IVS Newsletter

Issue 36, August 2013

Inauguration of TTW: A New Star in the VGOS Universe

– A. Neidhardt, G. Kronschnabl, and T. Schüler, Geodetic Observatory Wettzell

It was the beginning of a new age for VLBI at the Geodetic Observatory Wettzell when the TWIN Radio Telescope Wettzell (TTW) was inaugurated with a huge ceremony on April 26. Over 150 national and international guests visited the observatory to attend the festivities. After the ceremonial act, the Undersecretary of State of the German Ministry of the Interior Cornelia Rogall-Grothe, the Vice-President of the Technical University Munich (TUM) Prof. Hans Pongratz, and the President of the Federal Agency for Cartography and Geodesy (BKG) Prof. Hansjörg Kutterer symbolically started the operations under a clear and sunny sky by pushing a red start button. Immediately, the two antennas started a schedule, which demonstrated the different synchronous and asynchronous operation modes and the high slew speeds of the antennas.

(above) Prof. Pongratz, Undersecretary Rogall-Grothe, and Prof. Kutterer start the TTW operations. (below) The festivities attracted some 150 guests (view from the south tower WETTZ13S).

The TTW is the first complete realization of the VLBI2010 vision. It consists of two identical 13.2-meter antennas, which are operated from a control room in a newly constructed control building. The location of the new telescopes is an extension to the existing area of the observatory in the south-west. The fast moving antennas (12°/s in azimuth and 6°/s in elevation) were designed and constructed by Vertex Antennentechnik GmbH Duisburg, Germany. They use a radial symmetric reflector on a stiff backstructure concept. Currently, a tri-band feed horn is installed in the northern telescope WETTZ13N to support the two geodetic frequency bands (S/X-band) as well as Ka-band for a classic receiver design. With this feed, it is possible to participate in all standard VLBI and deep space network observations, allowing to substantially contribute to the improvement of the celestial reference frame also in Ka-band. The Eleven feed of the Chalmers University, Sweden should be installed in the southern telescope WETTZ13S. It will support the broad band from 2 to 14 GHz. The new control room for the TWIN telescope with a large control desk and several operator monitors enables all state-of-the-art techniques to remotely control the local systems as well as other telescopes. The computer center in the back offers enough space for the whole control and HF equipment and for future tests and extensions.

The new telescopes augment the existing 20-m Radio Telescope Wettzell (RTW) for the coming years and should then take over the main observation load. The telescopes are intended to mainly support the IVS in the same reliable fashion as the legacy antenna, which has been operating for 30 years now. The importance of the support of the international research and science at the top level was especially emphasized by the Undersecretary of State Rogall-Grothe; for that, the Ministry had financed the BKG project with a fund of €10 Million under special approval by the German Parliament. For the TUM as cooperation partner and co-operator of the observatory, the close link between continuous data acquisition as infrastructural service and the scientific tasks is very attractive, as was lauded by the Vice-President of the TUM. The head of the responsible building authority, which was overseeing the construction of the concrete towers and the control building, alluded to the big challenges of reaching the required accuracies and tolerances of fine mechanics for a whole tower building. Also regional and local politicians were impressed by the new equipment and ensured their continuing support for the activities at the observatory.

Prof. Harald Schuh, Vice-President of the International Association of Geodesy (IAG), gave an invited lecture about the background of VLBI and the importance of the new VLBI2010 concepts for the future of geosciences. Proud about the new telescopes as part of the IVS network and the VLBI2010 Global Observing System (VGOS), Prof. Schuh mentioned the importance of the future data from the global observing system as infrastructure for the research of natural hazards and the resulting influence on everybody's life.

All in all, the ceremony was very successful. It resulted in extensive media coverage in the German press and radio. For the team at the observatory, however, it was immediately back to business, as now the antennas must be pushed to first, usable output.

Feature

BKG/DGFI Combination Center at Frankfurt

Villa Mumm, home of BKG Headquarters in Frankfurt.

The Bundesamt für Kartographie und Geodäsie (BKG) and the Deutsches Geodätisches Forschungsinstitut (DGFI) jointly operate an IVS Combination Center. The operational work is mostly done at BKG in Frankfurt, while software development is done at DGFI in Munich. Newsletter editor Hayo Hase interviewed the lead of the Frankfurt group, Sabine Bachmann, to learn more about the combination activities.

Sabine Bachmann, team leader of Frankfurt Group.

Sabine, could you briefly explain the main characteristics of your combination center and how it came into being?

Our combination center is a joint effort of the DGFI (for maintaining the combination software DOGS) and BKG (for carrying out the operational tasks). The beginning of the combination center goes back to the PhD work of Sarah Tesmer (née Böckmann) at the Institute of Geodesy and Geoinformation (IGG) at the University of Bonn, where she developed and applied the VLBI combination strategies at the then IVS Analysis Coordinator's Office. In 2009, the IVS established dedicated analysis centers for the combination work, the so-called combination centers. My predecessor at BKG, Wolfgang Schwegmann, took over the combination task from Sarah at the newly created BKG/DGFI Combination Center at the end of 2009. When Wolfgang left BKG in 2010, he handed the task over to me. In 2011, Michael Lösler joined the combination team. Unfortunately, Michael left the group at the beginning of July, and now we are looking for a new person to join the VLBI combination team.

What are your specific tasks?

The combination center is responsible for generating a combined solution of Earth Orientation Parameters (EOP) and station coordinates. The input in form of SINEX files is currently provided by six IVS Analysis Centers: BKG, DGFI, GSFC, IAA, OPAR, and USNO. Our task is to compute the "best possible" solution by combining the input of all contributing analysis centers. The tricky part in the combination process is the robust detection of outliers and finding proper weighting schemes. At the moment, EOPs and station coordinates are the products for which we officially generate combined IVS solutions. The combination of the source positions is under development.

The combination center provides a fast solution twice a week (rapid solution) and a long-term solution every three months (quarterly solution). The combined products are listed on our Web page http://ccivs.bkg.bund.de/. Interested users can assess the quality of the products, for instance, with the comparisons of the combined solution with the individual contributions of the analysis centers.

What is of importance for a good result?

The combined product is at the end of the VLBI processing chain—following data acquisition, correlation, and analysis. For a good combination product, a reliable and error-free "delivery" of the input data from the analysis centers is indispensable. If, for example, a session has to be re-correlated, a combined solution is not reasonable until all analysis centers have also re-analyzed the session in question.

In order to be able to include all individual solutions at their best, it is necessary to know exactly how the solutions have been generated—any small difference can have an impact. Another important issue is the product deadline set by the IERS. As the combination center submits the IVS contribution to the ITRF, we are responsible to meet the deadline for the IERS contribution.

Who are the users of the combination products?

It is very difficult to follow the products after they have been submitted to the data center. We got feedback from the IERS Rapid Service/Prediction Centre for the EOPs and the IERS ITRS Center for station positions and EOPs. We are also receiving regularly requests for station coordinates from different groups studying VLBI station positions or comparing VLBI results with GNSS or SLR results. Aside from this feedback, it is virtually impossible to follow our products after their generation.

Did you receive complaints for any reason?

So far, we haven't received any real complaints. Every now and then we got feedback and suggestions for improving our Web site. But otherwise everyone seems to be content with our work.

Which procedure has to be followed by a new analysis center to provide its solutions to the combination center?

That is a good question that comes up regularly! For this reason I recently drafted a guideline for operational analysis centers to contribute solutions to the combination work. I

did this together with Robert Heinkelmann from GFZ Potsdam, who has been involved in VLBI analysis for many years. We developed a detailed guideline explaining the procedure for new analysis centers for contributing to the combined solution, and I posted it online on our Web site at http://ccivs.bkg.bund.de/bid.

How did you get involved in VLBI?

I got involved in VLBI when I started working at BKG in 2010. I learned the very first steps from Wolfgang Schwegmann. I have also traveled to Leipzig in order to learn from my BKG colleagues there; they work in VLBI analysis at a very high level for many years. In addition, I benefitted from an IAG School on Reference Frames in Mytilene, Greece in 2010, where I learned a lot about terrestrial reference frames. Just recently I attended the IVS VLBI School in Finland, which helped me a lot in understanding the different aspects of VLBI and the links between them.

How do you see the future of the combination center with respect to new analysis software which starts combining on the observation equation level?

The currently used method of the combination at the level of normal equations has been improved and developed continuously. At the moment, we prepare the switch to new software for the IVS combination: in cooperation with the University of Bonn we intend to replace the DOGS software with the Bernese software.

After the combination on the level of results and on the level of normal equations, the next step is the combination at the observation level. This is of particular interest for inter-technique combination. There are, however, still a lot of obstacles to overcome for a full inter-technique combination. The huge amount of data as well as different data types (e.g., microwave vs. optical data) are a challenge for software algorithms and hardware capacity. The combination at the observation level is studied in various projects and our department is also working in this direction using the Bernese software. Since the possibilities and perspectives of this approach are still at the very beginning, the IVS intra-technique combination center will remain indispensable for the next several years.

What is your view of the IVS?

I appreciate the work and the effort of the IVS. I like the cooperative nature of the IVS, being in contact with many international VLBI colleagues. The VLBI community has still a manageable size so that at the regular meetings one can easily have useful discussions.

If you are not working with VLBI, what are your personal interests?

I like spending time in nature: hiking, biking, or running. Sometimes I just go for a short walk, other times it's for a longer adventure. In summer, Michael Lösler and I regularly team up after work to pass the time with Geocaching roaming through the woods around Frankfurt.

Thank you very much, Sabine, for this interview. We have learned how important the work of a single person can be for the product generation in the IVS processing chain. We wish you continued success with your combinations.

Members of the IVS Team in Frankfurt: (front row) Sabine Bachmann, and Daniela Thaller (division head), (back row) Ole Roggenbuck, Wolfgang Dick, and Michael Lösler.

Newsflash… Newsflash… Newsflash…

First 24-hour Session with Broadband System Observed

On May 21, 2013, the first 24-hour session using the VGOS broadband delay system was observed on the GGAO12M–Westford baseline. The antennas, RDBE digital backends, and Mark-5C recorders were all operated under Field System control. The VGOS-ready 12-meter GGAO antenna and the 18-meter Westford antenna were each equipped with a cooled QRFH feed tailored to the specific antenna optics, followed by two cooled low noise amplifiers, one for each polarization. With a minimum scan length of 30 seconds and the minimum SNR set to 15 per band-polarization, the schedule achieved 48 scans per hour. Four 512-MHz-bands spanning 3.2 to 8.8 GHz within the available 2–12 GHz range were recorded at 2 Gbps (1 Gbps for each linear polarization) for a total of 37 Terabytes per station. Over 99% of the scans yielded good correlation.

A. Niell and C. Ma

News

TOW2013: The Hawaiian View

– Lawrence Chang, ITT Exelis, Kokee Park

Participants at the TOW2013 Meeting.

Aloha everyone! When I first started working for ITT Exelis, my co-worker Kiah Imai and I just missed the Technical Operations Workshop in 2011 (TOW2011). So we were looking forward to TOW2013. In preparation for TOW2013 we were first wondering who was going to attend. If only two of us would be allowed to go, which two? But the three of us, Kiah, Chris Coughlin and I, were able to attend from Kokee Park. Since every time I come to the "mainland", it's always unusually cold, I was prepared for cool weather. I guess being from Hawaii, everywhere else is cold! So I brought warm clothes and jackets and even grew my hair long to be prepared.

The Radome enclosed Westford Antenna was the venue of many hands-on classes.

We arrived in Massachusetts Sunday morning and to my surprise the weather was actually beautiful. It was a nice start to a great but intense week. Later that evening, the 7th IVS Technical Operations Workshop began with the registration and ice breaker at the Radisson Hotel. During the icebreaker we got to meet some of the people that our station has been interfacing with over the almost two years I've been involved with VLBI. I was also able to enjoy some great food and drinks with everyone. Putting the names and voices to faces and meeting everyone was rewarding and we were able to thank those who have helped or made contributions to our station. I'm glad Chris Coughlin was there to introduce and guide Kiah and I through the process; being that this was his third TOW, it was helpful to have him around.

The workshop started Monday morning with Alan Whitney's lecture on VLBI basics. This really put all the pieces of the VLBI puzzle together for me and gave me a better understanding of what we are actually recording, the factors involved in data quality, and the "mathematical magic" that the correlators are able to achieve. The following classes were organized into courses that included operations workshops, maintenance workshops, seminars, and lectures. The operations and maintenance workshops provided valuable knowledge that I could directly use at my workplace including hands-on teaching with system checks, experiment setup procedures, VLBI hardware and troubleshooting, cryogenics maintenance, and maser operation. I was able to apply what I grasped over the workshops right away after returning to Hawaii and better myself in the tasks that I have already been performing on a daily basis. The seminars were very informational and provided me with more insight on the larger picture of VLBI, its capabilities, and the different roles that each entity plays to make this international science such a success. The lectures reinforced the VLBI basics and provided me with a great foundation of general knowledge for the field, and also gave me insight on what's to come in the future of VLBI with the development of VGOS.

Even though my luck with the nice weather ran out at the end of the week with some rain, I still had a great time and gained so much valuable information. The hospitality was exceptional with great food, drinks, and conversations throughout the week, not to mention a great night out at Maxamillians Billiards with everyone (I'm writing my part of the article because I lost a billiards game to Dirk! I'll get you next time!). I especially wanted to thank everyone that tried to help with my quest for Yuengling, even though the closest ones were in New York. Mahalo for making my first TOW a great one! I hope to see you all at the next one in 2015!

Alessandra Bertarini giving her class on practical correlation.

News...

Breaking Ground for the VGOS Antenna at Ishioka

– Shinobu Kurihara, Geospatial Information Authority of Japan

Excavation work for the antenna foundation at the Ishioka site.

In 2011, the Geospatial Information Authority of Japan (GSI) decided to build a new VGOS station in Japan. After about two years of planning, construction began on the Ishioka VGOS antenna on July 1, 2013 at the top of a small hill on the grounds of the Ibaraki Prefectural Livestock Research Center, located 17 km northeast of the Tsukuba 32-m antenna. The Ishioka VGOS station will consist of a radio telescope built on basement outcrop, three front-end systems, a flexible up-down converter (UDC), a set of the digital back-ends (DBE) together with a huge data storage system, and a pair of hydrogen masers.

The telescope, which is manufactured by a German company, is similar in design to the RAEGE telescope at Yebes, Spain. It has fast moving Az/El drives with a rate of 12°/s and 6°/s, respectively, its optics is designed based on a 13.2-m ring focus reflector, and a concrete pillar is installed in the center of the telescope tower. Lightning arresters will be installed to avoid lightning strikes in the Japanese summer.

So far, three candidate feeds have emerged for consideration: the Eleven feed, the Quad-Ridged Flared Horn (QRFH), and the tri-band (S/X/Ka) feed for the transition period from legacy S/X to broadband. We really were torn between these feeds for our adoption. After getting some advice from the groups at Wettzell, RAEGE, and Haystack, we decided to install all three feeds after all. We confirmed that the Caltech LNA and QRFH, which were assembled into a cryogenic system by a manufacturer in Japan, have superior performance by the factory inspection.

The DBE, named K6/iDAS (K6/Intelligent Data Acquisition and Streaming sampler), is purely made in Japan. The sampler unit, which is capable of 4-Gsps/2ch sampling, DBBC function up to 32 channels, and 10-GigE streaming, is employed in conjunction with 16 Linux servers and a storage system as a recorder. Since Ishioka station will be linked to an external network with 10 GigE, e-transfer is assumed for data transfer. There is no removable disk; instead a 440-TByte total effective capacity RAID system is mounted for storage. We put special emphasis on the speed of the disk access. The system supports a sustained rate of 32 Gbps of simultaneous recording and playback, which is the rate of a full VGOS recording without RAM buffer in 'burst mode' data acquisition.

As you are probably aware, the eastern part of Japan experienced very large earthquakes and suffered serious damage in March 2011. It may be an unforgettable event for the Japanese people. Furthermore, the headquarters of the governmental Earthquake Research Promotion expects that a magnitude ~8–9 class megaquake will occur within the next 30 years along the Nankai Trough in southern Japan with a probability of ~60–70%. One of the missions of GSI is to observe the plate motions around Japan continuously and accurately in order to ensure the safety and security of the people and to figure out the mechanisms of earthquake occurrence. The concept of the Global Geodetic Observing System (GGOS) suits our purpose. With the completion of the Ishioka VGOS station, GSI will contribute to GGOS via the IVS and fulfill an important role of its responsibility in Japan and internationally.

By mid-March 2014, the construction of the Ishioka VGOS antenna will be completed. The year 2014 will be the dawn of the new VLBI era in Japan.

An artist's rendition of the Ishioka VGOS telescope.

e-transfer Operations at the IVS Correlators

– Simone Bernhart, Bonn Correlator and Jason SooHoo, Haystack Observatory

In the last several years, the number of stations that transfer their observational data via high-speed network connections to the correlators (e-transfer) has increased significantly. While initially only very few stations e-transferred their data, by now it is in excess of half of the stations. This necessitates a coordination effort, as the e-transfers mostly run on the same network connections and are thus limited by the available bandwidth. In order to help coordinating e-transfers among correlators and stations, the Bonn Correlator has created a set of cron jobs for displaying ongoing e-transfers on a Web page: http://www3.mpifr-bonn.mpg.de/cgi-bin/showtransfers.cgi. This Web page functions as the front end for querying an underlying data base. The resulting HTML page is static; there is no mechanism to automatically update the table. Therefore, the page needs to be reloaded in order to see the latest status of e-transfers. In addition to the ongoing e-transfers, the page also lists the storage capacity at the three IVS correlators in Washington, Haystack, and Bonn. It is important to point out that the Web page merely shows active e-transfers and works on a first-come, first-served basis. An overall coordination of e-transfers concerning their importance and priority is still required and the transfer Web page should be regarded as a first step only.

e-transfer stations should have a sustained network connection speed of at least 100 Mbps. The correlators support up to 1 Gbps (Bonn, USNO) or 10 Gbps (Haystack). The Bonn 1-Gbps network connection is sufficient for the current maximum observing mode of 256 Mbps of sessions that are handled at the Bonn Correlator and the number of e-transfer stations per experiment that we are dealing with at the moment. But as soon as the observing mode is increased to 512 Mbps or more stations start doing e-transfers, we cannot guarantee anymore to meet the 15-day turn-around time requirement for the R1 sessions. In view of these limitations and of VGOS (VLBI2010 Geodetic Observing System), it is definitely necessary to upgrade the network connection to 10 Gbps. However, funding problems still appear to be insurmountable.

At Haystack Observatory we began e-transfers back in the early 2000s. It was mainly for transferring Kashima K5 data, which we converted from K5 to Mark 5, wrote the data to Mark 5 disk modules, and shipped out to the actual target correlator. Our e-transfer operations were limited by our shared 100 Mbps network at the time and it was more practical to ship the disk modules. In 2011, the Haystack network was upgraded from our 100 Mbps shared connection to a 10 Gbps dedicated connection. Data e-transferred are still being written onto disk modules for processing as our data servers have not been merged with the correlator. Our goal is to have this merged so correlation processing can be done directly from the e-transferred data. We also hope to increase our server capacity as data rates and size increases.

The correlators typically use the Tsunami protocol for the e-transfers. Tsunami is a fast file transfer protocol that uses UDP (User Datagram Protocol) data and TCP (Transmission Control Protocol) control for transfers over high speed networks (≤1 Gbps) on a long distance. TCP is the most commonly used protocol on the Internet. The biggest advantage of TCP is the so-called "flow control" that guarantees the delivery of the data that are transferred. Flow control determines when data needs to be re-sent, and it interrupts the flow of data until previous packets are successfully transferred; i.e., the client re-requests the packet from the server until the whole packet is complete and identical to its original. UDP is another commonly used protocol on the Internet. It offers speed and is much faster than TCP, because there is no form of flow control or error correction. This main advantage, however, is at the same time its biggest disadvantage. Tsunami combines both TCP and UDP; it provides data transmission with a priority on data integrity by default, but one can disable retransmissions to give priority to flow rate. Communication to coordinate the transfer between the client and server is over a low bandwidth TCP connection. The bulk of the VLBI data is transferred using UDP.

More information about the status and future of the e-transfer operations has been compiled into an IVS Memorandum. The interested reader is encouraged to visit this memo at ftp://ivscc.gsfc.nasa.gov/pub/memos/ivs-2013-001v01.pdf.

Knowing is not enough; we must apply. Willing is not enough; we must do.

- Johann Wolfgang von Goethe

Upcoming Meetings...

IAG Scientific Assembly
Potsdam, Germany
September 1-6, 2013

Journées 2013
Paris, France
September 16-18, 2013

2nd Int'l VLBI Tech Wkshp
Jeju Island, South Korea
October 10-12, 2013

AGU Fall Meeting
San Francisco, USA
December 9-13, 2013

8th IVS General Meeting
Shanghai, China
March 2-7, 2014

EGU General Assembly
Vienna, Austria
April 27-May 2, 2014

http://ivscc.gsfc.nasa.gov/meetings

How to Become a Better Operator

– Rich Strand, NVI, Inc.

Originally, being employed at a radio observatory required you to operate, maintain, and repair all of the electronics necessary to acquire data and then ship it to a data processing center. This had an advantage, as the operator at these stations had a complete understanding of the data acquisition system end to end.

Today, at many stations most tasks have been divided up between different people based on the different skills that are required to operate and maintain the average VLBI radio observatory. For example, people trained in information technology and computer support are very important to the mission as well as those trained in electronics and repair.

Operating, however, is still the prime responsibility of many at the observatory and is needed to provide the high data yields necessary for the rest of the IVS organization to perform their tasks. The operators at each station are the starting points in the process and everything starts and stops with them. A well trained operator with a good working knowledge of data acquisition techniques is the key to a successful station.

Operating any system always begins with understanding the signal flow. As an operator make sure you can follow the path the photons from the quasar take after striking the microwave feed all the way to the recording media.

Operators that have been to the TOW Pre-Checks class have seen Westford radio observatory's flow chart as we proceed step-by-step through the system verifying everything is working correctly. Having a good understanding of signal flow from end to end at your station will help identify station problems quickly.

Know the 1PPS (one pulse per second) path from the maser to each unit or module that requires it. Know the 5-MHz (or 10-MHz) path as well and all the RF cables going to the receiver. This knowledge allows the operator to understand the interface to the VLBI DAT rack to the rest of the station equipment and the connections from the receiver to the DAT rack.

All operators should know their station timing system. This can be confusing as VLBI has a lot of clocks which all need to be set correctly each and every time they observe.

Know the terminology. The VLBI world has its own language and often you hear or read a term the rest of us use daily assuming things we speak about are understood by all. Reading and understanding the correlator and analysis reports for your station makes for excellent operators that follow the results of their work.

The Field System provides the operator with everything necessary to observe a VLBI session. This is a complex program developed over many years and has multiple tools designed in. Good operating requires you to know and understand each command and procedure that scrolls by during a session. This is not as difficult as it might appear, as these commands repeat for each scan.

For new operators on a non-observing day, one idea might be to review each and every SNAP command starting at "A" to "Z" and see what they do and how the Field System responds to each. You can also build your own test procedure and then edit it using PFMED to get an idea how all the different commands work together to run the DAT rack.

In summary, the best operators know the signal flow, rack setup, and the Field System to a point where they can recognize quickly when things are working or not. Knowing the general science of VLBI adds yet another layer to your observing skill.

Rich Strand going through the pre-check steps during a TOW workshop.

The IVS Newsletter is published three times annually, in April, August, and December. Contributed articles, pictures, cartoons, and feedback are welcome at any time.

Please send contributions to
ivs-news@ivscc.gsfc.nasa.gov.
The editors reserve the right to edit contributions. The deadline for contributions is one month before the publication date.

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The newsletter is published in color with live links on the IVS web site at

http://ivscc.gsfc.nasa.gov/.

CONT14: Continuous VLBI in Spring 2014—What to Expect

– Cynthia Thomas, NVI, Inc./GSFC

What's happening in 2014 with the best IVS stations? CONT14, of course! This highlight event is scheduled for the period starting on May 06 at 00:00:00 UT and ending on May 20 at 23:59:59 UT.

The 16+1 station network plan for CONT14.

How is CONT14 different from previous CONT campaigns? First, the network of 16 stations is the largest group of stations that ever participated in a CONT campaign. There is still a chance that the network could increase to 17, depending on Tsukuba's availability after their repairs.

CONT94	two 7-station networks	Jan 1994
CONT95	6-station network	Aug 1995
CONT96	5-station network	Sept – Oct 1996
CONT02	8-station network	Oct 2002
CONT05	11-station network	Sept 2005
CONT08	11-station network	Aug 2008
CONT11	14-station network	Sept 2011

Second, this is the first time that a CONT campaign will take place during the spring in the month of May. Scheduling the CONT14 campaign in May would have been difficult if we did not have the cooperation of the EVN Scheduler, Richard Porcas. A special thanks to Richard for coordinating with us so that stations that participate in both IVS and EVN can participate in both campaigns.

Third, there is a strong possibility of two broadband stations participating in CONT14, Westford and GGAO12M. We will not have confirmation until October 2013 about the feasibility of their inclusion. The plan is to use the same frequency sequence used in CONT11 at 512 Mbps. The frequency sequence will be finalized after more simulations are done and the media requirements are determined.

As was done in previous CONT campaigns, Ed Himwich and Brian Corey will ensure best possible performance of each participating station. The observing mode will be checked out in the R&D sessions. Also some single station tests will be used to check the stations offline. The station check-out will start with RD1309, scheduled for November 2013, and will end in March 2014 with the RD1403 session.

The CONT14 will be processed at the Washington Correlator. We will have three stations sending their data via e-transfer. Two stations will e-transfer directly to the Washington Correlator. A third station will e-transfer their data to the Haystack Correlator. The data will be copied onto a module and then shipped to the Washington Correlator. This process will help to eliminate a backlog of too much data trying to be e-transferred at one time to a single correlator. The remaining 13 stations will physically ship their data to the Washington Correlator. There will be five sessions equivalent to the rapids during this campaign (three R1s and two R4s). These sessions will be shipped or e-transferred as soon as possible and processed by the Washington Correlator immediately to meet the 15-day turn around target.

More information on CONT14 will be reported online when it becomes available at http://ivscc.gsfc.nasa.gov/program/cont14/.

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