

# 27th Directing Board Meeting – Summary Notes

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*Location:* Royal Observatory of Madrid, Spain  
*Date:* 9 March 2012  
*Note taker:* Dirk Behrend  
*Version history:* 9 March 2012, 16 August 2012, 29 October 2012

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, Gino Tuccari, Alan Whitney.

Absent: Oleg Titov, Ed Himwich

Attending guests: Arthur Niell and Bill Petrachenko (TOPs 7.6+7.9), John Gipson (TOP 8.1).

## 1. Welcome (Harald Schuh)

Harald Schuh welcomed the Board members.

## 2. Approval of Agenda

The Board approved the agenda for the 27th DB meeting.

## 3. Approval of Minutes of the 26th DB Meeting (Harald Schuh)

The Board approved the notes of the 26th DB meeting.

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

Axel Nothnagel was nominated as second IVS representative to the GGOS Consortium

Harald and Dirk represented the IVS at the meeting for the 20th Anniversary of GARS O'Higgins held in Punta Arenas, Chile in November 2011.

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

The IAG Executive Committee approved the new IVS Terms of Reference at its meeting in San Francisco, CA in December 2011.

Harald and Dirk wrote an invited overview paper about the VLBI technique titled ‘VLBI: A Fascinating Technique for Geodesy and Astrometry’ for Journal of Geodynamics. Harald wrote the Chair’s Report for the IVS Annual Report 2011.

### **New component proposals:**

- SHAO Correlator proposal:

The Board unanimously accepted the proposal. The Board agreed that an inter-comparison with other correlators would be important, for instance, to detect possible issues (also of existing correlators) and suggested that formal guidelines be set up for correlators for going through a (re)validation process.

- Metsähovi Network Station proposal:

The Board unanimously accepted the proposal.

- NGII Sejong Network Station proposal:

The Board unanimously approved the proposal.

## **5. IVS CC Director’s Report (Dirk Behrend)**

Activities since the last Board meeting were:

- Publication of the December Newsletter.
- 2011 Annual Report in preparation.
- Support of GGOS and WDS activities.
- Coordination of GM2012.
- Support of the TecSpec Workshop.

The CC coordinated the planning for the 7th IVS General Meeting (GM2012). The CC was responsible for chairing the Program Committee and coordinating the logistics with the local committee.

The CC assisted with the coordination of the VLBI2010 Workshop on Technical Specifications (TecSpec Workshop). The CC was responsible for information dissemination and coordinating the logistics with the local organizing committee.

The CC represented the IVS at the ‘20 Years Antarctic Research Station GARS O’Higgins’ workshop in Punta Arenas, Chile.

The IVS was accepted as WDS Regular Member, pending signed agreement with ICSU. Dirk wrote and submitted a paper to Data Science Journal about “Data Handling within the

International VLBI Service” as a contribution to the Proceedings of the WDS meeting in Kyoto. Dirk attended the ‘U.S. Forum on CODATA and WDS Cooperation’ at the National Academy of Sciences in Washington, DC. The meeting was organized by the Board on Research and Data Information (BRDI) of the National Research Council.

Activities for the next several months include:

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

## **6. Approval of the Hohe Wand Declaration (HS, all)**

The Board approved the Hohe Wand Declaration.

## **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:

- 2012 planning: The OPC approved the 2012 Master Schedule.
- CONT11: The correlation of the CONT11 data at the Washington Correlator took longer than anticipated. The correlation was completed in mid-February. The actual correlation was accomplished in December; however, the analysis, fringing, and bringing the entire 15 days into a single, continuous process added an additional two months prior to releasing the final databases.
- AUSTRAL sessions at 1 Gbps: The OPC approved a proposal to observe future AUSTRAL sessions at a data rate of 1 Gbps.
- O’Higgins meeting: The OPC was informed about the course of events at the 20th Anniversary workshop for GARS O’Higgins.
- Intensive observing: The OPC decided to increase the INT2 observing time to 2 hours once the paired observing has come to an end.
- Radioastron: The IAA stations are supporting the Radioastron mission. IAA will work with the Coordinating Center to alleviate the impact on IVS observing.

Alexander Ipatov replaced the late Andrey Finkelstein as official member of the OPC.

## 7.2 Publication about IYA Super Session (Patrick Charlot)

Two more groups have submitted their data analysis results for the EOP part: OPA, Sébastien Lambert; GSFC Calc/Solve solution, Dan MacMillan; GSFC SteelBreeze solution, Sergei Bolotin. Significant progress was made on the imaging part, leading to first images (Arnaud Collioud, Bordeaux).

Patrick started to write some general parts of an IYA paper.

## 7.3 Analysis Coordinator's report (Axel Nothnagel)

The Analysis Coordinator's (AC) Web site had a new presentation for analysis/results. The EOP products were now produced at the Combination Center at BKG.

The AC launched initiatives to improve the Intensive sessions. These initiatives include the distribution of observing scans as done by Minttu Uunila from Metsähovi and the change-over to 2-hour observing sessions in order to stabilize the contribution to the EOP combination in the long time series.

The Bonn group started to look into the combination of radio source coordinates. The source coordinates are now included into the normal equations in the SINEX files.

## 7.4 Network Coordinator's report (Ed Himwich)

As Ed could not attend the meeting, Harald requested that Ed should prepare and distribute a written report to the Board. [Ed sent this report on 12 March 2012 to the Board e-mail exploder.]

## 7.5 Technology Coordinator's report (Alan Whitney)

VLBI Transport Protocol (VTP):

- Standardizes e-VLBI transmission protocol
- VTP proposal put forward at November 2011 South Africa e-VLBI workshop and, hearing no concerns, was accepted; standardizes e-VLBI protocol and accompanying metadata
- VTP Task Force: Chris Phillips (ATNF, chair), Mark Kettenis (JIVE), Mamoru Sekido (NICT), Richard Hughes-Jones (Univ. Manchester), and Alan Whitney (MIT)

VLBI Data Interchange Format (VDIF):

- VDIF data format implementation has been adopted in all known new equipment designs
- VDIF2 specification almost complete:
  - Primary new capability is support of non-standard sample rates (e.g., 32/27 Ms/sec planned by ASKAP, 16.666 Ms/sec planned by MeerKAT, as to the requests from the respective communities)

- Standard VLBI can still use original VDIF

DiFX Progress:

- Processing of all phase-cal tones
- Most Mark IV post-correlation support software now ported to DiFX
- Dual-polarization capability being implemented
- Broadband processing capability being implemented

All Mark IV correlators are expected to be shut down within ~2 years.

e-VLBI workshop held in South Africa:

- 10th Annual International e-VLBI workshop was held 13–16 November 2011 outside Johannesburg, South Africa
- Attended by 55 participants from 19 countries, including five countries in Africa
- Strong emphasis on bringing VLBI/e-VLBI to Africa
- 11th International e-VLBI Workshop will be held at MIT Haystack Observatory in Q3 2012

Digital back-end testing

- need to consider another set of careful DBE cross-comparison tests (possibly in conjunction with Haystack e-VLBI workshop)

Online VLBI technical reference resource at <http://vlbi.org>

- Site is resource for VLBI standards and technical information (links posted to information at ~15 VLBI-related institutions)
- Suggestion has been made to also make site a resource for VLBI2010 technical specifications, memos, information

## 7.6 VLBI2010 Committee report (Bill Petrachenko, Arthur Niell)

The TecSpec workshop was successful with many participants (about 100) and with a very positive overall response. A few action items came out of the workshop: (1) Review the RFI environment at various VLBI sites and develop a plan to measure and monitor the RFI environment at all station locations. (2) Prepare technical documents comparing the various feed options and the various digital back-end options.

The V2C found that its mandate was still relevant. In particular, as a systems group it takes a top-down view of VLBI to see what needs to be improved, it stimulates and advances the technical development of VLBI2010, and it constitutes an ideal vehicle to foster communications, coordination, and reporting.

A Wiki for VLBI2010 was discussed. It could collect VLBI2010-related information such as system specifications, user manuals, manufacturers' information, example 'requests for proposals', and a list of possible projects. In addition, the memo series should be continued.

Special focus areas and their champions were identified:

- VLBI2010 hardware completion (tbd)
- Full automation from schedules to products (John Gipson)
- Antenna deformations and site ties (Dan MacMillan)
- Optimum schedules (Jing Sun & John Gipson)
- RFI (Brian Corey)
- Source structure (Arnaud Collioud)
- Atmosphere (Johannes Böhm)

Arthur reported on the status of the VLBI2010 development.

Prototype demonstration:

- Signal chain complete
- Field System control not yet available (perhaps by summer)
- GGAO12M
  - Elevation motion
  - Positioner
- Westford
  - QRFH feed and Dewar
- Geodetic observations

System development:

- Higher data rate recordings – Mark 6
- Wider bands – 1 GHz
- Circular polarization being considered

Other systems:

- Kokee 20-m
  - Current signal chain within next year
- Twin telescopes
  - Eleven feed in Dewar under development
  - Receiver backend components
    - Digital backend and recorders exist
    - Flexible Local Oscillators development uncertain

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

In the time since the last Board meeting, the V2PEG met in five teleconferences and in one face-to-face meeting. No letters of support were requested during the report period. The V2PEG co-organized the VLBI2010 Workshop on Technical Specifications. The Program Organizing Committee consisted of Bill Petrachenko, Brian Corey, Hayo Hase, Alexander Ipatov, and Alan Whitney. There were 100 participants from 19 countries. Several companies sent representatives to the workshop:

- Vertex Antennentechnik, MT Mechtronics, InterTronics

- Callisto (Dewar)
- T4Science (maser)
- Omnisys

A demonstration with the Twin Telescope Wettzell showed the use of a 30-second slew-track cycle as part of a possible VLBI2010 observing mode.

For selecting possible VLBI2010 frequencies, a first step could be an RFI survey at all stations. This would help to identify the areas of the spectrum that could be used for VLBI2010. The V2PEG would organize an RFI survey.

A network of about 30 stations is in different stages of development (operational, under construction, funded, proposal submitted, and planning phase). The Board unanimously approved the acronym VGOS (VLBI2010 Global Observing System) for this new network.

## 7.8 Chinese Geodetic VLBI Plans (Fengchun Shu)

Recent VLBI activities of SHAO:

- spacecraft tracking: VLBI budget from ChangE-II/ChangE-III and deep space missions expected to be dominant in the next 10 years; most of the budget is for a VLBI data processing center, technique development, and regular operations.
- 65-m antenna: S/X band ready for observations at the end of 2012.
- e-VLBI: demonstration planned using the CNGI (China Next Generation Internet) based on IPv6 (Internet Protocol version 6).

A CDAS and VLBI2010 workshop was held on May 7–8, 2010.

Several VLBI2010 proposals were submitted with various levels of success. Candidate sites for VLBI2010 stations include Shanghai, Hainan, Changchun, and Urumqi.

## 7.9 Short Reports on Status and Progress of VLBI2010 Projects

Hayo reported that Germany was in contact with Argentina to look into a possible new host location for TIGO. La Plata, Argentina was a possible new location.

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

The work was still ongoing. Several tests had been made by Brian Corey and Chris Beaudoin. Chris was developing a concept for a barrier. Clear recommendations were needed to come out of this investigation.

## 8. Reports of the IVS Working Groups

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

The Calc/Solve interface should be finished in the next few months. Oleg Titov and Thomas Hobiger were working on their respective interfaces. The cataloguing and archiving system was still to be implemented. Chris Jacobs should be contacted for the inclusion of older data sets.

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

Axel volunteered to write a first draft of a report from a geodetic point-of-view, planned to be available at the next Directing Board meeting.

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

The WG6 Web pages were slowly filling with material. The initial content encompassed a list of contacts at educational institutions and a first set of existing lecture material. The Web site is available at <https://sites.google.com/site/ivswg6>.

A VLBI school could be organized in connection with the EVGA 2013 meeting in Helsinki.

For the future it was planned to continue to collect existing teaching material, to eventually produce a scriptum or book, to continue to collect contacts at universities worldwide, and to provide these contacts with teaching material.

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

Activities since the last Board meeting were:

- performed several 24-h ultra-rapid Intensives on the baseline On–Ts during IVS R1, RD, and T2 sessions
- the whole CONT11 was operated as one 15-day-long ultra-rapid dUT1 session
- tests of 3-station ultra-rapid EOP sessions on the network Onsala–Tsukuba–Hobart (RD1106 and UREO01):
  - first attempt of ultra-rapid EOP observations
  - partly successful
  - to be continued in 2012, add HartRAO

Other work related to Intensives:

- automated dUT1 analysis with VieVS (Minttu Uunila, Tobias Nilsson et al.)
- automated multi-baseline ambiguity resolution (Thomas Hobiger)



- uniform sky strategy (Karen Baver et al.)
- source constellation influence (Minttu Uunila et al.)
- ray-tracing for INT analysis (Matthias Madzak et al.)
- simulation of intensives with Twin Telescopes (Judith Leek et al.)

#### Outlook:

- continue discussion with IERS rapid service on the use of ultra-rapids
- continue work on the three different INT products (ultra-rapid, rapid, and final)
- continue work on unified analysis strategy
- develop combination approach
- continue ultra-rapid dUT1 and UR.EOP sessions and improve analysis strategy (adapted window length)
- use free telescope time (12 h) at Onsala after IVS sessions
- develop new analysis approaches (e.g., use Kalman filter)

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

### 10.1 IAG

#### 10.1.1 GGOS (Harald Schuh)

GGOS was setting up a new structure. Axel and Dirk are members of the GGOS Consortium. There has been a new GGOS chair in Hansjörg Kutterer from BKG.

Chopo added that a retreat was planned for 26–27 June 2012 in Frankfurt, Germany; participation was on invitation only.

#### 10.1.2 IAG Newsletter Contributions (Dirk Behrend)

An obituary was published for Andrey Finkelstein's passing. Possible future articles could be about CONT11, the General Meeting, or the launch of VGOS.

#### 10.1.3 IAG Commission 1 (Chopo Ma, Harald Schuh)

Tonie van Dam has become the new president of IAG Commission 1. A new Web site was created at the University of Luxembourg. Several study and working groups have been established; they have a lifetime of four years.

## 10.2 EVGA (Axel Nothnagel)

The next EVGA meeting will be held in Helsinki, Finland in spring 2013.

## 10.3 IAU (Patrick Charlot)

The 28th IAU General Assembly 2012 will be held in Beijing, China from 20–31 August 2012:

- deadline for early registration and abstract submission: extended to 17 March 2012
- Joint Discussion 7 “Space-time reference systems for future research”: 27–29 August
- Commission 19:
  - Wed August 29 (8:30–10:00): Business Meeting
  - Thu August 30 (8:30–10:00): Science Meeting
  - Thu August 30 (10:30–12:00): Science Meeting

JD7 Program:

- Session 1 – Theoretical aspects of reference systems
- Session 2 – Space mission requirements
- Session 3 – Exoplanet and near-Earth object investigation requirements
- Session 4 – Pulsar investigation requirements
- Session 5 – Future requirements for products and services
- Sessions 6&7 – Discussion, Summary and Recommendations

Additional points:

- discussion about creating an IAU working group on next ICRF at IAU GA 2012
  - Goal: increase observing for the CRF (especially in southern hemisphere) and improve analysis
  - Should aim at realization of ICRF3 by 2018
- IVS Live 1st anniversary on 20 October 2011: there were about 1000 connections during the first year

Harald mentioned that Oleg Titov was confirmed as IVS representative to Commission 19.

## 10.4 EVN (Patrick Charlot)

EVN Observing:

- Mixed disk and e-operations (Bob Campbell talk)
- Two experiments scheduled with Radioastron
- Most of the EVN proposers now request the use of the QUASAR network

EVN Meetings:

- Next EVN Board of Directors meeting: 10–11 May 2012 in Bonn, Germany
- 11th EVN Symposium: 9–12 October 2012 in Bordeaux, France

## JIVE and RadioNet

- 5-year JIVE review took place from 5–7 March 2012
- RadioNet 3 kickoff meeting held on 28 February 2012 in Bonn, Germany
  - Chair: Rafael Bachiller (OAN)
  - Vice-Chair: Patrick Charlot (Bordeaux)
  - TNA Leader for the Executive Committee: Simon Garrington (Manchester)
  - At-large member of the Executive Committee: Huib van Langevelde (JIVE)
  - Coordinator: Anton Zensus (MPIfR)
  - Project Manager: Izabela Rottmann (MPIfR)
  - Project Assistants: Andrea Danzel & Elena Schwetz (MPIfR), Aukelien van den Poll (JIVE)

## 10.5 ICSU World Data System (Dirk Behrend)

This topic was mostly covered in TOP 5. NICT hosts the World Data System (WDS) IPO (International Programme Office). The IPO Director position was filled at the beginning of 2012 with Mustapha Mokrane.

## 11. Recent Meetings

### 11.1 GM2012 (Jesús Gómez González, all)

Harald stated that the GM was perfectly organized. Special thanks went to the LOC. The next step would be the Proceedings. Hayo added a special thanks to the Yebes staff.

### 11.2 VLBI2010 Specifications Workshop (all)

The TecSpec Workshop was also very successful. The LOC did an excellent job.

### 11.3 Other Recent Meetings (Future of UTC, e-VLBI Meeting, ...) (all)

Chopo mentioned that the leap second decision was pushed back by three years.

## 12. Upcoming Meetings

### 12.1 GM2014 (Fengchun Shu, Harald Schuh, Dirk Behrend)

Fengchun reported that the LOC would be formed prior to the next Directing Board meeting. It was planned to apply for support from the National Science Foundation of China.

## **12.2 Next DB Meeting (Harald Schuh)**

The next Board meeting will be held in conjunction with the next e-VLBI meeting at Haystack Observatory. The e-VLBI meeting is tentatively scheduled for 22–24 October 2012. [The date of the next DB meeting was fixed to 20 October 2012 after the meeting.]

## **13. Election Committee for 2012 Board elections (all)**

The Board determined the three-person Election Committee to consist of Alan Whitney (chair), Shinobu Kurihara, and Dirk Behrend.

## **14. Miscellaneous (all)**

Alan expressed his concern that there was no new blood of geodetic VLBI'ers in the US and that the old folks were near retirement. In 10 years time, the situation might evolve into a crisis. Perhaps cross-fertilization could alleviate the situation.