

## 3.4 Technique Centres

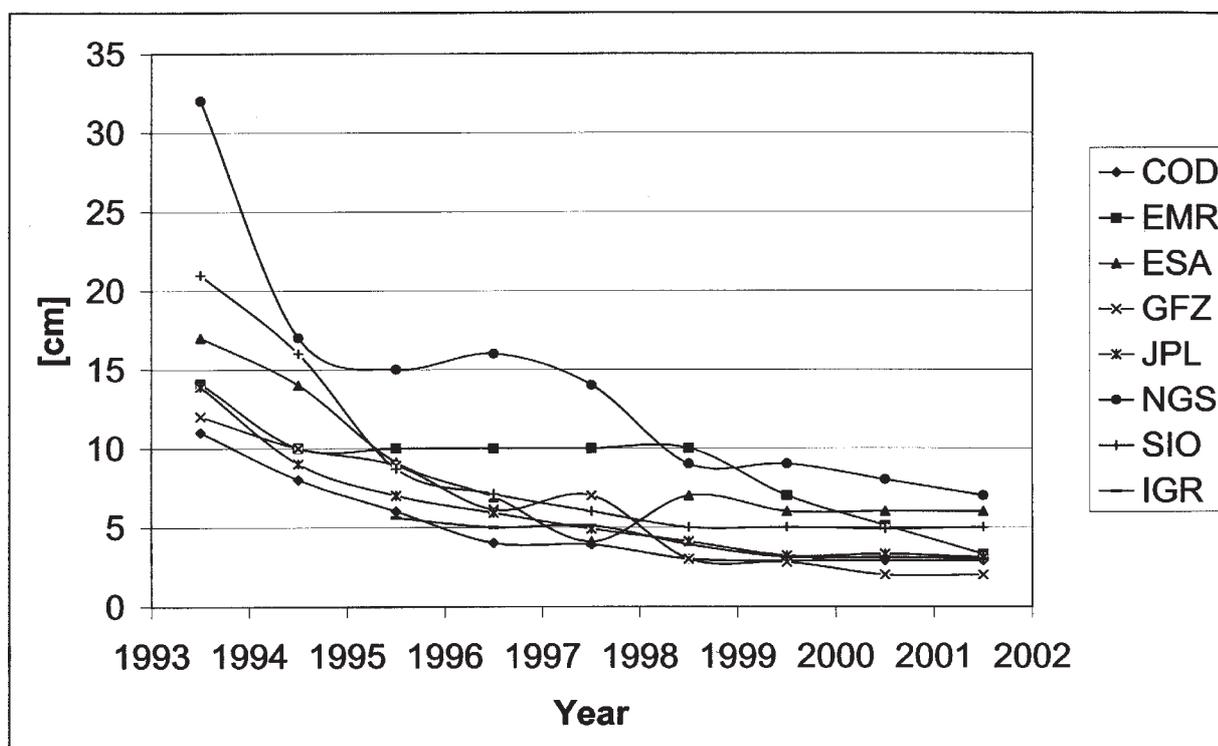
### 3.4.1 International GPS Service (IGS)

**General** The International GPS Service is committed to provide the highest quality data and products as the standard for global navigation satellite systems (GNSS) in support of Earth science research, multidisciplinary applications, and education. In this context the IGS offers a large number of consistent products which constitute the practical realization of the International Reference System and allow for an easy access to the most recent ITRF. Table 1 gives an brief overview of the estimated quality of these data sets at the begin of the year 2002.

*Table 1: Quality of the IGS Reference Frame products as of January 2002 (for details see <<http://igscb.jpl.nasa.gov/components/prods.html>>)*

Products	Ultra-Rapid Real Time	Rapid 17 hours	Final 13 days	Units
Delay				
Orbit	25.0	5.0	< 5.0	cm
Clock	5.0	0.2	0.1	ns
Polar Motion		0.2	0.1	mas
LOD		30.0	20.0	$\mu$ s/d
Stations h/v			3.0/6.0	mm
Troposphere			4.0	mm ZPD

*Figure 1: Weighted orbit RMS (WRMS) of the Analysis Center and the IGS Rapid (IGR) orbit solutions with respect to the IGS final orbits; WRMS values were smoothed for graphical representation*



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All products are based on a combination process of the individual IGS Analysis Centre (AC) solutions to ensure enhanced reliability. Figure 1 demonstrates the improvement in consistency of the AC's orbit solutions with respect to the combined IGS final orbit since 1994. End of 2001 several Analysis Centre solutions as well as the IGS rapid orbit were close to reach the 2 centimetre orbit precision level, also indicated by the IGS 7-day arc orbit analysis.

#### Tracking Network

In 2001 the IGS Central Bureau has added downloadable maps, demonstrating the distribution of the network stations, in several formats to the IGS server (<<http://igs.cb.jpl.nasa.gov/>>). In addition, a collaborative design of a future site log format, accommodating the planned inclusion of IGLOS stations, was completed. This new site log will be introduced in 2002.

Figure 2: IGS Global Station Network

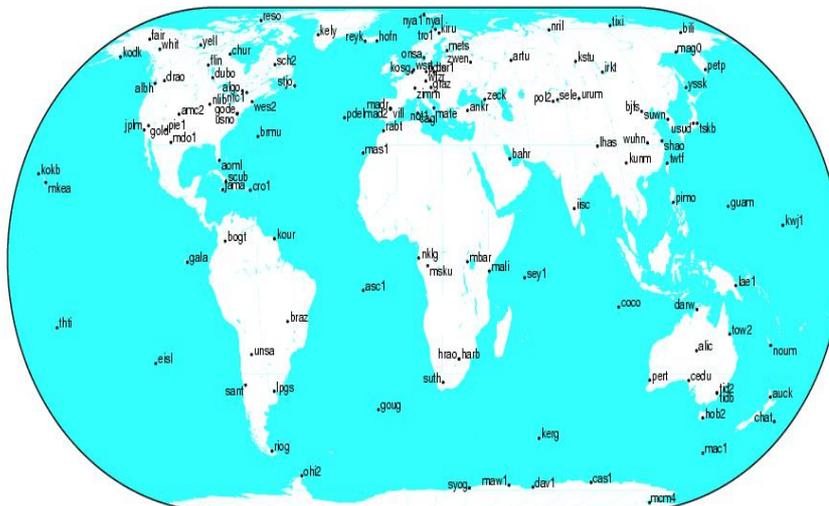


Figure 2 shows the so-called 'Global IGS stations network' which consists of about 110 sites as of begin 2002. Besides, there is a quite large number of additional IGS tracking stations, predominately located in the European, in the Central North American, and in the Southern Californian Region.

For further information see <<http://igs.cb.jpl.nasa.gov/network/netindex.html>>.

#### Africa

In order to encourage the installation of supplementary IGS tracking stations on the African continent (about ten stations at the end of 2001), IGS representatives participated to several meetings with representatives of African National Mapping Agencies.

- Reference Frame** Since December 2001 (GPS-Week 1143) all IGS products are based consistently on the IGS Reference Frame realization (IGS00) of the ITRF2000. To perform this task the unconstrained weekly combined IGS-SINEX solution of station coordinates/velocities and ERP's is aligned by minimum datum constraints to IGS00, based on a list of 54 reference stations with high quality positions/velocities in ITRF2000. Previous to the combination also the individual orbit solutions are rotated by means of a spatial similarity transformation to this common frame.
- IGS Projects** Within IGS a number of Working Groups focus on selected topics related to the IGS components. Furthermore Pilot Projects have been launched to develop new products and services. A few of them are briefly presented below. For a complete list and descriptions see <<http://igs.cb.jpl.nasa.gov/projects/projindex.html>>.
- TIGA Pilot Project** In March 2001, the IGS set up the TIGA Pilot Project for monitoring tide gauge benchmarks for long-term sea-level studies. Within TIGA, data analysis will be performed with a very low latency, but with as much as possible stations included.
- IGLOS Pilot Project** The International GLONASS Service - Pilot Project (IGLOS-PP) is a pilot service of the International GPS Service (IGS) to track and analyze data from the Russian GLONASS satellite constellation. The products from the Service should facilitate the use of combined GLONASS and GPS observations for scientific and engineering applications, and allow users to experiment with the combined systems as a prototype Global Navigation Satellite System.
- The IGLOS - Pilot Project was expected to start in 2001, but was postponed until 2002. While from the analysis point of view, the GLONASS data could be perfectly integrated in the routine IGS operations unreliable station meta-data and the correct handling of the combined data within the data centres caused the major delays.
- IGS/BIPM Pilot Project** The central goal of this pilot project is to investigate and develop operational strategies to exploit GPS measurements for improved availability of accurate time and frequency comparisons worldwide. This will become especially significant for maintaining the international Coordinated Universal Time (UTC) timescale as a new generation of frequency standards emerges.
- LEO Meeting** Beginning of March, an IGS LEO Pilot Project Meeting was held in Potsdam, Germany. The primary purpose of this meeting was devoted to understanding upcoming Low Earth Orbit (LEO) missions

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carrying GPS flight receivers, with particular emphasis on CHAMP, in order to develop the goals, objectives and structure for the IGS LEO Pilot.

#### **Outlook**

In order to support real-time applications the IGS provides combined 'ultra-rapid' satellite orbits (IGU) in standard SP3 format since November 2000. Because this format is not flexible enough e.g. to characterize sufficiently the variable accuracy of the given data points within the IGU-orbits, a new format, preliminary labelled SP3c, has been developed. Furthermore the update cycle of ultra rapid products will go down from 12 hours to 3 hours. Both innovations will become effective end of 2002.

With the tremendous growth of the IGS and an increase in demanding applications, the IGS Board decided to develop a strategic plan for the IGS for the coming years. This strategic plan was finalised in 2001 and is available on request from the IGS CB ([igsbc@jpl.nasa.gov](mailto:igsbc@jpl.nasa.gov)). Three key strategies have been identified to achieve the long-term goals and objectives of the IGS which are firstly *to ensure delivery of world standard GNSS data and products, providing the standards and specifications globally*, secondly, *to pursue new opportunities for growth to improve the services and serve a broader range of users* and finally *to continuously improve the effectiveness of the IGS organization*. The report, which further highlights the roles of the various IGS components, is thought to characterize the anticipated path of development of the Service over the upcoming 6 years.

#### **References**

##### **2002-2007 IGS Strategic Plan**

IGS Central Bureau, eds.  
Pasadena, CA: Jet Propulsion Laboratory, 2002.

##### **2000 IGS Technical Reports**

IGS Central Bureau, eds.  
Pasadena, CA: Jet Propulsion Laboratory, 2002.

##### **2000 IGS Annual Report**

IGS Central Bureau, eds.  
Pasadena, CA: Jet Propulsion Laboratory, 2002.

These documents are also available via FTP at  
<<ftp://igsbc.jpl.nasa.gov/igsbc/resource/pubs/>>.

Network, Data and Analysis Center Workshop 2002  
Workshop Recommendations  
<[http://www2.geod.nrcan.gc.ca/~pierre/  
workshop\\_reco\\_website.htm](http://www2.geod.nrcan.gc.ca/~pierre/workshop_reco_website.htm)>

Network, Data and Analysis Center Workshop 2002  
Summary of 2002 IGS Workshop  
[IGSMail-3845]:  
<<http://igscb.jpl.nasa.gov/mail/igsmail/2002/msg00183.html>>

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