SOPAC 2002 IGS Analysis Center Report

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Introduction

The Scripps Orbit and Permanent Array Center (SOPAC) at the Scripps Institution of Oceanography (SIO) has been producing precise satellite orbits, Earth Orientation Parameters, and station positions since 1991 when the Permanent GPS Geodetic Array (PGGA) project was initiated in southern California. SOPAC has been an analysis center from the inception of IGS.

This report covers the activities between 2000 and 2002, and will focus on SOPAC's GPS analysis strategy, changes in the software/procedure, and a review of some of the results.

Products Submitted and Served

SOPAC provides both processed products as well as observation data products (see companion SOPAC global data center report) accessible through anonymous ftp at (ftp://garner.ucsd.edu) and http (http://garner.ucsd.edu/), with explanatory information on our webpage (http://sopac.ucsd.edu/).

There are four types of processed products that SOPAC contributes to IGS at three latency levels. The products are summarized in Figure 1 and Table 1.

Analysis Procedure

SOPAC "final" solutions are based on daily sessions in distributed mode, that is, we divide the global network into sub-networks. During the period 2000-2002, three sub-networks were used (see Network Configuration below). Once the daily solutions are produced for a given GPS week, the loosely constrained solutions are fed into a weekly combination analysis, in which the orbits, EOP, and site positions are tied to a designated reference frame by constraining the positions of a group of selected core sites.

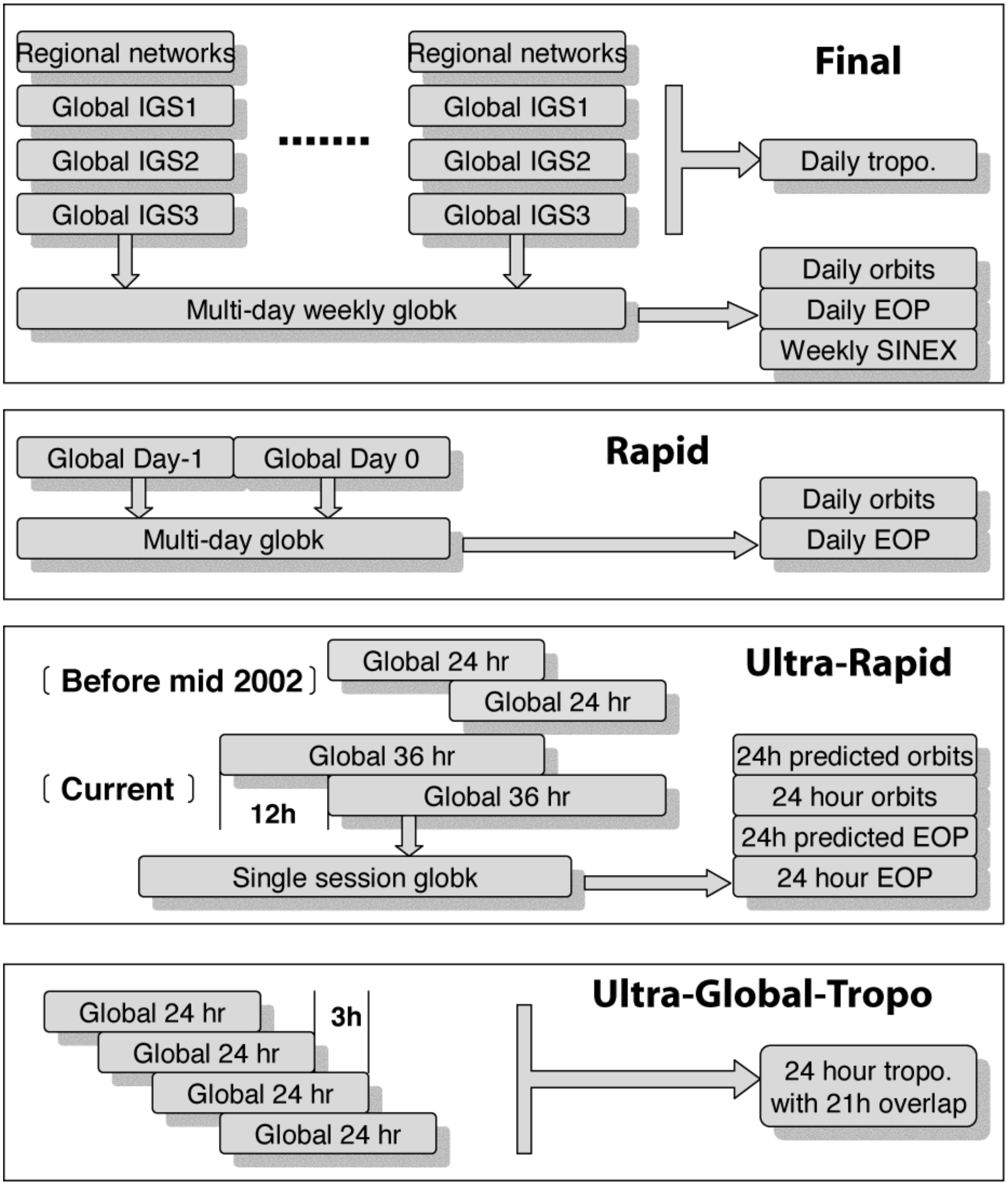

Figure 1. Flow chart for SOPAC final, rapid, ultra rapid processing and products.

SOPAC "rapid" solutions are based on multi-day solutions, that is, current day and previous day. The original two sub-network scheme, maximum 26 sites each, has been replaced by single network, up to 36 sites, since late 1999. This change was based on the evaluation of the orbit /EOP performance and the consideration of processing efficiency.

After the introduction of IGS ultra rapid products from GPS week 1075, SOPAC has contributed its 00h and 12h hourly orbit solutions. This process is based on a single 24-hour session using data from a single network of up to 38 sites.

SOPAC also contributes to the IGS near real-time global tropospheric delay product using a sliding window scheme. 24-hour session data from 40+ selected sites are processed every 3 hours with a latency of about 2 hours.

The main processing engines are GAMIT [*King and Bock*, 2002] and GLOBK [*Herring*, 2002].

The related software version changes and the applied model parameter changes for the above solutions are summarized in Table 2. More detailed processing parameters, models applied [*McCarthy*, 1992, 1996; *Beutler et al*., 1994; *Springer et al*., 1998; *Bar-Sever*, 1996; *Dong and Bock*, 1989; *Niell*, 1996, *Wu et al*., 1993] and processing strategies remained unchanged and have been reported in a previous SOPAC annual AC report [*Fang et al*., 1998]. The ocean loading model used is based on the *Scherneck* [1991] model.

Since all products are defined with respect to the global reference frame, the choice of core sites and the constraints on their positions and velocities play an important role in data processing. The constraint histories for final and rapid solutions can be found on the SOPAC webpage.

Network Configuration

For SOPAC final solutions, the global sites are grouped into 3 sub-networks: IGS1, IGS2, and IGS3, of 50+ sites each (Figure 2). IGS3 mainly includes the IGS defined core stations. Since there is a high concentration of global stations in Europe, some of the 'global' stations are grouped into SOPAC's EURO regional sub-network. Figures 1-3 show the basic network configurations for IGS1, IGS2, and IGS3. The sites in the maps include all sites processed within 2000 and 2002 time frame. Since the sites in each network have been adjusted from time to time, the detailed history of site inclusion and exclusion can be found in the constraint history plots.

Reprocessing of IGS Products

SOPAC has completed the reprocessing of its entire data holdings (starting in 1991) including both global and regional networks [*Nikolaidis*, 2002; *Bock et al*., 2003]. We now have a consistently analyzed data set and all SOPAC data products are referenced to ITRF2000 [*Altamimi et al*., 2002]. Web-based interfaces have been developed to facilitate users access to the IGS products and their derivatives. See, for example, http://sopac.ucsd.edu/cgi-bin/refinedJavaTimeSeries.cgi; http://sopac.ucsd.edu/processing/coordinates/).

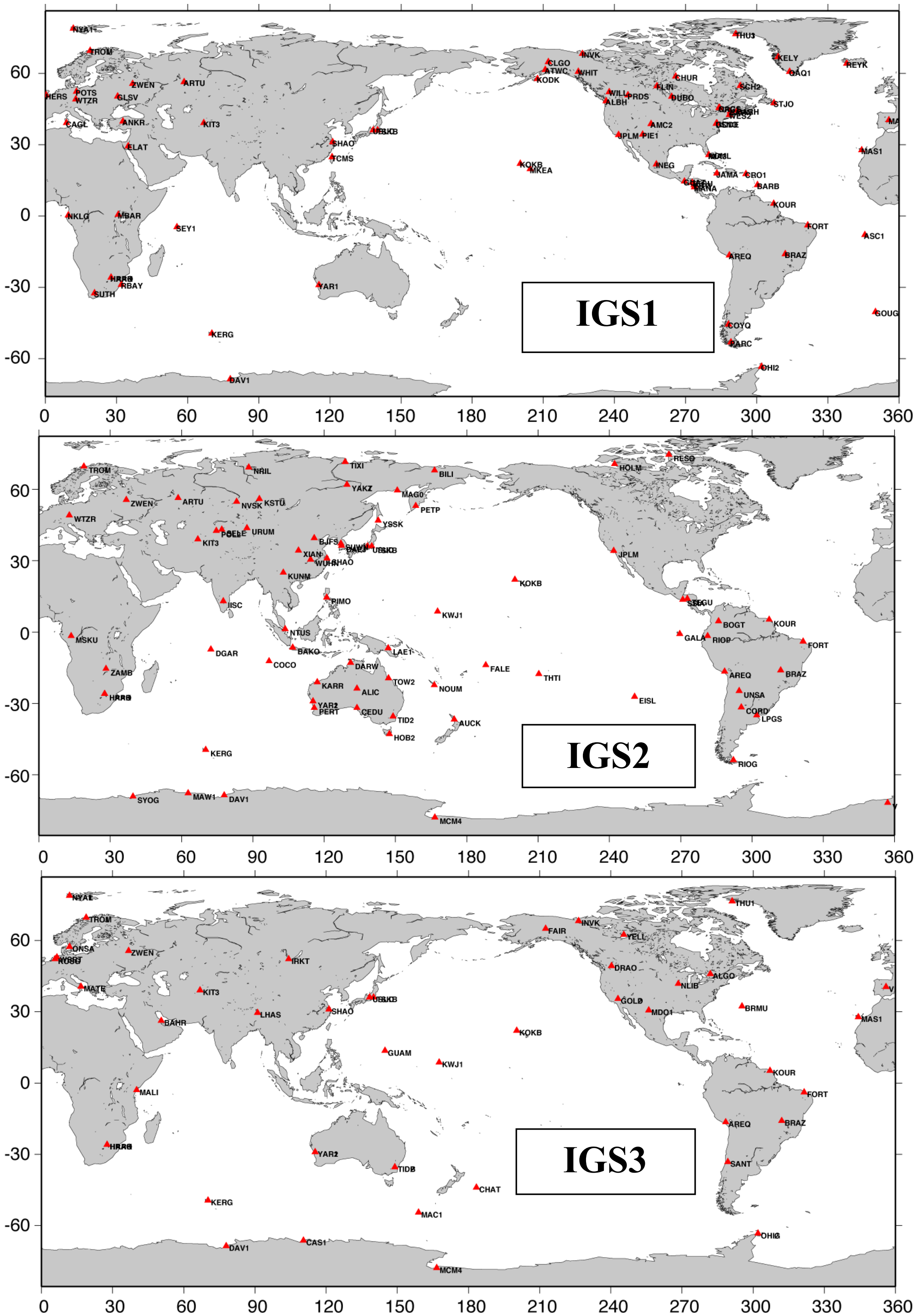

Figure 2. Site distribution of sub-networks for SOPAC final solutions (2000-2002).

Table 1. SOPAC IGS products (2000-2002)

Type of Product	Latency	File Format	*Description*
Final Products	4-8 days	siowwwwn.sp3	Daily precise orbits
		siowwww7.erp	Weekly EOP (pole, UT1-UTC, LOD)
		siowwww7.snx	Weekly SINEX files
		siowwwwn.tro	Hourly tropospheric delay updated daily
		siowwww7.sum	Weekly processing summary
Rapid Products	18 hours	sirwwwwn.sp3	Daily rapid orbit solutions
		sirwwwwn.erp	Daily rapid EOP solutions
Ultra Rapid Products	2 hours	siuwwwwn.sp3 *siuwwwwn_hh.sp3	24 hr estimated + 24 hr predicted orbits
		siuwwwwn.erp *siuwwwwn_hh.erp	24 hr estimated + 24 hr predicted EOP
		siowwwwn_hh.tro	Hourly tropospheric delay updated ever three hour

Latency is defined as the time period from product delivery to the end time of the observation session used in the data processing.
* new naming convention after the product update frequency changed from daily to every 12 hour.

Table 2. Reference frame, tidal model applied, and software version change history for SOPAC products (2000-2002)

	Reference frame		Pole tide/Ocean tide		GAMIT version		GLOBK version	
Final	2000 001	Itrf97	2000 001	No/No	2000 001	9.93	2000 001	5.05
					2000 122	9.92	2000 122	5.03
					2000 170	9.93	2000 170	5.04
			2000 331	Yes/Yes	2000 331	9.94	2000 331	5.05
	2001 302	Itrf00						
	2001 340	Itrf00U						
					2001 364	9.95		
							2002 055	5.06
Rapid/ Ultra Rapid	2000 001	Itrf97	2000 001	No/No	2000 001	9.93	2000 001	5.05
					2001 004	9.94		
	2001 345	Itrf00U						
					2001 363	9.95		
			2002 008	Yes/Yes				
							2002 035	5.06

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