IGS DATA CENTER OVERVIEW

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DATA CENTER SESSION

- Introduction and Overview of Data Center Status (C. Noll/CDDIS)
- Ideas and Perspectives for the Present and Future IGS Data Network Management (L. Daniel, E. Gaulue/IGN)
- Data Center Security Issues (H. Habrich/BKG)
- Data and Information Exchange Between Agencies (M. Scharber/SIO)
- General Discussion

OVERVIEW

- Background
  - Data centers
  - Types of data and products
- Current Status of Data Centers
  - Recent developments
  - Data and product availability
  - Timeliness of data deliveries
- Real-Time Issues
- Data Center Working Group
- Future Plans

BACKGROUND

- IGS has hierarchy of data centers
  - Operational or local data centers
  - Regional data centers
  - Global data centers
- Operational or local data centers (OCs or LDCs) interface to receiver, download, and QC data
- Regional data centers (RDCs) gather data from OCs and maintain archive of stations in a particular region
- Global data centers (GDCs):
  - Receive/retrieve data (IGS global sites, at a minimum) from OCs and RDCs
  - Equalize data holdings for key sites
  - Provide archive of data and products for ACs and user community

IGS DATA CENTERS

- Operations/Local Data Centers
  - ASI* AUSLIG* BKG*
  - CNES* DGFI DUT
  - ESOC* GFZ*† GOPE*†
  - GSI ISR JPL*†
  - NIMA NMA* NOAA*
  - NRCan* PGC* PGF*
  - RDAAC SIO* UNAVCO*
  - USGS +Others
- Regional Data Centers
  - AUSLIG* BKG* JPL*†
  - NOAA NRCan RDAAC
- Global Data Centers
  - CDDIS*† IGN* SIO*

* indicates data center currently transmitting and/or archiving hourly, 30-second GPS data from selected sites

† indicates data center currently to transmit and/or archive high-rate GPS data for LEO activities

GPS (AND GLONASS) DATA SETS

- GPS (and GLONASS) data (daily files)
  - 30-second sampling
  - ~300 GPS stations (~50 GLONASS) at CBIS
  - Average 2-hour delay
  - File types:
    - O (RINEX observation data)
    - D (RINEX observation data, Hatanaka compression)
    - M (RINEX meteorological data)
    - N (RINEX broadcast ephemeris data)
    - S (output from teqc)
- Near real-time GPS (and GLONASS) data (hourly files)
  - 30-second sampling
  - ~100 regularly submitting
  - Average 5-15 minute delay
  - Retained for three days
  - Since mid 1998
- High-rate GPS data
  - 1-second sampling
  - 39 stations currently (from JPL, GFZ, ASI, and GOPE)
  - Data in 15 minute files (*ssssdddhmi.yyt.Z*)
  - Since mid 2001

IGS PRODUCTS

- Orbit, clock, ERP products
  - Seven ACs
  - Since GPS week 0649
  - Weekly precise combination, daily predicted and rapid combinations from AC Coordinator (AIUB)
- SINEX products (station positions)
  - Standard IGS and working group products
  - Seven ACs, two GNAACs, three RNAACs (currently)
  - Since ~GPS week 0840
  - Weekly combination from Reference Frame Coordinator (NRCan)
- Ionosphere products (global ionosphere maps of total electron content, TEC)
  - Working group product
  - IONEX format
  - Daily files
  - Five AACs
  - Since June 1998
- Troposphere products (combined zenith path delay, ZPD)
  - Working group product
  - Seven AACs
  - Weekly files
  - Weekly combination (from GFZ)
  - Since January 1997

IGS GLOBAL DATA CENTER HOLDINGS

Data Type	CDDIS	IGN	SIO
Data			
GPS daily (D format)*	X	X	X
GPS daily (O format)	X		X
GPS hourly (30-second)*	X	X	X
GPS hourly (high-rate)	X		
GLONASS daily (D)†	X	X	
GLONASS daily (O)†	X		
Products			
Orbits, etc.*	X	X	X
SINEX*	X	X	X
Troposphere†	X	X	X
IONEX†	X	X	

* Official IGS data set/product

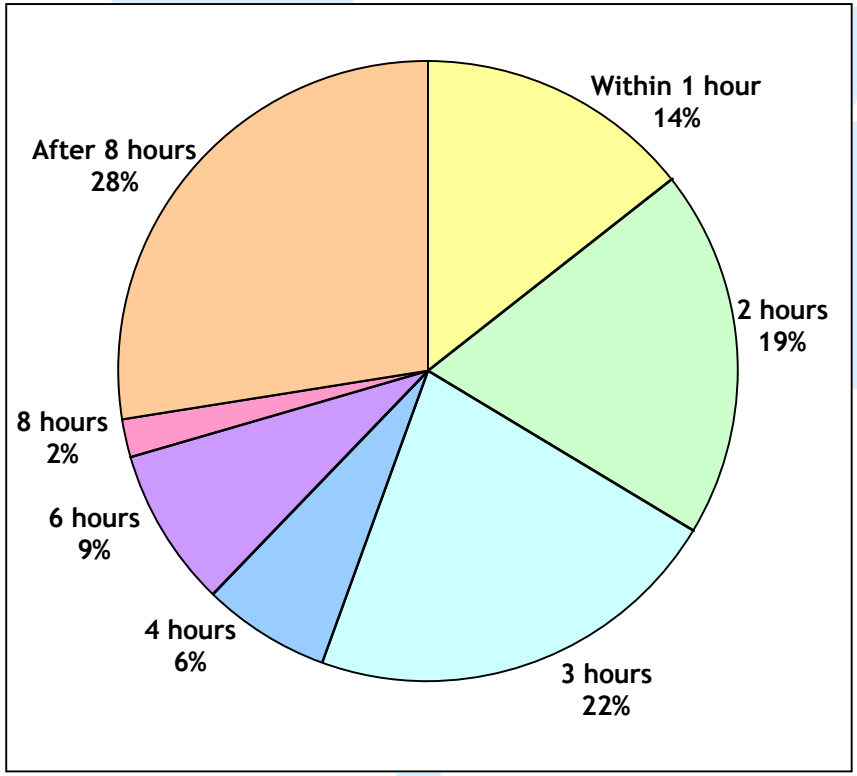
† Pilot project/working group data set/product

RECENT DEVELOPMENTS

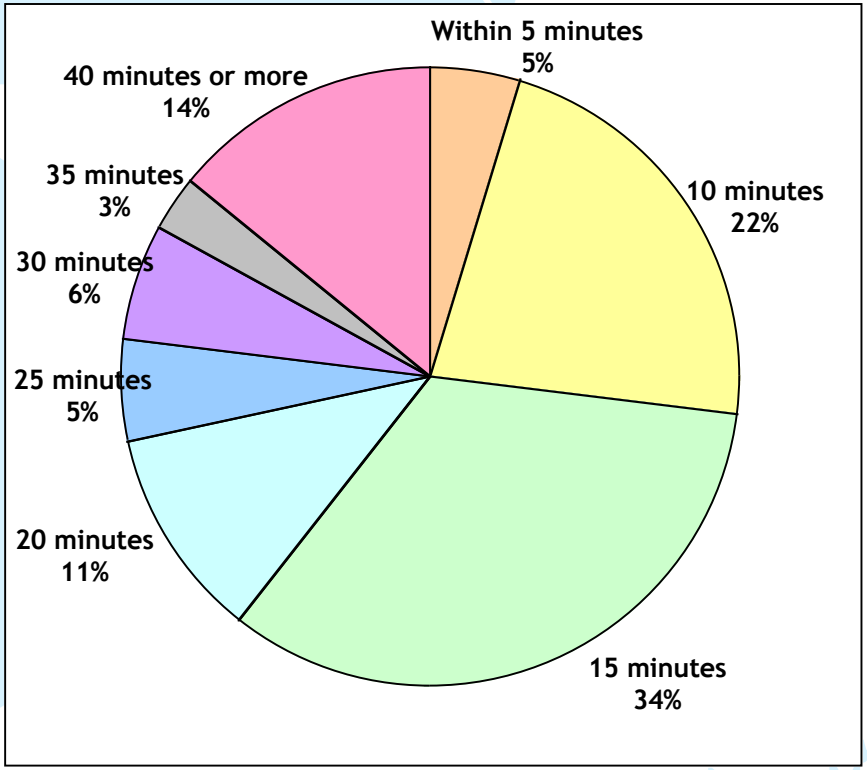
- General:
  - Integration of GLONASS data into IGS data stream to begin in 2002 in support of IGLOS-PP
  - Approximately 60% of daily data files delivered within three hours
  - Approximately 60% of hourly 30-second data files delivered within fifteen minutes
- IGN:
  - Begun "revitalization" of global data center in Jun-01
- SIO:
  - Archiving observation data in compact RINEX as of Apr-2001
  - Began archive of hourly, 30-second RINEX data in May-2001
- CDDIS:
  - Began archive of 1-second RINEX data in 15-minute files in May-2001 in support of LEO-PP; also archiving analysis products for test campaign (13 received thus far)
  - Archive of LEO receiver data (CHAMP and SAC-C) since Jan-2002 in compact RINEX (V2.0) format; retrieved from GENESIS archive
  - Supported HIRAC/SolarMax campaign in Apr-2001; archived 13 Gbytes of high-rate data from 104 sites

DATA LATENCY (CDDIS)

Daily Files



Hourly (30-Second) Files



REAL-TIME ISSUES

- Data center involvement dependent upon requirements developed by IGS Real-Time Working Group
- Data center would act as a distribution/relay center
- Data is streamed into relay center and then streamed out to analysis center
- Redundancy along this data flow path is important
- Need to gather information from potential distribution centers
  - Capacity
  - Bandwidth
  - Redundant connectivity

IGS DATA CENTER WORKING GROUP

- Direction of IGS has changed; time to re-visit data center requirements
- Many projects and working groups have been created since the inception of the IGS
- Address issues and challenges at the IGS data centers (all levels) in order to improve service for users both internal and external to the IGS
  - Effective data flow
  - Backup of the operational data flow
  - Security
  - Consistency of data holdings among centers
  - Timely archive and dissemination of data in a real-time scenario
- Membership consists of main IGS data center contacts plus other experts
- Immediate plan:
  - Contact potential members (done)
  - Develop charter (done)
  - Present draft charter at next IGS Governing Board meeting (April 11) for approval

IGS DCWG ACTIVITIES

- **Near-term activities:**
  - Ensure data center information at IGS CB is current
  - Create web site for working group
  - Establish DCWG email exploder
  - Develop a user survey form and compile results
  - Develop a topology of the current IGS data flow
  - Develop data flow redundancy procedures at key data centers
  - Develop procedures for identifying and notification of problem/replacement data sets

- **Long-term activities:**
  - Study of web-based enhancements to data center information
  - Interface with real-time working group and assess requirements
  - Study seamless archive and how effort can be utilized by the IGS and provide a benefit to the data centers

FUTURE PLANS

- Integrate GLONASS data into the IGS/GPS data flow and archive
- Survey existing data centers concerning real-time data flow support and capabilities
- Begin efforts within IGS Data Center Working Group
- Finalize backup data flow plans and conduct tests