Working with the IGS:
The ESA/ESOC experience

I. Romero¹, C. Garcia¹, J. Dow

ESA/ESOC, Robert-Bosch-Str. 5, Darmstadt, Germany

¹GMV at ESA/ESOC
Contents

• ESOC Data and Product contributions
• ESOC internal data/metadata handling
• IGS data/metadata handling and uses
• IGS improvements and effect at ESOC
• Conclusions / Next Steps
ESA/ESOC IGS Contributions

- 8 worldwide stations in 4 continents operating at 1Hz with RT data transmission back to ESOC + 1 daily (KOU1).
ESA/ESOC sites

• Are located at tracking stations used for ESA satellites, in some cases sharing comms.
• The monumentation standard is very strictly adhered to.
• We make every attempt to satisfy all the IGS Site Guidelines ‘strictly required characteristics’ (Section 2.1)
• Additionally we have one MET station (vill) one dual-system receiver (kou1), and we have external frequency standards at all sites.
Handling ESA/ESOC data/metadata

- ESOC has moved with significant effort from 30 second data once a day to 1Hz data every 15 minutes over the last 5/6 years.
- ESOC maintain all the data modes for all the stations (30sec daily and hourly, 15min 1Hz data).
- Metadata is updated by hand. RINEX submissions are automatically cross-checked (receiver, antenna, etc).
- There is always confusion when our stations are out for long periods of time. Our SIFs do not get updated until the station returns to operation.
 Handling the IGS data/metadata

- The RINEX data is continuously being downloaded, checked and windowed with `teqc` before available for processing.

- The SIF data is downloaded daily (if needed), and used to generate an internal format.

- The repository is difficult to update with resubmissions.

- New stations are now seldom included unless very attractive.

- New coordinate file generated as needed: (new itrf or antenna changes)

- Station information file: Relating antenna, receiver, internal numbering, Coordinate source, eccentricity, domes, ...

- ESOC RINEX data repository
  Available for POD

- CDDISA, SIO, IGN, …

- RINEX files

- SIF data

- `igs.snx`

- `igs_01.pcv`

- IGS97

- ITRF00

- IGb00

- Coord.: Coordinate file for all the defined stations

- ESA TOS-GN

6 IGS 10th Anniversary Workshop & Symposium
Bern, 1-5 March 2004
The use of IGS Data

- ESOC products require the use of the IGS data and metadata to supplement our own stations.
- There is currently no internal consistency check between the IGS RINEX file headers and the SIFs (under consideration)
- Problematic information either at the data or metadata level (antenna mismatching, incorrect data formats, etc) cause serious problems for the ESOC processing.
- Some of the problems have been reported to the SIF contacts or to the IGS, but results are very mixed, so we end up excluding the problematic stations.
IGS stations used (IGLOS)
IGS data uses at ESOC

ESOC Data archive

RINEX files

30 sec daily

30 sec hourly

1 Hz 15'

Data Pre-processor

48hrs

36hrs

~12hrs

24+hrs

up to 24hrs

ESA Finals (& IGLOS)

ESA Rapids

ESA UltraRapids

Experimental Runs

igs_01.pcv

coord

station info

ESOC Data archive
Some of the IGS improvements
(over last ~five years)

• The number of dual-frequency stations has increased beyond our processing (we use 60-70 max).

• Data Centres are providing much improved service (certain CDDIS failures used to stop everything, situation is much better now with SIO).

• The data is available faster and is much more reliable, thus pushing the current processing.

• The Metadata (SIF, igs.snx) have improved and are reliable, and very necessary for our processing.

• The resubmission of data from both sides (originator/user) is still unclear.
Conclusions

• Working with the IGS has become easier and more worry-free:
  – There is plenty of dual-frequency data from a well characterised and long standing set of stations.
  – The stations are well described via SIFs and a stable and coherent ITRF with a large number of core stations.
Next Steps

• The improvements are now incremental:
  – Data resubmissions …
  – Feedback to station operators …
  – Notifying planned/unplanned station outages …

• The ACs will help the IGS to anticipate user needs so we can stay as the world-wide reference for GNSS data and products.