NEW FTLRS software tools for tuning observations schedule and remote control

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Abstract

In the goal to facilitate and make more pertinent campaign observations, we have developed:

- *A fully automated mechanism for the CPF predictions: CPF file reception and propagation, prediction generation and orbit display are automatically performed.*
- *An acquired data sky coverage display for any site (per satellite and per date).*
- *A new levelling system for FTLRS, easy to use for observers, efficient and completing the remote controlled capability.*

Introduction

The French Transportable Laser Ranging Station often operates far from our French location in Grasse and it is very important to increase its remote capability, and to facilitate the observer's life.

Fully automated mechanism for the predictions

CPF mail reception

Mail is automatically extracted on the principal computer in Grasse. CPF files are sorted and dispatched in dedicated directories (for example /d/dat/prev/grca if GraceA) and files. File names are based on CPF file headers, for example gracea_060930_7732.gfz is done with target (gracea), date (060930), sequence number (7732) and provider (gfz).

CPF file propagation for FTLRS

For this, we use the rsync command (a free software computer program for Unix) to synchronize CPF files and directories from the Grasse computer to the FTLRS computer. This rsync command is executed every hour via the Crontab unix facility.

Files creation for satellite orbit display

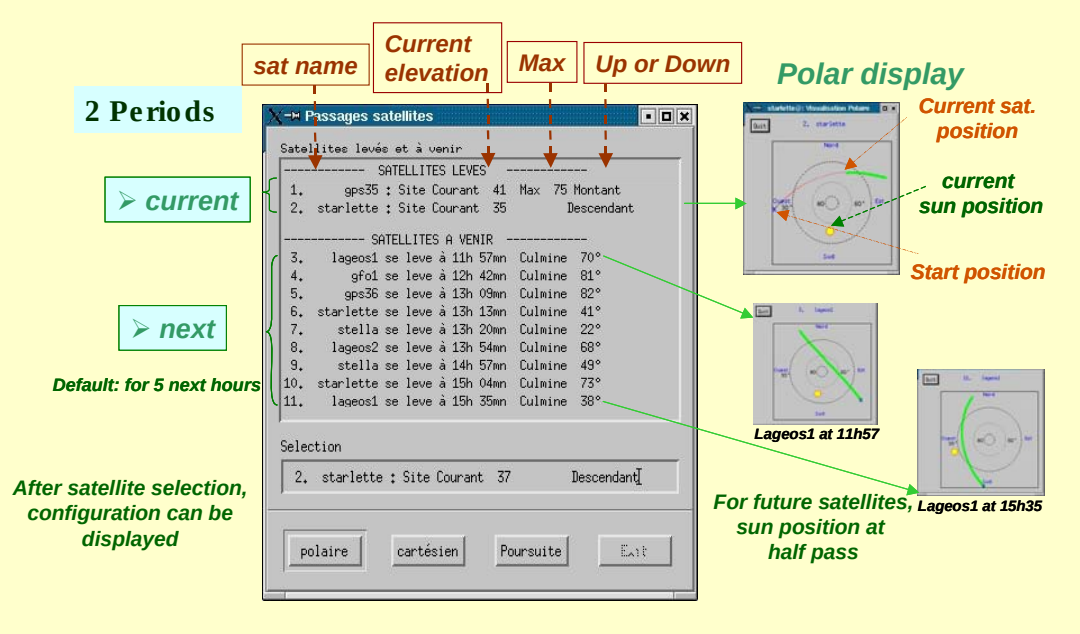
All necessary files to display satellite orbits for the next few hours are created daily on Grasse and FTLRS computers (via cron facility):

- satellite timetable files for one month or more,

- prediction files for satellite passes to come: in this file, the step between positions depends on pass duration, in order to have a continuous curve for orbit display,
- file with next passes list for easy display; each line has the following form: Satellite name, MJD (begin), culmination, azimuth (begin and end), duration, date (hour and minute), prediction file name.

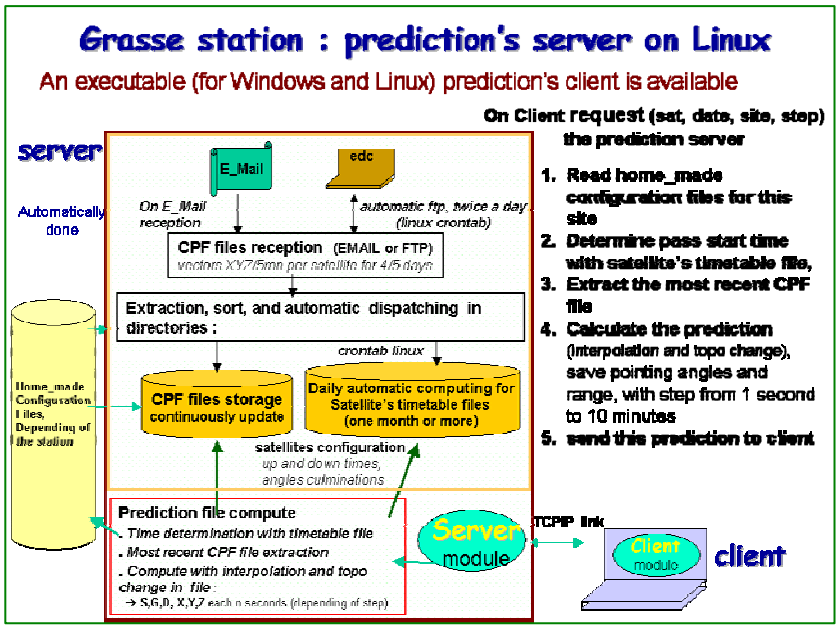
Satellite list and orbit display

At login the following window is displayed and continuously updated.



A few minutes before each satellite pass, a window with information appears and a bell rings.

With this mechanism in place, it was then natural and easy to develop the prediction's server on our main computer in Grasse. An executable prediction client (for Windows and Linux) is available. This will be very useful for further operations with MEO station (7845).



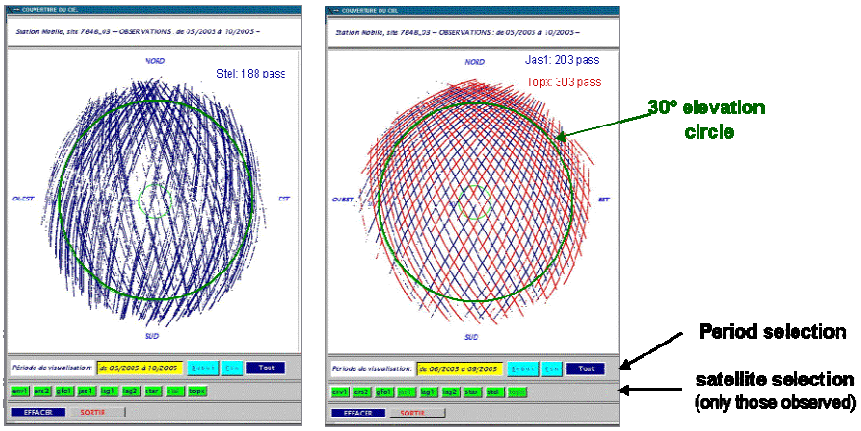


***Figure 1**: Sky coverage for Stella and Jason/Topex - FTLRS - May to October 2005*

Acquired data sky coverage display

This application allows display of data for each Grasse station (FTLRS, MEO and GRSL). Each point on the display is a validated return. The operator has just to choose:

- the satellite(s) in the proposed list, and
- the observation period.

The observation's Grasse station is done with an environment's variable.

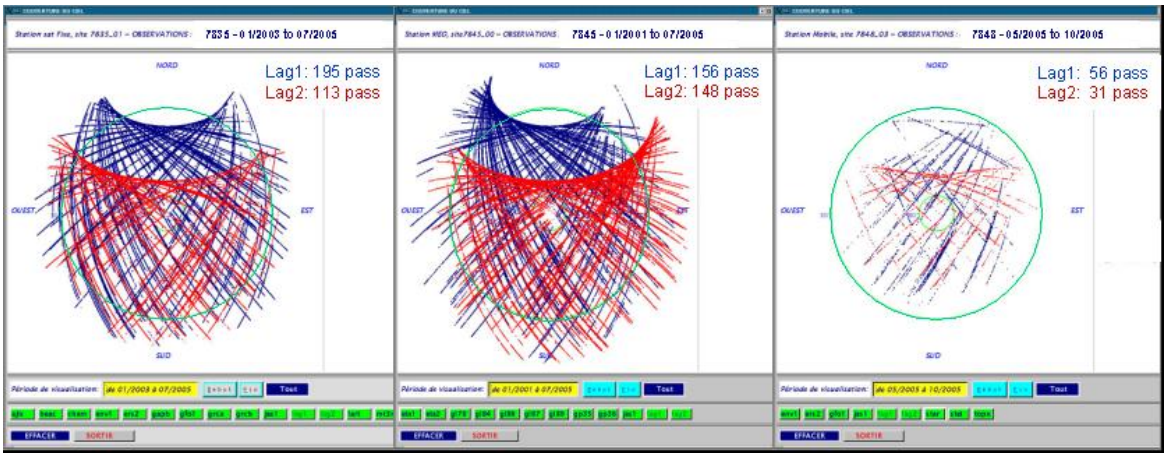


***Figure 2**: Lageos 1/Lageos 2 on Grasse stations: GRSL(7835), LLR(7845) and FTLRS (7848 Ajaccio)*

For FTLRS (7848 station during last Corsica campaign), we observe from the display that:

- the coverage has good repartition on all directions,
- Stella (first part Figure 1) is lost just during culmination,
- for Lageos (third part Figure 2) there were no returns under 30 or 40 degrees.

For GLRS (7835 station) we had a good coverage for all satellites (low satellites to Lageos).

For 7845 station (MEO station used for HEOS) from Lageos:

- the coverage has good repartition on all directions,
- it is easy to have returns when the satellite is low,
- for Lageos, it is very difficult to have returns when higher than 80°; this doesn't exist for higher satellites (Glonass or GPS).

A remote levelling system for FTLRS

We have developed a new system, to process the mount levelling system. The system (laser + telescope) is now on a mechanical device, and this device is levelled with two electrical jacks. These jacks are positioned in perpendicular directions.

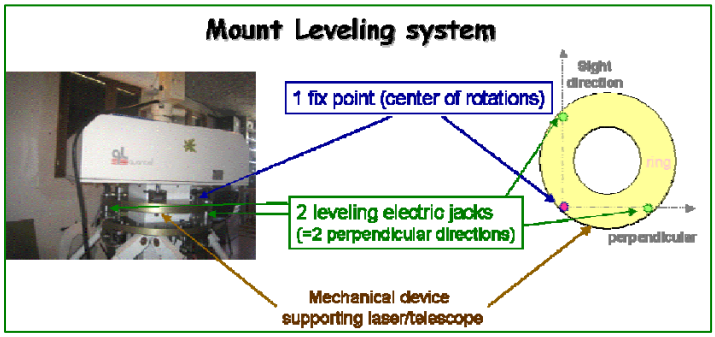
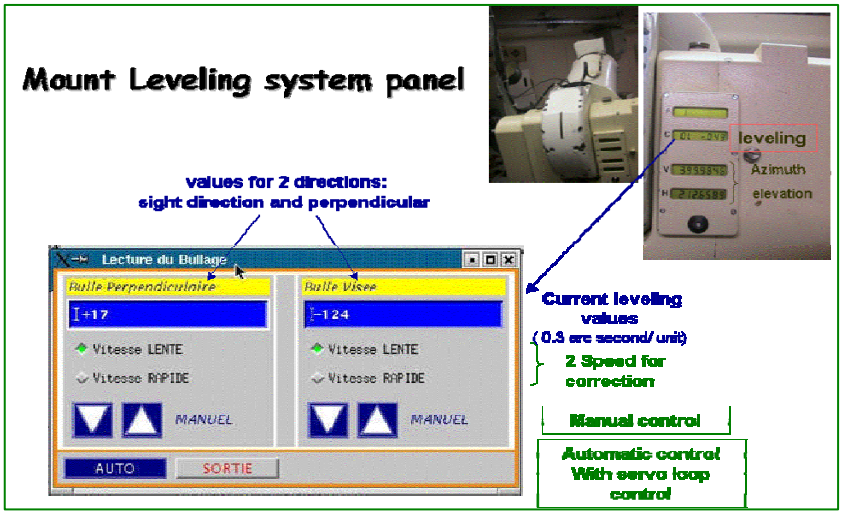


Figure 3: *The new mount Levelling sytem for FTLRS*

These jacks are software controlled via a control panel. Levelling values in two directions are continuously read and displayed, and it is possible to adjust the level:

- manually with the two push buttons on panel, or
- automatically with a servo loop control.

This new remote tool for FTLRS is efficient, easy to use and very important for remote controlled capability.



Conclusion

Fully automated mechanisms for the predictions and the new levelling system for FTLRS are major improvements, facilitating the observer's life and completing the remote controlled capability. FTLRS will very soon be operational in our new laboratory in Grasse, and all our staff is very excited to test these new tools and we look forward to our first returns there.