

26th Directing Board Meeting – Summary Notes

Location: Gasthof Postl, Hohe Wand, Austria
Date: 23 September 2011
Note taker: Dirk Behrend
Version history: 23 September 2011

Attending Board members: Harald Schuh (Chair), Dirk Behrend, Alessandra Bertarini, Patrick Charlot, Rüdiger Haas, Jesús Gómez González, Hayo Hase, Shinobu Kurihara, Chopo Ma, Axel Nothnagel, Fengchun Shu, Oleg Titov, Gino Tuccari, and Alan Whitney. Ed Himwich attended via Skype for TOP 6.4.

Attending guests: Arthur Niell in person (TOPs 6.6+6.9) and John Gipson via Skype (TOP 7.1).

1. Welcome (Harald Schuh)

Harald Schuh welcomed the Board members. Andrey Finkelstein passed away the previous weekend. The Board observed a minute of silence.

2. Approval of Agenda

The Board approved the agenda for the 26th DB meeting.

3. Approval of Minutes of the 25th DB Meeting (Harald Schuh)

The Board approved the notes of the 25th DB meeting.

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

Harald represented the IVS at the IUGG General Assembly in Melbourne, Australia. He gave a 'Highlight Report' about the IVS at the Opening Session.

The IUGG adopted the ICRF2 in its Resolution 3 'Second Realization of the International Celestial Reference Frame' (<http://www.iugg.org/resolutions/> >> *Melbourne 2011*).

Harald represented the IVS at the '40th Anniversary of the Effelsberg Radio Telescope' event on 19 May 2011. He wrote several letters on behalf of the IVS, among them letters to Pierre Kaufman (Brazil), to Bakosurtanal (Indonesia), and to GSI (Japan).

Harald gave several presentations about VLBI and IVS in Indonesia, Taiwan, Japan, and Switzerland.

CGS Proposal for Operational IVS Analysis Center (Harald Schuh, Dirk Behrend)

The Matera group at Centro di Geodesia Spaziale (CGS) applied to upgrade from an Associate Analysis Center to an Operational Analysis Center. The Board unanimously approved the proposal.

4.1 Approval of New Terms of Reference

The Board unanimously (all 14 members present) approved the new ToR fulfilling the requirement of a 2/3 votum for a change to the ToR.

4.2 New chair

The Board members agreed on a letter of concern to be sent to the IAG requesting to evaluate the situation and possibly allow Harald to continue to be IVS Chair.

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

Activities since the last Board meeting were:

- Publication of the April and August Newsletters.
- Publication of the 2010 Annual Report.
- Support of GGOS and WDS activities.
- Coordination of TOW2011.
- Preparation of CONT11.
- Preparation of the 2012 General Meeting.

The CC coordinated the sixth IVS Technical Operations Workshop (TOW2011) that was held at Haystack Observatory from 8–11 May 2011. The CC was responsible for coordinating the Program Committee activities, preparing the teaching schedule, and maintaining the meeting Web site including registration, class selections, and class assignments.

The CC coordinated the planning for the 7th IVS General Meeting (GM2012) to be held in Madrid from 4–9 March 2012. The CC was responsible for chairing the Program Committee and coordinating the logistics with the local committee.

The Coordinating Center (CC) did the overall planning and coordination of the CONT11 campaign. The CC prepared the media usage and shipment schedule as well as the detailed observing schedules and notes.

Activities for the next several months include:

- Publication of December and April Newsletters.
- Publication of 2011 Annual Report.
- Publication of the 2012 General Meeting Proceedings.
- Support GGOS activities.
- Support WDS activities.
- Coordinate the next Directing Board meeting.

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:

- Domestic Russian sessions: Andrey Finkelstein (IAA) decided to leave the observing day of the Russian Ru-E sessions on Saturdays. The QUASAR stations dropped out of the IVS-R1 sessions commencing June 1. The domestic Russian data will be made available through the IVS data centers.
- AuScope reduced observing: The funding for the operations of the AuScope network (Hobart, Katherine, Yarragadee) was significantly reduced w.r.t. the anticipated amount. The OPC decided that most observation time should be used for the IVS-R1 and IVS-R4 sessions. This is followed by the CRDS, IVS-T2, and the AUSTRAL sessions. Katherine and Yarragadee dropped out of the CONT11 network, but Hobart 12-m remained.
- CONT11: Warkworth was taken out of the list of CONT11 stations due to technical issues becoming apparent in a dedicated fringe test. These issues could not be resolved prior to observing CONT11. The OPC suggested requesting the participating stations to use the same H-maser for their VLBI and GPS instruments.
- Int2 and Int3 following Japan earthquake: Pairs of Int2 sessions have been observed on Saturdays and Sundays. One session used the baseline Wettzell–Kokee for operational dUT1 determination, the other sessions used the baseline Wettzell–Tsukuba for diagnostic purposes. The Int3 sessions were extended with Sheshan for a number of sessions in the weeks/months following the earthquake.
- Kunming: The OPC agreed on Kunming participating in IVS sessions; as a narrow band station Kunming can only participate in APSG or T2 sessions.
- Kashima and Koganei observing: Kashima-34m will be unavailable until probably April 2012. Kashima-11m and Koganei-11m were added to most of the APSG and T2 sessions of 2011.

- VLBA Intensives: The OPC agreed on the inclusion of the VLBA Intensives into the IVS observing plan.
- 2012 planning: The OPC approved the planned station usage for 2012. The planning could continue with individual networks for the various session types.
- GRASP: The OPC was ambivalent about the GRASP (Geodetic Reference Antenna in Space) mission. There were concerns pertaining to a possible RFI source from space and whether all stations can support this mission as part of their own mission (it may be an unfunded mandate).

6.2 Publication about IYA Super Session (Patrick Charlot)

On the source imaging side progress was made through contact with Haystack and receiving imaging data that could be imported into AIPS. The next step would be to produce images. A very first draft of the publication may be available by the end of 2011.

6.3 Analysis Coordinator's report (Axel Nothnagel)

Four ACs worked pretty reliable and were used for the combination; this gave rise to a clear domination of the combination by Calc/Solve. For the homogenization of analysis procedures, a new analysis description was developed.

USNO was not updating their models to new ones. The contribution of the Norwegian Mapping Authority (NMA) was quite promising, since completely new software (*Geosat*) would be used.

Harald thanked Axel for being the lead editor of the Special Issue of CONT08 in the Journal of Geodesy.

6.4 Network Coordinator's report (Ed Himwich)

Resolved Station Issues:

- AuScope and Warkworth: improved clock behavior
- Fortaleza: antenna repaired, operating again
- Kokee: azimuth gearbox replaced, second gearbox on its way
- Matera: receiver is cold again
- Ny Ålesund: sensitivity issue resolved, power supply problem
- Parkes: wide X-band now available
- Simeiz: 50 Hz receiver modulation solved

Current Station Issues:

- TIGO: sensitivity issues, cause(s) unknown
- Simeiz: unknown problems, perhaps maser

- AuScope and Workworth: DBBC issues still unresolved
- RFI: Fortaleza, Matera
- Ny Ålesund: receiver monitoring down
- Medicina: warm receiver
- Metsähovi: 2.5 bad BBCs
- Kashima-34m not operating
- Noto: antenna rail problem, returning in 2012
- Shanghai, Urumqi: limited availability due to Chang'E operations

Mark 5B Upgrades:

- Ny Ålesund repaired
- TIGO upgraded, Bank A problem
- HartRAO done
- Wettzell should occur after CONT11

6.5 Technology Coordinator's report (Alan Whitney)

VDIF Data Format

- VDIF data format is being implemented in many new VLBI systems
 - RDBE (Haystack); 2 different variations
 - Fila10G (Metsahovi/MPI/INAF)
 - LBA (Chris Phillips)
- Basic VDIF support implemented for DiFX correlator
 - support for additional VDIF modes planned

VTP (VLBI Transport Protocol)

- VTP group has not been very active due to workload of chair (Chris Phillips, ATNF)
- push to have initial draft by November 2011, in time for discussion at e-VLBI workshop in South Africa

VEX2 Task Force:

- VEX2 Task Force working to update VEX to support new devices and operational modes
- Plans to present draft VEX2 document at e-VLBI workshop in South Africa

Mark 6 system (under development)

- collaboration with NASA/GSFC HPCC (hardware evaluation) and Conduant (disk-module specific hardware)
- Input: four 10GigE data interfaces (16 Gbps max total sustained)
- Output: 32 disks
- ~32 Gbps burst mode capture (not yet fully tested)
- fully COTS hardware except for disk modules
- fully open-source software
- 'resilient' file system to protect against slow/failed disks
- existing Mark 5 systems can be upgraded to Mark 6

- existing Mark 5 SATA modules may be upgraded to Mark 6 compatibility
- target VLBI programs: VLBI2010 and mm-VLBI
- target date for readiness ~Jan 2012

DiFX Progress:

- Input formats supported: Mark IV, VLBA, Mark 5B, Mark 5B+, LBADR, VDIF
- Output formats supported: Mark IV correlator, FITS-IDI, RPFITS
- full phase-cal processing for all in-band tones now supported
- full HOPPS support in progress
- next semi-annual international DiFX meeting in November 2011 at Haystack
- very active and dedicated development community
- Mark IV correlators are being superseded by DiFX

6.6 VLBI2010 Committee report (Arthur Niell)

Feed and LNAs:

- both cooled to ~20K
- Eleven feed: 2–12 GHz, dual linear polarization, frequency independent phase center and beam shape; cooling to cryogenic temperatures created problems
- Quadridge feedhorn (QRFH): 2–14 GHz, designed for Patriot 12-m antenna, overcomes limitations of commercial quadridge designs, Haystack working to confirm QRFH performance expectations on GGAO12M
- S/X/Ka feeds

Proof-of-concept (VLBI2010) project status:

- 12-m Patriot antenna at GGAO erected (GGAO12M)
- QRFH/LNA installed: efficiency ~60%, SEFD < 3000 Jy at zenith
- contract call for bids out to harvest trees around GGAO12M
- initial elevation pointing slippage, then binding: high pressure lubrication eliminated binding, pin installed as done by AuScope
- improvement needed in optical fiber link: wider bandwidth being tested, need for equalizer to mitigate against S-band RFI
- signal chain: ORCA box (fiber link receivers amplifiers, splitters), four UpDown converters (usable as is for 2–13 GHz), four RDBE digital back ends, four Mark 5C recorders
- phase and noise calibration: functional and in use, test for temperature stability
- MCI (Monitor and Control Infrastructure): five nodes planned (front end, control room, etc.), sensor points and control items identified and laid out, sensor design for first node in progress
- Post-correlation software: phase cal treated as delay to align bands, can coherently fit multiple bands, add ionosphere estimation across all bands, add dual polarization fitting
- Next steps: check pointing fixes, check performance below 3 GHz, holography to verify that antenna geometry is optimized, evaluate proposed mitigation of optical fiber

limitation, install and use RDBEs and Mark 5Cs, begin observations to evaluate broadband performance

- Under development: RDBE-Q (four IFs per RDBE instead of two, only two units are required for 8 Gbps), Mark 6 recorder (8 Gbps to one module, only one recorder needed for 8 Gbps, up to 16 Gbps on four modules, commercially available beginning of 2012)

A VLBI2010 Workshop on Technical Specifications is being organized to take place in Wettzell, Germany directly before the General Meeting in Madrid, Spain.

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

The V2PEG met in monthly telecons and wrote several letters of support (e.g., for Kazan and Tahiti). The group discussed in depth the organization of the VLBI2010 Workshop on Technical Specifications (TecSpec) including the preparation of the draft program. As of October 2011, almost 30 new antennas are operational, under construction, funded, proposed, or planned.

6.8 Short Reports on Status and Progress of VLBI2010 Projects

Rüdiger reported that Onsala had submitted a proposal to the Wallenberg Foundation for a Twin-telescope system on 1 September 2011.

Oleg reported that the situation at Kazan was changing rapidly. The documents for tender were under preparation with a 1 October 2011 deadline.

Shinobu-san gave an account of the VLBI2010 activities at GSI. A proposal for a new antenna was submitted. The site for the new antenna was not determined yet. There were two siting options: on the GSI campus itself or on a hill about 10 km away from the campus. A decision was due by the end of October 2011. The construction schedule will be very tight; construction shall be accomplished by 2014.

Patrick thanked the V2PEG for the letter of support and the provision of information. The Tahiti proposal was a joint effort between the Laboratoire d'Astrophysique de Bordeaux and the Observatoire de Côte d'Azur. In the end, the decision was made to not submit the proposal. Patrick was hopeful that the proposal can be submitted at a later stage.

Jesús reported on the status of RAEGE. Construction work at Yebes had started. In January/February 2012 the antenna structure would be established in Northern Spain and then transported to the actual site. The Azores were scheduled to get the second antenna. Land has been bought on Santa Maria (African tectonic plate). Design work for a tri-band feed was ongoing; work commenced on building a tri-band receiver. On the Canary Islands the RFI situation was being investigated.

Gino said that for Noto a proposal was submitted in July 2011. This proposal was part of a larger proposal with LOFAR stations.

Chopo mentioned that at NASA the framework has changed for support of VLBI2010. About two months before the Board meeting, a project was approved for developing the next generation integrated station (Next Generation Space Geodesy Project, SGP).

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

The RFI investigation was done by Chris Beaudoin, Brian Corey, and Bill Petrachenko. The SLR radar radiation pattern was verified with a field probe at GGAO (more details in Haystack BBDev memo #37, http://www.haystack.mit.edu/geo/vlbi_td/BBDev/037.pdf). A hardware bench test of the receiver saturation was done to validate the AGU2010 receiver saturation model. DORIS measurements of a stationary beacon have been collected at GGAO.

Work in progress was the validation of the 12-m sidelobe envelope with field measurements. Also in progress was the computational electromagnetic evaluation of the DORIS barrier performance. Then field testing of the efficacy of the DORIS barrier could be done.

7. Reports of the IVS Working Groups

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

A draft proposal for the new data structure was circulated in 2009; the final proposal will be ready by the end of summer (August 2011). The Mark III databases need to be converted into the new format. The software interface will use OpenDB format (Steelbreeze; VieVS, Occam, C5++). There is a Calc/Solve problem, because the starting point of most IVS analysis systems is a Version 4 Mark III database. The replacement of the superfiles by OpenDB format began in fall 2010; many of the `lcodes` are read in the new format. It is expected to be complete in early 2012. Interactive `solve` will be replaced by `nuSolve`. The switch-over to using the new format is scheduled for 31 March 2012. There may still be a need to keep the Mark III databases for internal use by Calc/Solve in order to go from correlator output to Version 3 databases.

7.2 IVS WG5 on Space Science Applications, Chair's report (Leonid Gurvits)

Patrick said that there was no activity in the last six months.

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

WG6 has a Web page at the IVS site (<http://ivscg.gsfc.nasa.gov/about/wg/wg6/>). An e-mail exploder list has been set up (ivs-wg6@ivscg.gsfc.nasa.gov). The Web page still needed to be updated.

An application to NordForsk for financial support to organize a VLBI summer school was not selected for funding. Further ideas and plans include the collection of teaching material on Wiki pages eventually forming a handbook about VLBI and to establish a list of education contacts for geodesy in order to be able to disseminate relevant teaching material. Such a list of contacts could be based on personnel at universities and other educational centers.

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

USNO studied the impact of the rapid Intensive Int2 sessions (GSI weekend Intensives) on the EOP predictions: there was an improvement of 30% for 1 day dUT1 error when including the rapids; with and without GSI Intensives the RMS was 42.5 μs and 47.9 μs , respectively. Several 24-hour Onsala–Tsukuba ultra-rapids were performed during IVS-R1, IVS-RD, and IVS-T2 sessions. Ultra-rapid determination was performed during CONT11.

Future activities include:

- continue discussion with the IERS Rapid Service on the use of the ultra-rapids,
- continue work on three-tiered Intensive products (i.e., ultra-rapid, rapid, final,)
- continue work on unified analysis strategy,
- develop combination approach,
- continue ultra-rapid dUT1 sessions,
- develop new analysis approaches (e.g., Kalman filter).

Harald requested to also look into options with a completely new setup of the Intensive sessions. For instance, can the distribution of the sessions be improved?

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

9.1 IAG

9.1.1 IUGG General Assembly (Harald Schuh)

There was a good number of participants considering the relative remoteness of the venue (Melbourne, Australia). The meeting was well organized. The geodesy keynote lecture was presented by Markus Rothacher.

9.1.2 GGOS (Harald Schuh)

GGOS has new Terms of Reference and a completely new internal structure. A GGOS Consortium was created with about 45 members; out of the Consortium the members of the

GGOS Coordination Board will be elected. Dirk will send the nomination of Harald and Dirk as candidates for the Coordination Board. The first Consortium meeting will be held in San Francisco in December.

9.1.3 IAG Newsletter Contributions (Dirk Behrend)

No contribution was sent to the IAG Newsletter since the last Board meeting. Possible future contributions include the CONT11 campaign and the ultra-rapid Intensives.

9.1.4 IAG Commission 1 (Chopo Ma, Harald Schuh)

Tonie van Dam (University of Luxembourg) is the new President of Commission 1. Johannes Böhm (TU Vienna) is the chair of Subcommission 1.4 on the relation between ITRF and ICRF.

9.2 EVGA (Axel Nothnagel)

The EVGA meeting was held in Bonn in spring and the proceedings are ready and are being sent out. The next EVGA meeting will likely be held in Helsinki.

9.3 IAU (Patrick Charlot)

The IAU General Assembly 2012 will be held 20–31 August 2012 in Beijing, China. The deadline for early registration, abstract submission, and grant applications is 29 February 2012; the end of regular registration is 10 August 2012.

At the Journées 2011 there was a discussion on future IAU recommendations and organization. This included the definition of the astronomical unit, which was last defined by IAU in 1976. A draft IAU 2012 Resolution re-defines the astronomical unit with the Gaussian gravitational constant removed.

An extension of the Universal Time family with a name for UT1 corrected for zonal tides did not receive widespread acceptance. There is the possibility of confusion especially among the non-experts with regards to the models used and whether tidal effects are included or not.

A possible working group on ICRS is under discussion. It could be tasked with modeling the systematic effects in the definition and realization of the future ICRS (e.g., aberration, lensing). A recommendation shall be made at the 2015 General Assembly. IVS and GAIA would be organizations to recruit potential WG members from. Another working group could be established about ensemble pulsar time. Lastly, the question was raised if the Journées should be a meeting of IAU Division I.

9.4 EVN (Patrick Charlot)

An ERIS school was held in Rimini, Italy from 5–10 September 2011. The school had about 80 participants.

The EVN Consortium Board of Directors met on 14 October 2011 in Bologna.

There will be a RadioNet Board meeting in Capetown, South Africa on 11–12 November 2011 and an e-VLBI meeting in Broederstroom, South Africa from 13–16 November 2011.

For the Target of Opportunity observations the proprietary period was reduced from one year to six months in order to ensure that results be published in a timely fashion.

9.5 ICSU World Data System (Dirk Behrend)

The World Data System (WDS) is an interdisciplinary body of ICSU (International Council for Science) and was created through a decision of 29th General Assembly of ICSU. It builds on a 50-year legacy of WDCs (World Data Centers) and FAGS. The WDS concept aims at a transition from existing stand-alone WDCs and individual Services to a common globally interoperable distributed data system, that incorporates emerging technologies and new scientific data activities. WDS will strive to become a worldwide ‘community of excellence’ for scientific data. Web site: <http://icsu-wds.org>.

NICT hosts the IPO (International Programme Office); the director position was to be filled by the end of 2011. IVS was accepted as a member pending the signing of an agreement with ICSU WDS formally obligating the IVS. The 1st ICSU WDS Conference “Global Data for Global Science” was held in Kyoto, Japan from 3–6 September 2011.

10. Meetings

10.1 Recent Meetings (AOGS 2011, Journées 2011, URSI 2011) (all)

see TOPs 4, 9.1 and 9.3. A VieVS user workshop was held in Vienna with about 25 participants.

10.2 GM2012 Status (Jesús Gómez González, Dirk Behrend)

Francisco Colomer leads the local organization. The Second Announcement was planned for 5 October 2011. A draft session layout consisted of four sessions. A fifth session about the large earthquakes in Chile and Japan was added.

10.3 VLBI2010 Specifications Workshop, Wettzell (Hayo Hase)

see TOPs 6.6 and 6.7

10.4 Other Upcoming Meetings (Future of UTC, e-VLBI Meeting) (all)

Chopo mentioned that currently the movement is to remove the leap second. The meeting about the “Future of UTC” was in favor of keeping the leap second.

10.5 Next DB Meeting (Harald Schuh)

The next Board meeting will be held in Madrid on Friday, March 9, 2012.

11. Miscellaneous (all)

Hayo reported on recent CRAF activities. Documents have been prepared about the impact of eolic generators on radio astronomy and about the scaling of the interference limits given in ITU-R RA.769.