The Role of IGS Data Centers and Real-Time Data

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Traditional Services of IGS Data Centers

- **Acquisition and distribution of <u>files</u>**
  - **GPS**
  - **GLONASS**
  - **Meteorological**

- **Data <u>files</u> are made freely available to**
  - **Scientific**
  - **Commercial**
  - **Government**
  - **Military**

- **Ingenious methods allow for easy user access to <u>files</u>**
  - **UCAR's LDM (Local Data Manager)**
  - **SOPAC's GSAC (GPS Seamless Archive)**

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From data files to data streams

- **Numerous applications require timelier data**
  - **Earth observing satellite missions (e.g. COSMIC)**
  - **ground based tropospheric delays**
  - **positioning services**

- **As latency decreases to realm of real-time data files are replaced by data streams.**

- **What will the role of IGS Data Centers have with regards to data streams ?**

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What is the added value ?

- **What value can IGS Data Centers add to data streams ?**

- **Traditional IGS Data Center roles are:**
  - **Cataloging**
  - **Quality Monitoring**
  - **Archiving**
  - **Distribution**

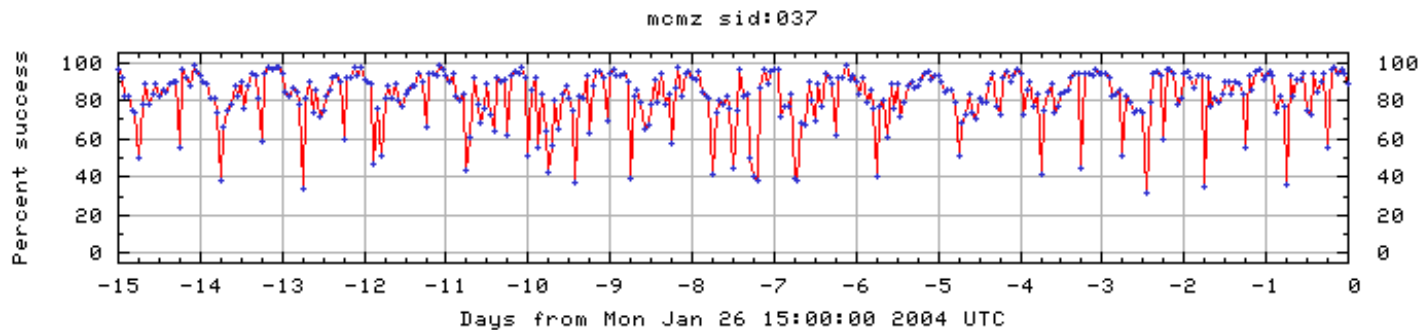**Natural Resources Canada** **Ressources naturelles Canada**
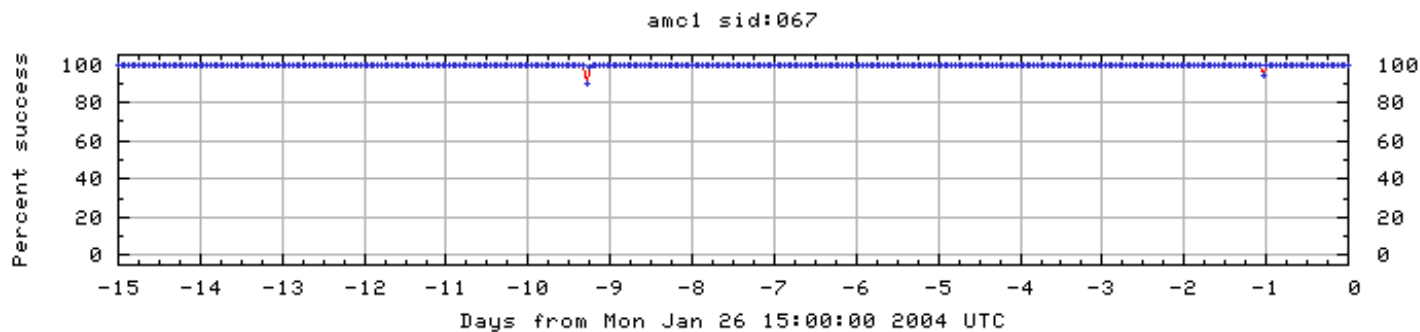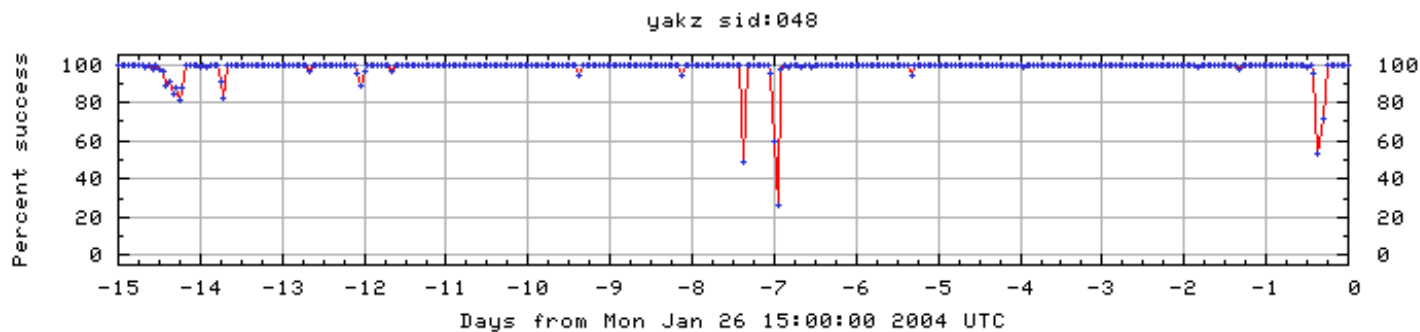
Cataloging

- **Listen to available streams and summarize**
  - **Availability**
  - **Outages**
  - **Source**
  - **Point of contact**
  - **Subscription method**
- **Web based real-time tools**
  - **Monitoring tools**
  - **Summarizing techniques**
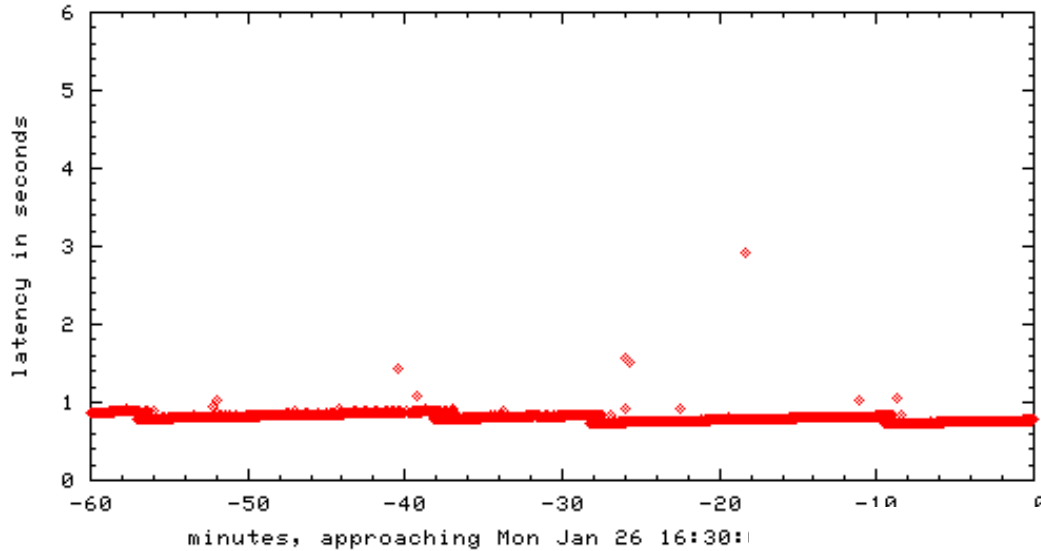 - **User-friendly displays**

Cataloging

Cataloging

IGDG Latencies for amc1 to JPL

Example, IGDG web monitoring

IGDG Number of GPS for amc1
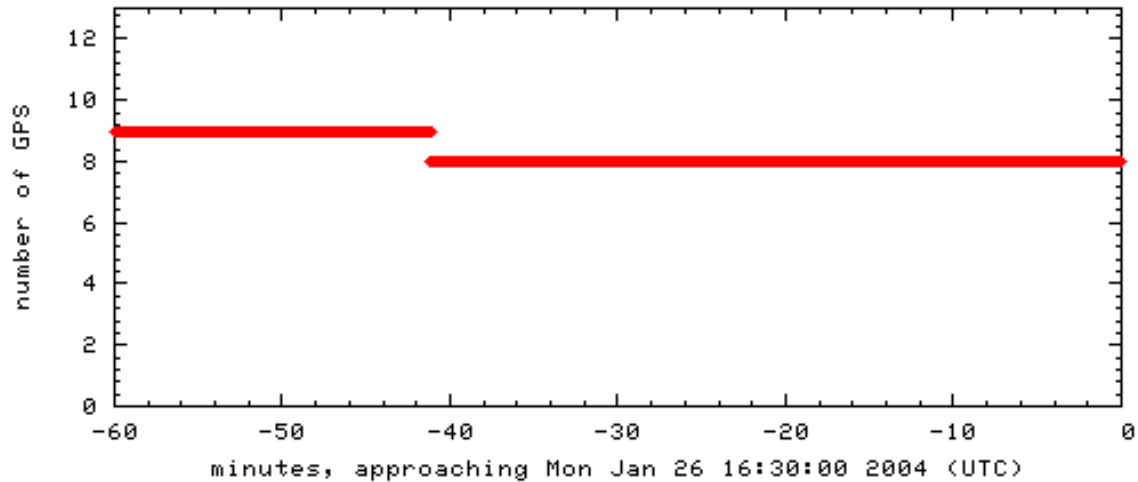
Quality Monitoring

- ## Simple
  - ### number of GPS observed over time

- ## More complex
  - ### Real-time point positioning
    - #### With or without real-time differential corrections
  - ### Post-processed point positioning

- ## Verify format

- ## Monitor IODS and report IODS changes

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Archiving

- **JPL's GPS Data Handling Facility (GDHF)**
  - **co-existence of data files and data streams**
  - **there will always be a need to archive files**
  - **and there will never be sufficient bandwidth to do so from a real-time data stream**

- **Archiving real-time data streams by IGS Data Centers does not add value to the data stream**

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Distribution

- **Users of Real-time Data Streams are better served with a distributive architecture**
  - **Direct access to accumulating organizations**
    - **they are closer to the data**
    - **are likely to have established multiple links to data**
    - **and likely to have provided multiple access points to obtain this data**

- **RTWG has proposed a common data format and method for universal access of IGS available streams**

- **Data distribution by IGS Data Centers does not add value to the data stream**

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Recommendations for IGS Data Centers

- **IGS Data Centers can add value to existing streams by:**
  - **Cataloging**
    - **Subscribe and listen to available real-time streams**
    - **Summarize and advertise availability within the IGS community**
    - **User friendly web based graphical displays**
  - **Quality Monitoring**
    - **Develop monitoring tools**
- **Not value adding roles to real-time streams**
  - **Archiving**
  - **Distribution**

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Distribution

A simple UDP relay (10 lines of code):

```perl
#!/usr/bin/perl
# assign destination(s) for host and port for delivery of data
use Socket;
$dstHost = 'snowball.jpl.nasa.gov';
$dest = sockaddr_in(3138, inet_aton($dstHost));
$port = 3138;
# open and bind socket for packet reception
socket(SOC, PF_INET, SOCK_DGRAM, getprotobyname('udp'));
bind(SOC, sockaddr_in($port, INADDR_ANY));
# relay data from incoming to destination host and port
while (1) {
    $addr = recv(SOC, $message, 1024, 0);
    send(SOC, $message, 0, $dest);
}
```

Where is the added value ?

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