Geoscience Australia IVS Analysis Center

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Abstract

This report gives information about current and future activities of the Geoscience Australia IVS Analysis Centre.

1. Introduction

In mid-2001 Geoscience Australia (GA, formerly AUSLIG) was admitted as a full analysis centre of the International VLBI service (IVS). Using the OCCAM 5.0 software package, 5 EOPs are estimated and submitted routinely to the IVS Data Centre. The activity of the GA Analysis Centre is being further enhanced to improve and densify the ICRF in the Southern hemisphere, especially due to the convenient location of Hobart and Parkes radio telescopes. The contribution of GA is described, addressing future prospects for VLBI activity in Australia.

2. EOP Service

The GA Analysis Center regularly submits the EOP estimates from weekly NEOS-A VLBI sessions. The VLBI data processing is undertaken using OCCAM 5.0 software package [1] which incorporates an implementation of the IERS Conventions 2000 [2] computation standards. Using the Kalman filter technique, daily values of the X-pole, Y-pole components, UT1-UTC and the two corrections to the IAU 1980 nutation model are estimated. A random walk dynamical model is used to treat the wet troposphere delays and clock offsets as stochastic parameters. Troposphere gradients and clock rates are estimated as constant parameters, except in some extraordinary cases when non-zero dynamical model dispersion for clock rate is applied for the analysis.

The statistics of the comparison of the EOP time series from the IVS Analysis Coordinator web-page (solution from 09-Jan-2002) are given in Table 1.

Table 1. Biases and weighted root-mean squares of the GA IVS EOP series

	x_p		y_p		$UT1-UTC$		$d\psi \sin\epsilon_0$		$d\epsilon$	
	bias $[\mu as]$	wrms $[\mu as]$	bias $[\mu as]$	wrms $[\mu as]$	bias $[\mu s]$	wrms $[\mu s]$	bias $[\mu as]$	wrms $[\mu as]$	bias $[\mu as]$	wrms $[\mu as]$
GA	-30.6	120.2	-44.0	28.9	4.7	3.9	3.0	34.3	25.2	49.4

Also the daily estimates of the EOPs from two parallel independent VLBI networks (NEOS-A and CORE-A) have been analysed to compare EOP determinations from two independent observing systems. Between January, 1997 and April, 2000 80 parallel VLBI sessions have been observed on these independent networks. The independently determined EOP time series from these two networks are approximated by linear functions so that the offset and rate of the differences between the networks for the common epoch are estimated. Indications are that the biases between the two EOP solutions are negligibly small for the years 1996-1997, but increase with time. A more detailed analysis is presented in [3].

3. Software Development

OCCAM software has been updated to implement the new models of IERS Conventions 2000 as well as to cater to the needs of users. The new version OCCAM (5.0) has been finalised and distributed at the end of 2001.

A global solution strategy is now being implemented to estimate radio source positions and to construct a catalogue. The least squares collocation method (LSCM) [4] is applied to adjust for these parameters using all available VLBI observations. The parameters are divided into three groups:

- global (constant for the entire observation span)
- local (constant for a 24-hour session)
- stochastic (estimable for every observation)

An apriori covariance function must be applied for the LSCM procedure to avoid any degeneration of the normal equation matrix. Analytical expression of the covariance functions is described in [5].

4. Outlook

The improvement and densification of the ICRF in the Southern Hemisphere is a priority. Therefore, a program, within the auspices of the IVS, to observe a selected set of radio sources to the south of -30 latitude is proposed, using the Australian radiotelescopes in Hobart (Tasmania University) and Parkes (Australian Telescope National Facilty).

5. References

1. Titov, O., V. Tesmer, J. Böhm, OCCAM Version 5.0 software. User Guide, AUSLIG Technical Report, 7, 2001.
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3. Titov, O., Analysis of the EOPs from Independent Parallel VLBI Sessions, Proceedings of IAG meeting in Budapest, 2001, (in press).
4. Titov, O., Estimation of subdiurnal tidal terms in UT1-UTC from VLBI data analysis, IERS Technical Note 28, B. Kolaczek, H. Schuh, D. Gambis (eds.),Paris Observatory, pp.11-14, 2000.
5. Titov, O., H. Schuh, Short periods in Earth rotation seen in VLBI data analysed by least squares collocaton technique, IERS Technical Note 28, B. Kolaczek, H. Schuh, D. Gambis (eds.), Paris Observatory, pp.33-41, 2000.