

IVS Newsletter

Issue 17, April 2007



Harald Schuh Succeeds Wolfgang Schlüter as IVS Chair

– Dirk Behrend, NVI Inc./GSFC



A historical moment for the IVS: outgoing chair Wolfgang Schlüter congratulates the newly elected chair Harald Schuh on his new position.

Following the Directing Board elections in December 2006 and January 2007, the new Board came together in Wettzell, Germany in February 2007, among other things, to elect the new IVS Chair, i.e., the successor to the outgoing officeholder Wolfgang Schlüter. [Please read more about the details of the Board elections and the Board meeting on pages 4 and 5 of this newsletter.] Harald Schuh literally turned out to be a shoo-in. The Board voted unanimously for Harald to succeed Wolfgang as chair of the IVS. And, he does not owe this ringing endorsement merely to the coincidence of sharing the first three letters of his last name with

Wolfgang's, but clearly to his long standing experience and expertise with the VLBI technique and the IVS.

Dr. Schuh received a diploma degree in geodesy from the University of Bonn and a doctorate from the same university for work in VLBI on station displacements and Earth rotation. After steps at the German Air and Space Agency (DLR) in Cologne and at the German Geodetic Research Institute (DGFI) in Munich, he became a full professor at the University of Technology in Vienna, Austria in 2000. He is the Director of the Institute of Geodesy and Geophysics. His main research interests lie with VLBI, Earth rotation, Earth tides, geodynamics, troposphere, and ionosphere. He is co-editor of the Journal of Geodesy. Within the IVS, he was the chairman of Working Group 2 on "Product Specification and Observing Programs". The report of this working group continues to be the basis of IVS' observing program.

We wish Harald all the best for his new task and are confident for a bright future of the IVS.

Haystack Gears Up for the IVS Technical Operations Workshop 2007

– Dirk Behrend, NVI Inc./GSFC

Every two years, the IVS organizes a workshop tailored to the needs of the station operators. This so-called Technical Operations Workshop (TOW) gives hands-on training and problem resolution in VLBI operations. The fourth IVS TOW will be held at MIT Haystack Observatory from April 30 through May 3, 2007 in Westford, MA, USA.

The Program Committee for the workshop is currently working on the class layout and structure based on a poll of the training preferences among the potential students (class feedback). Once the final number of participants is known, the final class offering can be prepared based on teacher availability and other time constraints. The final class selection form will be made available on the IVS Web in early April. This selection form needs to be filled in in order to complete the registration.



The Local Organizing Committee at Haystack, in particular Heidi Johnson, has her hands full in making sure that everything will run smoothly prior and during the workshop. The number of people coming together at Haystack is expected to be in the range of 50-70. We are looking forward to seeing new as well as familiar faces at the "icebreaker" party on Sunday evening before the meeting.

The meeting web page is available at the URL <http://ivscc.gsfc.nasa.gov/meetings/tow2007/>

Permanent Component

Wolfgang Schlüter's IVS Chairmanship Ends

Wolfgang Schlüter, BKG, was chairman of the IVS since its inception in 1999. He served two full four-year terms at the helm of

the IVS. A third term was not possible according to the IVS Terms of Reference (ToR), but Wolfgang never intended to go for a third term anyway. Hence, in February 2007, Wolfgang's chairmanship of the IVS came to a natural end, as did his official time on the Directing Board. Newsletter editor Hayo Hase caught up with the outgoing chair to reflect upon the past eight years, but also to give an outlook into the future.

Wolfgang, prior to the existence of the IVS the international VLBI community already collaborated on an international level. What were the major reasons to create the IVS?

In 1994, the International GPS Service (IGS) was created in order to coordinate the GPS activities performed by many institutions all over the world. IGS was very successful; it had clear structures, well defined products, and an enormous potential for future advances. As a consequence, SLR (Satellite Laser Ranging) and VLBI became less visible in the geodetic community. Some colleagues even held that SLR and VLBI would become superfluous. It was Gerhard Beutler, then chair of IGS and chair of CSTG (Commission on International Coordination of Space Techniques for Geodesy and Geodynamics), who pointed out the unique features of SLR and VLBI and emphasized their importance and needs. He encouraged the SLR and VLBI communities to follow the example of the IGS and proposed to establish similar services. As VLBI was organized as a subcommission of CSTG at that time, Tom Clark—the chairman of the CSTG VLBI Subcommission—drafted the IVS ToR.

At its inauguration meeting in Wettzell in 1999, what were the main items on the agenda of the very young IVS?

On February 19, 1999 fifteen elected or nominated board members met in Wettzell—in the same conference room the 17th board meeting was held at. Nancy Vandenberg, then Director of the Coordinating Center and well known for her organizational skills, had prepared the first agenda. One item, of course, was the election of the chair together with a discussion of the tasks of the chair. Another important agenda item was the role of the coordinators and their plans for the future. A further point of discussion was the products that IVS was able to provide and which were based on existing observing programs. Also questions related to the organization of IVS came up, such as how to handle external proposals or what kind of meetings should be held.

It is obvious that the IVS Directing Board needed a chairman. What was the challenge for you to become chairman of the IVS?

As head of Wettzell, I was familiar with the geodetic space techniques, with leading a fundamental station, and with handling projects such as TIGO. On the other hand, I was not deeply involved in any one of the techniques; for special questions I had to get advice from the experts. Becoming chair of IVS, I was forced to get more familiar with VLBI. With support from Richard Kilger, Hayo Hase, and several friends in the VLBI community, I learned a good deal about VLBI technology. The real challenge for me was to establish a profile for the IVS, creating a strong and stable service that was ready to tackle future challenges, while taking heed of existing structures, maintaining the history, and improving product quality and timeliness. I knew that such a task could only be done with good partners and friends that share the same goal. I had to find my role as “moderator”.

In 2003 you were re-elected for a second four-year term as IVS chair. Looking back at the past eight years, what were your personal highlights?

Highlights were the results from the Working Groups. The WG2 report was the basis to change the IVS profile to a real service. As a result the coordination of the available resources was optimized and product quality and quantity was pushed to their limits. The WG3 report provides a vision for the future. It is an important report for the coordination of future technology developments in all areas of VLBI. Both reports will continue to have a major impact on the evolution of IVS. IVS meetings have always been highlights. I would like to mention all General Meetings with their social events. I also recall the Japanese “Radio Day” on June 1, 2001—a holiday in Japan. At that event I had the privilege to receive on behalf of the Directing Board a “Certificate of Commendation” from the Japanese Minister of Public Management, Home Affairs, Post and Telecommunication.



(top) Wolfgang Schlüter enters Wettzell's conference room at the first Directing Board meeting in 1999. Seated from left W. Cannon, C. Ma, E. Reinhart; (below) Wolfgang Schlüter explains the geodetic facilities installed at Wettzell.



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We know you as a person who likes to involve younger persons. What will be the tasks left for the younger VLBI generation?

I am glad that we released the vision report VLBI2010. VLBI2010 will generate a lot of work for the younger generation, from the development of the new generation telescopes, to feeds and receivers, to correlators, and to analysis software. In addition, the IAG project GGOS, to which IVS strongly contributes, opens up a lot of interesting work for the next decade(s). I hope that VLBI, in particular VLBI2010, is attractive for young researchers and will provide future prospects. I wish that the younger generation will get comparable opportunities and support to work in this field as my generation has received over the past years.

Your enthusiasm for the IVS culminated in a new radio telescope project at Wettzell. Can you outline how important it was to have the IVS Working Group reports in order to get financial support for the project?

To get financial support for any project, it is of importance that there is a real need for society. There is no doubt that reference frames are needed and that VLBI plays a fundamental role in their realization. WG2 worked out the requirements for the products, optimized the efficiency of the available resources, and set standards. WG3 outlined future requirements and provided a vision for the next generation VLBI system. Both documents were developed by leading scientists and on an international level. The documents constitute a prime reference to get across the importance of VLBI and that new radio telescopes are a valuable investment into the future. I cannot say how important the documents finally have been for getting support. I, for one, was completely convinced by the documents. They provided me with good arguments which possibly have helped in convincing the real decision makers.

What exactly will be realized at Wettzell in the years to come?

The plan is to realize two identical 12-m telescopes (TWIN Telescope) that are fully equipped for geodetic VLBI, with built-in water vapor radiometers, capable of receiving signals in the frequency domain from 2 to 18 GHz, highly mechanically stable for years, designed to observe 1000 scans per day. The goal is to guarantee continuous observations, even during maintenance periods for one of the antennas. With two antennas at one site, the number of observations could be doubled. For observing a weak signal both antennas can be combined to a more efficient receiving system.

With respect to the realization of the IAG Project "Global Geodetic Observing System" (GGOS): how important will the IVS be?

I regard GGOS as very important for soci-

ety. The project will provide the infrastructure urgently needed to meet the future requirements, e.g. for hazard research. GGOS will keep us busy for the next several years to decades. VLBI has some unique features that GGOS depends on. Only VLBI realizes and maintains the CRF; only VLBI provides the complete set of EOP; only VLBI is capable of measuring UT1-UTC. With respect to TRF, VLBI with its long baselines remains a strong contributor.

Your successor as chairperson of the IVS Directing Board is Prof. Harald Schub. What are your suggestions to him?

Harald has thorough knowledge and experience in VLBI. With him as chair, IVS is in an excellent position to meet future challenges. IVS has a good perspective with VLBI2010. It covers all areas of VLBI. Nevertheless, continued reviews are very important for not losing track of future requirements. Such reviews may include hardware and software developments, analysis procedures, and also products, and may be done either internally or by independent external experts. The status of the IAG services gives reason to some concern. IVS today has the responsibility for society to provide unique parameters. IVS is dependent on contributions from institutions based on a call for participation in 1998. The very foundation could fail any day, if key players (have to) withdraw their support, for example, due to budgetary reasons. In the years to come, it will be of extreme importance to improve the basis in close collaboration with the other measurement services.

Through the years!



Radio Day 2001



General Meeting Chile 2006



EAGS 2005



17th Directing Board Meeting
2007

IVS Directing Board Elections Held

– Alan Whitney, MIT Haystack Observatory

As directed by the IVS Terms of Reference, election of IVS Directing Board members takes place every two years to fill any vacancies due to term expiration or any other reasons. As a result, and as you are no doubt aware, the last few months have been filled with IVS election activity. An Election Committee consisting of Dirk Behrend (NVI, Inc./GSFC, USA), Harald Schuh (TU Vienna, Austria), and Alan Whitney (Haystack Observatory, USA; Committee Chair) was appointed and charged with conducting the elections.

Members whose terms were due to expire were (* indicates ineligible for re-election after completing two consecutive full terms):

- Networks Representatives: Wolfgang Schlüter* (Germany) and Shigeru Matsuzaka* (Japan);
- Correlators and Operation Centers Representative: Kerry Kingham (USA);
- At Large Members: Yasuhiro Koyama* (Japan), Franco Mantovani (Italy), and Zinovy Malkin (Russia).

Nominees for the December general election were:

- Networks Representatives: Yoshihiro Fukuzaki (Japan), Rüdiger Haas (Sweden), Hayo Hase (Germany/Chile), Alexander Ipatov (Russia), Xiuzhong Zhang (China);
- Correlators and Operation Centers Representative: Kerry Kingham (USA).

In a very close election from this strong slate, the successful candidates were Yoshihiro Fukuzaki, Hayo Hase, and Kerry Kingham.

Candidates for At Large members were: Andrey Finkelstein (Russia), Rüdiger Haas (Sweden), Ryuichi Ichikawa (Japan), Franco Mantovani (Italy), Oleg Titov (Australia), and Xiuzhong Zhang (China). In the interests of the broadest geographical representation, the Directing Board selected Drs. Finkelstein, Titov, and Zhang from this extremely well qualified set of candidates.

We welcome the new Directing Board members to carry on and build on the strong foundation of IVS, while at the same time thanking the departing members for helping to build that foundation.

Check your IVS Savvy

Are you familiar with IVS matters? You may test your knowledge with this crossword puzzle. Enjoy!

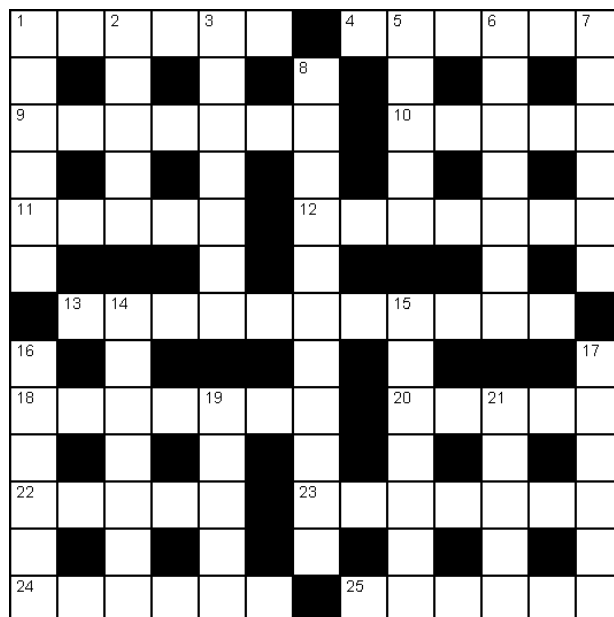
Across

1 a sequence of numbers; TV program running for a season – **4** collection of commands in programming – **9** the American postman; IVS' exploder list program – **10** subcontinent; country with an emerging VLBI program – **11** an important subject requiring a decision; the way of counting the Newsletter editions – **12** Russian Network Station – **13** organization or establishment founded for a specific purpose; building block of the IVS – **18** more than nothing, or less than nothing – **20** VLBI analysis software package; 14th-century English philosopher – **22** for a particular purpose only (Latin); usually used in conjunction with committee, group etc. – **23** to make software available on a system – **24** yearly records of activities – **25** made of an iron-based alloy.

Down

1 Ukrainian Network Station – **2** tracks that a VLBI antenna rolls on – **3** town in Suffolk, England (with ICAO airport code EGST) – **5** host country of an IVS General Meeting – **6** postponement or remission of a punishment, pardon (Spanish) – **7** to go from one place to another – **8** having different physical properties in different directions (e.g., in atmosphere modeling) – **14** Chinese Network Station south of Urumqi – **15** equipment or gadget kit

– **16** Swedish Network Station – **17** to use; to hire – **19** spreadsheet software – **21** device for lifting (e.g., VLBI antennas); the Lufthansa bird.



Notes from the 17th IVS Directing Board Meeting

– Wolfgang Schlüter, BKG

The 17th Directing Board Meeting was held at the Fundamental Station Wettzell, Bad Kötzing, Germany on Saturday, February 24, 2007. All board members—the outgoing as well as the incoming members—had been invited to participate. As chair I had the pleasure to welcome as new members Andrey Finkelstein, Russia; Hayo Hase, Germany/Chile; and Xiuzhong Zhang, China. Unfortunately the new board members Yoshihiro Fukuzaki, Japan and Oleg Titov, Australia could not attend the meeting. I congratulate the new members to their election. I am very pleased that the IVS Directing Board is well balanced in its composition with respect to global coverage, to component representation, and to a good mixture of experienced and young members.

With this Directing Board Meeting my term as the IVS Chair came to an end. The new Directing Board Members unanimously elected Harald Schuh to be the chair for the next four-year term (2007-2011). I congratulate Harald and wish him the very best. With Harald as chair, who has thorough knowledge and experience in VLBI, IVS is in an excellent position to face future challenges.

As in previous meetings, reports from the Chair, the Coordinating Center Director, and the three Coordinators were given in order to keep all board members well informed about IVS activities. The main focus of the chair since the last board meeting has been the cessation of the Canadian VLBI operations by Natural Resources Canada (NRCan). Letters of protest from the services of the International Association of Geodesy (IAG)—first from IVS, then from ILRS, IGS, and IDS—and from the IAG itself as well as a letter from the German Government (Ministry of the Interior) did not change the decision of the Canadian Government.

Nevertheless, Bill Petrachenko from NRCan, representing the Technology Development Centers (TDCs) was given permission to attend this board meeting. The Canadian TDC is still supported by CRESTech (Center for Research in Earth and Space Technology), NRCan, DRAO (Dominion Radio Astrophysical Observatory), and CSA (Canadian Space Agency), and is not affected by the cessation—with the consequence that Bill is authorized to continue his work as representative of the TDCs and, in particular, as chair of the VLBI2010 Committee. This is of extreme importance for the IVS and for the continuation of VLBI activities in Canada in view of VLBI2010. It gives hope that in the future Canada will reinstate geodetic VLBI observations, possibly in the frame of a new program. I would like to thank Gerhard Beutler, President of IAG, and the chairs of our sister services for their solidarity.

The Observing Program Committee (OPC) approved a proposal from Bjorn Engen, Norwegian Mapping Authority, and others to establish an additional Intensive-type session involving Wettzell, Tsukuba, Ny-Ålesund and other stations

with e-VLBI capability and the MPI-fR/BKG Correlator in Bonn. The goal is to apply e-VLBI for UT1 determination to demonstrate very short latency product delivery and to fill the 36-hour gap in the data series between the INT1 and INT2 Intensive series, which occurs on Monday mornings.

Recent activities in various countries are of great importance for the realization of VLBI2010. I would like to mention the following:

- New Zealand: purchase of a new VLBI antenna and the foreseen participation in the IVS observing program,
- Australia: realization of plans to install three telescopes that are well distributed over the continent,
- Korea: formation of a geodetic VLBI program in addition to the astronomical/geodetic KVN (Korean VLBI Network) project,
- Germany: design and development of a TWIN telescope (two identical telescopes) for VLBI2010,
- USA: testing of the broadband approach for VLBI2010.

Moreover, plans to develop and build geodetic VLBI facilities are currently being discussed in India.

A joint IERS/IVS Working Group was set up under the chairmanship of Chopo Ma. The purpose of this working group is to generate the second realization of the ICRF from VLBI observations, consistent with the current realization of the ITRF and EOP data products. The goal is to present the second ICRF to relevant authoritative bodies, e.g. IERS and IVS, and to submit the revised ICRF to the IAU Division I Working Group “On the second realization of the ICRF” for adoption at the 2009 IAU General Assembly.

It was a real honor for me to have been IVS Chair for eight years. I am very grateful that I had the privilege of collaborating with so many unique people, excellent scientists, engineers and technicians. Thank you very much.

A full report of the board meeting is available online at <http://ivscc.gsfc.nasa.gov/about/org/board/>.



The participants at the IVS Directing Board meeting in Wettzell. From left to right: A. Niell, Y. Koyama, S. Matsuzaka, E. Himwich, B. Petrachenko, K. Kingham, A. Whitney, C. Ma, R. Booth, P. Charlott, H. Hase, A. Finkelstein, H. Schuh, X. Zhang, D. Behrend, W. Schlüter, Z. Malkin.

Advances of the Global Geodetic Observing System

—Dirk Behrend, NVI Inc./GSFC



(top) Participants at the GGOS Retreat in Oxnard, CA, USA in February 2007.

The Global Geodetic Observing System (GGOS) project of the International Association of Geodesy (IAG) made further steps in becoming an operational system. A group of about 30 people came together in Oxnard, CA, USA to participate in the GGOS Retreat 2007. The main focus areas of this three-day event (February 19–21) were threefold: (1) reports from the GGOS working groups and GEO (Group on Earth Observations) representatives about their on-going work, (2) discussion of the



(top) Tom Herring during his talk on the future geodetic reference frames.; (below) The GGOS Chairs (from left): Hans-Peter Plag (Vice-Chair), Markus Rothacher (Chair), and Ruth Neilan (Vice-Chair).

GGOS2020 process with a presentation of preliminary results and consequences for implementation, and (3) building GGOS on the existing services and commissions of the IAG including a discussion on potential contributions and challenges of integration.

The IVS was represented by Dirk Behrend, the nominal IVS delegate to GGOS,

but also by Chopo Ma (IERS Delegate and Member of the GGOS Executive Committee) and Harald Schuh (invited participant). IVS will strongly contribute to GGOS by providing uniquely the CRF (Celestial Reference Frame) and the full set of EOP (Earth Orientation Parameters) including nutation and UT1-UTC. Further, it will contribute to the TRF

(Terrestrial Reference Frame), in particular the scale. In order to reach the goal of 1 mm accuracy for GGOS, the IVS has started investigations into the next generation VLBI system and work is under way to realize the VLBI2010 vision.

GGOS is working on its vision for the future geodetic observing system—dubbed GGOS2020. VLBI will be an integral part of this system. The GGOS2020 Reference Document (about 140 pages) is being drafted and is planned to be finalized by the IUGG General Assembly in Perugia, Italy in July 2007. This document is intended to provide background material and details for a global geodetic observing system in terms of concepts, conventions, infrastructure, and services. The main target group is the geodetic community proper. In addition to this document, a second document—the GGOS2020 Strategy—shall provide the main vision and an overview of the key issues. The scope of this strategy document will be about 30–40 pages with the target group being the decision makers, whose financial support will be required for realizing GGOS.

A sensitive issue with considerable discussion was whether the documents should list the planned number of stations for each technique. The consensus was that numbers should be included; however, this should be accompanied by a discussion of necessary redundancies and required minimum numbers.

The GGOS Steering Committee will meet during the EGU in Vienna, Austria in April 2007 and again in Perugia, Italy in July 2007. Furthermore, a combined workshop of GGOS and IGOS-P (Integrated Global Observing Strategy Partnership) will take place in Frascati, Italy on November 5–6, 2007. More information on the latter event can be found at http://geodesy.unr.edu/ggos/ggosws_2007/index.html.

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/>.

VLBI How To...

SINEX Files for IVS Intensives

— Axel Nothnagel, Institute for Geodesy and Geoinformation, University Bonn

Since January 1, 2007, the official IVS earth orientation parameter series is computed using datum-free normal equations in SINEX format. After only three months it has become apparent that the agreement of the inputs of the IVS Analysis Centers to the IVS combinations of 24-hour network sessions has improved significantly. The major reason is certainly that the datum is applied consistently with an identical terrestrial reference frame for all input series.

Looking at the improved agreement, it is only a consequent step to also use this method for the combination of input series of IVS Intensive sessions from individual IVS Analysis Centers. A change-over to a combination procedure based on datum-free normal equations in SINEX format will mostly eliminate the need for applying offset and rate terms which have to be adapted quite frequently in the current combination process for the Intensives carried out by the IERS.

Establishing the data flow in SINEX format for the Intensives will also have another application which has been proposed and conveyed to the IVS by the IERS Analysis Coordinator, Markus Rothacher. For the combination with other space-geodetic techniques—in particular GPS—on a low-latency basis, IVS Intensive observations could play a more prominent role, if SINEX files were used. Here, the parameter set envisaged would consist of X,Y,Z of both sites, X-pole, Y-pole, UT1–UTC (UT1–TAI), and LOD. Of course, this set of parameters will never be usable for a reasonable VLBI-only solution without applying multiple constraints on the datum, on polar motion, and possibly on LOD. However, the files would be suitable for any type of combination applications conceivable in the future, where the datum and other information would be contributed by other techniques.

At present, the necessary directory structure and filters are being set up at the IVS Data Centers and first tests are carried out for the extraction of the SINEX files as well as for the combination with GPS data. We would like to urge IVS Analysis Centers to look into this issue and prepare to contribute to this important activity of the IVS. The improved agreement of the network session solutions of the individual IVS Analysis Centers through the use of normal equations in SINEX files has told us that this is the right way to go.



Science never solves a problem without creating ten more.

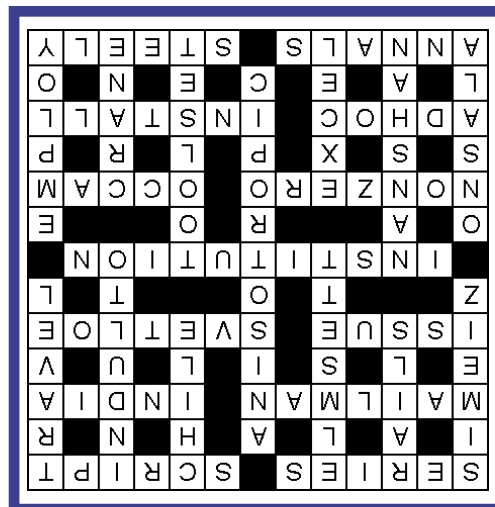
— George Bernard Shaw

Upcoming Change in E-Mail Exploder List Handling

Due to a large and steady increase of spam mail sent to the IVS e-mail exploder lists over the last several months, the Coordinating Center will change the policy on how non-authorized submissions are being handled. The plan is to only allow submissions from subscribers and people on a white list. Note that the subscription and white list entries are based on the e-mail addresses provided. The actual, real-world name of a subscriber is not recognized in this context. Submissions done from other e-mail addresses will be automatically discarded without notification.

The roll-out of the change is foreseen in the next several weeks. Information on this will also be sent to the individual mailing lists. If you want an address added to the white list, please send the pertinent information to Dirk Behrend (dbb@ivscc.gsfc.nasa.gov). This may be necessary if you use more than one e-mail address. The receiving of messages from the exploder lists will not be affected.

Puzzle on page 4



Upcoming Meetings...

European VLBI Meeting
Vienna, Austria
April 12-13, 2007

Joint Assembly 2007
Acapulco Mexico
May 22-25, 2007

8th IVS Analysis Workshop
Vienna, Austria
April 14, 2007

TimeNav'07
Geneva Switzerland
May 29-June 1, 2007

EGU General Assembly
Vienna, Austria
April 15-20, 2007

IUGG General Assembly
Perugia, Italy
July 2-13, 2007

Fourth IVS TOW
Haystack Observatory
Westford, MA, USA
April 30-May 3, 2007

Journées 2007,
Meudon, France
September 17-19, 2007

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

Stamp-ede

– Dirk Bebrend, NVI, Inc./GSFC



Special issue stamps showing the VLBI antennas at Yebes, Spain (top) and Ny-Ålesund, Norway (below).



A real treat for the philatelists among the VLBI community: the Spanish and the Norwegian postal services recently issued special issue stamps depicting the VLBI antennas at Yebes and Ny-Ålesund, respectively. On February 16, Spanish “Correos” announced the emission of two stamps in the “Sciences of the Earth and the Universe” series, one featuring the new 40-m radio telescope at Yebes (<http://www.correos.es/comun/filatelia/2007/img/16-feb-07a.jpg>). Just five days later, on February 21, Norway’s “Posten” followed suit with their special issue stamps for the commencement of the International Polar Year 2007–2008. Here one of the stamp pair was inspired by the geodetic VLBI antenna at Ny-Ålesund (<http://www.posten.no/Portal/Privat/SamleFrimerker/Frimerkeprogram/NK+1639-40.htm>). For more information please go to the following Web links:

Spain: http://www.correos.es/comun/filatelia/2007/0450_07-seleccionaSello.asp?idSello=4022007&idiom=ENG&idiomaWebActual=ES

Norway: <http://www.posten.no/Portal/English/NorwayPostPhilatelicServices/StampProgramme/Read+more+1639-40.htm>.

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