

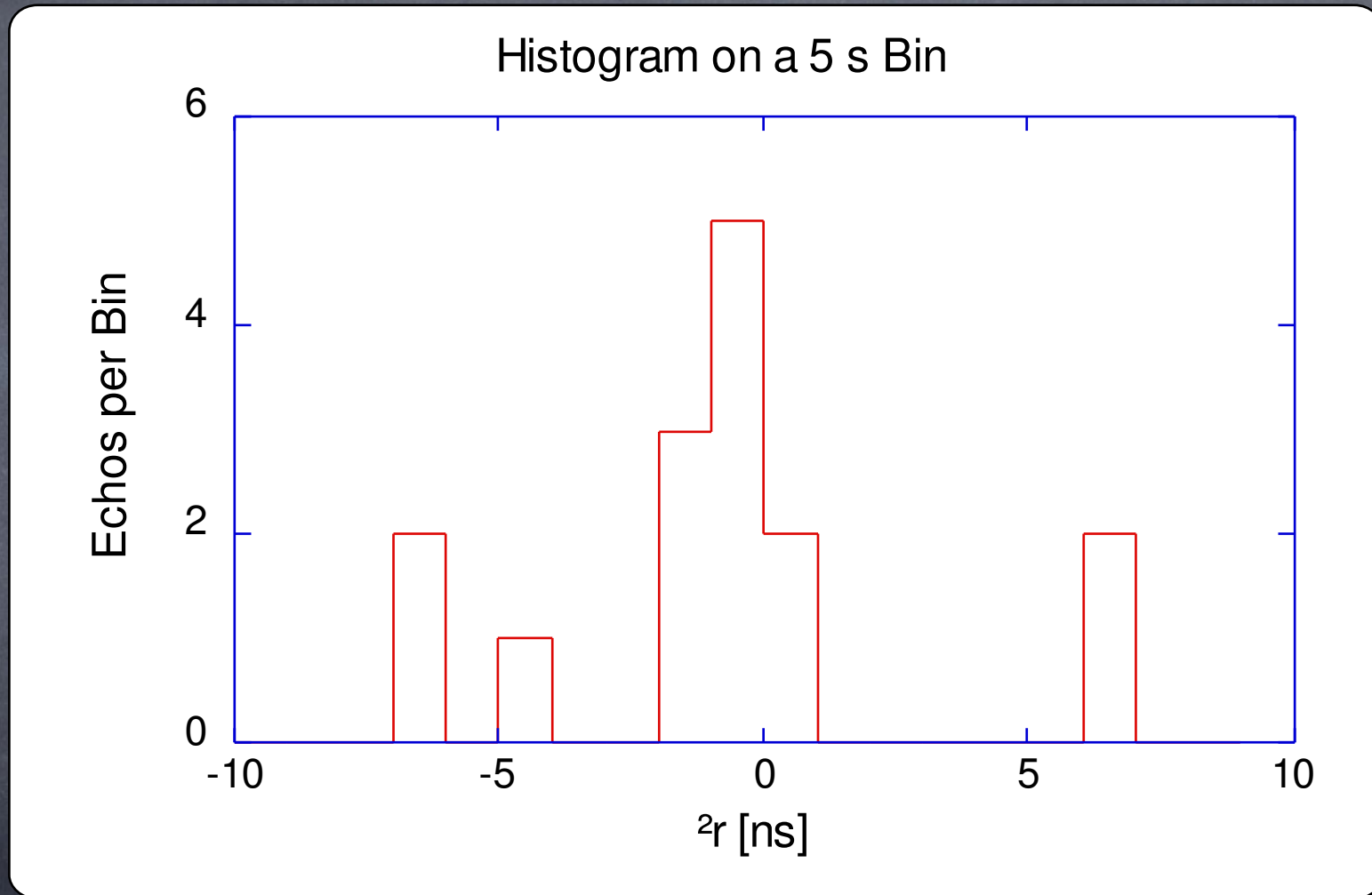
Recursive Filter Algorithm for Noise Reduction in SLR

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Filtering by Histograms...

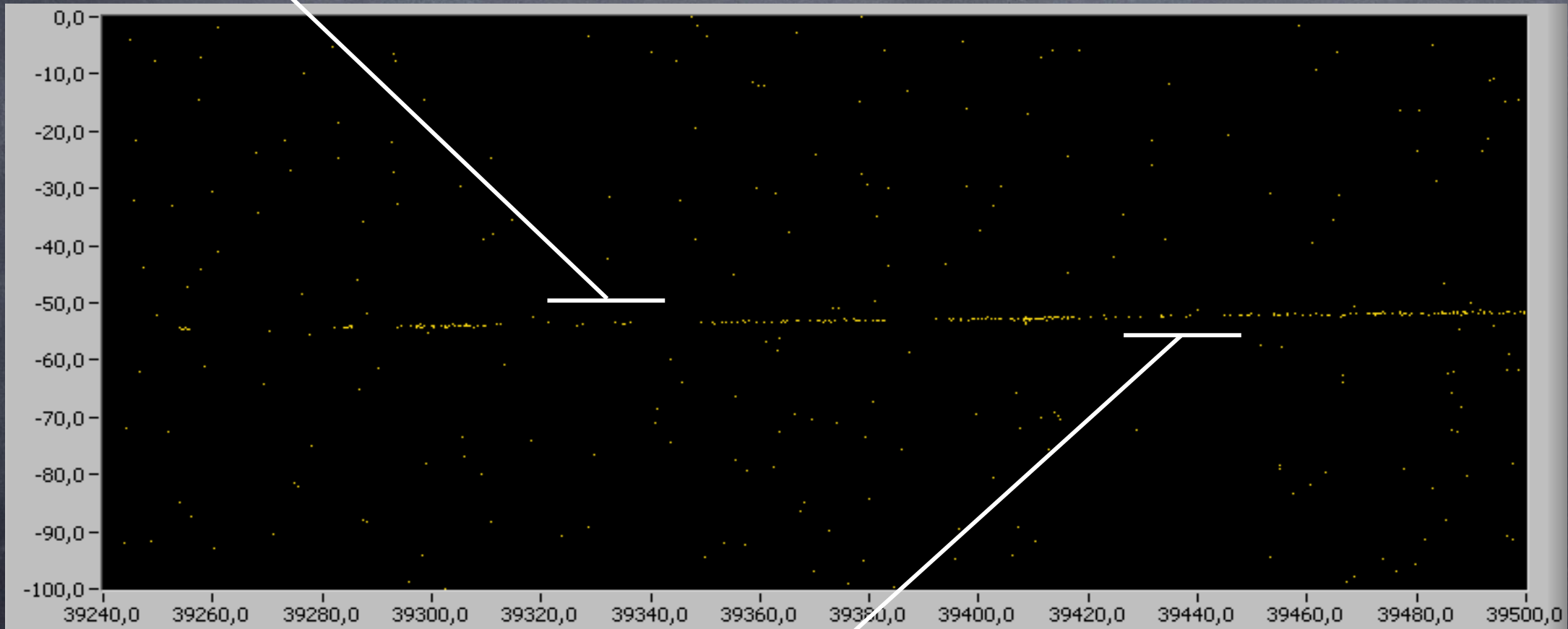


... a standard Practise

Difficulties

data gaps

Timebias

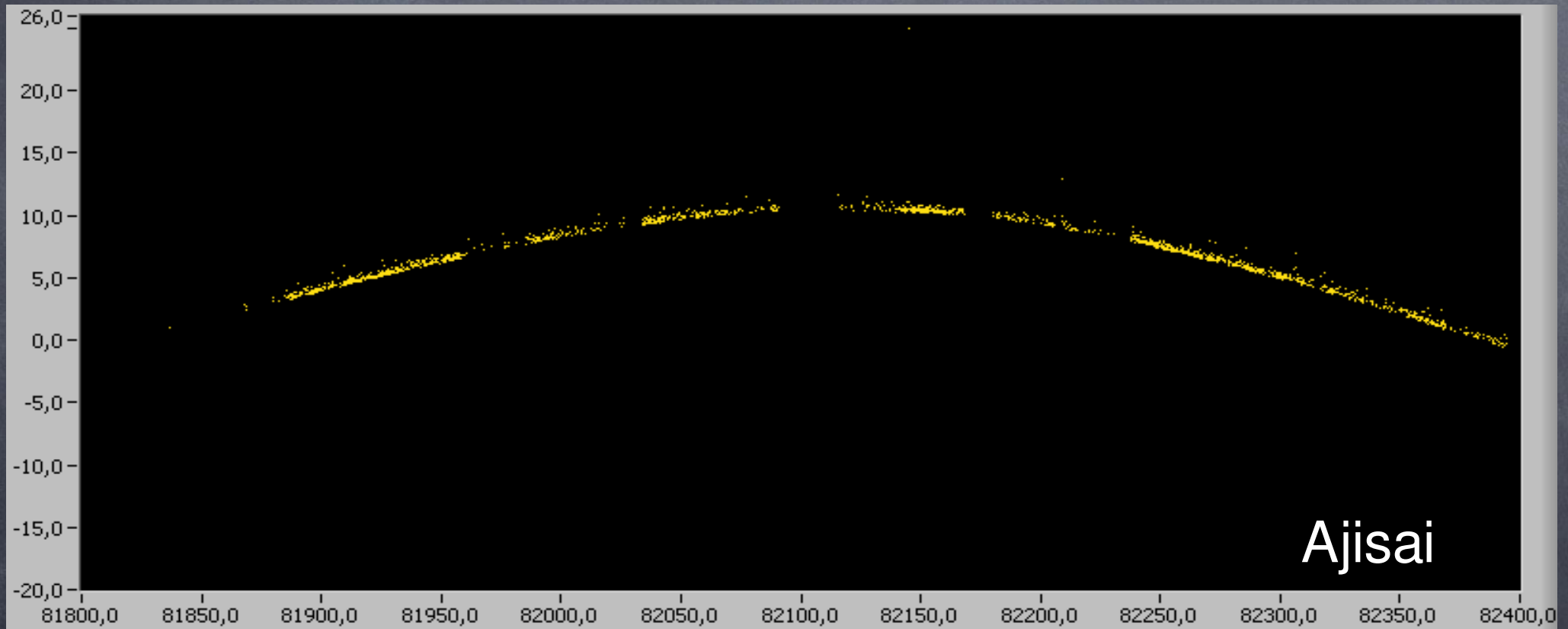


sparse returns

... current Baseline

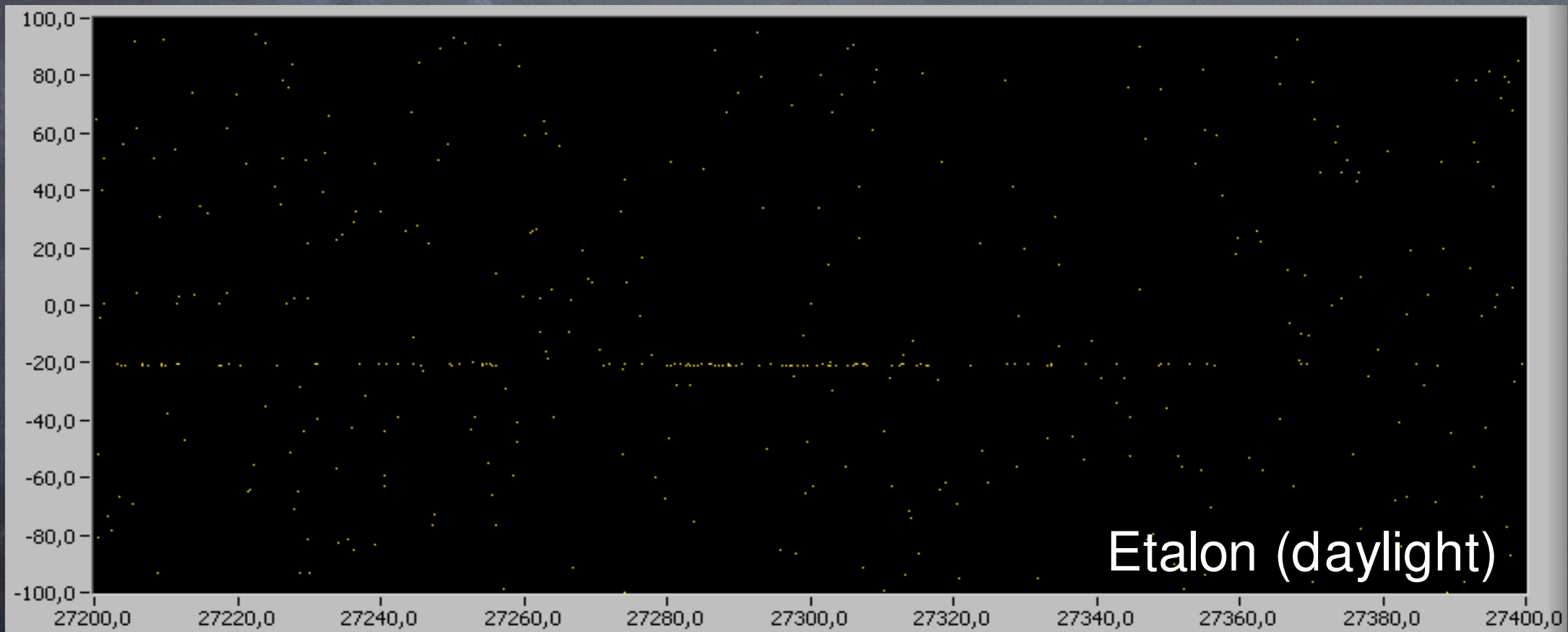
- Screening needs to be automatic (done)
- Histogram Analysis on Range Residuals
- Evaluation of Time Slices (near Realtime)
- Drawbacks at: low SNR, large Timebias, substantial Gaps of Data

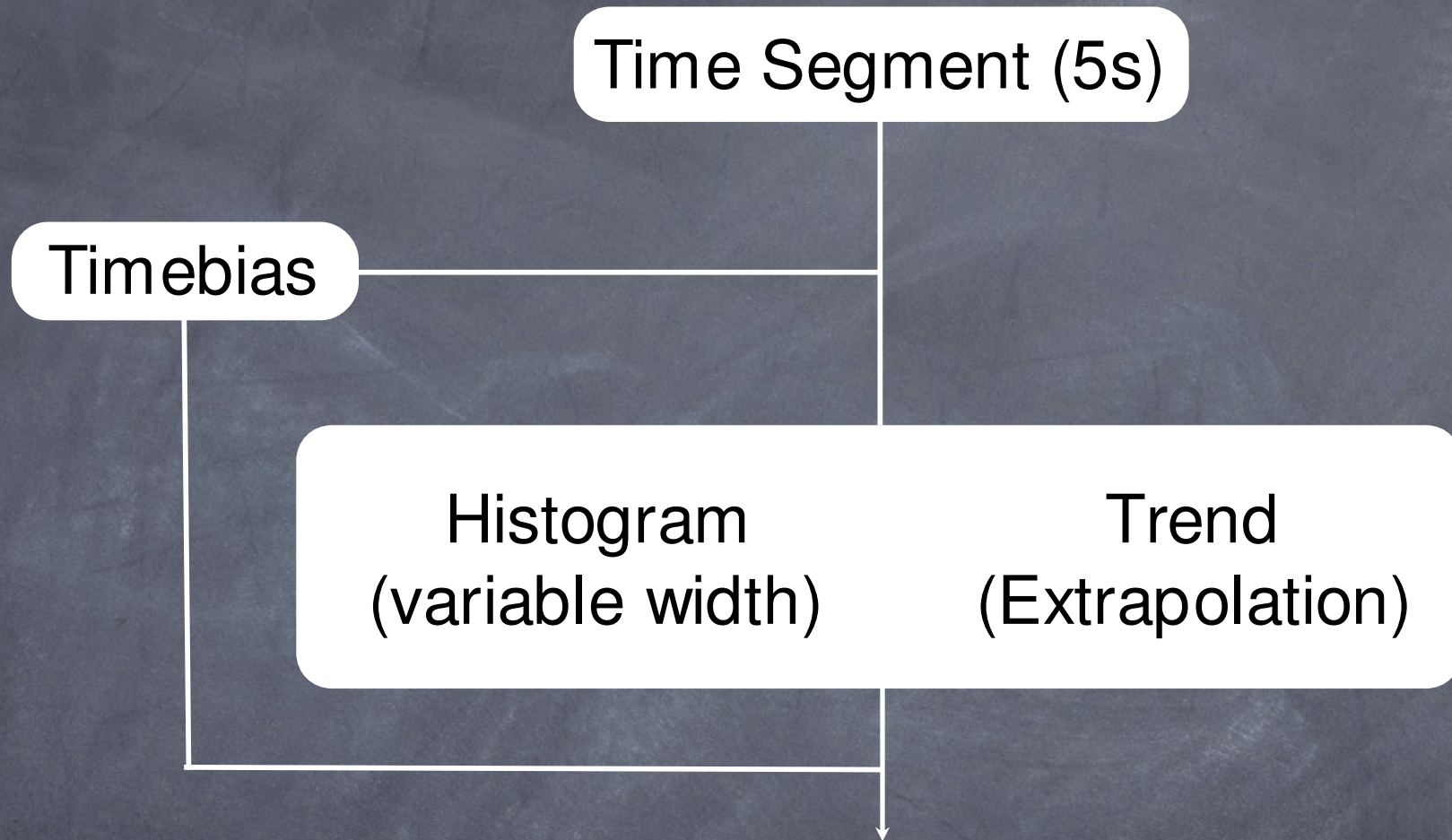
The Timebias improved a lot with
the new CPF's...



...but still not always a simple Correction
Value

Bad SNR suggests to look ahead
and reconsider the past





Identification: # of Returns larger than Threshold
Verification: # of Returns twice the Threshold
or identified in both Routines

Analysis of History

Reprocessing of last 12 Time Segments

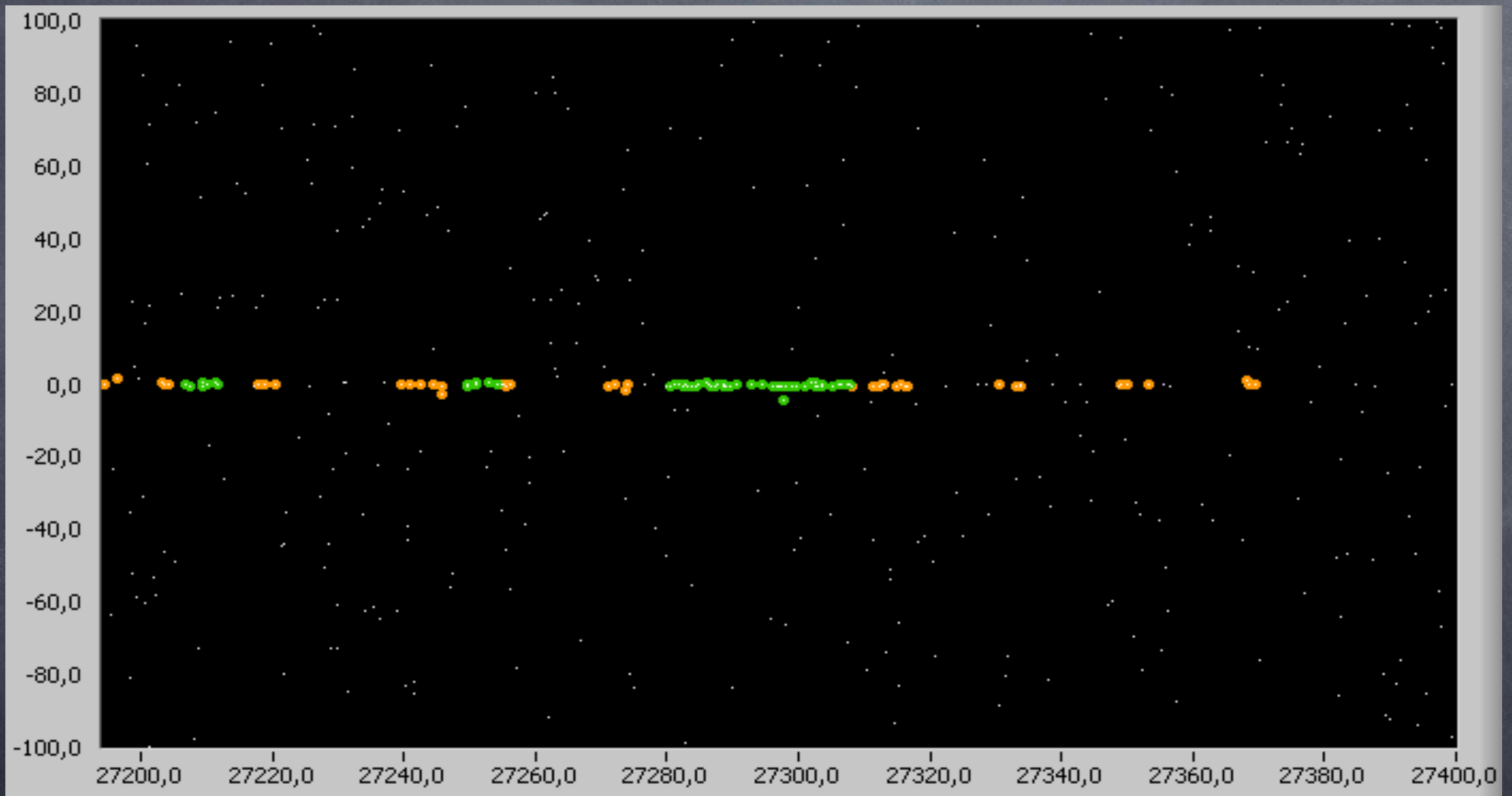
If more than 5 verified Returns exist

linear Extrapolation and Corridor of ± 2.5 ns
Everything inside this Corridor is a Return



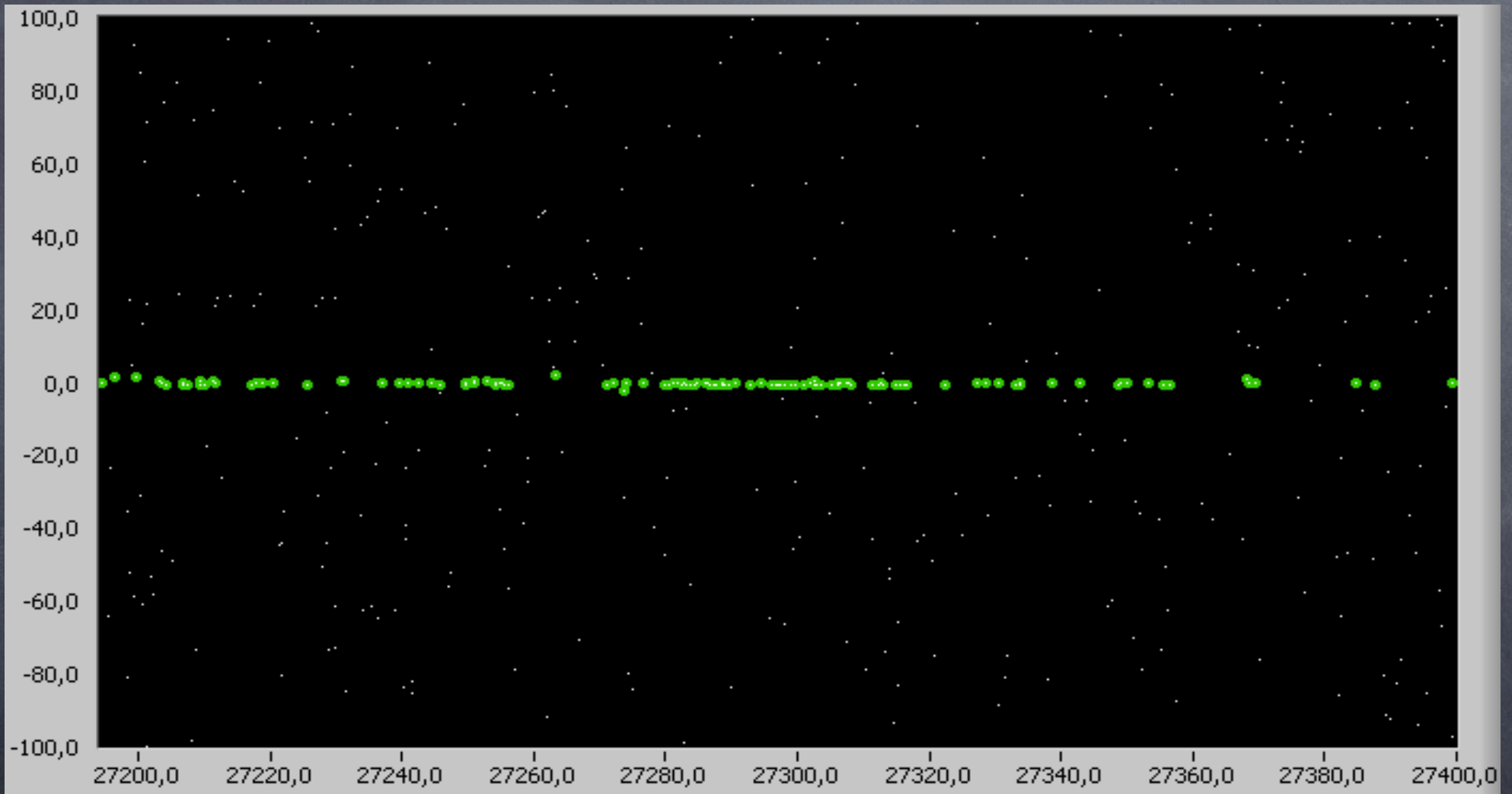
“identified” Returns become “verified” Returns
new Datapoints become “identified” Returns
“identified” Returns OUTSIDE the corridor are
deleted.

Examples: Etalon (sparse Data)



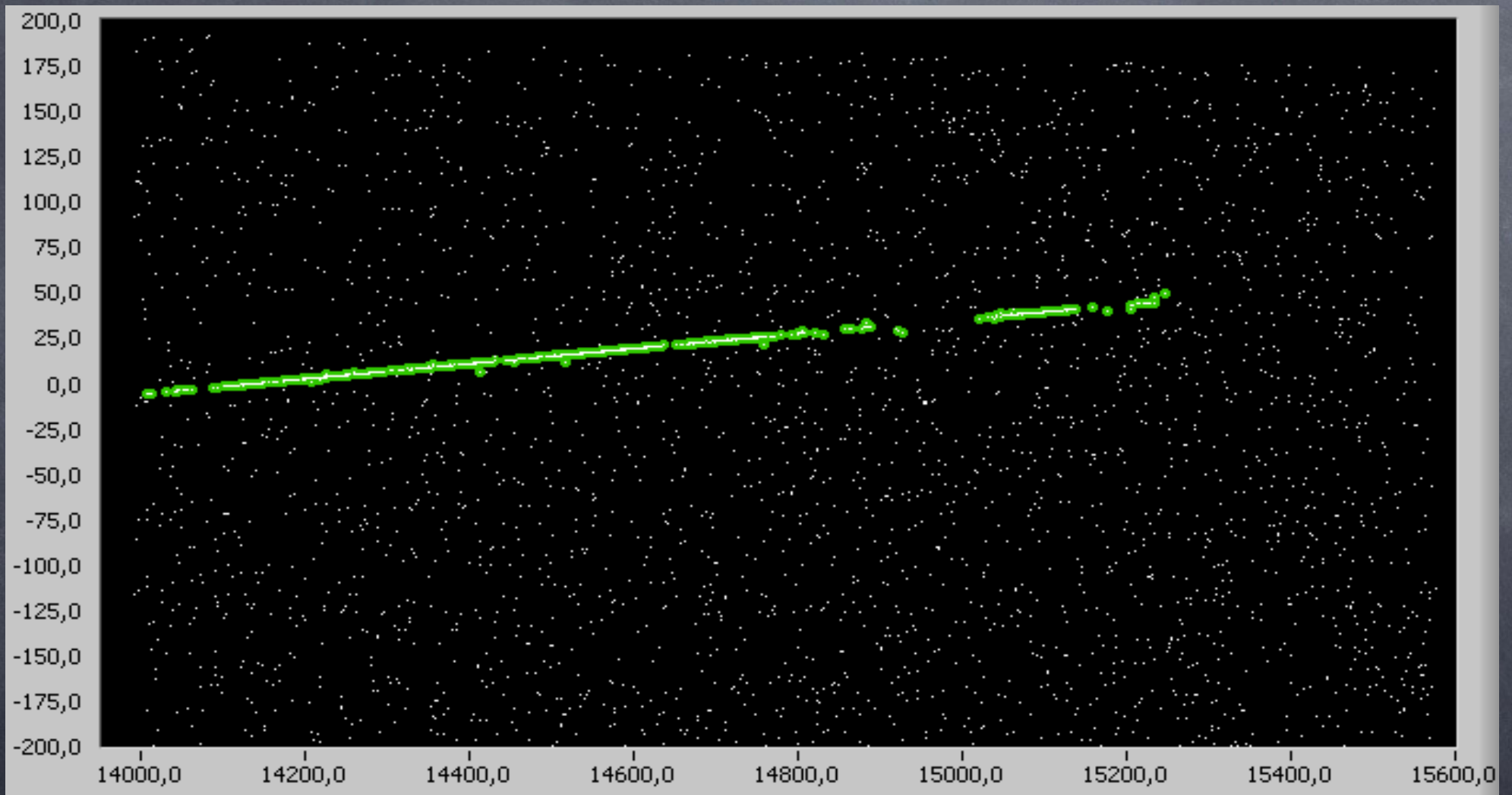
... before Reprocessing

Examples: Etalon (sparse Data)



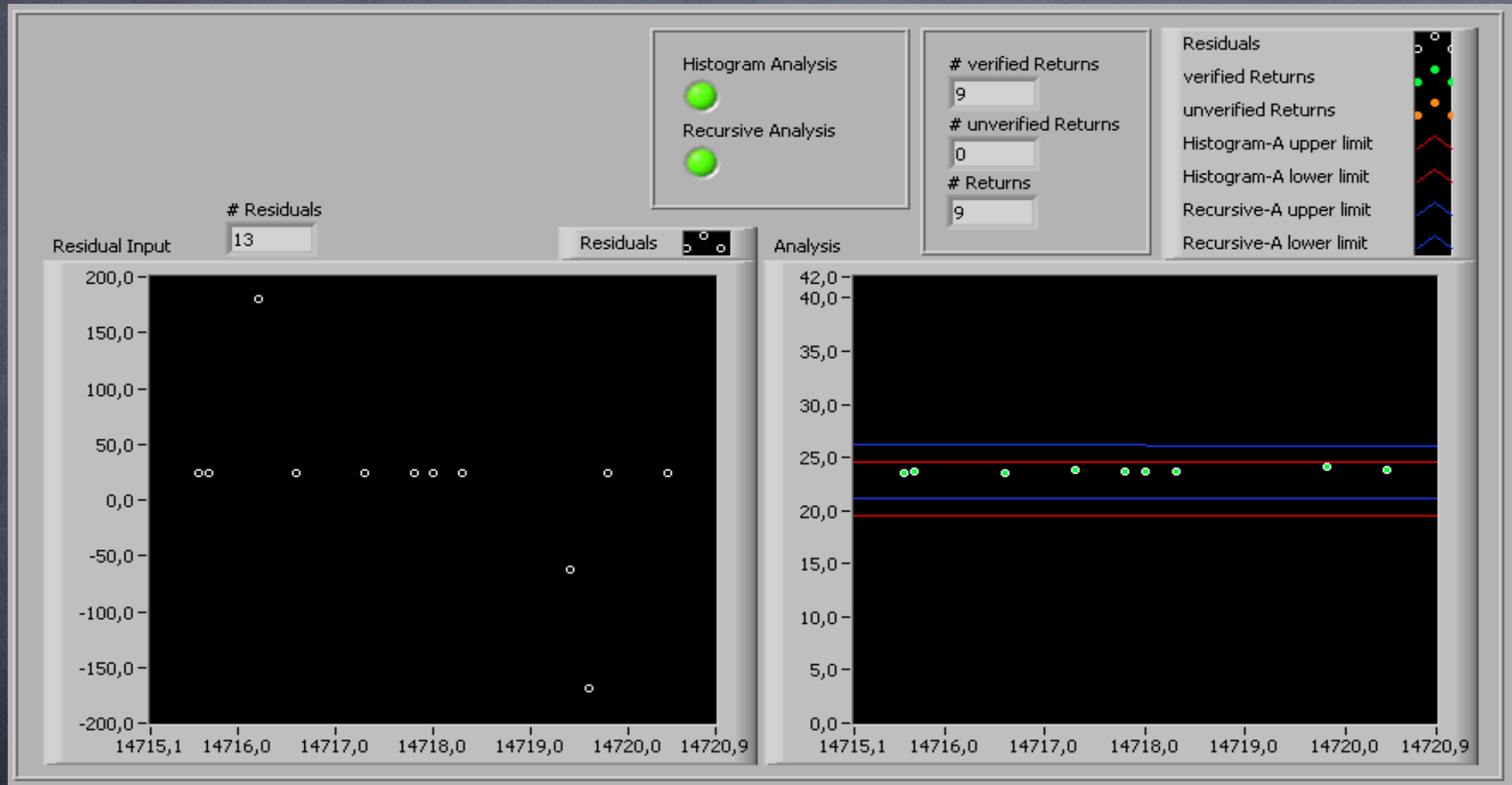
... with Reprocessing

Examples: Glonass (sparse Data)



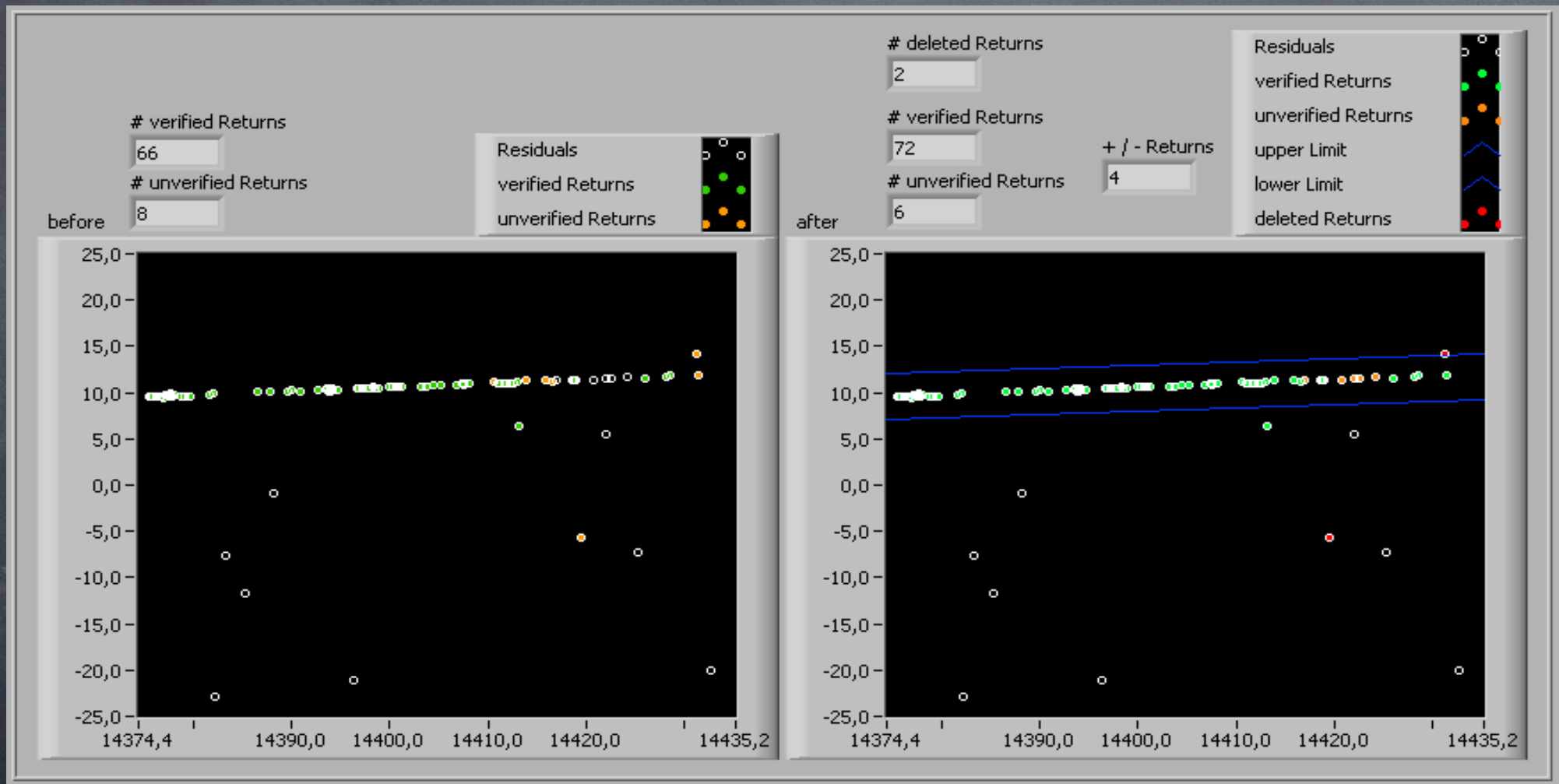
... no false Alarms outside a Band of Tolerance

Examples: Analysis of Time Segment



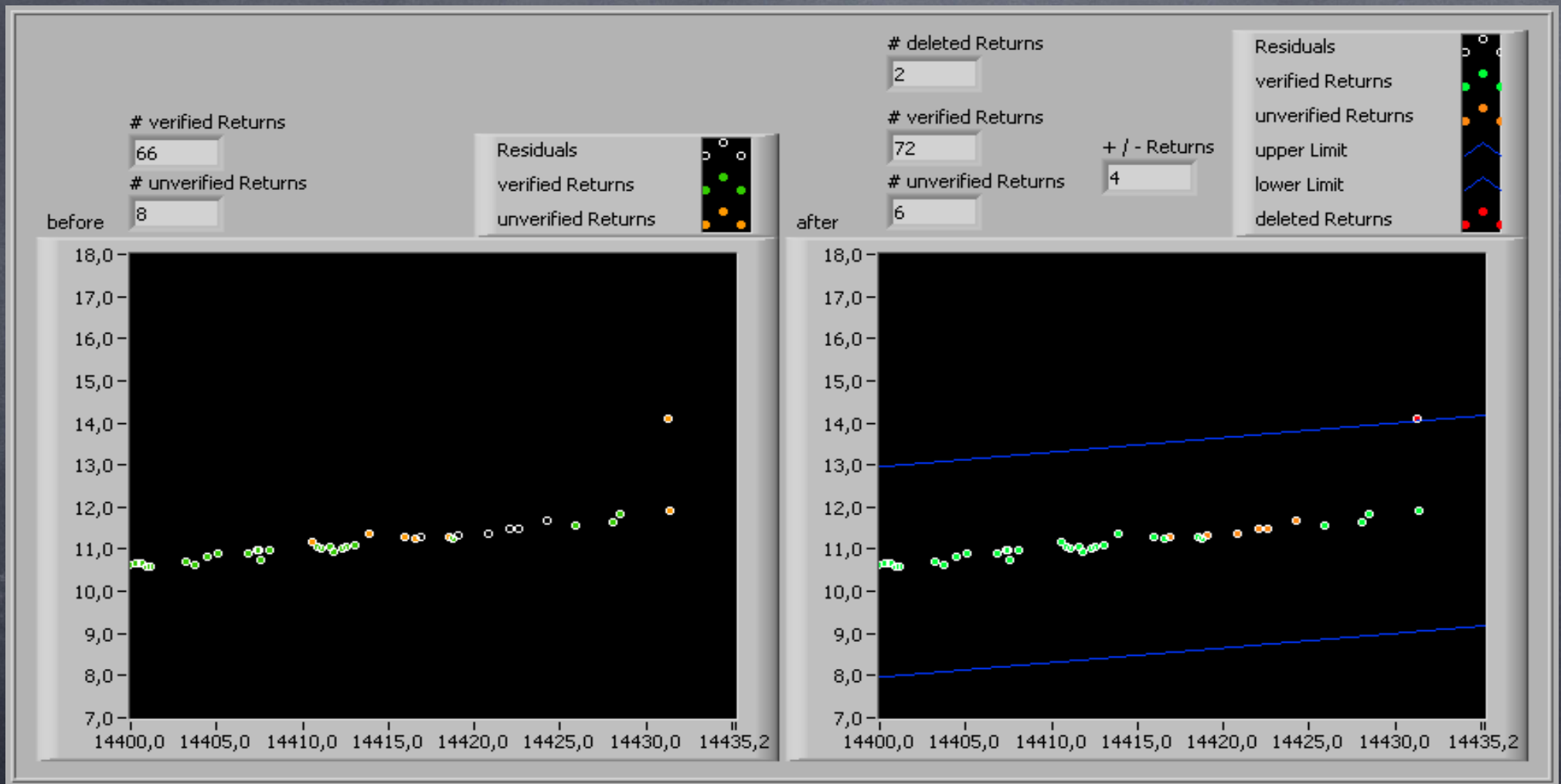
new Data in - verified Returns out

Examples: Reprocessing



sparse Data is added - false alarms removed

Examples: Reprocessing (blow up)



sparse Data is added - false alarms removed

Summary

- Improvement of 10 - 40% over plain Histogram Analysis
- Substantial Reduction of false Alarms
- Tuned to 10 Hz Laser of WLRS
- In particular great Progress for sparse Data
- Side-effects still exist but at a much reduced Level (not a silver bullet)