Comparison and Combination of the Earth Orientation Parameters Submitted to the IERS Alignment Campaign 2002

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Introduction

Several Earth Orientation Parameters (EOP) series (pole coordinates, UT1–UTC, nutation coefficients) for the years 1999 and 2000 submitted by various Analysis Centers (ACs, see Table 1) to the IERS Alignment Campaign were edited, compared and combined. Only independent raw time series, i.e. without any preprocessing, with the station coordinates fixed to the ITRF2000, were used. Figure 1 shows the nine time series for the months June and July 1999 obtained from the VLBI Analysis Centers.

Table 1 Overview of the participating ACs

Abbr.	ACs	Submitted techniques
ASI	ASI, Italy	SLR
BKG	BKG, Germany	VLBI
CAN	NRC, Canada	VLBI
DGF	DGFI, Germany	VLBI
GAUS	GAUS, Australia	VLBI
GSF	NASA GSFC, USA	VLBI
IAA	IAA, Russia	SLR
IGG	IGG, Austria	VLBI
OSO	OSO, Sweden	VLBI
OS2	OSO, Sweden	VLBI
SHAO	SHAO, China	SLR, VLBI
CODE	AIUB, Switzerland	GPS

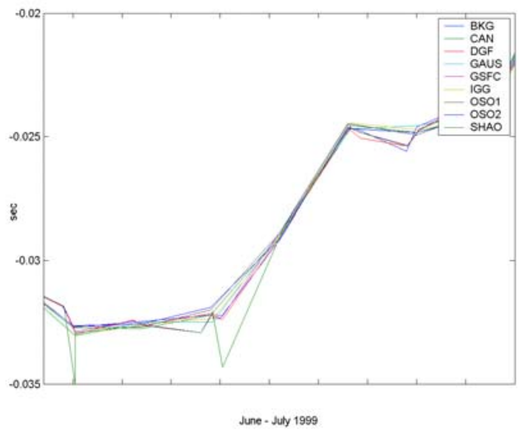

Fig. 1 Individual VLBI solutions for the xpol time series as submitted by the IVS Analysis Centers

Combination procedure

Before combining and comparing the various solutions from the different ACs it was necessary to edit the raw data and interpolate them to weekly epochs. Then, a two-step procedure for the combination was carried out (see flow chart in Figure 2). In a first step AC-dependent biases were removed and a combination within each technique was carried out. In Figure 3 the edited data and the combined VLBI series are displayed. In the second step, after removing technique-dependent biases, a combination of the different techniques was calculated. This step is carried out twice, first unweighted and then with assigned weights calculated from the standard deviations of the first, unweighted solution. In Figure 4 the individual solutions of each space geodetic technique and the combined weighted series are plotted.

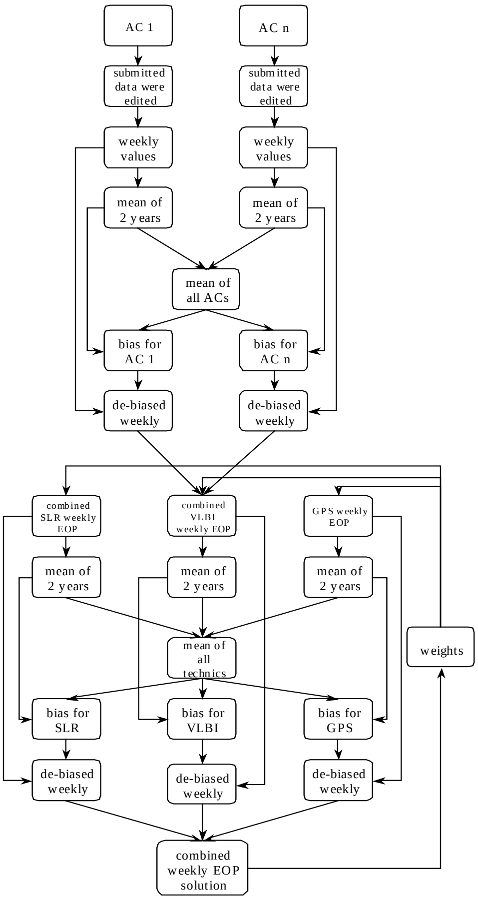

Fig. 2 Flowchart of the combination procedure

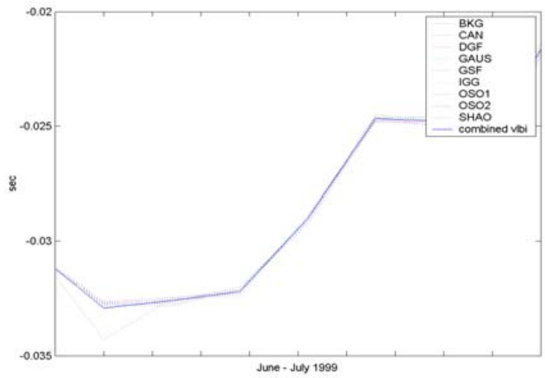

Fig. 3 Individual VLBI submissions and the combined VLBI time series for xpol

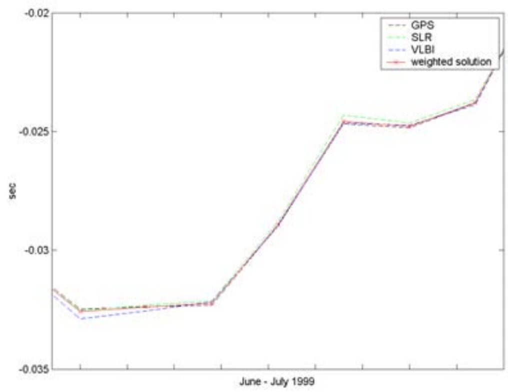

Fig. 4 Individual VLBI solutions of the different techniques and combined weighted solution for the xpol time series

Results, Discussion and Conclusions

Most problems occurred when editing and interpolating the raw data that were submitted to the IERS Alignment Campaign covering different time intervals, given on different time epochs, and the coordinates fixed to different reference frames with different a-priori models used for the analysis. For our combination only solutions with the station coordinates fixed to the ITRF2000 were used. The comparison shows a good agreement between most ACs. The two-step procedure (1^{st} step combination within each technique, 2^{nd} step combination of the various techniques) improved the quality of the results in terms of accuracy and robustness. However, clear descriptions are needed of the reference frames, a-priori models, and parameters to be determined.

Stand. dev. of the individual techniques w.r.t. the unweighted combined solution

	xpol [mas]	ypol [mas]
VLBI	0.155	0.134
SLR	0.147	0.170
GPS	0.095	0.095
Comb. solution	**0.138**	**0.143**

Stand. dev. of the individual techniques w.r.t. the weighted combined solution

	xpol [mas]	ypol [mas]
VLBI	0.173	0.122
SLR	0.154	0.205
GPS	0.064	0.059
Comb. solution	**0.100**	**0.099**