Agenda item : F-2.1.

34 th Argos Operations Committee meeting
Prepared by CLS
Date : May 25, 2000

OPERATIONS REPORT

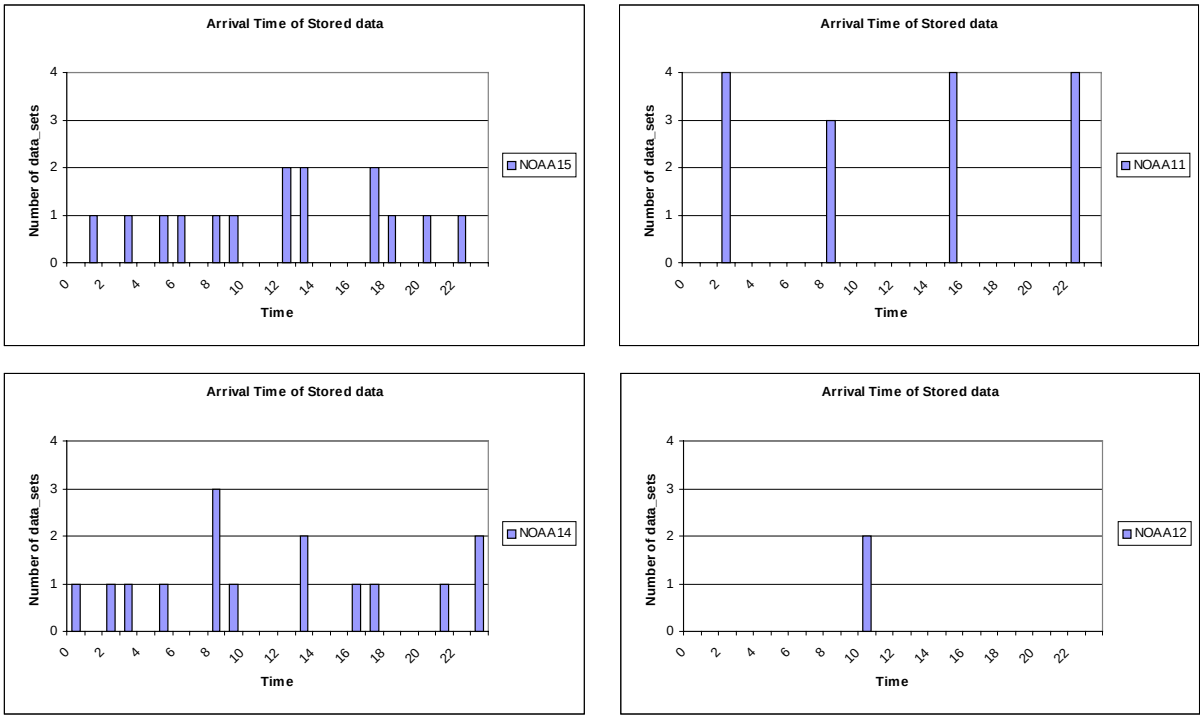
1. GROUND RECEIVING STATIONS

Global stations

The situation at the three main receiving stations at Fairbanks, Wallops Island, and Lannion did not appear to show any improvement in 1999.

During the course of the year, Fairbanks stopped sending us STIP data sets from NOAA-D. At the same time, Wallops Island only delivered two STIP orbits a day for this satellite.
Consequently, instead of receiving 24 hours of data we now only have three hours, which is not nearly sufficient for the precise orbit determination required to supply our users with good location data.
Since NOAA-15's frequency was changed, Lannion is no longer able to provide STIP data sets for this satellite.
Since the last Operations Committee meeting, we have expressed our desire to reduce throughput times for STIP data sets from the NOAA-12 and NOAA-11 satellites. We now only have two orbits per day for NOAA-12, and throughput for NOAA-11 is still long, between four and eight hours.
Figure 1 shows STIP data set arrival times at the Toulouse and Largo processing centers. Ideally, one data set should be received every 100 minutes. This is far from being the case for NOAA-11 and reception is sub-optimal for NOAA-14 and NOAA-15.

Figure 1



Regional stations

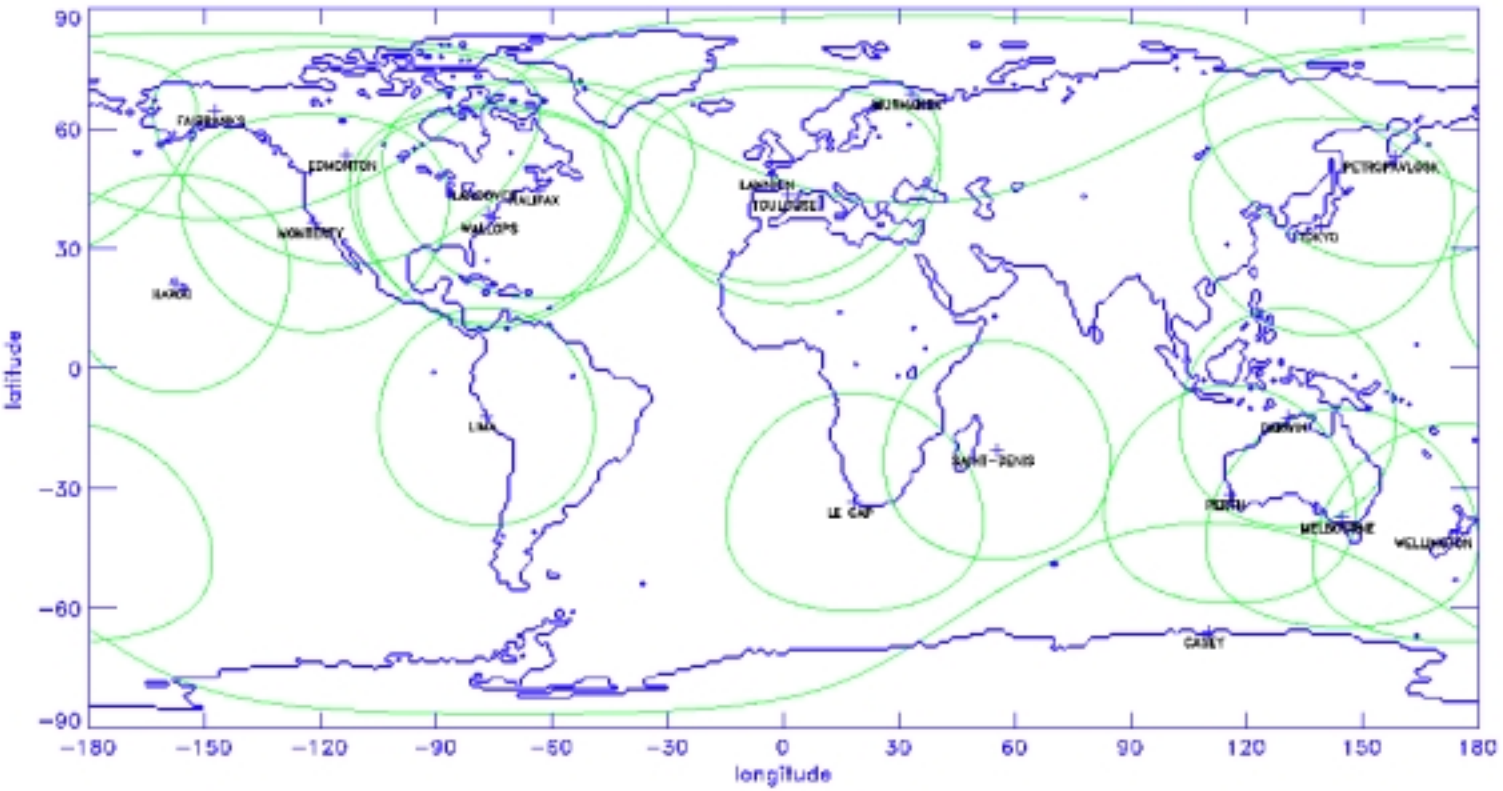
CLS and Service Argos Inc. pursued their efforts in 1999 to secure new cooperation agreements with a number of organizations to increase the number of receiving stations able to provide TIP data sets from the NOAA satellites. These efforts will continue in 2000, focusing if possible on improving coverage in Central America, Europe, and Asia.Today,
20 stations deliver TIP data sets to CLS and Service Argos Inc.
Unfortunately, not all these regional stations receive data sets from all four satellites (NOAA-15, NOAA-14, NOAA-12 and NOAA-11).
For example, many do not receive data from NOAA-11 because the AVHRR instrument is inoperative. Other stations can no longer receive data from NOAA-15 since the frequency of the HRPT channel was changed.
However, thanks to these regional receiving stations we have been able to reduce throughput times significantly. In certain regions, such as North America, Australia, and Europe, throughput times are less than 20 minutes 80 per cent of the time.

List of regional receiving stations

Regional stations	Country	Operator	Satellites
Cape Town	South Africa	CLS/SAWB	NK, NJ, ND, NH
Melbourne	Australia	BOM	NK, NJ, ND
Darwin	Australia	BOM	NK, NJ, ND
Perth	Australia	BOM	NK, NJ, ND
Casey	Australia (Antarctica)	BOM	NK, NJ, ND
Halifax	Canada	Environment Canada	NJ, ND
Edmonton	Canada	Environment Canada	NJ, ND, NH
Lannion	France	Météo France	NK, NJ, ND
Toulouse	France	CLS	NK, NJ, ND, NH
Reunion Island	France	Météo France	NK, NJ, ND
Tokyo	Japan	Jamstec	NK, NJ, ND, NH
Wellington	New Zealand	Met Office	NK, NJ, ND
Gilmore	USA	NOAA	NK, NJ, ND
Wallops	USA	NOAA	NK, NJ, ND
Hawaii	USA	National Weather Service	NK, NJ, ND
Monterey	USA	National Weather Service	NJ, NK
Largo	USA	SAI	NK, NJ, ND, NH
Murmansk	Russia	Complex System	NK, NJ, ND, NH
Petropavlosk	Russia	Rybradion	NK, NJ, ND, NH
Lima	Peru	CLS perù	NK, NJ, ND, NH

Figure 2

Satellite NOAA / Altitude 800 km / Elevation : 0 deg



2. PROCESSING CENTERS

Each of the five Argos processing centers in Toulouse, Largo, Melbourne, Tokyo, and Lima operated without a major hitch in 1999.
In Toulouse, we have resolved the problems encountered with our backup power supply in 1998. The system is now working perfectly.
The two global processing centers in Toulouse and Largo continue to process data sets from all receiving stations, in other words, about 270 data sets per day (see Figure 4).

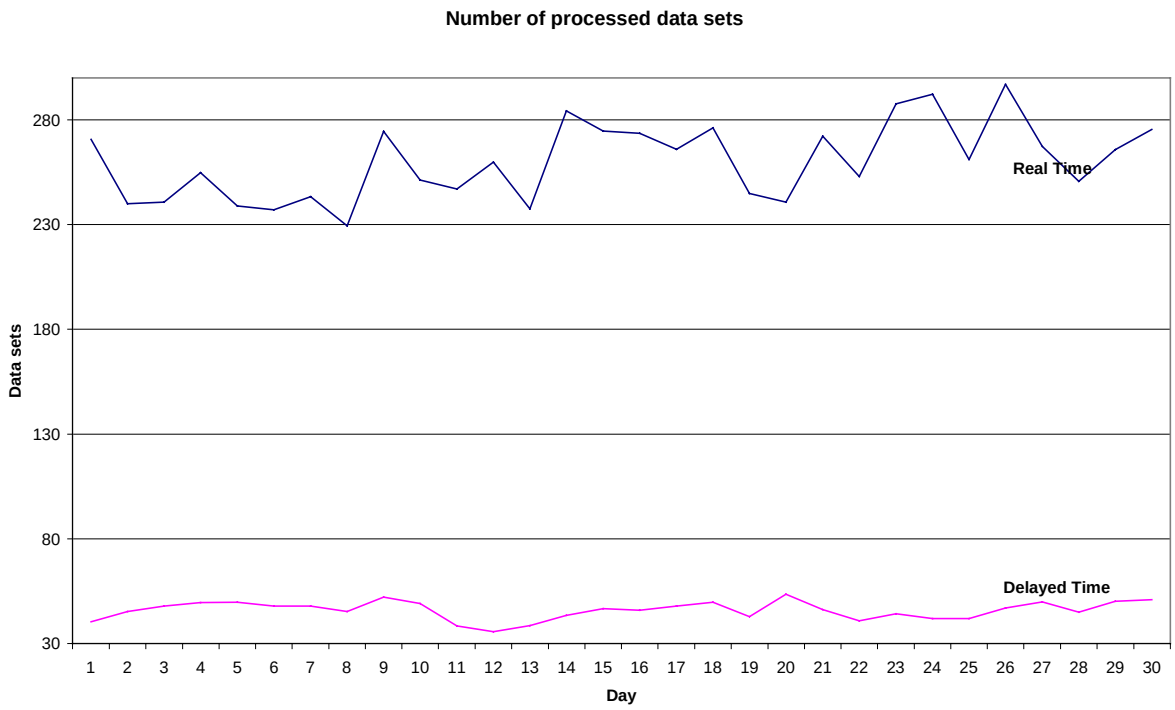
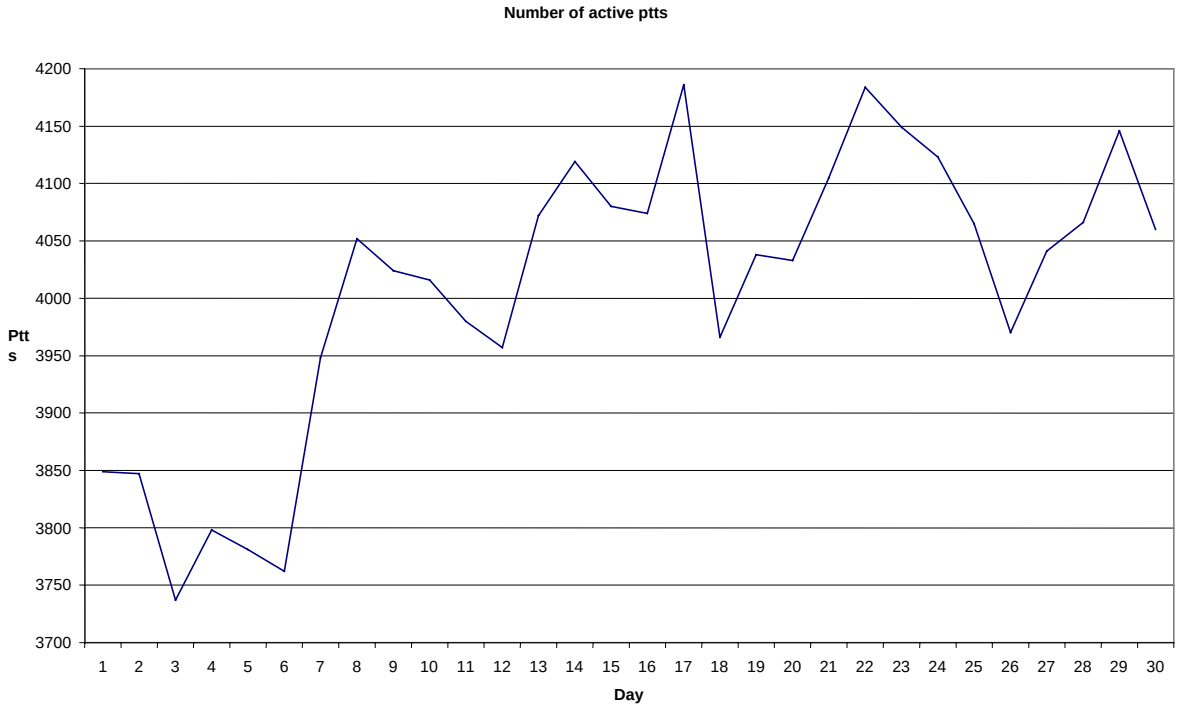


Figure 4

On the other hand, the regional processing centers (Melbourne, Tokyo, and Lima) only process data sets from stations covering their region. Complementary data sets providing global coverage are supplied by the Toulouse center.

The number of Argos platforms operating continues to increase. In April 2000, about 4150 platforms were active per day. However, each of the two global centers processed data from 7395 individual platforms during this month.

Figure 5



Figures 6 and 7 below show the number of locations and messages received every day by the Largo and Toulouse centers.

Figure 6

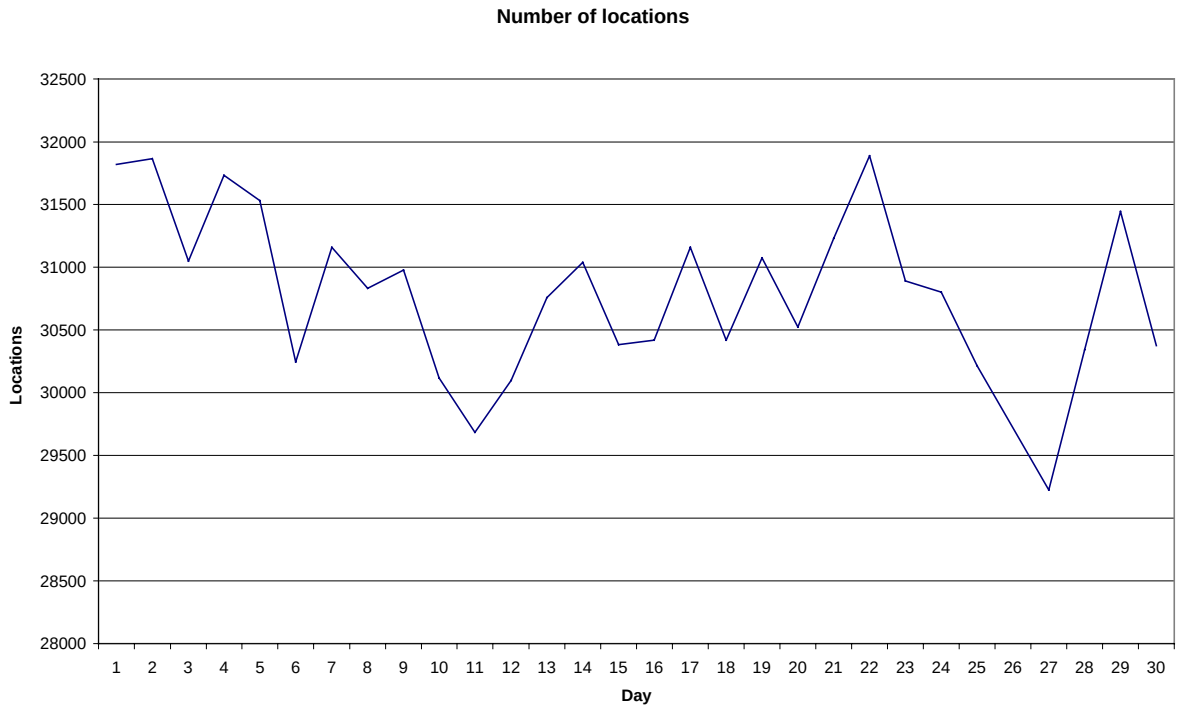
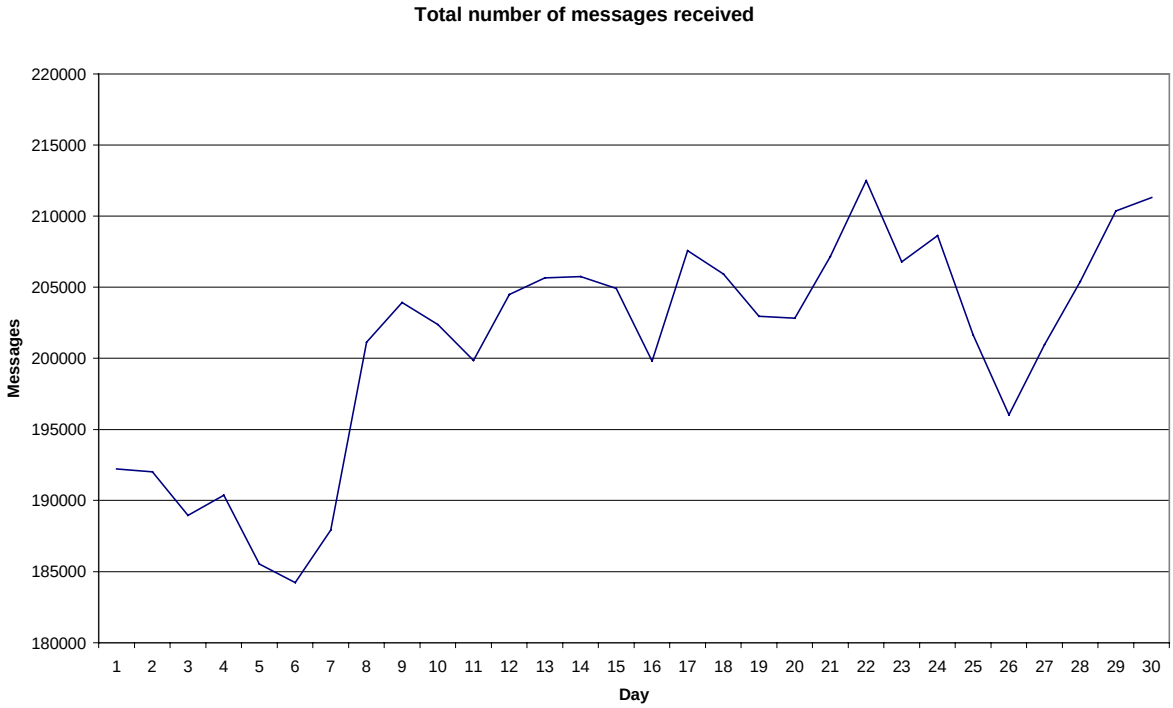


Figure 6



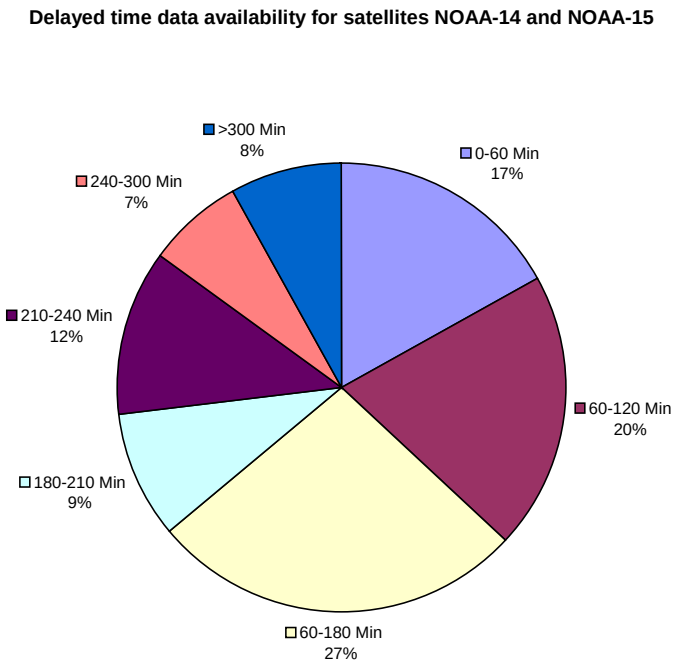
3. COMMUNICATION LINKS

The Internet is now the main communication link used by all Argos centers to distribute processed data to users and to retrieve data sets from receiving stations.
The X25 protocol is now used almost exclusively by the Toulouse center to send weather bulletins to the Météo France weather service. Some users still prefer to receive their data using this communications protocol via our Automatic Distribution Service (ADS).
The transatlantic link between Toulouse and Largo still exists but we are looking for a cost-effective solution to speed up data transmission.

4. THROUGHPUT TIMES

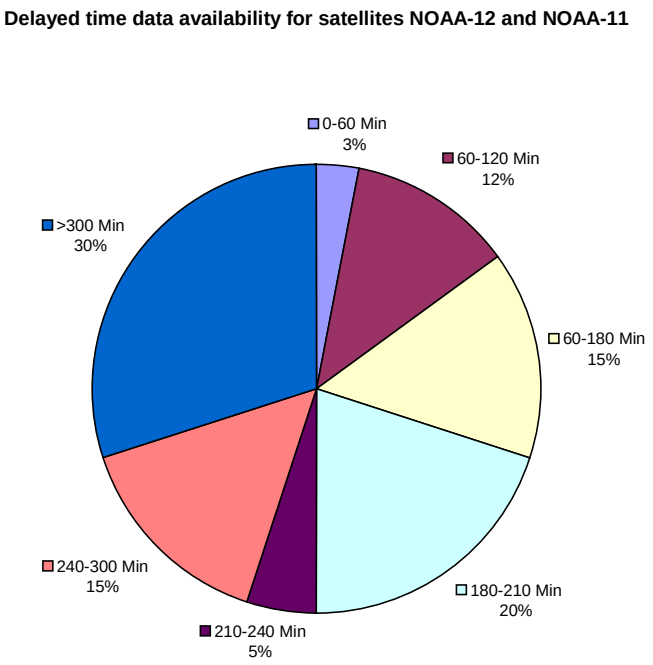
CLS throughput times for delivery of results should be calculated in terms of the time taken to reach end users.
For each message received by the satellite, we compute the data turnaround time, which is the time elapsed between recording the message onboard the satellite and processing the same message at the global processing center.

Figure 8 shows the throughput time for delivery of results for stored data from NOAA-14 and NOAA-15, the two operational satellites.
Figure 8
43.7% of the data are available within two hours, and 68.4% within three hours.



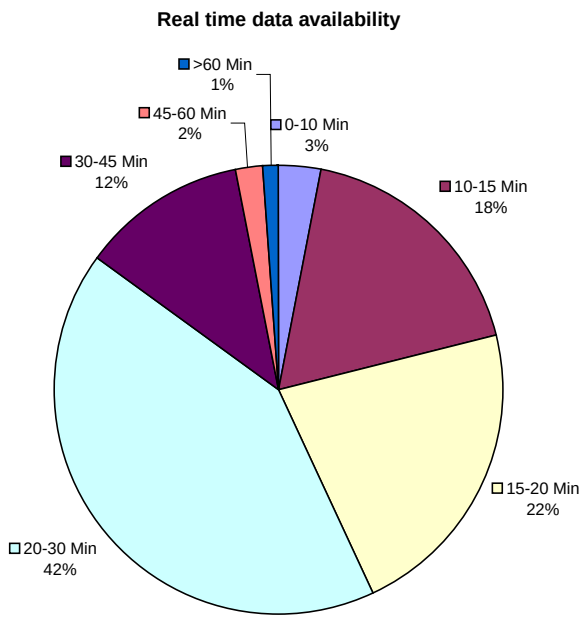
We can correlate these statistics with those produced by NOAA, which computes <u>data set</u> delivery times to the Argos global processing centers, whereas CLS computes <u>result</u> delivery times to Argos users. Result delivery times include the orbital delay, and the time taken by NOAA to deliver data sets and by the Argos global processing centers to process them.

Figure 9 shows the throughput time for delivery of results for stored data from NOAA-11 and NOAA-12, the two backup satellites.`
Figure 9



Only 30% of the data are available within three hours, as opposed to 64% for the two operational satellites. This delay is due to NOAA data set delivery times.

Figure 10 shows the throughput time for delivery of results for real-time data from NOAA-15, NOAA-14, NOAA-12, and NOAA-11, acquired by the 20 HRPT receiving stations.
Figure 10



85% of these real-time data are available within 30 minutes.

The throughput time for delivery of results for real-time data includes three main delays:

- the satellite pass duration, because we have to wait for the end of the pass to transfer and process the data set;
- the time taken to transfer the data set to the global processing centers. Most transfers go over the Internet, and the data rate is getting better all the time;
- the time global processing centers take to process the data set, which is not significant (less than 30 seconds).