. South Africa became a member of JIVE.

9.5 ICSU World Data System (Dirk Behrend)

The WDS-IPO Director position was filled at the beginning of 2012 with Mustapha Mokrane.

10. Next IVS DB Elections (Dirk Behrend, Election Committee)

The original Election Committee was named with Alan (chair), Kurihara-san, and Dirk at the previous Board meeting. As Kurihara-san would be a candidate at the elections, the Board approved that Oleg would replace Kurihara-san on the Election Committee.

The representative positions up for elections were: one Network Station representative, two Analysis and Data Center representatives, and one Technology Development Center representative. The Directing Board would have 16 members after the election because the second Analysis and Data Center representative was to be elected according to the updated Terms of Reference.

The Board approved the suggested timeline for running the representative and At-Large elections in fall/winter 2012/2013.

11. New Coordinators (Technology Coordinator, Analysis Coordinator)

New proposal:

- Technology Coordinator proposal from NRCan (Bill Petrachenko):

Natural Resources Canada (NRCan) submitted a proposal for Bill to become the successor to Alan Whitney as IVS Technology Coordinator. NRCan would support Bill's coordinator position for three years until his retirement. The Board unanimously approved the proposal. Bill would officially start his tenure with the Helsinki meeting.

Axel announced that he would resign as Analysis Coordinator effective February 28, 2013. The Coordinating Center should inform the community and seek proposals for a new Analysis Coordinator.

12. Recent Meetings

Covered in previous TOPs.

13. Upcoming Meetings

13.1 First VLBI Technology Workshop (Alan Whitney)

75 people signed up for the meeting. Of these, five were unable to come, mostly due to visa issues (China, Russia).

13.2 21st EVGA Meeting (Axel Nothnagel)

see TOP 9.2

13.3 Next DB Meeting (Harald Schuh)

The next Board meeting will be held in conjunction with the EVGA meeting in Helsinki on Friday, March 8, 2013.

14. Miscellaneous (all)

Harald mentioned that he would start his new position at GeoForschungsZentrum (GFZ) Potsdam on November 1, 2012.