Development of quality control tools for the MLRO

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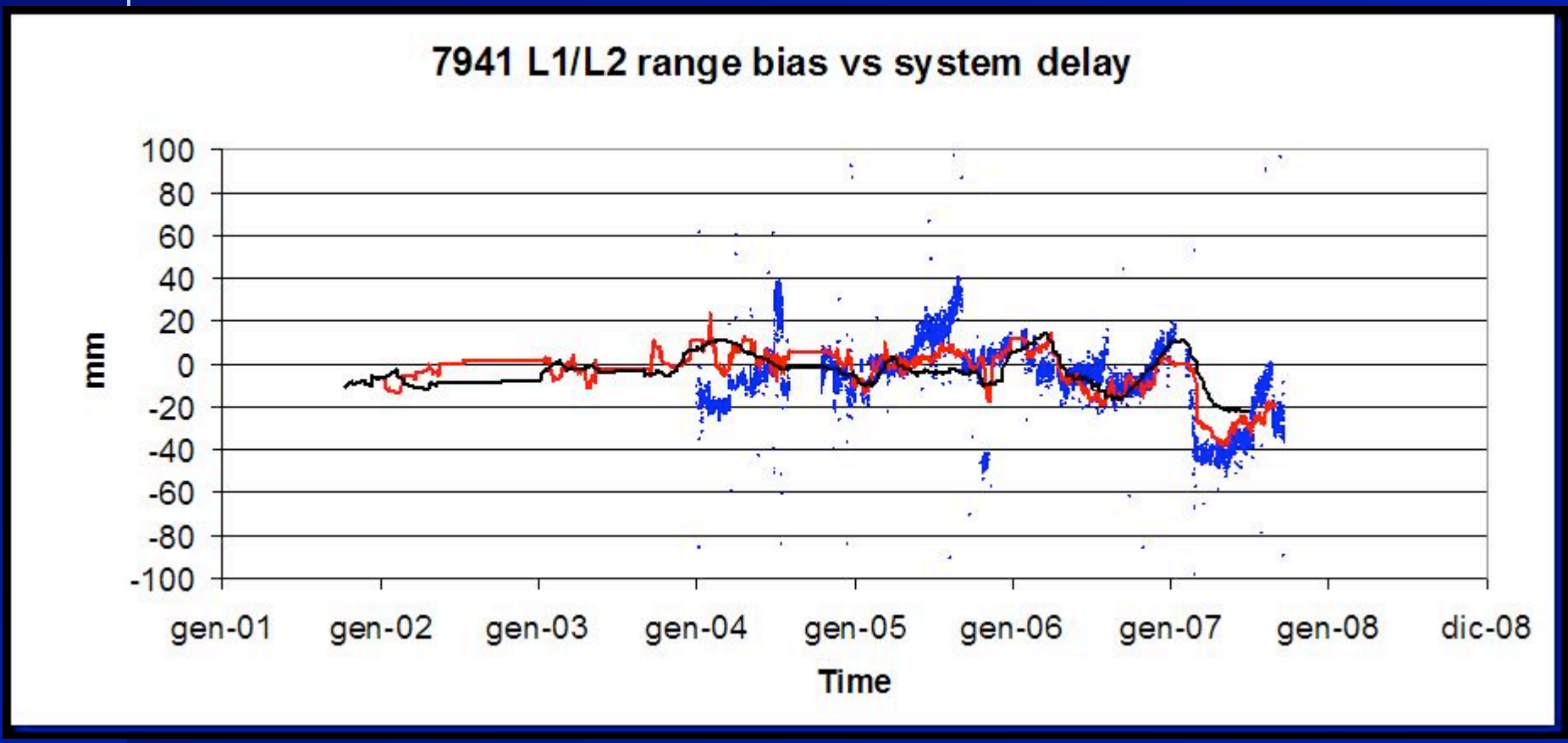
One year ago…

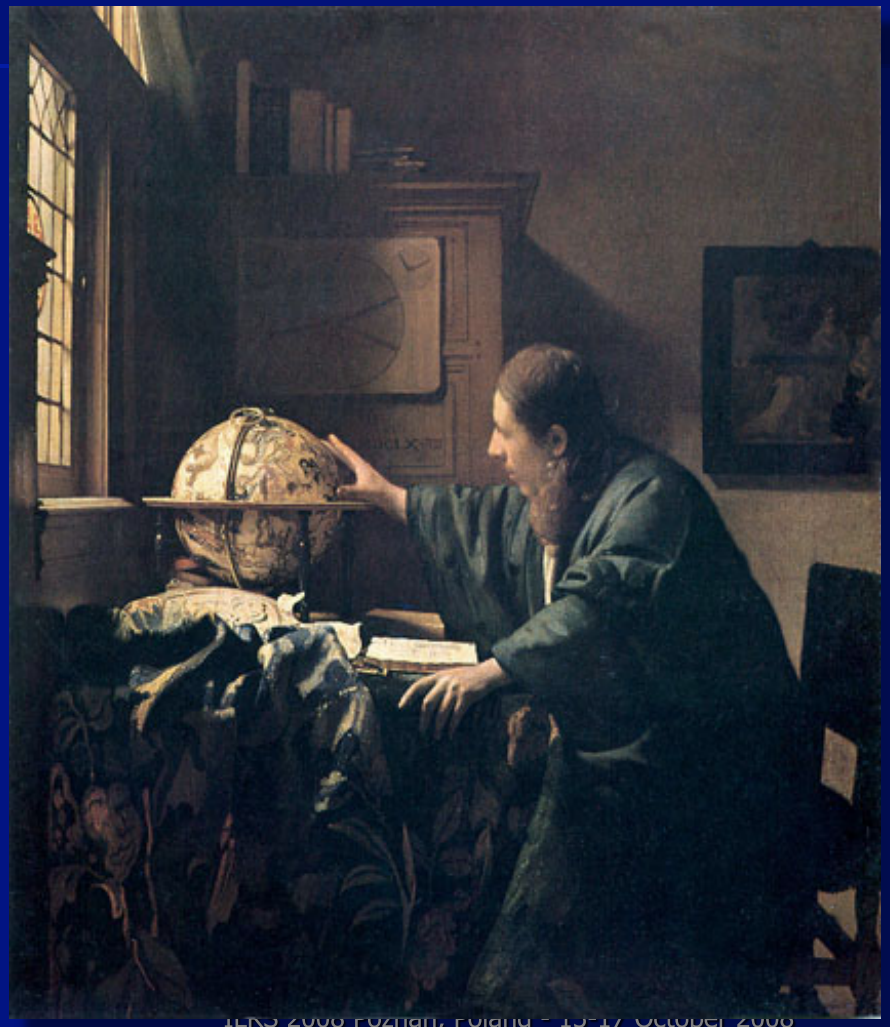

7941 L1/L2 range bias vs system delay
100
80
60
40
20
0
-20
-40
-60
-80
-100
mm
gen-01
gen-02
gen-03
gen-04
gen-05
gen-06
gen-07
gen-08
dic-08
Time

At that time we concluded…

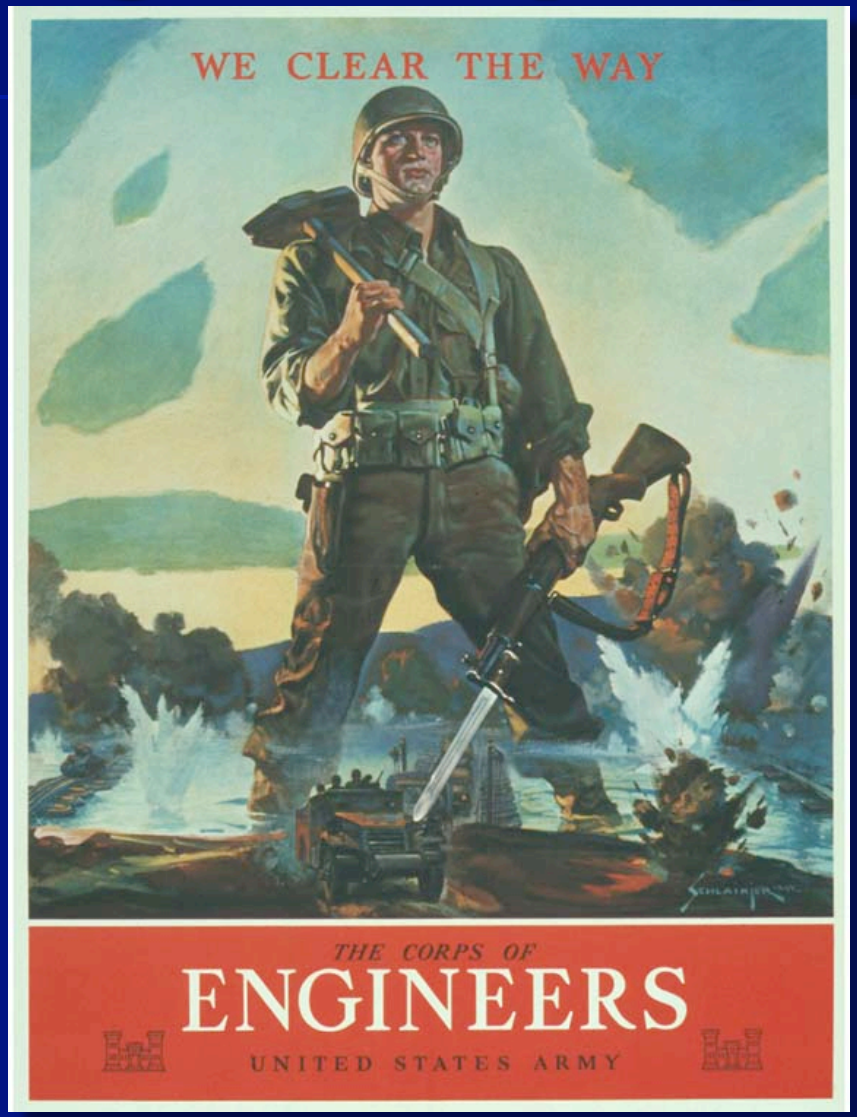
- A *dedicated* SLR system engineer is mandatory.
- A set of *quasi real-time SLR station health indicators* should be agreed upon, defined and developed by system specialists and data analysts. This should allow to rapidly pinpoint a problem arising at a station
- Is range bias monitoring enough?
- Standardizing calibration procedures?

The three souls in SLR:

The scientist (DA)

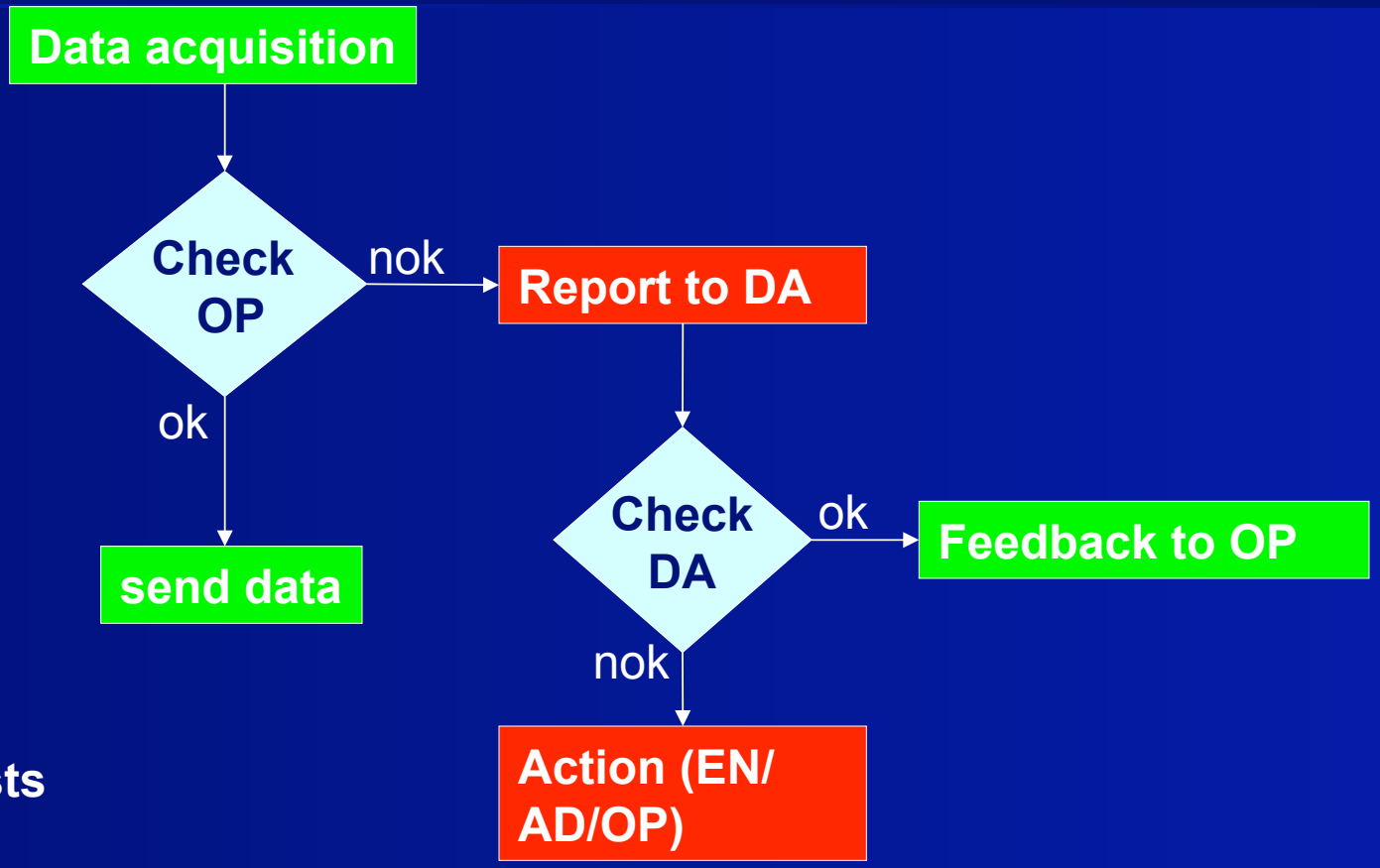


The engineer (EN)



The operator (OP)

Internal QC



OP = Operators
DA = Data analysts
EN = Engineers

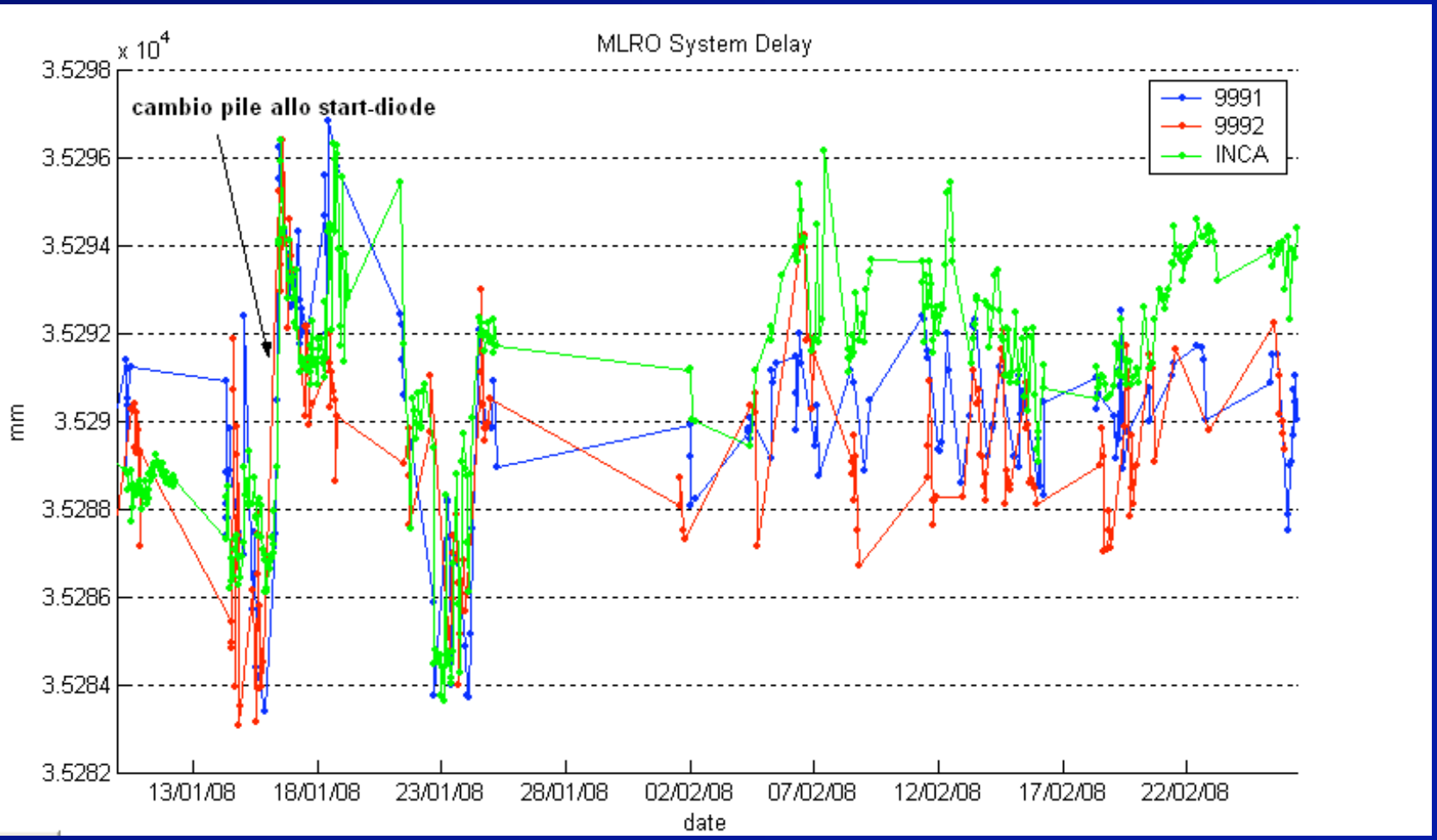
Internal QC

- Acquisition phase
  - Calibration stability (mean, rms)
  - Pass parameters stability (editing, rms, other)
- Routine checks
  - Diagnostics, calibrations
  - Other procedures in collaboration with EN

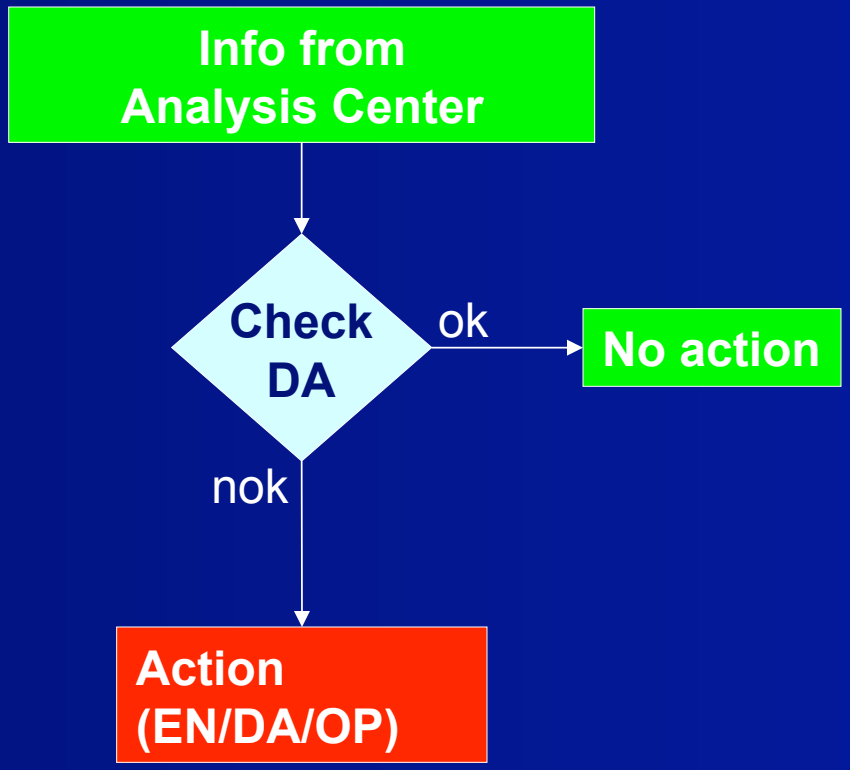
MLRO health indicator parameters

- Automatically monitored params (DA is automatically notified if threshold values are reached):
  - System delay rms (should be <2 mm)
  - System delay variations
  - Transmitted energy std
  - Pass residuals rms

System delay



External QC



OP = Operators
DA = Data analysts
EN = Engineers

External QC

- ILRS reports
- ILRS station performance
- Biases from Hitotsubashi Univ.
- GeoDAF MLRO monitor

GeoDAF

MLRO System Performance

MLRO System Performance (SP)

- MLRO System Performance (SP)
- MLRO bias
- MLRO coordinate offsets

SLR station monitor

MLRO SP files
Documentation MLRO System Performance

START date: Year/Month/Day
2008 / 07 / 12

STOP date: Year/Month/Day
2008 / 10 / 10

Select X axis parameter
- (•) Time
- ( ) Full-rate RMS data
- ( ) System delay
- ( ) System delay RMS
- ( ) Return Rate
- ( ) Tx Energy
- ( ) Rx Energy

1) Satellite option: category
(•) Enable satellite category ( ) Disable satellite category

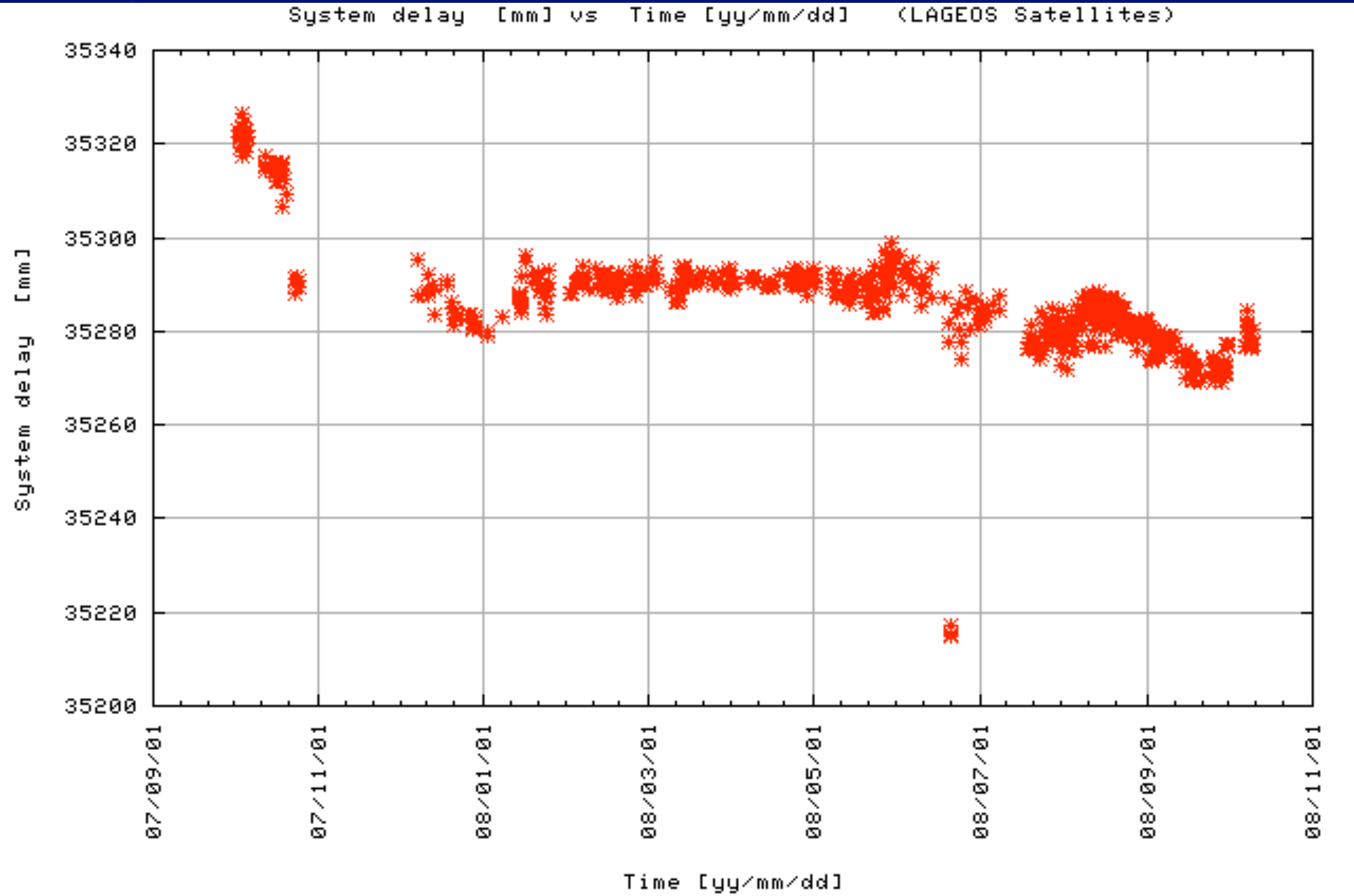
2) Satellite option: name
noname
AJISAI
ANDERR-Act
ANDERR-Pas
BEACON_C

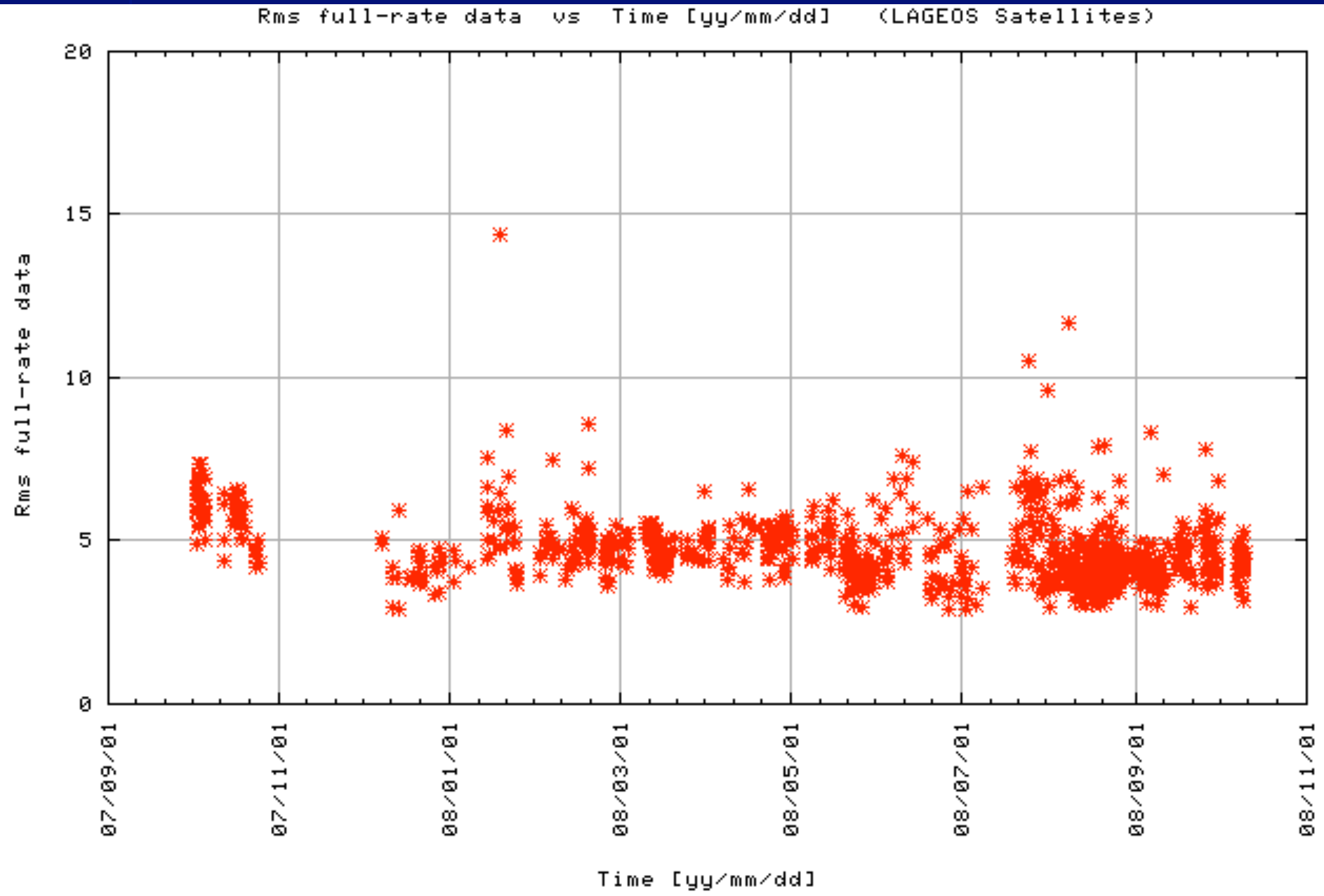
Select Y axis parameter
- (•) Pass
- ( ) Full-rate RMS data
- ( ) System delay
- ( ) System delay RMS
- ( ) Return Rate
- ( ) Tx energy
- ( ) Rx energy
- ( ) Edited data for non-recorded energy
- ( ) Edited data for MAX energy
- ( ) Edited data for min energy
- ( ) Edited data after fit

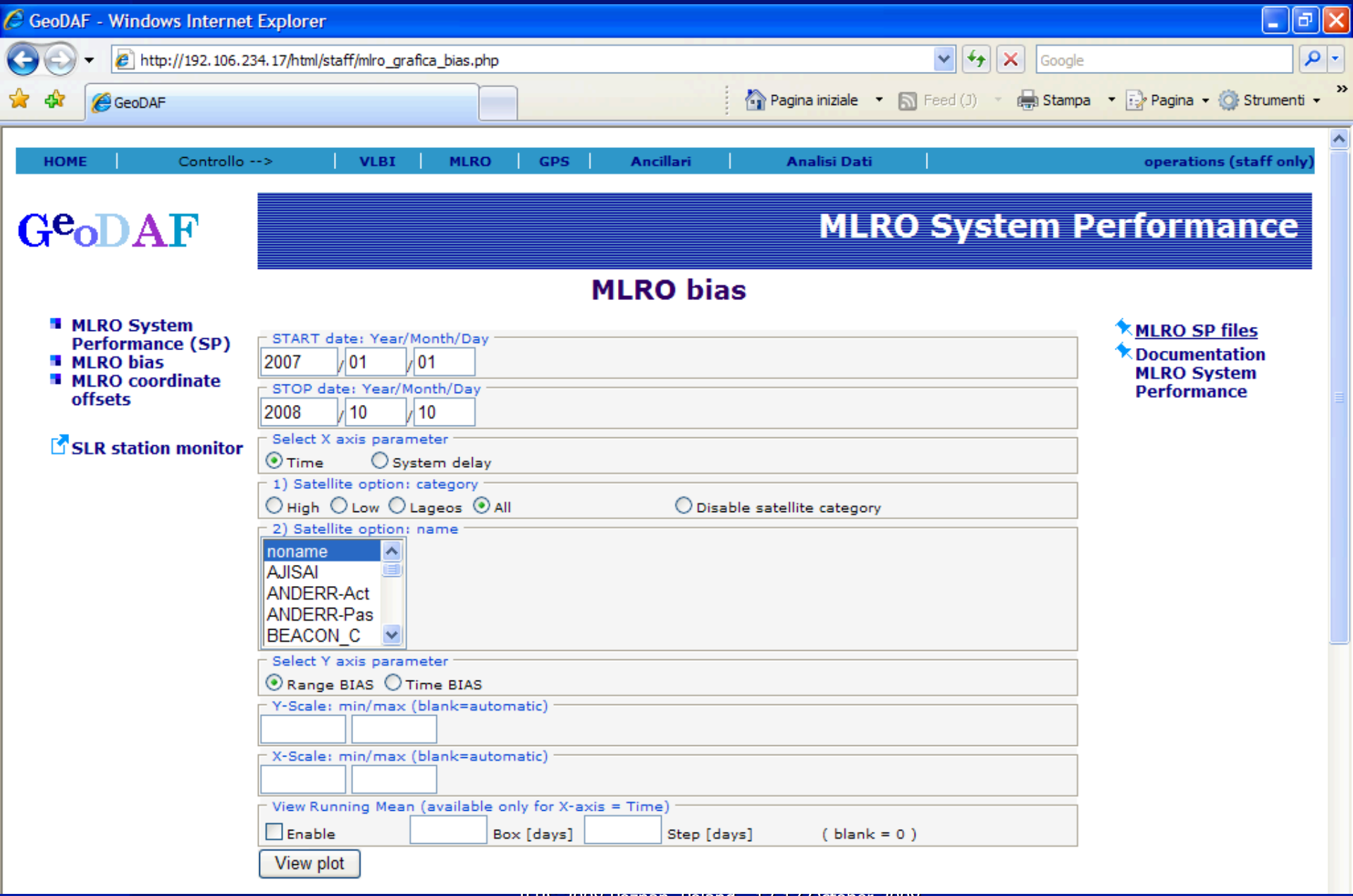
Y-Scale: min/max (blank=automatic)

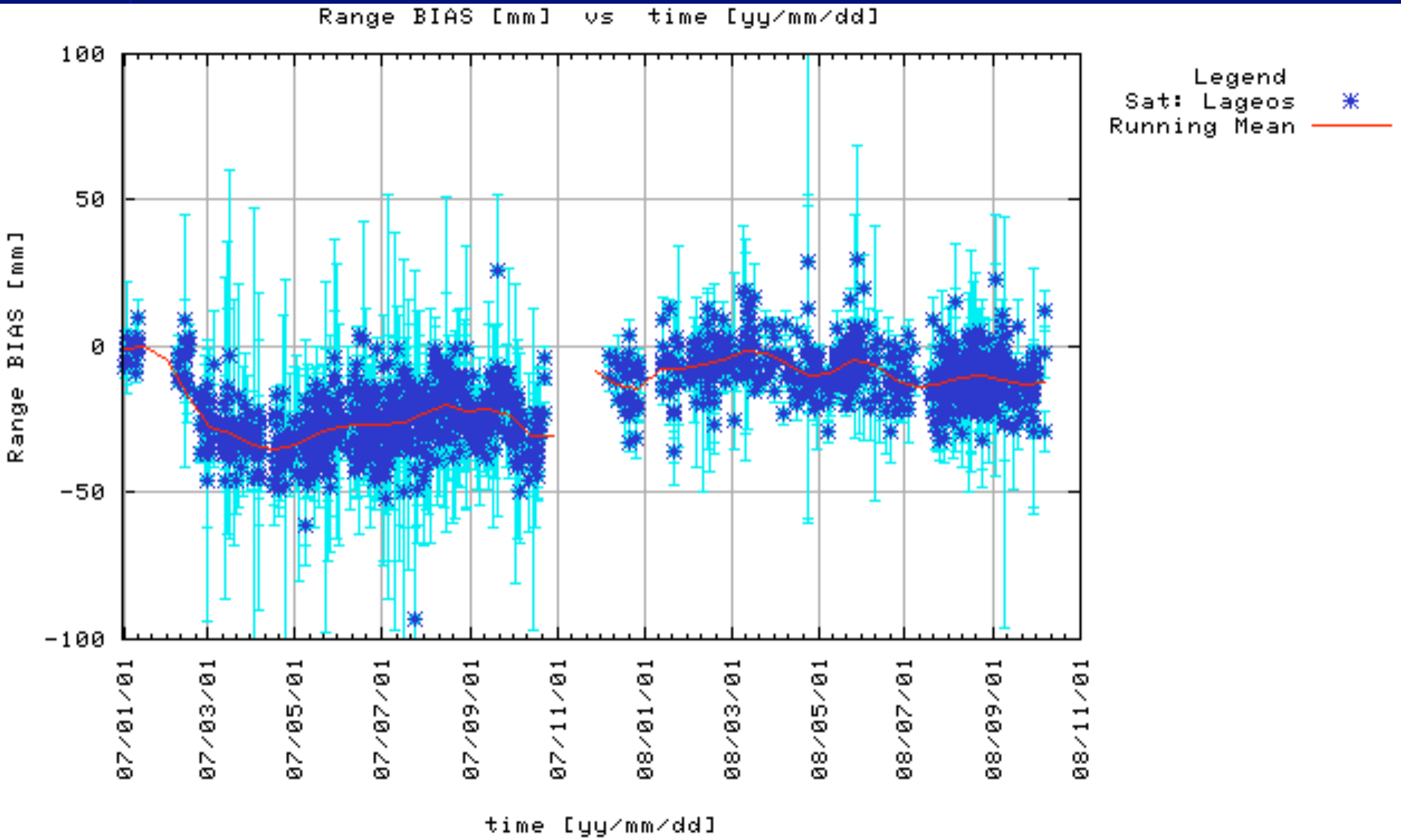
X-Scale: min/max (blank=automatic)

View plot

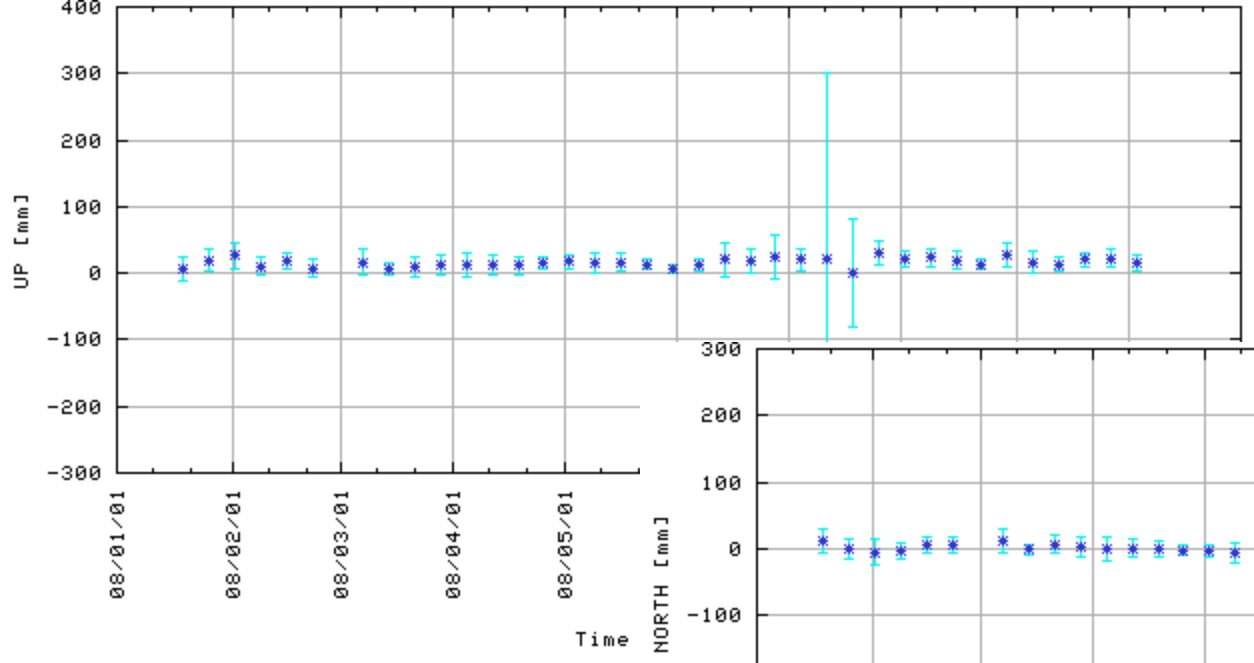

System delay [mm] vs Time [yy/mm/dd] (LAGEOS Satellites)
System delay [mm]
35340
35320
35300
35280
35260
35240
35220
35200
07/09/01
07/11/01
08/01/01
08/03/01
08/05/01
08/07/01
08/09/01
08/11/01
Time [yy/mm/dd]

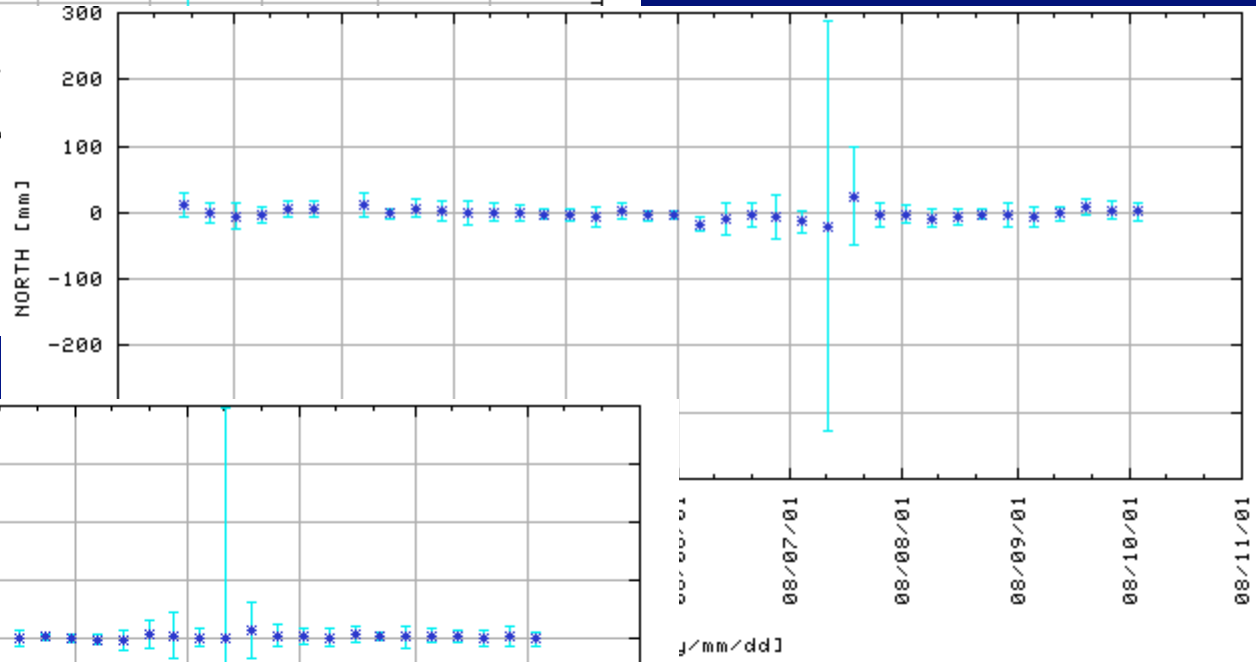

Rms full-rate data vs Time [yy/mm/dd] (LAGEOS Satellites)
Rms full-rate data
20
15
10
5
0
07/09/01
07/11/01
08/01/01
08/03/01
08/05/01
08/07/01
08/09/01
08/11/01
Time [yy/mm/dd]

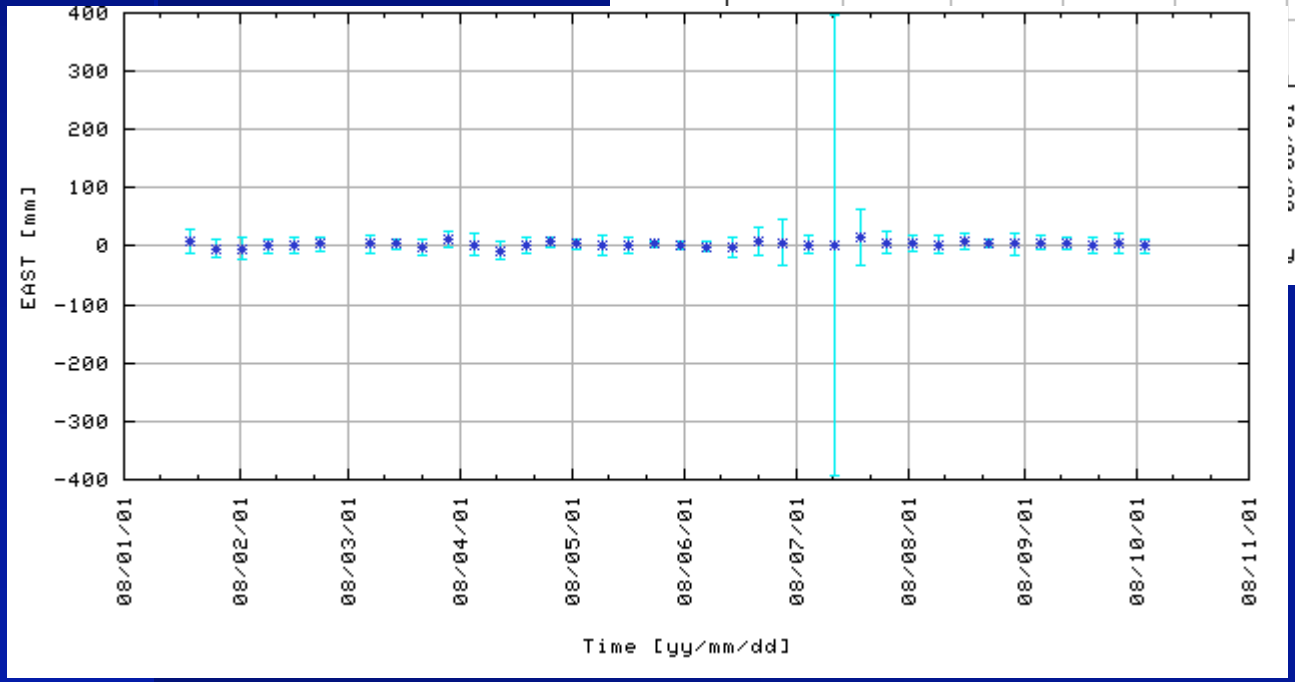

GeoDAF - Windows Internet Explorer
http://192.106.234.17/html/staff/mlro_grafica_bias.php
GeoDAF
Pagina iniziale
Feed (J)
Stampa
Pagina
Strumenti
HOME | Controllo --> | VLBI | MLRO | GPS | Ancillari | Analisi Dati | operations (staff only)
GeoDAF
MLRO System Performance
MLRO bias
MLRO System Performance (SP)
MLRO bias
MLRO coordinate offsets
SLR station monitor
START date: Year/Month/Day
2007 / 01 / 01
STOP date: Year/Month/Day
2008 / 10 / 10
Select X axis parameter
Time
System delay
1) Satellite option: category
High
Low
Lageos
All
Disable satellite category
2) Satellite option: name
noname
AJISAI
ANDERR-Act
ANDERR-Pas
BEACON_C
Select Y axis parameter
Range BIAS
Time BIAS
Y-Scale: min/max (blank=automatic)
X-Scale: min/max (blank=automatic)
View Running Mean (available only for X-axis = Time)
Enable
Box [days]
Step [days]
(blank = 0)
View plot
MLRO SP files
Documentation MLRO System Performance


Range BIAS [mm] vs time [yy/mm/dd]
Range BIAS [mm]
100
50
0
-50
-100
07/01/01
07/03/01
07/05/01
07/07/01
07/09/01
07/11/01
08/01/01
08/03/01
08/05/01
08/07/01
08/09/01
08/11/01
time [yy/mm/dd]
Legend
Sat: Lageos
Running Mean


GeoDAF - Windows Internet Explorer
http://192.106.234.17/html/staff/mlro_grafica_off.php
GeoDAF
Pagina iniziale
Feed (J)
Stampa
Pagina
Strumenti
HOME | Controllo --> | VLBI | MLRO | GPS | Ancillari | Analisi Dati | operations (staff only)
GeoDAF
MLRO System Performance
MLRO coordinate offsets
MLRO System Performance (SP)
MLRO bias
MLRO coordinate offsets
SLR station monitor
START date: Year/Month/Day
2008 / 01 / 01
STOP date: Year/Month/Day
2008 / 10 / 10
Select Y axis parameter
X-Y-Z
Up-East-North
Y-Scale: min/max (blank=automatic)
View plot
MLRO SP files
Documentation MLRO System Performance


UP [mm]
400
300
200
100
0
-100
-200
-300
08/01/01
08/02/01
08/03/01
08/04/01
08/05/01
Time


NORTH [mm]
300
200
100
0
-100
-200
08/07/01
08/08/01
08/09/01
08/10/01
08/11/01
y/mm/dd]


EAST [mm]
400
300
200
100
0
-100
-200
-300
-400
08/01/01
08/02/01
08/03/01
08/04/01
08/05/01
08/06/01
08/07/01
08/08/01
08/09/01
08/10/01
08/11/01
Time [yy/mm/dd]

Lesson learned, and conclusions

- Improve interaction between DA, EN and OP
- Web based monitor system on line and working
- Better understanding of the system
- Clear identification of issues
- Still a lot to be done…