



IGS INTERNATIONAL  
GNSS SERVICE

# IGS Data Centers: Status and Progress

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- Then and now
- Current status
  - MGEX support
  - Real-time activities
  - Metadata efforts

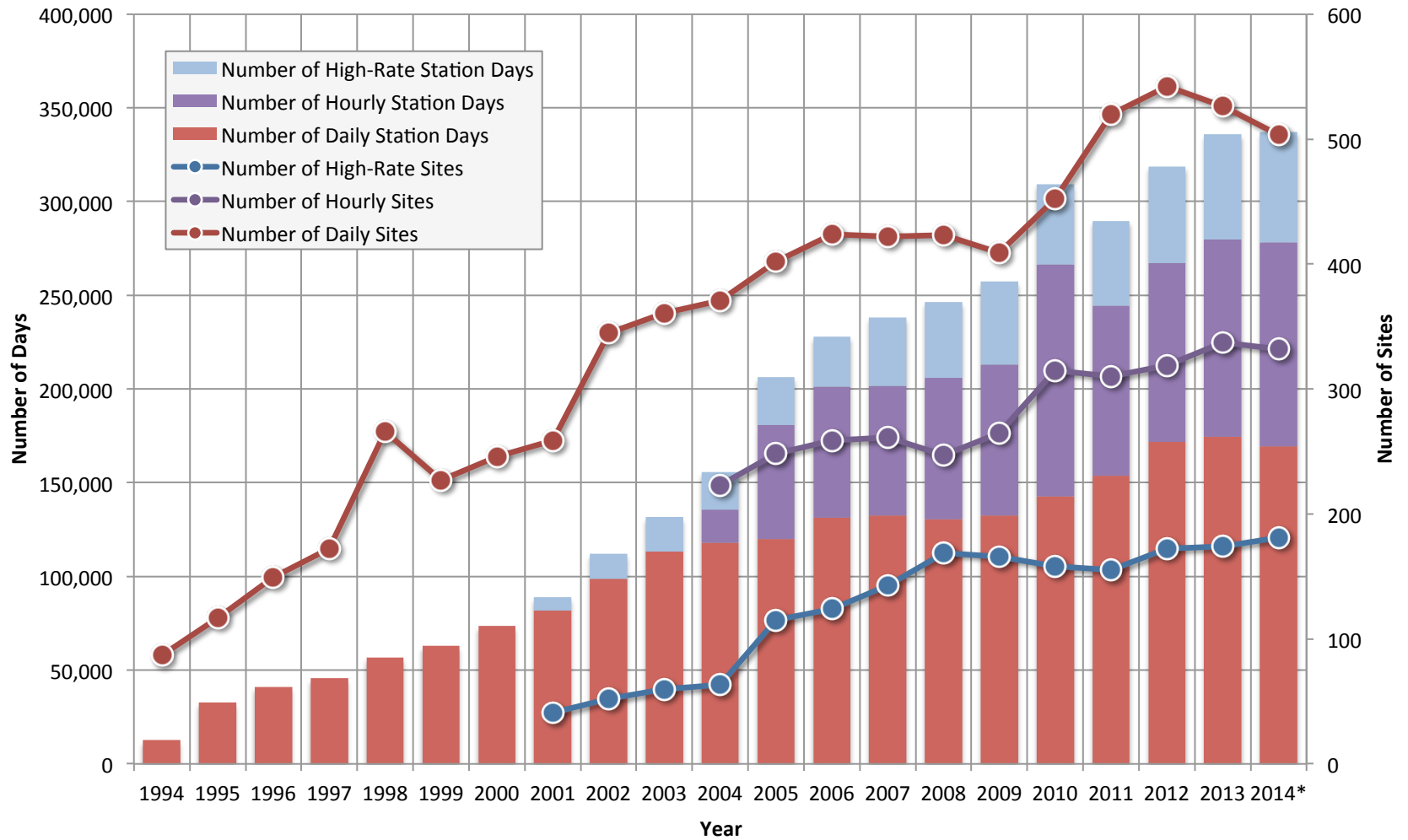
- Using CDDIS as an example:

- Data

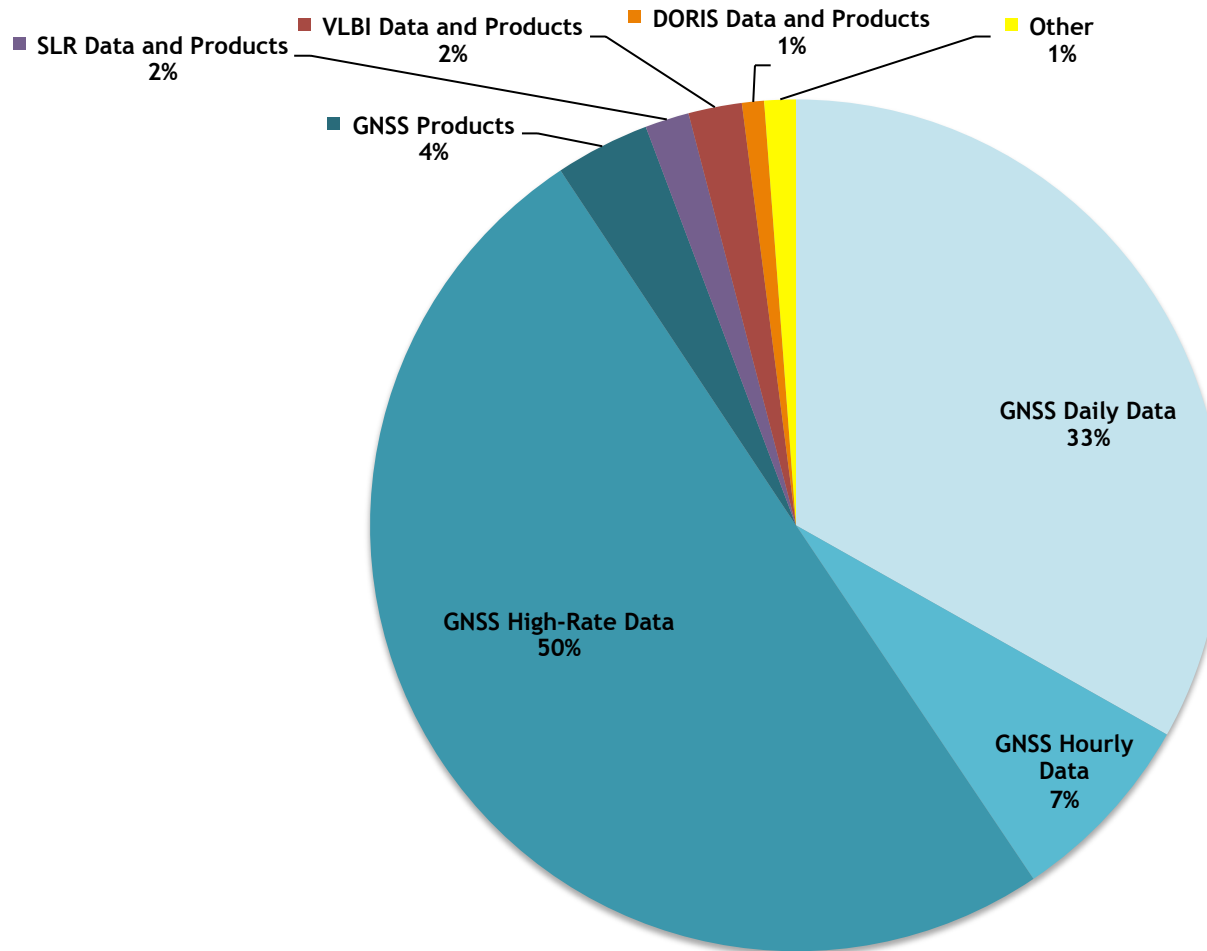
- 1994:
  - ~85 daily 30-second sites
- 2014:
  - 500+ daily 30-second sites
  - 330+ hourly 30-second sites
  - 180+ high-rate 1-second sites
  - 140+ real-time sites
  - 110+ MGEX sites (daily, hourly, high-rate)

- Products

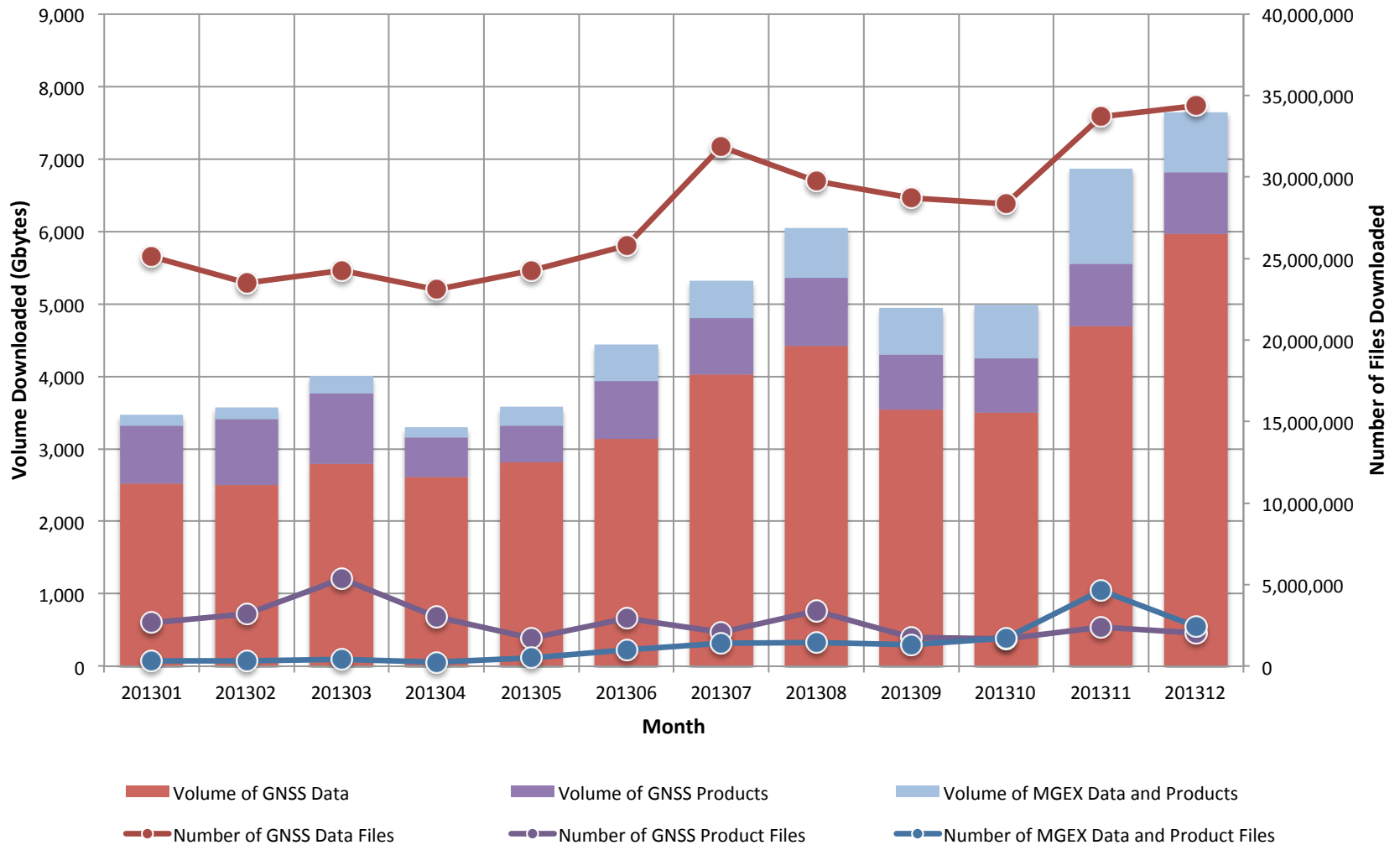
- 1994:
  - Orbit and ERP from 7 ACs + combination
  - Weekly and daily rapid
- 2014:
  - Orbit, ERP, reference frame, clock solutions from 9 ACs
  - Reference frame solutions from 5 AACs
  - Weekly, daily, rapid, ultra-rapid
  - Orbit, clock, and reference frame combination
  - ~600 files/week
  - Ionosphere
  - Troposphere
  - MGEX
  - RTS
  - repro1 and repro2



\* Estimated values for full year



- CDDIS archive is currently nearly 10 Tbytes in size; over 9 Tbytes of this archive, or 90%, is devoted to the storage of GNSS data and derived products.



- IGS data centers currently supporting MGEX: CDDIS and IGN (Global DCs), BKG (regional DC)
- All data supplied in RINEX V3 format
- Separated from operational IGS data (archived in RINEX V3 format)
  - Under “campaign” directory structure at GDCs, e.g., <ftp://cddis.gsfc.nasa.gov/gnss/data/campaign/mgex>
- Files utilize same filenaming convention, e.g., ssssddd#.yyt.Z
  - Same filenames have caused confusion and errors in archive
- Current “separation” not conducive for integration in IGS operations
- Need to plan for integration of RINEX V3 into operational archive structure while ensuring clear “separation”

- Move to utilization of new filenaming convention as specified in RINEX V3.02 documentation
  - `mmmmsscccc_s_yyyydddhhmm_fff_tt.rnx/crx.gz`
  - `ALGO00CAN_R_20121600000_01D_GN.rnx.gz`
  - `KIRU00SWE_R_20141600000_01D_30S_MO.crx.gz`
- New filenaming convention will require significant work for DCs (and ACs)
- Will remove some difficulties DCs have experienced in handling V2 and V3 data from same site
- Test:
  - CDDIS has started providing RINEX V3 data (from selected sites) in both old and new filename format
  - Purpose: Promote use of new filename format
  - Utilizes gzip for compression
- Need a “teqc-like” utility for data QC and metadata extraction



- Nearly 140 sites supply real-time streams to IGS RTS
- Some high-rate files created at the receiver, some from real-time streams
- DCs must ensure that files generated from these streams are sufficiently reliable; some suggestions:
  - tool for comparison of RINEX files from various construction approaches
  - minimum requirements for acceptance of an accumulated data stream of observations as a RINEX file in IGS data archives
  - mandatory/optional observation types to be included
  - procedures to fill the gaps in the case data streams have been interrupted
  - separate directories for distinguishing between files created from streams and by receivers?

- Past recommendation: IGS DCs investigate implementation of improved metadata standards and search and data discovery tools to improve access to the diverse archive structures available through the IGS and to aid in the integration of these archives into GGOS and other global data systems.
- Metadata is essential for data discovery
- DCs extract metadata from incoming files for managing their archives
- Tools, e.g., teqc, also useful for metadata extraction (DCs need similar tool for RINEX V3!)
- DCs provide statistics on availability of data
- Information about usability of the data would also be helpful

- Daily status files available at CDDIS summarize data holdings and include key metadata
- Available for operational and MGEX daily data
- File location: ftp://cddis.gsfc.nasa.gov/gnss/data/daily
- Software available to other DCs

IGS Tracking Network Status for 09-Jun-14 140609 14160 GPS Week 1796 Day 2 As of date: Jun 19 2014 17:58:44

Site	Dly (H)	No. Exp.	No. Obs.	Pts. Del.	Avg. %	Avg. MP1	Avg. MP2	Pos. Diff	No. Slps	No. V	Receiver Type	Antenna Type	Ant. Height	Marker Name	Marker Number	Marker Type	RINEX Version	Dly (M)	Checksum		
aber	156	25116	24377	375	97	0.43	0.44	0.03	31	1	TRIMBLE NETR9	TRM59900.00	SCIS	3.9650	ABER	13231M001	M	2.11	9430	64de0c9491409c3e474f2589c65a0139	
abmf	6	26325	26319	2	99	0.38	0.40	0.04	0	1	TRIMBLE NETR9	TRM57971.00	NONE	0.0000	ABMF	97103M001	M	2.11	424	a27cf0b95ba608ea5c0cda5ea99e6e79	
abpo	1	27408	25561	4	93	0.55	0.58	0.07	3	1	ASHTECH UZ-12	ASH701945G_M	SCIT	0.0083	ABPO	33302M001	G	2.11	73	18ce0d122589b0afa5b1cce537b56cde	
adis	1	28896	27223	432	94	0.53	0.54	0.04	23	1	JPS LEGACY	TRM29659.00	NONE	0.0010	ADIS	31502M001	M	2.11	86	f0459d03791b7172d91317f10acfff65	
aira	1	24682	19553	973	79	0.39	0.51	0.05	76	1	TRIMBLE NETR9	TRM59800.00	SCIS	0.0000	AIRA	21742S001	M	2.11	100	0826e686d6ed28865a33fefaf95ea0a6	
ajac	6	24599	24595	2	99	0.09	0.11	0.04	3	1	LEICA GR25	TRM57971.00	NONE	0.0000	AJAC	10077M005	M	2.11	424	bc6b9efd60ea73f12dec14cb27bd72e2	
albh	1	25572	24934	0	97	0.22	0.28	0.03	8	1	AOA BENCHMARK ACT	AOAD/M_T	SCIS	0.1000	albh	WCDA-ACP 927	40129M003	M	2.11	69	39b21a6e96b6fdec786afe1509267f71
alg2																					
alg3	1	24941	24796	98	99	0.47	0.50	0.04	8	1	TPS NET-G3A	TPSCR.G3	NONE	0.0500	ALG3	CACS-GSD M08300	40104M006	M	2.11	79	d0d887a89ee3e5deb4ef404b6f9bcc20
algo	1	24940	24794	0	99	0.39	0.39	0.04	0	1	TPS NET-G3A	AOAD/M_T	NONE	0.1000	ALGO	CACS-GSD 883160	40104M002	M	2.11	79	71c505d1aa59aefe1c366a1193396d20
alic	1	24896	24896	0	100	0.28	0.23	0.05	2	1	LEICA GRX1200GGPRO	LEIAR25.R3	NONE	0.0015	ALIC	50137M001	M	2.11	79	421df1885a4b62d0737cf4c361ab1fcb	
alrt	2	29941	28929	15	96	0.08	0.10	0.04	9	1	ASHTECH UZ-12	ASH701945D_M	NONE	0.1000	ALRT	40162M001	G	2.11	186	15df1c804dc9db38007ac4af9bed6283	
amc2	1	24509	24155	0	98	0.31	0.30	0.04	4	1	ASHTECH Z-XII3T	AOAD/M_T	NONE	0.0000	AMC2	40472S004	G	2.11	73	b82fca9ca12390a4005e11d1fb3cc780	
amu2	1	58197	58189	1	99	0.39	0.31	0.07	0	1	TRIMBLE NETR8	ASH700936D_M	SCIS	0.0000	AMU2	66040M002	G	2.11	74	8f9506120ca2cd932d9aef3e6a569ec3	
ankr	1	25048	25036	6	99	0.32	0.35	0.03	0	1	TPS E_GGD	TPSCR3_GGD	CONE	0.0700	ANKR	20805M002	M	2.11	105	f571136cdd0d87504bbcd634f4beadb	
antc	155	23853	23487	50	98	0.34	0.28	0.03	3	1	TRIMBLE NETRS	ASH700936D_M	SNOW	0.0000	ANTC	Antuco, Regi 41713S001	G	2.11	9412	4cf1052b37db58afcd10640ec39261d4	
areq	1	26163	25350	1	96	0.45	0.48	0.04	2	1	ASHTECH UZ-12	AOAD/M_T	JPLA	0.0610	AREQ	42202M005	G	2.11	73	be5e7b8e334ae4c580054f82a76f66d0	
arev	1	26163	26163	0	100	0.60	0.62	0.04	0	1	JAVAD TRE_G3TH DELTA	AOAD/M_T	JPLA	0.0610	AREV	42202M005	M	2.11	71	0e5e0b6d440b87329693c0abaddff3f61	
arit																					
ars1																					
artu	1	25402	24855	154	97	0.37	0.38	0.02	53	1	ASHTECH Z-XII3	ASH700936D_M	DOME	0.0796	ARTU	12362M001	G	2.11	69	783edd0bdb6727f5cb83ec1daed9e5	
aruc	1	25553	24646	6	96	0.57	0.57	0.03	15	1	ASHTECH UZ-12	ASH701945C_M	SCIS	0.0792	ARUC	12312M002	G	2.11	73	6744e423b48da39c0379bef5b426ccd9	
aspa	1	25452	25424	6	99	0.61	0.49	0.06	2	1	TRIMBLE NETR5	TRM55971.00	NONE	0.0000	ASPA	50503S006	M	2.11	88	1286eff0c77734045325745df3d2b3c4	
auck	6	23918	23864	51	99	0.45	0.40	0.04	0	1	TRIMBLE NETR9	TRM55971.00	NONE	0.0550	AUCK	50209M001	M	2.11	457	d52315328b55212ba831e267f634562b	
aukt	6	24159	23480	161	97	0.35	0.37	0.04	18	1	TRIMBLE NETRS	TRM55971.00	NONE	0.0030	AUKT	50216M001	G	2.11	457	b8706dcb95f3d4359f2290c75f84a173	

- Increasingly, data centers are storing site, file and status metadata in databases (example, IGS Central Bureau Site Log Manager)
- With metadata stored in a database, GSAC (Geodesy Seamless Archive Centers) software then allows access via web services to useful metadata and to data
- GSAC in federated mode allows additional useful queries such as tracking of status of file delivery across multiple data centers
- CDDIS, SOPAC, and UNAVCO are providing GSAC services.
- Several European geodetic data centers are also trying GSAC (ROB, INGV, SEGAL, and others)

- 20 years ago – text based site logs stored station metadata which was shared via file transfer (site log, SINEX, station.info, RINEX headers)
- 2014 – metadata is often stored and managed in databases but sharing is still largely by file transfer in same formats as 20 years ago
- Management of metadata in files is highly inefficient and error prone
- Migration to use of web services (GSAC or other), and away from metadata in files, should be considered as a way to efficiently transfer the best metadata available
- The format of the metadata output by web services is flexible i.e., can simulate familiar file formats

- Address issues relevant to effective operation of all IGS data centers
- Meeting:
  - When: Splinter Session 4  
Thursday, June 26  
16:00-17:30 (concurrent with Antenna and TIGA WG meetings)
  - Where: Noyes 147