Abstracts of the 2nd General Meeting of the Asia-Oceania VLBI Group for Geodesy and Astrometry

Keynote Speech

Synergy aspects of AOV and IVS

Axel Nothnagel (University of Bonn)

Regional VLBI groups for geodesy and astrometry like AOV and EVGA play an important role in the self-organisation of the IVS. In this presentation, the benefits of the regional VLBI groups as well as a list of open issues in the operations of the IVS will be presented. In particular, the talk covers imminent tasks which apparently are not addressed by any VLBI group at the moment but should be taken over by somebody as soon as possible.

Activity Report for each institute

Status report of Geoscience Australia

Oleg Titov (Geoscience Australia)

New modern VLBI technology is designed to achieve a 1-mm goal in routine geodetic VLBI experiments. However, no mathematical procedure to demonstrate the performance has been developed so far. In my presentation, I suggest to use the scale factor estimated for a single VLBI experiment. The 'evolution' of the parameter since 1980 follows the improvement in previous VLBI technology advancements. Therefore, the scale factor could be used as a statistical criterion for the performance of a geodetic VLBI network.

We have a set of observations that were performed by radio telescopes in Asia-Oceania (and sometimes, other regions) over the last 3 years. I will report on two achievements:

- astrometric observations of radio stars. With 4 successful sessions, 4 radio stars were detected (2 in S/X and 2 in X band only). Using legacy astrometric data, the proper motion of the stars may be estimated with high accuracy. One of the stars discloses a strong non-linear proper motion with a period of ~50 years that hints a presence of an invisible companion. In addition, parallax of the stars could also be estimated with an accuracy up to 30 microarcsec, if more follow up experiments are organised.

- test of general relativity on 1-2 May, 2017. We obtained the best accuracy of the PPN parameter, gamma, ever achieved with VLBI technology (formal error is 9*10^-5). I will provide a short report and propose another session on 8 October to track radio source 3C279. Since this source is stronger, it could be detected closer to the Sun followed by a further reduction of the statistical uncertainty. The goal is to beat the Cassini test of the general relativity (formal error is 2.3 *10^-5) that is the stringent limit in the post-Newtonian parameter 'gamma'.

Status report of GSI

Michiko Umei (Geospatial Information Authority of Japan)

The Geospatial Information Authority of Japan (GSI) has actively been involved in the Asia-Oceania VLBI Group for Geodesy and Astrometry (AOV) as a station, scheduler, and correlator since its establishment. Operation of the Tsukuba 32-m antenna was terminated at the end of 2016 and was dismantled this year. On the other hand, the Ishioka VLBI station has performed international observations since 2015 and takes over the role of the Tsukuba station. Both stations were basically involved in the AOV sessions. In addition, the Ishioka station succeeded in the first international VGOS experiment with AOV (UTAS and NICT) last year. We report on the current status of the Ishioka station and its future plan.

Current Status of VERA Geodetic VLBI System

Takaaki Jike (National Astronomical Observatory of Japan)

VERA is carrying out two kinds of geodetic VLBI observation. One is VERA internal VLBI observation with K-band, and another is participating to IVS sessions includes AOV with S/X bands. In order to correspond to the specification changes of these observations, the observation system of VERA-Mizusawa was updated concerning widening of observed bandwidth and improvement of sampling-recording rate. Newly developed DBBC (OCTAD) was adopted as the geodetic VLBI observation system, by verification of a fringe, we stated use of this updated observation system for IVS session.

Status report of SHAO

Bo Xia (Shanghai Astronomical Observatory)

The Shanghai Astronomical Observatory (SHAO) has been involved in the IVS observations and data analysis for many years. In recent years, we also made Kunming 40-m and Tianma 65-m radio telescopes available for the IVS observations. The Shanghai VLBI correlator began to provide regular data correlation within the framework of the IVS from 2015 onward. This report will outline recent geodetic activities conducted at SHAO and report our plans in the near future, with emphasis on the AOV activities.

Status Report of VLBI Group of NICT/Kashima

Mamoru Sekido
(National Institute of Information and Communications Technology)

The VLBI Group of NICT/Kashima is developing a broadband VLBI system GALA-V. Combination use of small diameter antenna and broadband observation, compact and high performance VLBI system is being developed. That is conceptually compatible with VGOS system. In addition to domestic R&D experiments, international broadband experiments are expected to be conducted in this year. Besides of those development, status of the 34-m antenna will be presented in this report.

AuScope VLBI operations at UTAS

Lucia McCallum, Jamie McCallum (University of Tasmania)

The Australian geodetic VLBI operations are coordinated by the University of Tasmania (UTAS), contracted through Geoscience Australia. We operate three telescopes across the Australian continent, in Hobart (Tasmania), Katherine (Northern Territory) and Yarragadee (Western Australia), at a current level of about 160 days per year.

In this status report we give an update on changes in the personnel and funding situation, our current activities, and plans for the future. The biggest challenge in the upcoming year is the upgrade of all three AuScope antennas to broadband VGOS, as well as our aim to build a sustainable research group in VLBI. For both projects, we actively seek collaboration within the AOV.

A report from the Warkworth NZ Radio Observatory

Tim Natusch, Sergei Gulyaev (Auckland University of Technology)

The Warkworth Radio observatory involvement in current Geodetic and Astrophysical research programmes will be reviewed. Recent developments including work to add an X band capability to the 30-m antenna, efforts to implement Tsys + Pcal measurements, the installation of Fila10G units to allow higher bandwidth recording from the stations DBBC digitisers and results of work undertaken to establish a "cloud based" correlation facility will be discussed.

Activity report of NIPR

Y. Aoyama[1], K. Doi[1], H. Hayakawa[2], T. Fujisawa[2], E. Sasamori[3], Y. Tamura[3], M. Nakamoto[4] and K. Shibata[4]
(1: National Institute of Polar Research & SOKENDAI, 2: The 56th Japanese Antarctic Research Expedition, 3: The 57th Japanese Antarctic Research Expedition, 4: The 58th Japanese Antarctic Research Expedition)

To investigate polar science, the National Institute of Polar Research (NIPR), Japan is managing Japanese Antarctic Research Expeditions (JAREs). Syowa Station (69.0°S, 39.6°E) was established 60 years ago on East Ongul Island, Dronning Maud Land (DML), East Antarctica as the main wintering base for JARE's activities.

Syowa Station has become one of the key observation sites in the Southern Hemisphere's geodetic and geophysical networks. As a part of several geodetic measurements, the JAREs have been operating the 11–m S/X–band antenna, which is registered as IERS Domes Number 66006S004 and as CDP Number 7342, at Syowa Station for geodetic VLBI experiments since February 1998.

During 2015–2017, the 56th, the 57th, and 58th JARE participated in two AOV sessions— AOV002 and AOV013. Although we planned to participate AOV007 session, we cancelled due to a malfunction of video converter. We will participate in the AOV sessions once a year at least in future.

Contribution Talk (Research and Science)

Some consideration on AOV observations

Fengchun Shu (Shanghai Astronomical Observatory)

Currently most of IVS observing resources are devoted to the EOP monitoring. In the coming 5-10 years, this work will be transited to the growing VGOS network. While in China, there are still some big antennas to be installed, in addition to currently used Kunming, Urumqi and Tianma65. One question is whether those big antennas can play a role in the field of VLBI geodesy and astrometry. I will briefly present some recent astrometric activities, in cooperation with the AOV stations, and propose some ideas for future astrometric observations with the AOV stations.

Dynamic Scheduling – a simulation study

Elizabeth J. Iles, Lucia McCallum, Jim Lovell (University of Tasmania)

Presently, development of the Dynamic Observing process is being undertaken at the University of Tasmania. Responding to the VGOS plan of continuous 24/7 observing, Dynamic Observing aims for more automation in VLBI observing and analysis. Using the AuScope array and the 15 m antenna at Hartebeesthoek in South Africa, a first realisation of this process has now successfully undergone proof-of-concept testing.

In this talk we will show that from a range of Dynamic Scheduling simulations it was determined that EOP results of the current standard are achievable with even short or non-continuous contributions from only 2 overseas stations, additional to the Australian network. We believe it is in the best interest of the geodetic community for this to be confirmed observationally so as to facilitate further development of Dynamic Observing and increase the overall number of VLBI observations.