IVS NEWSLETTER
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The First 25 Years of the IVS

Nancy Kotary, MIT Haystack Observatory

Does the IVS know how to party? We sure do! In March, at the 13th IVS General Meeting in Tsukuba, Japan, we threw ourselves an IVS 25th Anniversary celebration. Sponsored by the Geospatial Information Authority of Japan (GSI) and organized by IVS Coordinating Center Director Dirk Behrend and IVS Chair Rüdiger Haas, the anniversary event kicked off with opening remarks from Kensuke Kokado, Rüdiger Haas, and Shoichi Oki from GSI.

Greetings followed by representatives from the IVS parent and sister geodetic/astrometric organizations: IAG (Harald Schuh), IAU (Patrick Charlot), IERS (Daniela Thaller), ILRS (Stephen Merkowitz), IGS (Rolf Dach), and IDS (Frank Lemoine).

Audience members were treated to a couple of films: a remote presentation from Wolfgang Schlüter, the first IVS chair, and a movie directed and narrated by Dirk that highlighted numerous

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Celebration Time

March was the time for jubilees and celebrations. The IVS turned 25 and the Directing Board held its 50th meeting. The community gathered in Tsukuba to revel in having an in-person meeting after six years of solitude. And John Gipson completed his stint as IVS Analysis Coordinator. Read more in this issue.

Inside this issue

John Gipson Ends His Tenure as IVS Analysis Coordinator

The date of March 8 has a special significance for John Gipson. It marks the boundaries for his 11-year stint as IVS Analysis Coordinator. On March 8, 2013, the Directing Board elected him to be the successor to Axel Nothnagel in this function, and on March 8, 2024, he presided over his last Analysis Workshop before being relieved by Benedikt Soja the next day. Newsletter editor Hayo Hase interviewed John to appraise his time as Coordinator and to provide some guidance for the future generation. The exchange was slightly edited for clarity.

John Gipson giving a talk at GM2024 in Tsukuba.

When you assumed the role of IVS Analysis Coordinator from Axel Nothnagel a good decade ago, the IVS was already well established. Contributions to the IERS for the ITRF, for instance, were mostly a routine affair. What were the hot topics in analysis at the time?

In March 2013, Axel Nothnagel resigned as IVS Analysis Coordinator to become IVS Chair. Harald Schuh and Chopo Ma encouraged me to apply for the position of Analysis Coordinator, and I was approved at the IVS Directing Board Meeting in Metsähovi.

The two major items at that time were preparing for ITRF2013 (which subsequently became ITRF2014) and the transition to VLBI2010. One requirement for the IVS submission to the ITRF was that all the Analysis Centers (ACs) that contributed data had to use the latest IERS standards (updated in 2010). Some of the ACs were slow in modifying their software and had to be encouraged. Another issue with the IVS submission to the ITRF was that the IVS applies loading corrections in its solutions, while the other techniques did not. An argument that some people made was that loading corrections were not perfect, and hence should not be applied. The consensus in the IVS was that the loading should be applied since it reduced baseline scatter over long time periods. In any case, to ensure consistency with other techniques, the ACs did a special processing of the data without applying loading. These contributions were combined by the IVS Combination Center and submitted to the IERS. Ten ACs contributed to this effort (see *https://ivscc.gsfc.nasa.gov/publications/gm2016/050_bachmann_etal.pdf*).

The other major issue at the time was planning the transition to broadband observing with small, fast-moving antennas. At the time this was optimistically called VLBI2010, although the name was later changed to VGOS—VLBI Global Observing System. A few institutions had installed ~12-m class antennas, and others were planning on doing so. A proof-of-concept test with the new GGAO12M and Westford was performed in October of 2012. I don't think anyone anticipated how long and difficult it would be to come up with a fully operational VGOS network. The first sustained demonstration of VGOS did not occur until CONT17, when six VGOS antennas (GGAO12M, ISHIOKA, KOKEE12M, WESTFORD, WETTZ13S, and RAEGYEB) observed for five days. The UT1 estimates from these six stations were comparable to the those from the two legacy 14-station networks. The Polar Motion results were not as good, but this is because the geometry was poor—all the VGOS stations were in the northern hemisphere and within a narrow latitude band. I am very happy to see the progress we have made in the last ten years. There

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John presiding over his final IVS Analysis Workshop on March 8, 2024.

are several VGOS Intensive series, some of which are used by the IERS Rapid Service / Prediction Center. In addition, we have regular operational 24-hour sessions. The main issue now is transmitting and storing the large amount of data. For a typical VGOS station in a 24-hour session, the amount of data is ~35 TB, compared to ~2 TB for a typical S/X session.

You were a major player in the conversion from the legacy VLBI data format to the vgosDB format. What were the reasons for the change and how do you see this effort in retrospect?

Since the inception of the IVS, the default format for sharing and archiving data was the Mark III Database (MK3 DB) format, designed in the 1970s by Chopo Ma. This was his thesis project. The longevity of its use—over 30 years—is a testament to the many good characteristics. But it also had serious deficiencies. Among them: it used a custom data format; the only interface was in Fortran; there was a tremendous amount of redundancy; all the data for a session was stored in a single large file. (This later meant that even if you only changed a subset of the data, you had to make a complete copy of the rest of the data.) Each of these copies is called a 'version' of the database, and for some of the earliest sessions the version number was in the 30s. In addition, a lot has changed since the design of MK3 DB format.

I was chair of IVS Working Group 4. Our charter was to come up with a more modern format for VLBI data. Our goal was to design a format that had support in many languages, was compact, had fast data access, was extensible, and, of course, would be able to handle the existing and anticipated VLBI data. Our recommendation, adopted by the IVS, was the vgosDB format. In this format most VLBI data are in netCDF files. The VLBI data is divided into small pieces of closely related data, e.g., all the met data for a station is stored together. NetCDF is widely used in the ocean and atmosphere community. As a consequence, there are libraries in many languages to access and manipulate netCDF files.

The data for a given session is organized by an ASCII file called a wrapper, which lists the data files for a given session. Splitting the data into smaller pieces (as opposed to the monolithic Mk3 DB format) makes it easy to update only part of the data. All you need to do is write a new netCDF file and make a new copy of the wrapper which references this new file.

There are many ACs within the IVS. Could you explain the various categories of ACs and which level of commitment this means?

There are over 30 ACs within the IVS. These are classified as 1) Operational (also called "Full") ACs, 2) Associate ACs, and 3) Combination ACs. The primary difference between Full and Associate ACs is that the Full ACs make a commitment to process and submit IVS data in a regular timely fashion, while the Associate ACs make no such promise. The Combination ACs are special: They do not produce VLBI data on their own, but take data submitted by the other ACs to produce a combined product.

There are currently ten Full ACs. Three of these—BKG, GSFC, and USNO—have the special responsibility of doing the initial processing of the vgosDB and then making the vgosDB available on the IVS Data Centers for use by IVS.
GSFC is responsible for the IVS-R1 *(continues)*

and VGOS-OPS sessions, USNO for the IVS-R4 sessions, and BKG is responsible for the IVS-T2 sessions and many regional networks.

Although the Associate ACs do not produce data regularly, they are still very important. Many of the Associate ACs contributed to ITRF2020 and the recent ITRF2020 update. The Galactic Aberration model currently used by the IVS is the work of members from several ACs. In addition, some of the Associate ACs have a special interest in some aspects of the VLBI data such as the CRF, atmosphere modeling, or regional networks.

The ACs are using different software packages. How does the IVS go about vetting an analysis software package for operational use?

If an organization wants to become an IVS Analysis Center, they have to submit an application indicating the software they are using, the level of institutional support, and their level of commitment. The IVS Combination Center at BKG has the primary responsibility of vetting the new ACs. The ACs will submit SINEX files for a variety of sessions, and the Combination Center will make sure that the results are consistent with those produced by other ACs.

One of the advantages of having so many ACs using so many different software packages is that the errors seem to average out in the combination. The IVS Combination Center has found that the combined solution is better than any of the individual solutions. For example, the baseline scatter of the combined solution is reduced. The Polar Motion estimates are closer to the results of the IGS.

When there is a meeting, the diversity of human characters appears in the discussion of different strategies and models. What are the important skills needed to find a consensus and to be successful as IVS Analysis Coordinator?

Beekeeper John wearing his bee suit

The IVS consists of many independent organizations, each with their own issues and priorities and funding. Because of this, it is impossible to accomplish anything with a top-down approach. As the IVS Analysis Coordinator, this means I cannot command people to do something. Instead, I need to persuade them. My experience has been once something is clearly laid out and the advantages for doing something differently are clearly explained, most people reach the same conclusion.

The regular IVS Analysis Workshops have been an important forum for discussing issues of general interest. Many changes in scheduling, analysis, or processing of VLBI data over the last decade are a direct outgrowth of these meetings. A real strength of the IVS is having people with many backgrounds willing to share their thoughts on how to make things better. Equally important is the willingness of others to listen.

Much of the success I have had as IVS Analysis Coordinator has been due to facilitating the work that other people have been doing. For any leadership position, people skills are as important as technical skills.

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After having served for 11 years, which achievements do you consider significant and which processes are still ongoing? Which open areas are to be addressed by your successor?

As mentioned previously, in past submissions to the ITRF, to be compatible with the other space geodetic techniques, the IVS ACs had to generate a special solution without loading corrections. I was always unhappy with this. First, this meant we had to do twice as much work; second, this increased the chance of error.

For ITRF2020 we arrived at a compromise with the IERS. At the 2019 Unified Analysis Workshop in Paris, I suggested that the IVS would submit solutions that had pressure loading applied. But there would be enough information in the SINEX files so that the loading effects could be removed. This also meant that for most ACs they would not have to do any special processing for ITRF2020.

Other significant accomplishments include the incorporation of Galactic Aberration in our modeling and the incorporation of Antenna Gravitational Deformation Models. My role in the first of these was to organize and appoint a Working Group that did the analysis and wrote up the results. For the second it was a matter of gathering existing models of antenna deformation, encouraging groups to take surveys of antennas, and persuading the IVS community that we should include these in our analysis.

Gipson's Gold, another terrestrial product out of John's realm

I can think of three ongoing technical challenges, although I know there are others: 1) Handling source-structure effects correctly; 2) Correctly modeling the atmosphere, particularly including the effect of turbulence; 3) Optimal use of the VGOS stations.

I recently learned that you are going to spend more time with your bees as a beekeeper. I'm sure that you will take good care of your bees and their products—equally well as you did for the ACs and their products. What piece of advice can you give to those young analysts that are in doubt or struggle to understand why things are done in one way and not in another?

One advantage I had that not everyone has is working in a relatively large VLBI group. This means I could bounce my ideas off other people. If I was uncertain of something, I could ask them. I have had the opportunity to work with a lot of smart people over the years. I think in particular of Jim Ryan, Chopo Ma, Tom Clark, and my colleagues at Haystack.

I often say that, by its very nature, VLBI is a cooperative enterprise. You cannot do anything on your own. Because of this I think it attracts and retains people that are naturally cooperative. Colleagues from our sister services have commented on how friendly the IVS community is.

My suggestion for younger colleagues is to ask more experienced people. They may know the answer or can point you to someone who does. Most people do not mind being asked for their opinion or their advice!

I have been fortunate to see a lot of changes in VLBI since I started in 1985. I think with the rollout of VGOS we are at the start of a new era in geodetic VLBI, and I envy the young scientists just starting out!

The General Meeting, Through Fresh Sets of Eyes

The 13th IVS General Meeting took place March 4–9, 2024, in Tsukuba, Japan. This was the first GM to take place in person after the COVID pandemic. The following are the perspectives of four "newbies" to the General Meeting and their experiences.

Arno Rüegg, ETH Zurich (Switzerland):

Attending the conference in Tsukuba was my first experience at such an event and it was excellent. It was great to meet so many new people and connect with the members of the IVS. The welcoming and supportive atmosphere was particularly notable, offering great comfort, especially during my own presentation. I really enjoyed and learned a lot in all the sessions, where a great variety of interesting topics were presented.

Arno (middle right) and others at the PhD dinner in Tsukuba

I also want to highlight the beauty and diversity of Japan. From lively cities to relaxing gardens and culturally rich shrines, the country offers an impressive variety. And, of course, the food was consistently fantastic throughout our stay. A special thank-you to the organizers of the 13th General Meeting for ensuring a perfect experience.

Katherine Pazamickas, Peraton (USA):

I joined the IVS in 2011, shortly after the Goddard VGOS antenna (Gs) was constructed and attended the General Meeting for the first time in person this year. The meeting was held in Tsukuba, Japan in March, and it was an unforgettable experience. Arriving in Tokyo after dark, my first impression of Japan was the magnificent transit system, which is so well designed that our group had no problem navigating to Tsukuba, even after traveling for almost 21 hours. Early the next morning, I met the LOC for the cycling tour. As someone who loves sports, I could not think of a better way to shake off the jet lag than a 40-km ride and an opportunity to explore the countryside while connecting with an international group of colleagues—some of which I had never met in person.

Katie (second from the right) and other GSFC folks standing in front of the Ishioka 13-meter

The presentations highlighted the progress of the stations around the world. I kept thinking about how far we've come since the beginning of my career and the early Wf-Gs VGOS baseline. The VLBI products section reminded me why we conduct VLBI and the positive impacts VLBI has on science and society. It was very rewarding to see how our colleagues use Gs's data, especially as the reference station, demonstrating the importance

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and the "why" of the work we do each day. Another highlight was the 25th Anniversary Celebration of the IVS. Learning the history and creation of the IVS was very important to me as someone who has spent their entire career working in the organization. There were also well wishes from our "sibling" organizations, celebrating that we are working toward a common goal. The LOC hosted a banquet with an incredible food spread, an amazing performance of traditional drums, and the ceremonial opening of a sake barrel. I truly appreciated the LOC incorporating local Japanese culture into the conference experience.

The LOC put together a fantastic conference. In addition to the presentations, the icebreaker and excursions allowed us time to connect with each other. I am proud to be a member of the IVS!

He Xuan, Shanghai Astronomical Observatory (China):

I am one of the operators of the Shanghai VLBI Correlator. This is the first time for me to participate in an IVS General Meeting and also my first time to come to Japan. I am deeply grateful for the hospitality extended by the local organizing committee and their endeavors in orchestrating these events. During the meeting, I encountered several old friends, as well as some colleagues with whom I only interacted via email before. The conference was filled with many interesting oral talks and posters, granting me insight into some of the cutting-edge VLBI trends. Concurrently, I had the opportunity to present the newly established correlator platform in Shanghai and our recent developments at this gathering. I participated in two distinct group meetings. The first was a deliberation on the new VGOS-INT-G series with colleagues from Yebes, Santa Maria, and Tsukuba; the second involved engaging in the AOV group discussion as a new member. Subsequently, I attended the IVS Analysis Workshop, where the attendees were notably proactive in presenting ongoing issues and solutions concerning the current state of the IVS.

He Xuan (kneeling, fourth from the left) among the group participating in the AOV splinter meeting

David Schunck, University of Tasmania (Australia):

I am a PhD candidate at the University of Tasmania in Australia, with my research focusing on the potential of co-location satellites for inter-technique frame ties. Finishing the third year of my studies, the IVS 2024 General Meeting presented a perfect opportunity not only to present my own work but, more importantly, to connect with researchers and fellow PhD students from around the globe. On Saturday, March 2, I completed the 12+ hour journey from Hobart to Tsukuba, including two flights with a layover in Melbourne and a taxi ride from Narita Airport. I settled into my accommodation that evening and prepared for the Sunday bike ride. The weather was picturesque as we rode about 40 km at the base of Mount Tsukuba, followed by an engaging icebreaker event in the evening.

The conference sessions began on Monday. Questions, comments, and fruitful discussions

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followed the presentations during coffee breaks and lunch. I presented my own work in the last session of the conference on Thursday. This was the second IVS GM I attended. Unlike the GM in 2022, which was held in an online format, in-person conferences provide experiences that cannot be matched by online conferences. Networking and exchanging ideas with academics are an incredibly constructive process for a PhD student like me. On the excursion, we visited the Ishioka Geodetic Observing Station. Although I've been to other stations in Wettzell, Onsala, and Hobart before, it was very exciting to see the antenna and control room. Despite the relentless rain, the Ishioka Observatory was my highlight of the conference.

The GM 2024 was a valuable experience. As a PhD student attending a conference can be nerve-wracking, but the opportunity to network and meet others quickly makes you forget any worries. I am very grateful to have been given the opportunity to attend, and I am delighted by the Japanese people, culture, food, and hospitality.

David (far right) and the other participants of the cycling tour on March 3

2024 Meetings

14–19 April	EGU General Assembly 2024, Vienna, Austria
13–21 July	45th COSPAR Scientific Assembly, Busan, South Korea
6–15 August	IAU XXXII General Assembly, Cape Town, South Africa
14–15 August	Focus Meeting 11: Multi-wavelength Astrometry, Cape Town, South Africa
21–23 October	9th International VLBI Technology Workshop, Westford, MA, USA
9–13 December	AGU Fall Meeting, Washington, DC, USA

The charming IVS 25th Anniversary logo, created by Masafumi Ishigaki

Pop-up cherry tree cards were given to contributors to the 25th Anniversary celebration.

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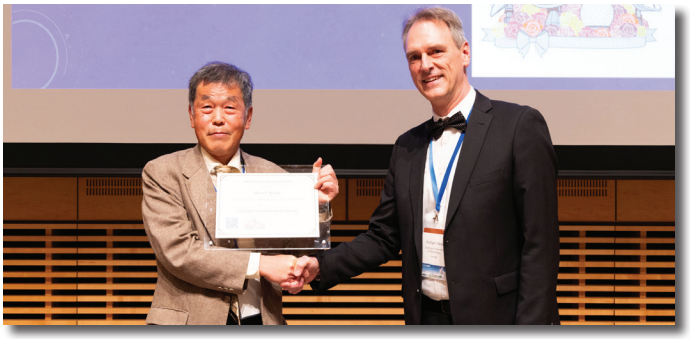
historical IVS milestones and special moments from past celebrations and landmark occasions.

The anniversary celebration continued with a series of talks that addressed the role of the IVS throughout past decades and in relation to the worldwide geodetic community; Axel Nothnagel, Harald Schuh, Basara Miyahara, and Toshimichi Otsubo each spoke on topics about how the IVS has grown and its place in geodesy.

Dirk and Rüdiger then announced a series of lifetime contribution awards in recognition of those who have served the IVS for much of their professional careers, and formally presented these tribute awards to recipients Wolfgang Schlüter, Harald Schuh, Axel Nothnagel, Nancy Vandenberg, Alan Whitney, Bill Petrachenko, Jim Lovell, Ed Himwich, Tetsuro Kondo, Arthur Niell, James Campbell, Xiuzhong Zhang, and Yasuhiro Koyama. (Several people were not able to attend in person and others accepted the award certificates on their behalf.) The certificates featured a lovely IVS 25th Anniversary logo image designed and created by Masafumi Ishigaki.

After the official presentations concluded, General Meeting attendees were treated to a festive banquet dinner, also at the Tsukuba International Congress Center. At the banquet, commemorative wooden masu boxes for drinking sake were given to those in attendance, and a large ceremonial sake barrel or komodaru was opened in a ceremony with assistance from appropriately attired Rüdiger and Dirk.

At the anniversary banquet, an incredible performance featured a local drumming ensemble from the Taiko Student Club of the University of Tsukuba. After winning over the crowd with their energy and perfectly coordinated harmony, the performers turned their instruments over to audience members so that they could learn firsthand just how much of an Arm Day workout the taiko performance is.



Tetsuro Kondo and Rüdiger Haas

Celebrating the anniversary with sake toasts

Talented local performers on taiko drums

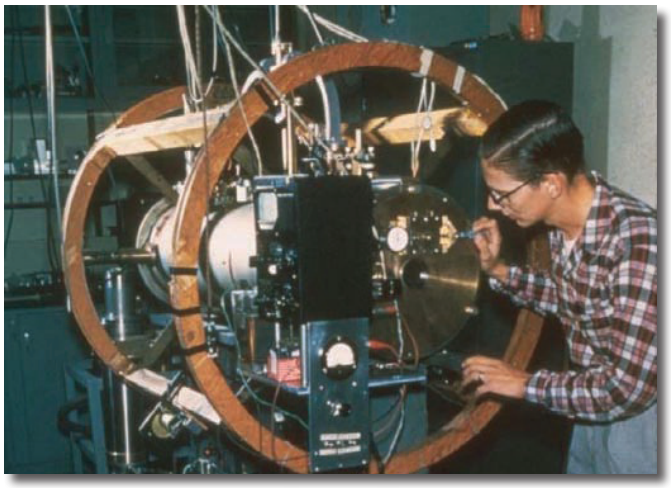
The IVS is most grateful to our generous hosts.

There was widespread agreement that the anniversary celebration was a huge success, and that it will be difficult to match the taiko-drummer level of entertainment at future general meetings, but—as we learned during the historical talks—the IVS community is always up for a challenge.

Monitoring a Timing Standard

Alex Burns and Mike Poirier
MIT Haystack Observatory

Every VLBI site has a hydrogen maser. The accuracy of a hydrogen maser, measured over 1,000 seconds using Allan deviation, is unmatched thus far with any other readily available timing standard. Very little maintenance is required for most hydrogen masers, and they can last quite a long time. Just come to the Westford site and you will see a relic—an NR-series maser from the 1980s! Modern masers monitor many parameters and require less intervention by the site personnel. Nowadays, they are connected to the Internet and monitor their own telemetry and perform tuning with drift correction automatically. Some things are still important to keep in mind.



NBS-1 cesium atomic clock in 1952 (Credit: NIST). Atomic clocks, and hair styles, have changed much since their invention in the 1940s.

Back in the 1980s, the NR-series masers were put into temperature-controlled chambers built by the Bendix corporation. These were giant aluminum boxes with TECA units (solid-state devices that can either electrically heat or cool an enclosed space) and many fans to ensure a consistent temperature throughout the chamber. Of course, today we have great HVAC units, like mini-split ductless air conditioners that you can hang on the wall, to ensure the temperature stays in a consistent range. Most sites will have a temperature-controlled room, which is not highly traveled, to keep their maser at a constant temperature all year long. Temperature ranges acceptable to new masers are better, but it is still important to minimize change. Check to make sure this room stays consistent to ensure a stable reference clock.

Now, masers are capable of sending telemetry automatically to the factory, where in the past we had to generate logs locally over a serial port, from the microprocessor. These were then formatted in different spreadsheets, plotted, and analyzed to try to detect any anomaly inside the physics package of the unit, or the electronics side. For example, you can check the current draw of the ion pumps that pull a vacuum on the maser chamber. When these currents rise, it can mean that the pump is "loaded" with contamination from the chamber and will need to be replaced soon. We can plot power supply voltages and backup battery currents. We can also monitor the drift rate, to be sure we won't need to apply a cavity correction to our maser to correct the drift. We monitor the drift rate of the maser by comparing it to GPS. A GPS receiver at each site is used as a comparison. The accuracy of GPS time relative to UTC is measured in nanoseconds! The maser, as stated, is accurate over 1,000 seconds, but it is not locked to a measurement like UTC and does drift eventually. We use a time interval counter measuring the pulse coming from the GPS receiver and the pulse coming from the maser. Normally, we want the difference from GPS pulse to be between 10 µs and 100 µs. This can be adjusted locally at the site. Most modern masers have front panels as well as connections over the Internet. So be sure your local atomic clock is temperature controlled and tuned, and it will reward you with stable 5 MHz and 1PPS for many years to come.

Recent Activities at the Matera VGOS Antenna

Luciano Garramone, ASI
Paolo Rutigliano, e-Geos SpA

The Italian Space Agency (ASI) has started a new project to install a VGOS (VLBI Global Observing System) antenna in the Matera Space Geodesy Center. The new system is being implemented at the Italian Fundamental Station, where SLR activities have been performed since 1983 and where VLBI operations on our 20-meter antenna are ongoing since 1990. The construction of the new VGOS antenna is near completion and the necessary front-end and back-end equipment are in the final stages of assembling. It is foreseen that the ASI final acceptance test of the VGOS system will start during June 2024.

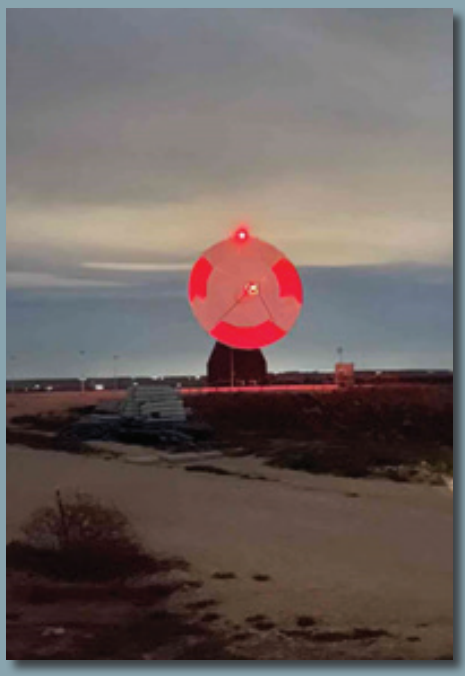
In 2021, a contract was signed between ASI and the Italian company e-Geos SpA to implement a new VLBI system, compliant with the new standards recommended by the IVS. This became the Matera VLBI Global Observing System (MVGOS).

The project is in its final stage: the antenna was constructed on-site in 2023. The reflector alignment work was ongoing at the end of the year (see figure). Completion of the installation of the front-end and back-end equipment is foreseen in a time frame of six months. Pre-operational activities will be performed during the second half of 2024.

The telescope mount type is a standard elevation over azimuth design and provides full sky coverage starting from 0° elevation. The elevation axis can be rotated between 0° and 100°. The azimuth axis can be rotated ±270°.

The integration of these devices into the final site will be completed in the first months of 2024. It is expected that the final acceptance tests will take place during the second half of 2024. Accordingly, the MVGOS system should be available to be included in the global VLBI at the end of 2024.

MVGOS antenna



MVGOS reflector alignment activities

Metsähovi Geodetic Research Station

Nataliya Zubko and Joona Eskelinen,
Finnish Geospatial Research Institute

The Metsähovi Geodetic Research Station (MGRS) located in Southern Finland has undergone major infrastructure and renovation works in recent years. The MGRS research infrastructure had extensive upgrades, including new GNSS receivers and superconducting gravimeters as well as building new SLR and VGOS observing systems. The station's new VGOS 13.2-m telescope is equipped with a QRFH broadband receiver (built by the Yebes group) operating in the 2–14 GHz frequency range. A signal from the antenna is transferred via optical fibers to the backend that comprises a DBBC3 and a Flexbuff system.

The VGOS telescope's commissioning phase has been extended due to thermal stability issues of its steel pedestal. The telescope manufacturer installed a new insulation layer and new aluminum cladding at the end of 2022. During the last two winter seasons, we have been facing major problems with ice build-up on the antenna pedestal, forcing occasional antenna shutdowns. Improvement work with the VGOS antenna thermal stability along with ice build-up mitigation continues.

Metsähovi's new VGOS telescope

New main building of the Metsähovi Geodetic Research Station and the new SLR station

In addition to the upgraded and new instruments at MGRS, a new main building was built during the last few years and is being commissioned. The new building has a dedicated space for the VGOS backend, laboratory spaces, and an operator room. Moreover, the building was designed to prevent possible RFI leakage inside/outside the building. For this purpose, a metal mesh was laid into the outer surfaces of the building.

The station's renovation project continues and affects the operations of the VGOS telescope. Our VGOS backend is being moved to new premises, involving the re-routing of the whole signal chain. Work with the commissioning of the signal chain components continues with the aim of getting the new chain operational within the next year. Additional instrumentation required for the VGOS operation, such as a hydrogen maser, are currently being acquired. MGRS is also expanding its staff to meet the demand of increased technical and operational tasks and two technical specialists were hired recently.

50th IVS Directing Board Meeting

Rüdiger Haas, Chalmers University of Technology

The 50th IVS Directing Board Meeting was held directly after the 13th IVS General Meeting in Tsukuba on Saturday, 9 March 2024. It was a full day of intense and fruitful discussions culminating in decisions taken by the Board. Two Board members were not able to travel to Japan due to illness; however, one of them joined the full length of the meeting via Zoom.

The Board discussed in depth the applications for the position of Analysis Coordinator, determining the successor to John Gipson. Eventually, the Board elected Benedikt Soja from ETH Zurich as the new IVS Analysis Coordinator. We are looking forward to working with Benedikt and to seeing him at the next DB meeting!

Beyond the Analysis Coordinator position, the Board also decided to (among other things):

- Confirm José Antonio ("Pepe") López Pérez as the new chair of the VGOS Technical Committee (VTC), succeeding Gino Tuccari
- Confirm Oleg Titov as the new chair of the CRF Committee, succeeding Aletha de Witt
- Appoint Christian Plötz as deputy chair of the Observing Program Committee (OPC), in support of OPC chair Dirk Behrend
- Establish an official IVS Working Group on VLBI Scale, further investigating the potential scale drift that was detected during the ITRF2020 production
- Prepare a call to organize an IVS Working Group on Data Documentation
- Extend the IVS Terms of Reference (ToR) to allow for the appointment of IVS representatives to other organizations (e.g., for frequency management)
- Confirm Oleg Titov as IVS representative to IAU Commission A2 "Rotation of the Earth"

The outcome of the GENESIS Scientific Workshop on 29 February 2024 at ESA/ESOC in Darmstadt was discussed. ESA wants to create a GENESIS Science Team including a GENESIS Science Exploration Team (GSET) with technique-specific Working Groups and is looking for proposals by the geodetic services for Working Group chairs. The Board agreed to actively cooperate and interact with GENESIS, at the same time ensuring that there will be no negative impact on IVS operations and product quality. The mission should lead to benefits for space geodesy and particularly the TRF.

On behalf of the Directing Board and the entire IVS community, Dirk Behrend thanked John Gipson for his highly appreciated work as IVS Analysis Coordinator for more than a decade and presented him with a couple of gifts.

We also discussed where to organize the next IVS General Meeting in 2026. As there were no proposals submitted to the IVS, it is, for the time being, unknown where and when GM2026 will be held. The Board decided to proactively approach potential host organizations so that a venue and date can be decided in the next several months.

The 51st Directing Board meeting is planned to take place in October 2024 in connection with the International VLBI Technology Workshop (IVTW) at MIT Haystack Observatory.

What Is Going On in the IVS Network?

Alexander Neidhardt, IVS Network Coordinator

The legacy S/X network continues to be a stable "workhorse" for the IVS. VGOS Intensives clearly extend the classic product with much better quality though longer turn-around times. The VGOS network is steadily growing. Regular sessions are with 11 or 12 sites. Matera is going to start their test phase in April and requested support from the IVS to get feedback about quality. The Yebes group supports first qualification tests and Matera should be ready to tag along to sessions in June/July. The test sessions with different VGOS frequencies are ongoing. Ny-Ålesund, Santa Maria, and other sites are preparing for regular contributions. Beyond the known projects, there are also activities in China, India, Indonesia, and Malaysia. There are several suggested new Intensive networks to be processed at different correlators. Discussions are ongoing about having quasi 24/7 observing using either stacked INTs or short scans to reduce the data volume.

Sample map with strongest RFI source during an R4, pointing to a local mobile communication sender

Special activities. A questionnaire for correlator staff and about updating Network Configuration Files was considered. Due to personal health reasons, the activity was postponed. But after some tests with online platforms (such as Budibase), it became apparent that the number of questions and the support of many users will cost too much. Instead, we have started to establish our own database and PHP scripts on a local platform.

Meanwhile, a group of supportive people and institutions (i.e., ETH Zurich, AuScope, TU Munich) have started to combine their activities and codes to further the idea of an automated IVS Success Analysis and Station Feedback system. Several others are showing interest in getting involved. The idea is to have central access points for data series like UT1 formal errors, SEFD values, or simple feedback about successful scan counts. ETH Zurich was able to get funding for developments of open-source data in this field. TU Munich secured some leftover funds from an innovation program to buy new server hardware, which can be used to host such databases.

The student project on monitoring RFI using spectral features of the recorded VLBI data ended at the end of March. While the software suite is not completed, a development version can be accessed at *https://github.com/luca-rigon/RFImonitoring-tool*. A recent extension includes the support of basic legacy S/X analysis in addition to the already existing VGOS part. A promising feature are the direction plots that show the strongest RFI source(s) on a map.

What else? ESA's GENESIS mission is gaining importance also for IVS network stations (*https://www.esa.int/Applications/Satellite_navigation/Genesis*). Mission participation can be seen as the continuation of work done for observing satellites.

Farewell to Dave Hall (1963–2024)

Phillip Haftings, Nick Stamatakos, and the United States Naval Observatory

Our friend and colleague Dave Hall passed away on January 10, 2024. His passing came as a surprise, especially to his closest friends and family.

Dave has been a member of IVS for many years and an astronomer at the United States Naval Observatory (USNO) for many years besides. He's been a steadfast friend and a guiding hand to many of us. Dave was a Pittsburg Steelers fan, a bit of a tech gadgeteer, and a handyman. His most recent project had been restoring and repairing his family home in Butler. He leaves behind his mother Jane Hall, brother Dr. Richard Hall, sister Martie Towns, sister Barbara Hall, sister Victoria Hall, and extended family.

Dave came out of Butler PA near Pittsburg, earning his BS from Grove City College in 1985, and starting work at USNO observing and analyzing data from the 6″ transit circle in 1986. He earned his MS from Yale

Dave and colleagues at the 2007 IVS TOW meeting

University in 1991 working through the Navy Professional Development Program with study in astronomy, astrometry, computer modeling, and statistical analysis. After obtaining his master's degree, Dave went on to analyze VLBI experiments in the USNO efforts to produce the first realization of the Radio Optical Reference Frame (RORF) from 1991–1996. He went on to work in the development and maintenance of the frames catalog for USNO's Combined Astrometric Catalog (UCAC) from 1996–2001. He was

The group photo for the 2023 IVS TOW

also instructed at Averett University on Astronomy over this time from 1996–2006. He was responsible for regular analysis of VLBI data for Earth Orientation Parameters (EOP) from 2001–2006 which corresponded with the transition into the IVS. Dave became the Correlation Operations Manager at USNO in 2006, and then took over as Team Lead of the VLBI division in 2013. Dave became the official Chief of USNO's VLBI division in 2023.

Dave served in the IVS Directing Board as the Correlator and Operations Center Representative 2017–2018 and 2019–2022, and he has been a member of the IVS Observing Program Committee (OPC) for many years. He was a tireless advocate for the unique work we do and the crucial importance of international cooperation in the VLBI community.

The United States Naval Observatory and the IVS wish Dave's family and friends our heartfelt condolences. He will be dearly missed.

Dave and colleagues at the 2019 IVS TOW meeting

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Please send contributions to the General Editors; the deadline is one month before the publication date. The editors reserve the right to edit contributions.

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