

French Transportable Laser Ranging Station

New software tools



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We have developed new software tools for FTLRS

▶ **To facilitate observers life:**

Consolidated Prediction Format file's reception and propagation, prediction's generation and orbit display are automatically performed

▶ **To have an easy look to our observation's data with sky coverage display**





▶ **To increase remote capability**

In adding leveling application for FTLRS remote control

From CPF mail receiving, to orbit display and alarm bell

The Goal is to have better reliability, and fully automated mechanism around predictions

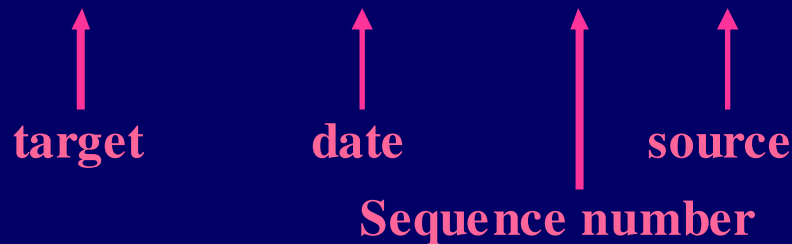
How is it done?

- > Mail Filtering and CPF file propagation for FTLRS 
- > Timetables pass creation, satellite prediction compute 
- > Satellite list display and polar pass representation 
- > Some minutes before pass, alarm bell rings 

Mail Filtering and CPF file propagation for FTLRS

CPF mail on Grasse computer

- Mails are automatically extracted, sorted and dispatched in directories (ex: /d/dat/prev/grca/) and Files (ex: gracea_cpf_060131_5312.gfz); filename is based on CPF file header



CPF file propagation for FTLRS

- CPF files are automatically updated on FTLRS computer by files synchronization with Grasse (Rsync is running every hours via Crontab Unix facility on Grasse computer)
- FTLRS can get Ephemeris by FTP on data center in case of problem



Timetables pass creation, satellite pass prediction

Create all necessary files to display satellite orbits for next hours

Daily: on Grasse and FTLRS computers via Crontab facility

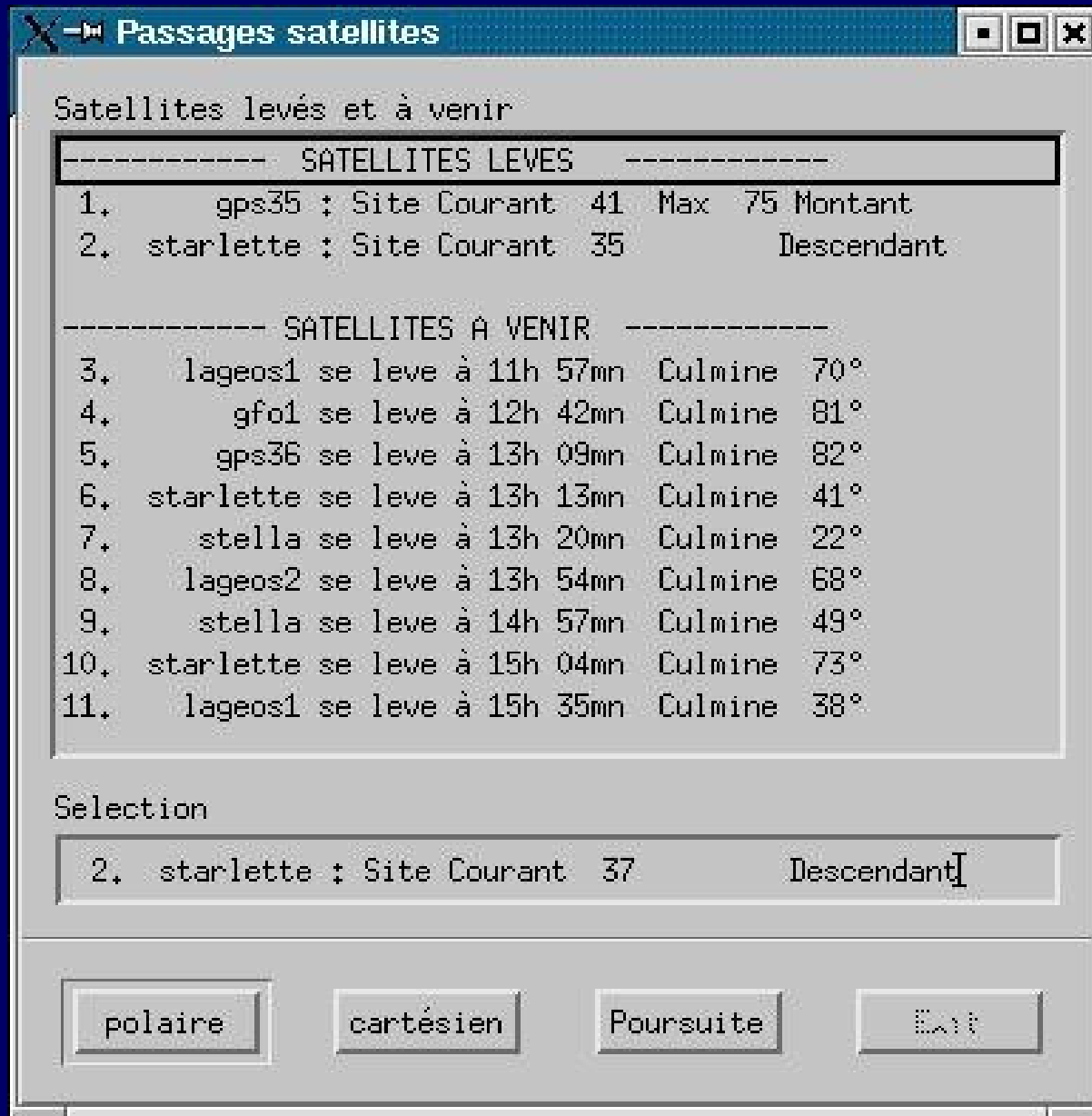
- Create satellite's timetable files for one month or more
- Compute predictions for satellite passes to come ,
In this file, the step between positions depends of pass duration
(to have a continuous curve for orbit display)

- Create ASCII file with next passes list for easy display:

```
Sat_name MJD(begin) culmination az (begin end) duration hh mm config_file_name
      :
Sat_name MJD(begin) culmination az (begin end) duration hh mm config_file_name
```



Satellite list display, at log in



**At log in,
a window with satellite passes
is displayed, and permanently
updated**

Satellite list display and polar pass representation

Displayed window is permanently updated

2 Periods

➤ *current*

➤ *next*

Default: for 5 next hours

After satellite selection, configuration can be displayed

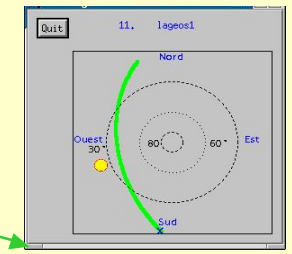
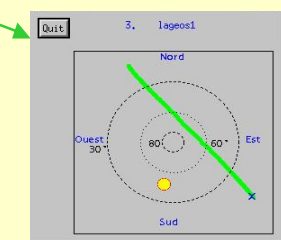
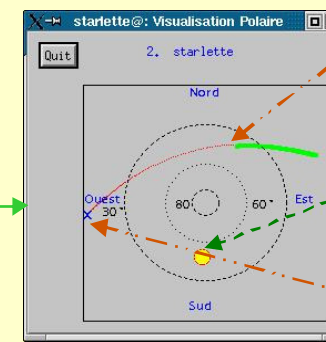
	<i>sat name</i>	<i>Current elev.</i>	<i>Max. elev.</i>	<i>Up or Down</i>
Satellites levés et à venir				
----- SATELLITES LEVES -----				
1.	gps35 ; Site Courant	41	Max 75	Montant
2.	starlette ; Site Courant	35		Descendant
----- SATELLITES A VENIR -----				
3.	lageos1 se leve à 11h 57mn		Culmine 70°	
4.	gfo1 se leve à 12h 42mn		Culmine 81°	
5.	gps36 se leve à 13h 09mn		Culmine 82°	
6.	starlette se leve à 13h 13mn		Culmine 41°	
7.	stella se leve à 13h 20mn		Culmine 22°	
8.	lageos2 se leve à 13h 54mn		Culmine 68°	
9.	stella se leve à 14h 57mn		Culmine 49°	
10.	starlette se leve à 15h 04mn		Culmine 73°	
11.	lageos1 se leve à 15h 35mn		Culmine 38°	

Selection

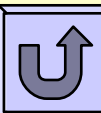
2. starlette ; Site Courant 37 Descendant

polaire cartésien Poursuite Exit

Polar display



For future satellites, sun position at half pass



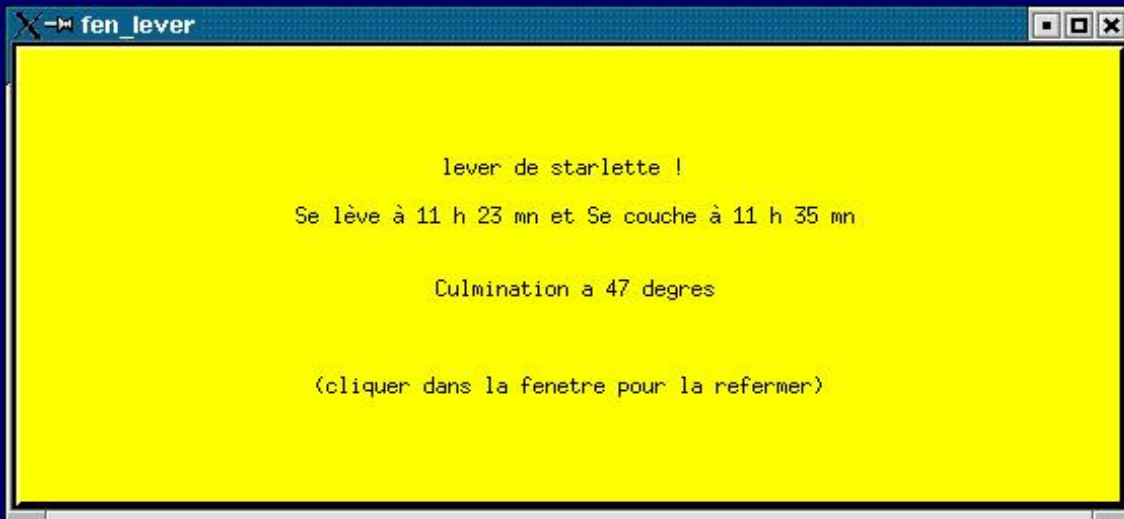
Alarm bell

Few minutes before satellite pass,

*such a window appears (disappear
at end of pass)*



and a bell rings

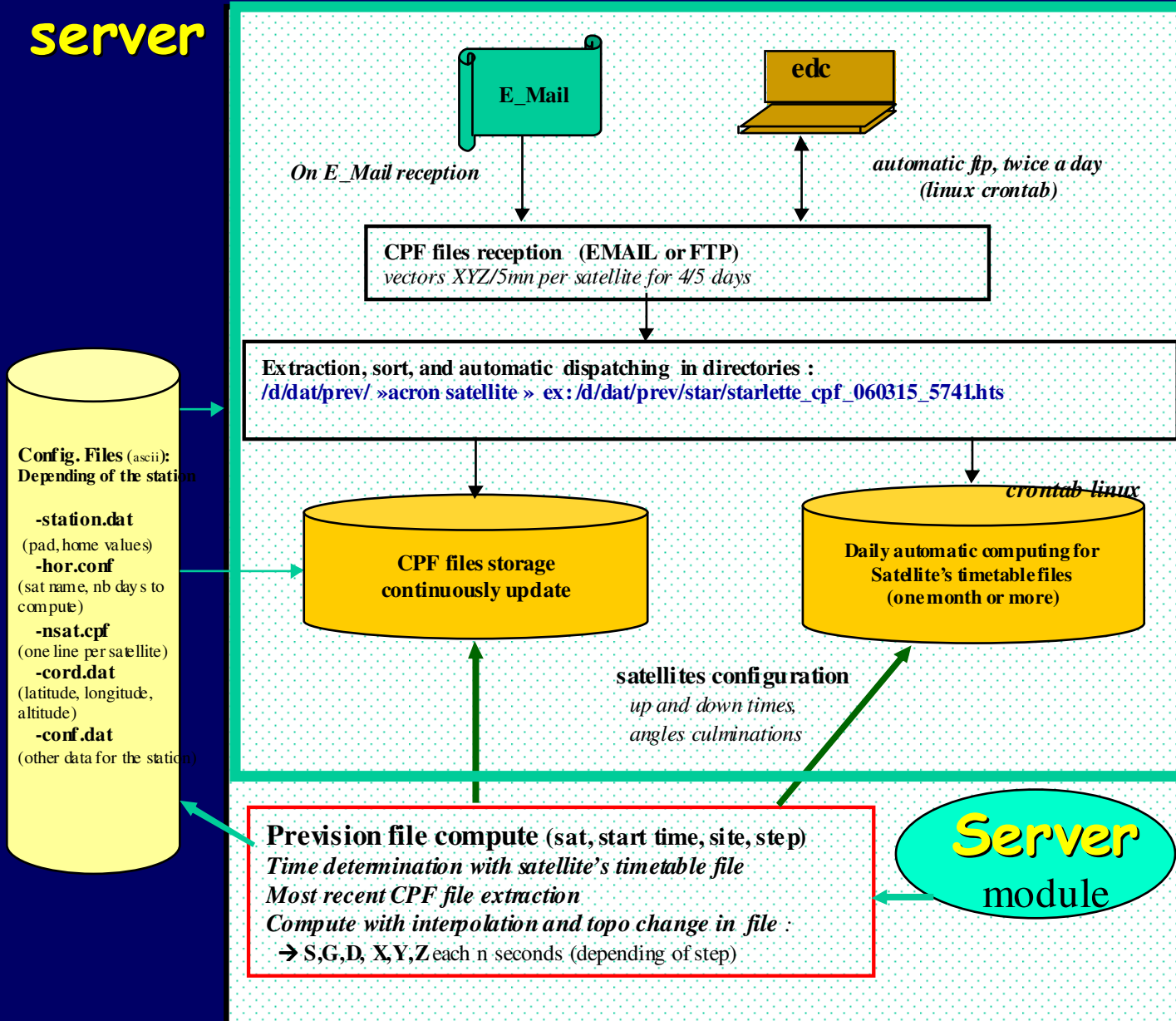


SLR : previsions server on Linux

An executable (for Windows and Linux) prediction's client is available

On Client request (sat, date, site, step) the prediction server

server

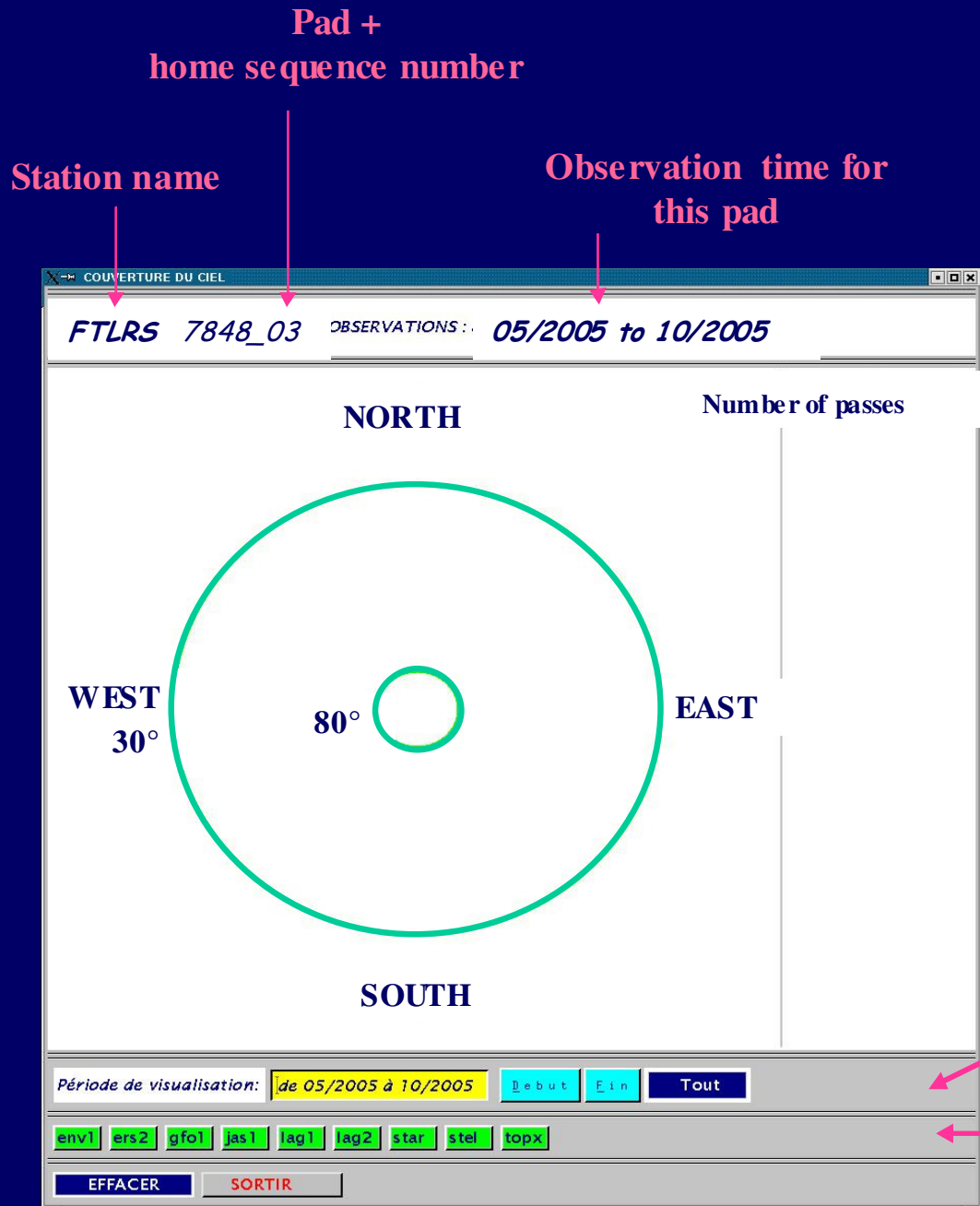


- Read configuration files for this site
- **Determine pass start time with satellite's timetable file,**
- **Extract the most recent CPF file**
- **Calculate the prediction** (interpolation and topo change), save pointing angles and range, with step from 1 second to 10 minutes
- send this prediction to client

Thanks for orbitography subroutines on ILRS site!!

client

Data sky coverage display panel



Pad +
home sequence number

Station name

Observation time for
this pad

We can display data sky coverage
For each Grasse station (MEO, SLR,
FTLRS)

Home sequence number correspond to a
campaign for FTLRS

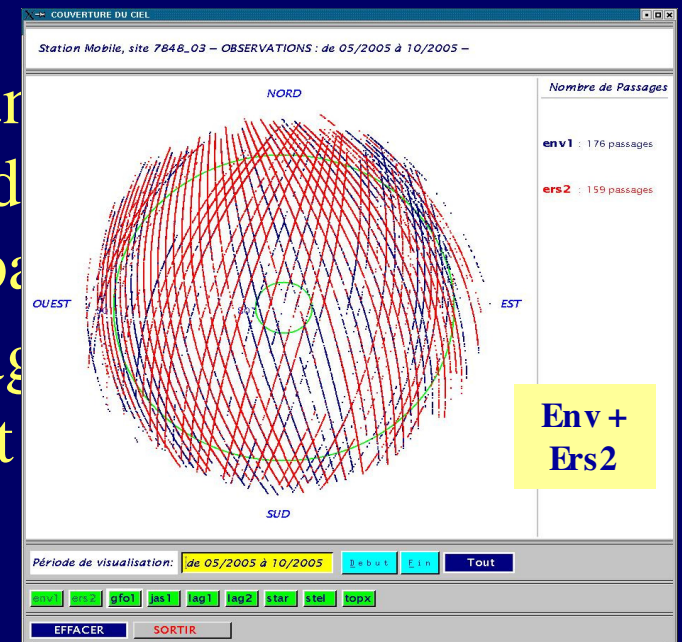
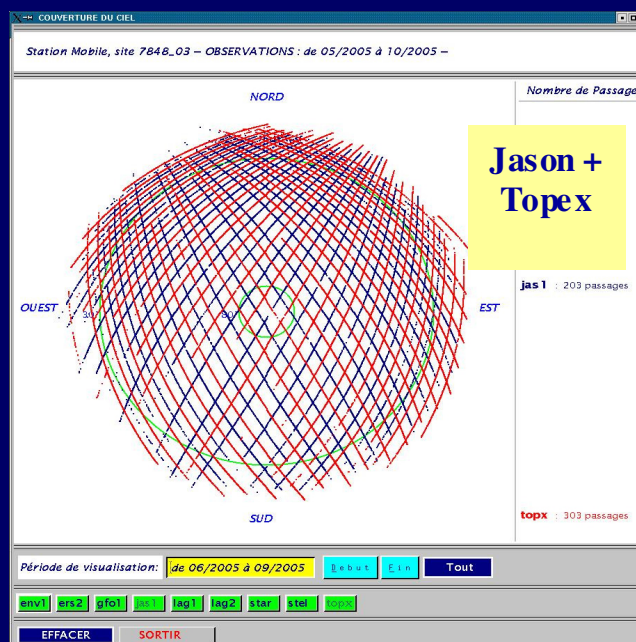
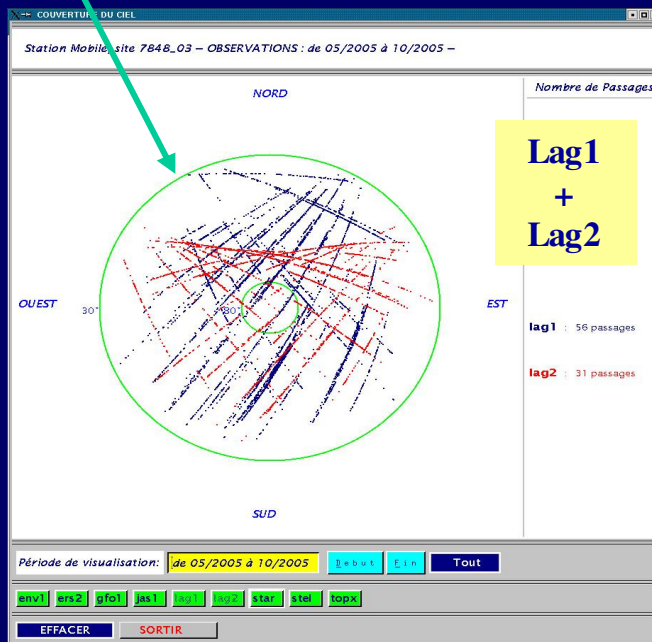
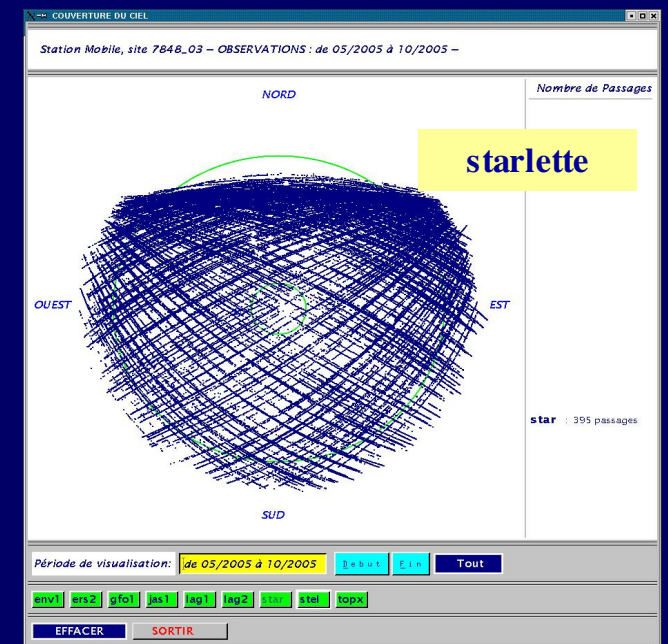
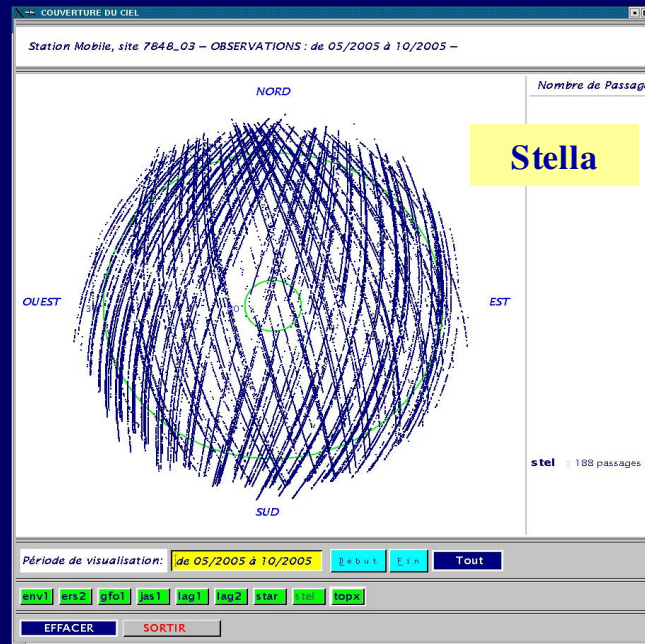
Period selection

satellite selection
(only those observed)

Data Sky coverage display exemples (1)

**FTLRS (7848_03)
Corsica Campaign
May 2005 to Oct. 2005**

30° elevation circle

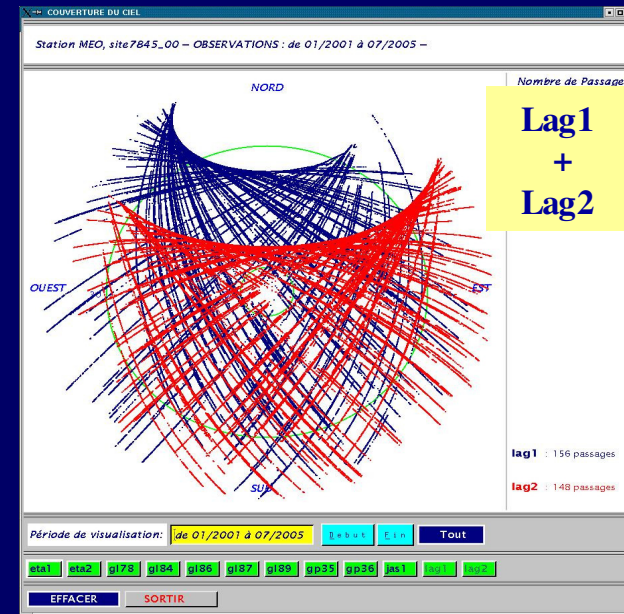
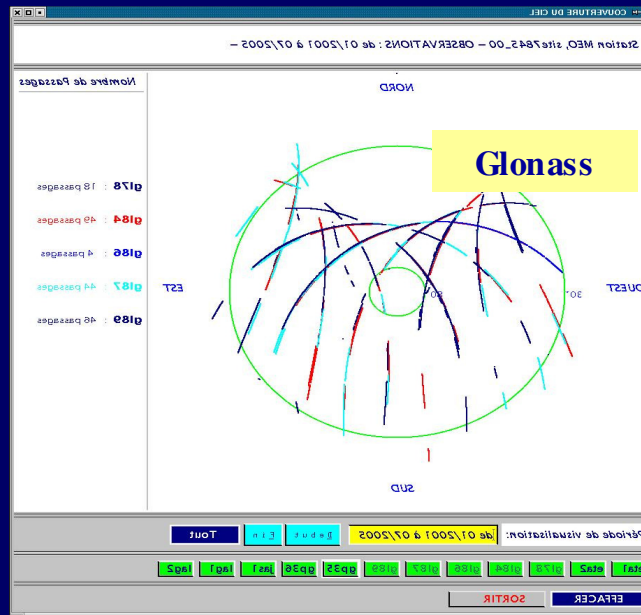


and
passages
right

Data Sky coverage display exemples (2)

LLR (7845_00)

Jan. 2001 to
July 2005



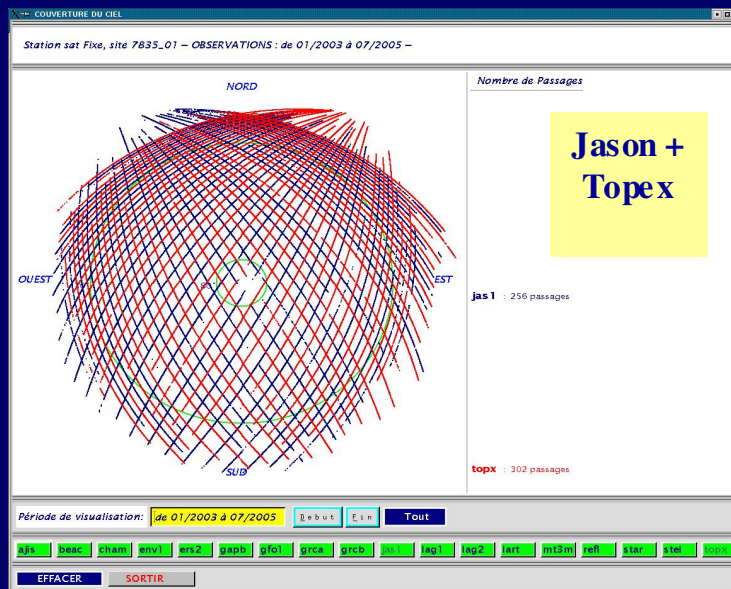
Lag1
+
Lag2

lag1 : 156 passages
lag2 : 148 passages

for HEOS during last
years

SLR (7835_01)

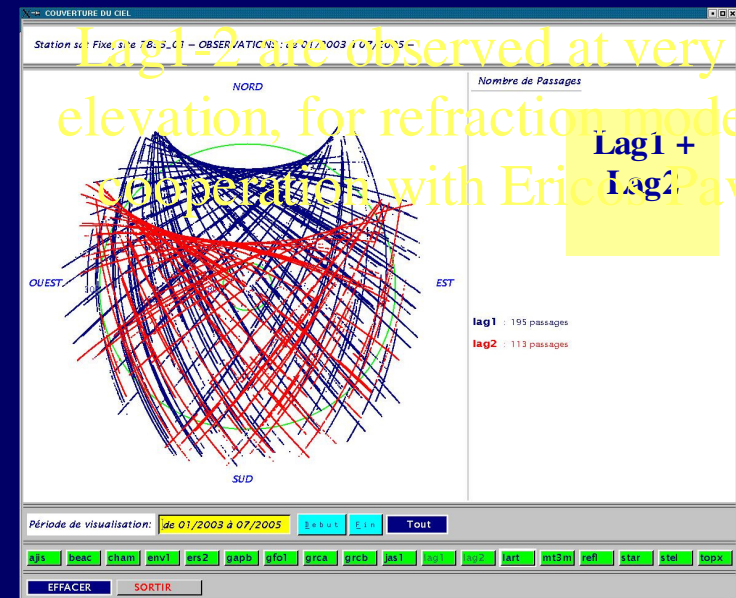
Jan. 2003 to July
2005



Jason +
Topex

jas1 : 256 passages

topx : 302 passages



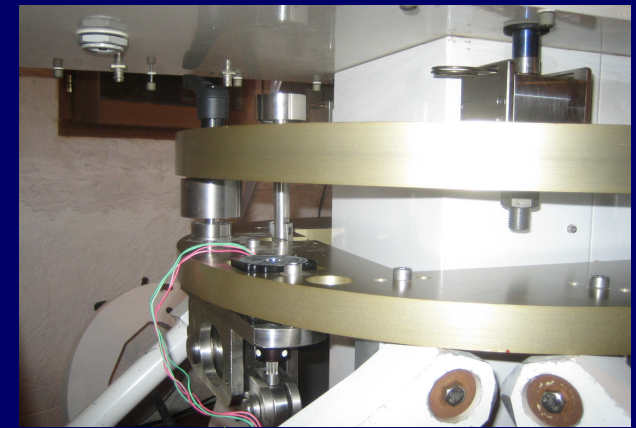
Lag1 +
Lag2

lag1 : 195 passages
lag2 : 113 passages

Lag1-2 are observed at very low
elevation, for refraction models in
cooperation with Eric's Paylis

Mount Leveling system

Leveling system is achieved with 2 electric jacks, software controlled



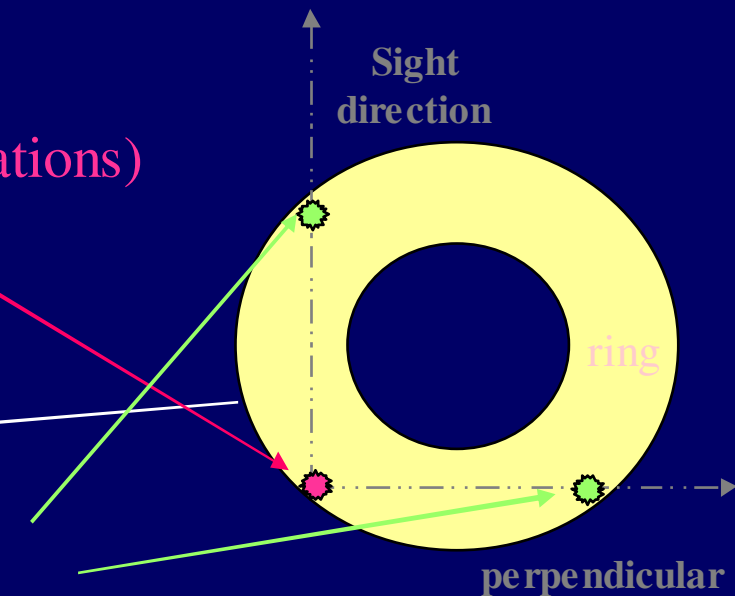
↑ Leveling jack



1 fix point (center of rotations)

Mechanical device supporting laser/telescope

2 leveling electric jacks
(=2 perpendicular directions)



Mount Leveling system panel



values for 2 directions:
sight direction and perpendicular



Current leveling values
(0.3 arc second/ unit)

2 Speed for correction

Manual control

Automatic control
With servo loop control

This efficient system increase remote controlled capability

FTLRS tracking in the fields at sunset



FTLRS just installed in our new laboratory

Merci!

