



Utility of Raw Radiosonde Data in QA/QC

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Modern automated upper-air processing often deeply hides details of measuring and processing. This is a great advantage unless hidden are sporadic (operators mistakes, equipment malfunction and failures, external interference), occasional (improper maintenance, production variability) and persistent (design, algorithms) problems:

- inadequate surface observation and improper sensors conditioning/exposure before and just after release of a balloon
- radiosonde and tracking system malfunction
- radiosonde telemetry reception and tracking position inconsistency
- losing information due to errors of the second kind (rejecting plausible values due too strict control), needless smoothing
- introducing bogus data (improper interpolation of signal gaps).

“Raw” data is the key that allow opening and looking inside “clever black box”.

Last but not least - only raw data provide possibility of adequate re-processing if calibration, correction or software problems were fixed. The lower the level of raw data archived – the more fundamental retrospective corrections could be done.



“Raw” data in wide sense – the data at all steps of conversion from instrument readings preceded to eventual profiles of meteorological values reported to end users in agreed formats:

- Properly raw data
 - telemetry signals: sensors and references signals (capacitance, resistance, frequency), battery voltage, status word
 - radiosonde position tracking: signals and following error of radar tracking system, GPS tracking information
- So called Level I data: raw PTU after application calibration information (including auxiliary info such as e.g. internal radiosonde temperature) and radiosonde position with native sampling rate; interpolated to a regular time grid edited (filtered) and corrected data, QC flags

It's rather difficult to guess a priori which kind of information can be helpful in a particular situation. Therefore it may have sense to encourage manufacturers to provide records of all possible information.



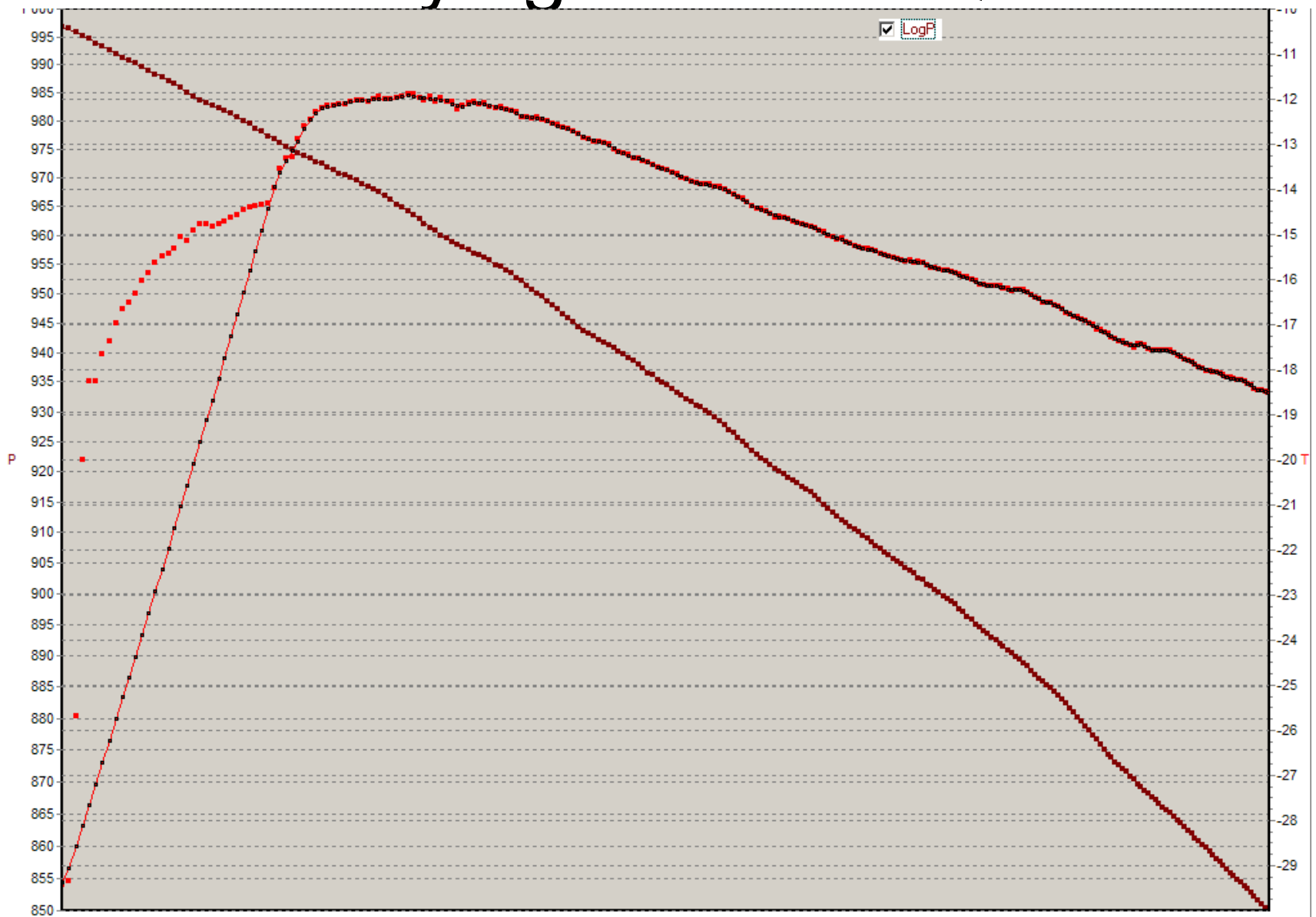
Raw data analysis is very useful for operational sounding, but mainly for support purposes, because requires relevant expertise and experience. In case of GRUAN the analysis can benefit from more sophisticated and better-motivated staff and available resources for data archiving. Therefore it's worth to perform it on the regular base both in real-time and non real-time mode for estimating/improving quality of particular ascents and sounding systems themselves.

Content and amount of data is highly system dependent, close cooperation with manufacturers is required to develop necessary well-documented transparent and traceable procedures. Auxiliary software development may be helpful.

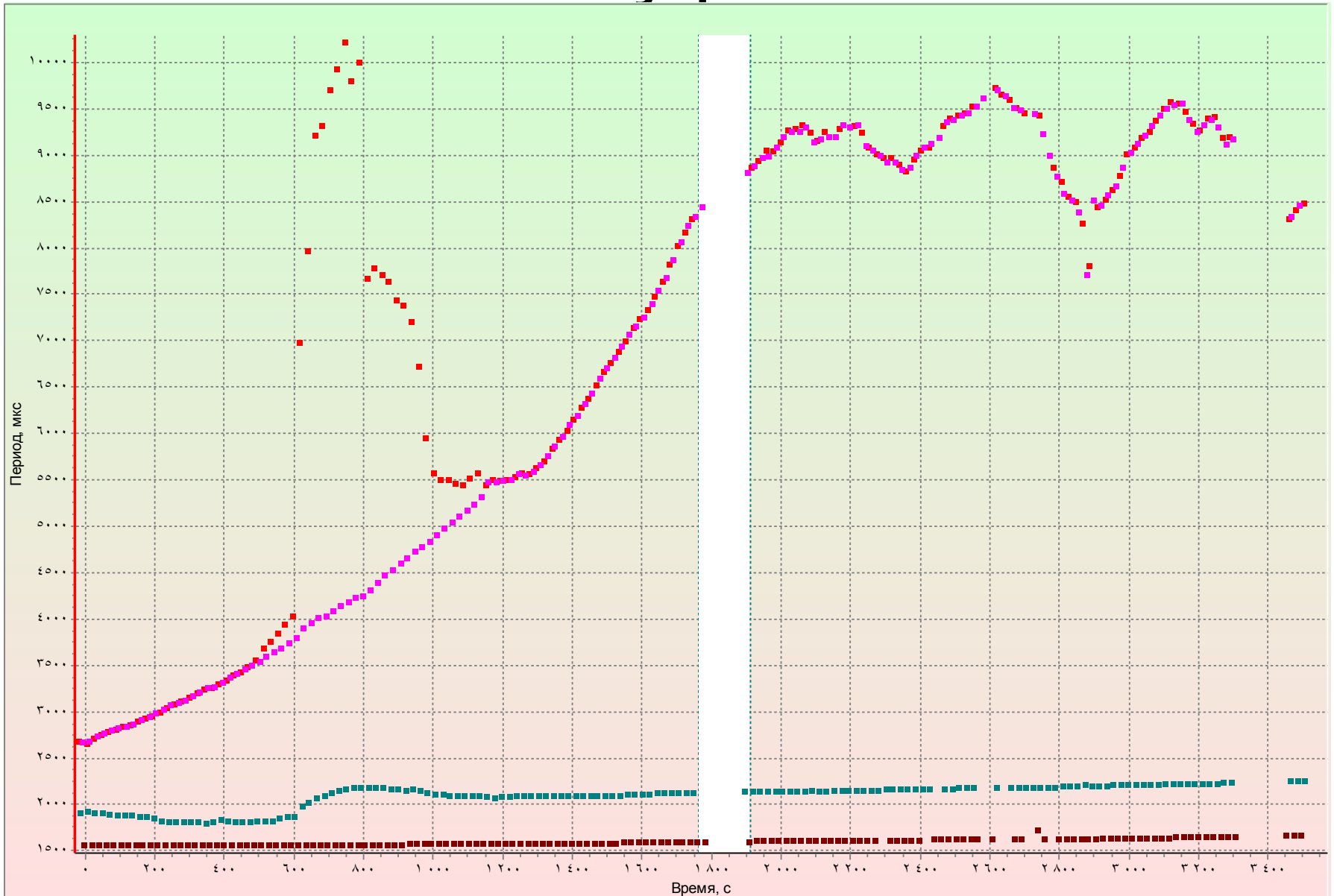
Dedicated personnel from operational and oversight staff may be needed.

Important both for commercial and research instruments.

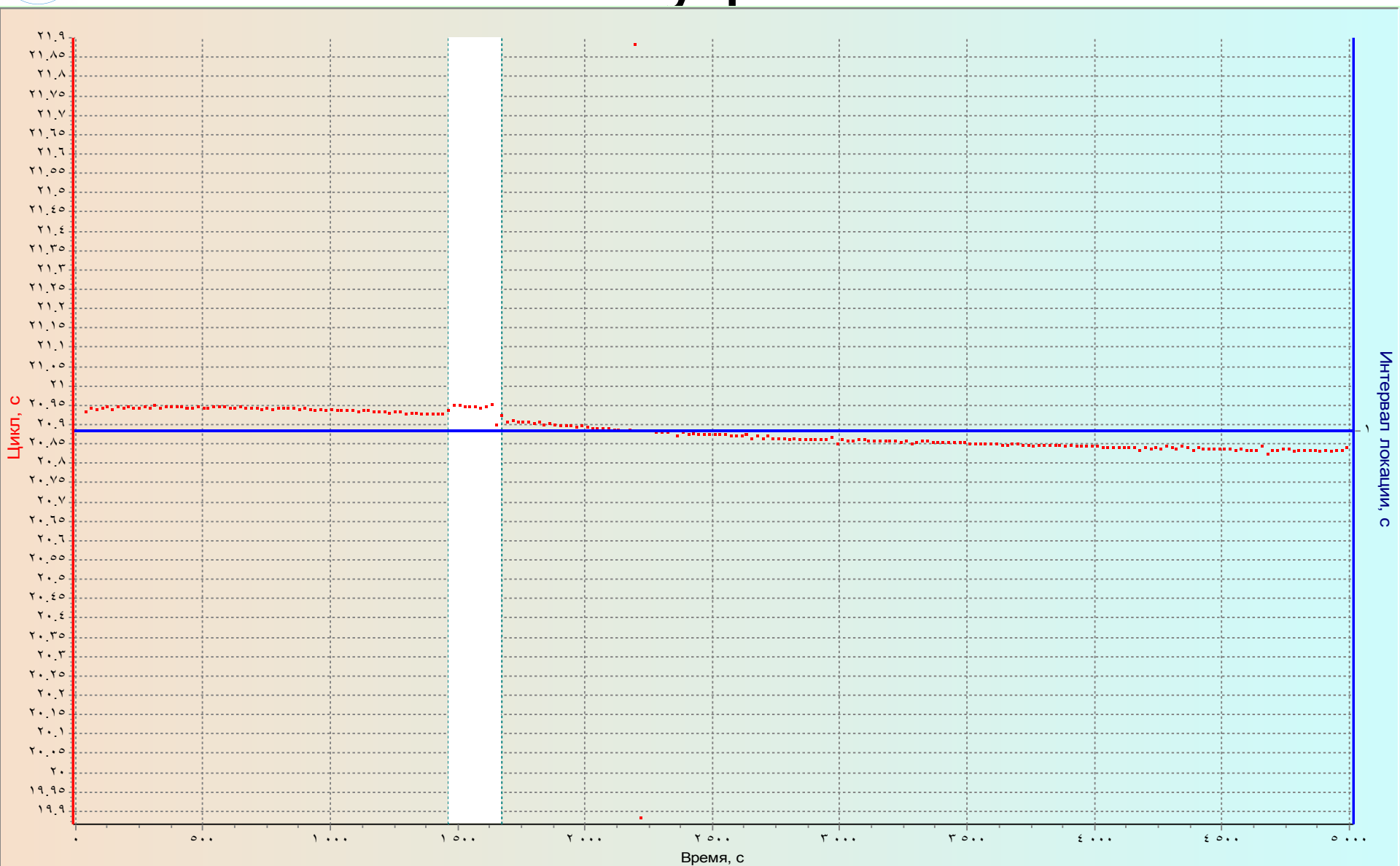
Identifying too strict QC



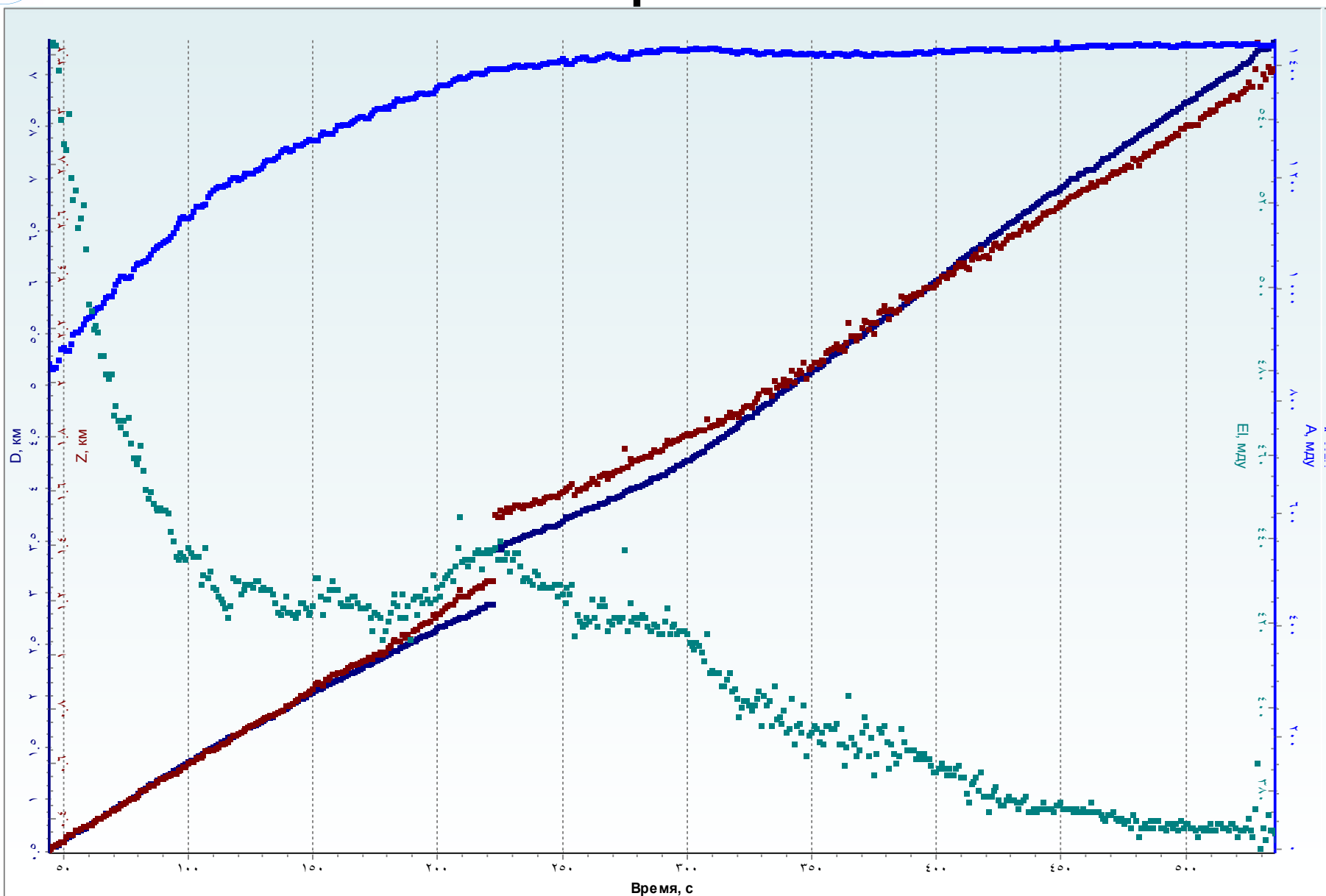
Telemetry problems



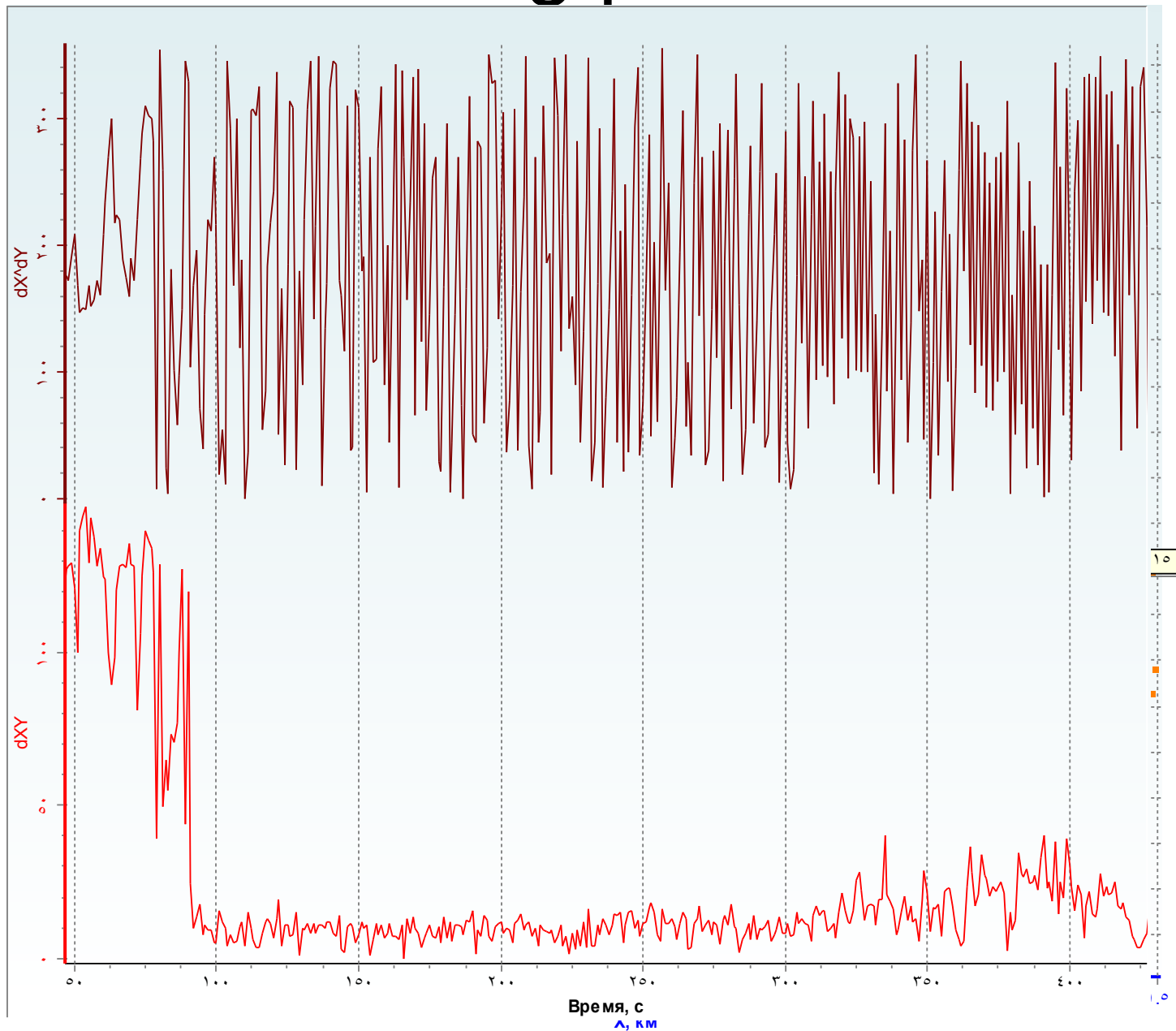
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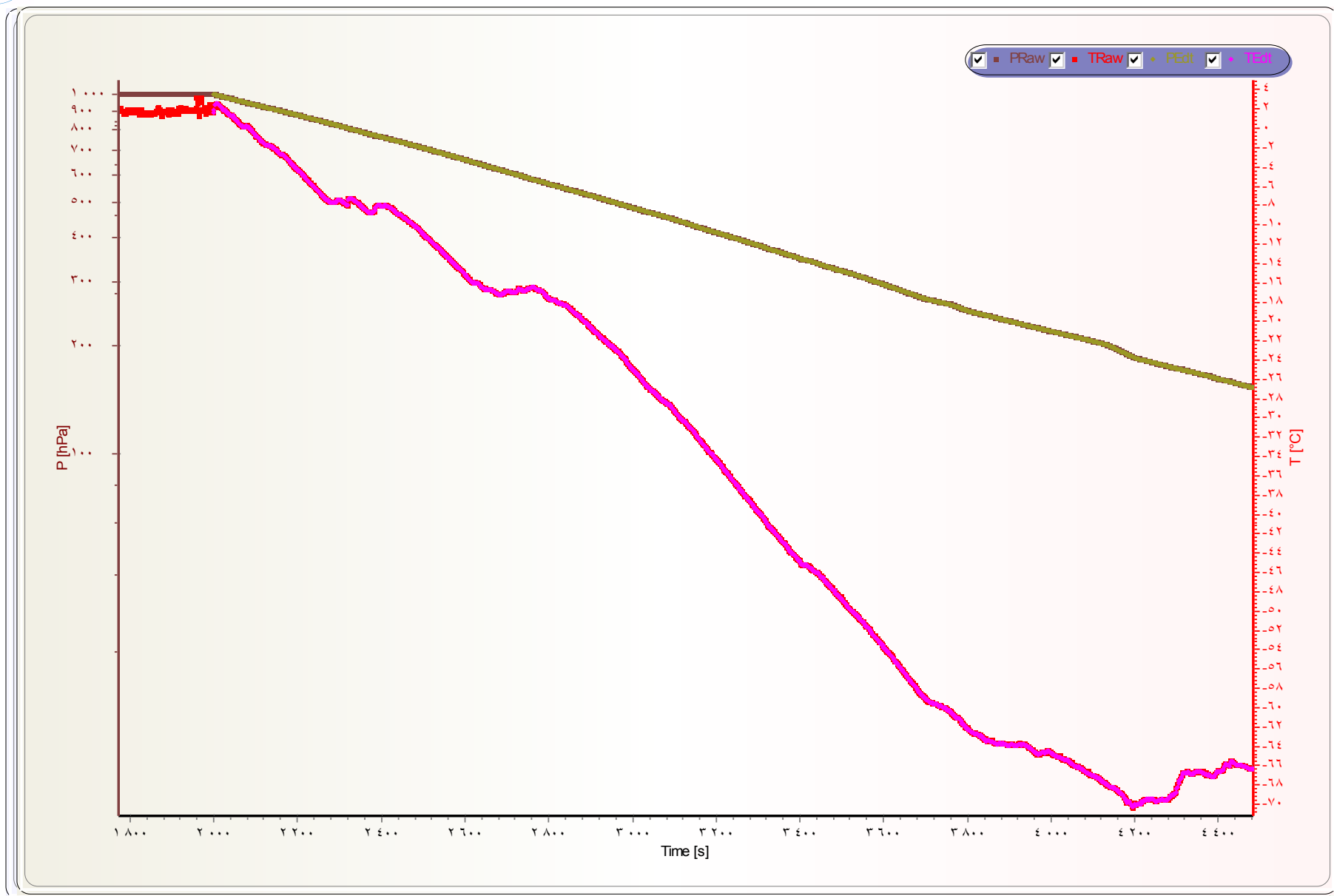
Radar problems



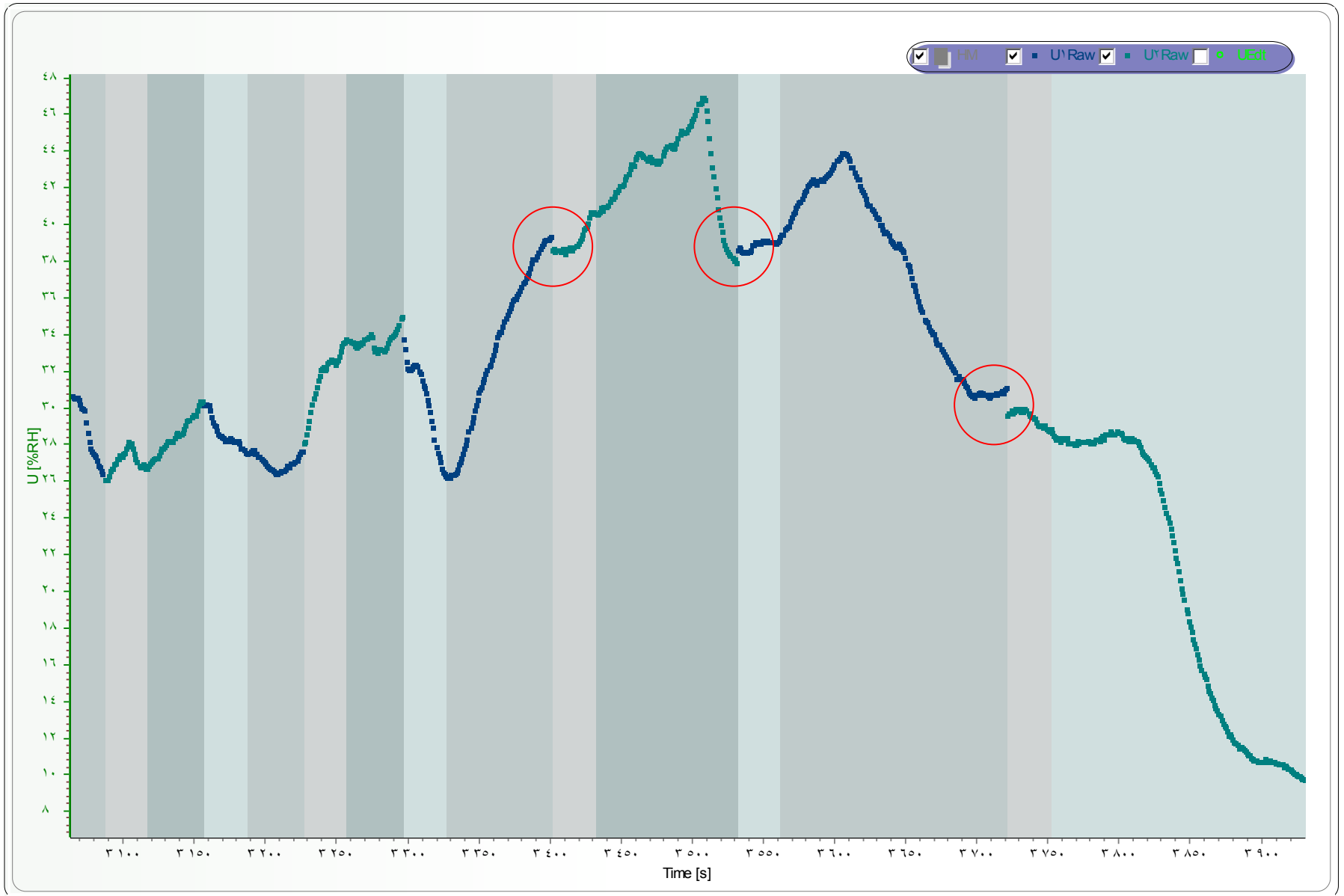
Tracking problems



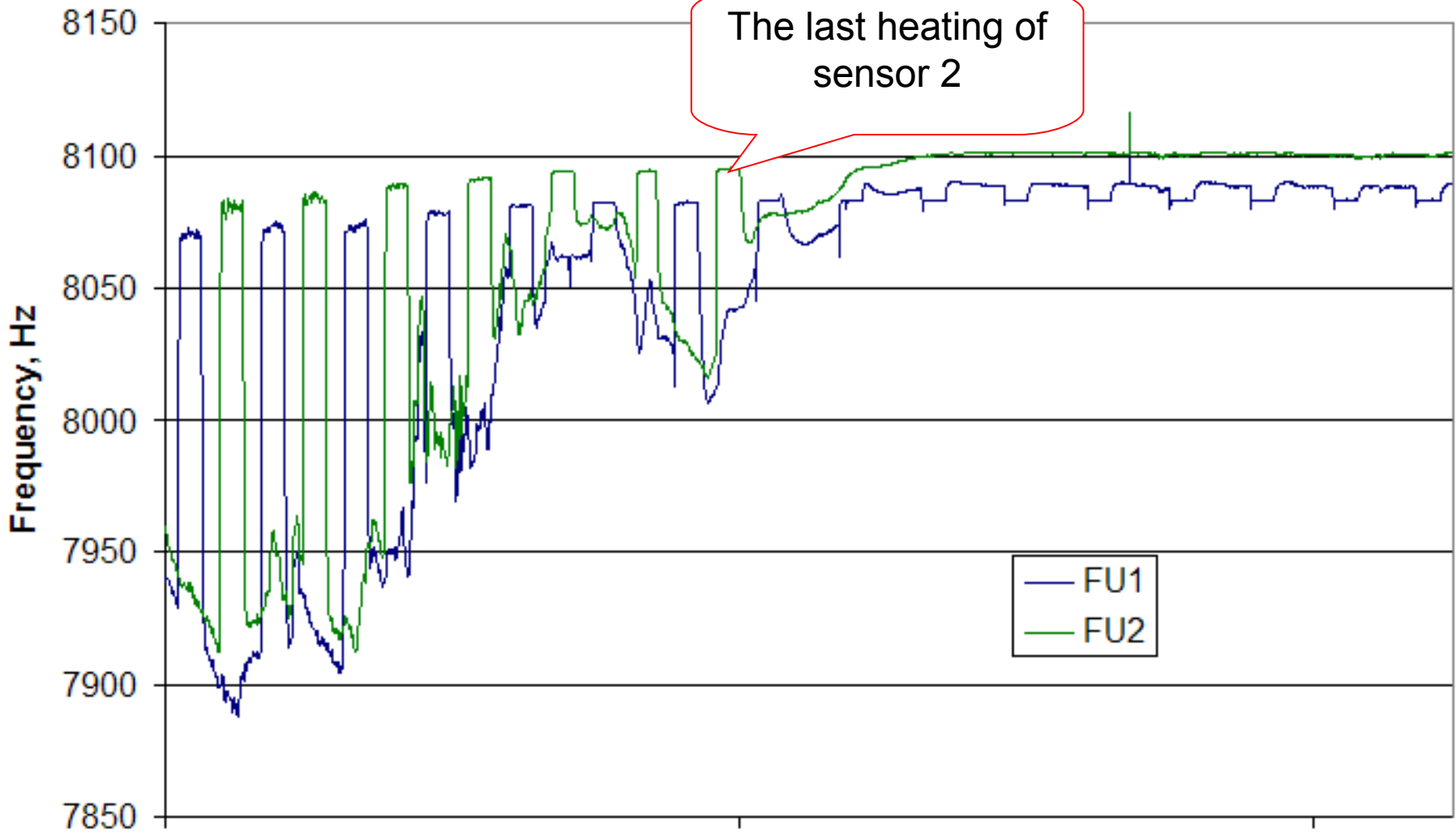
RS90/RS92 specific features



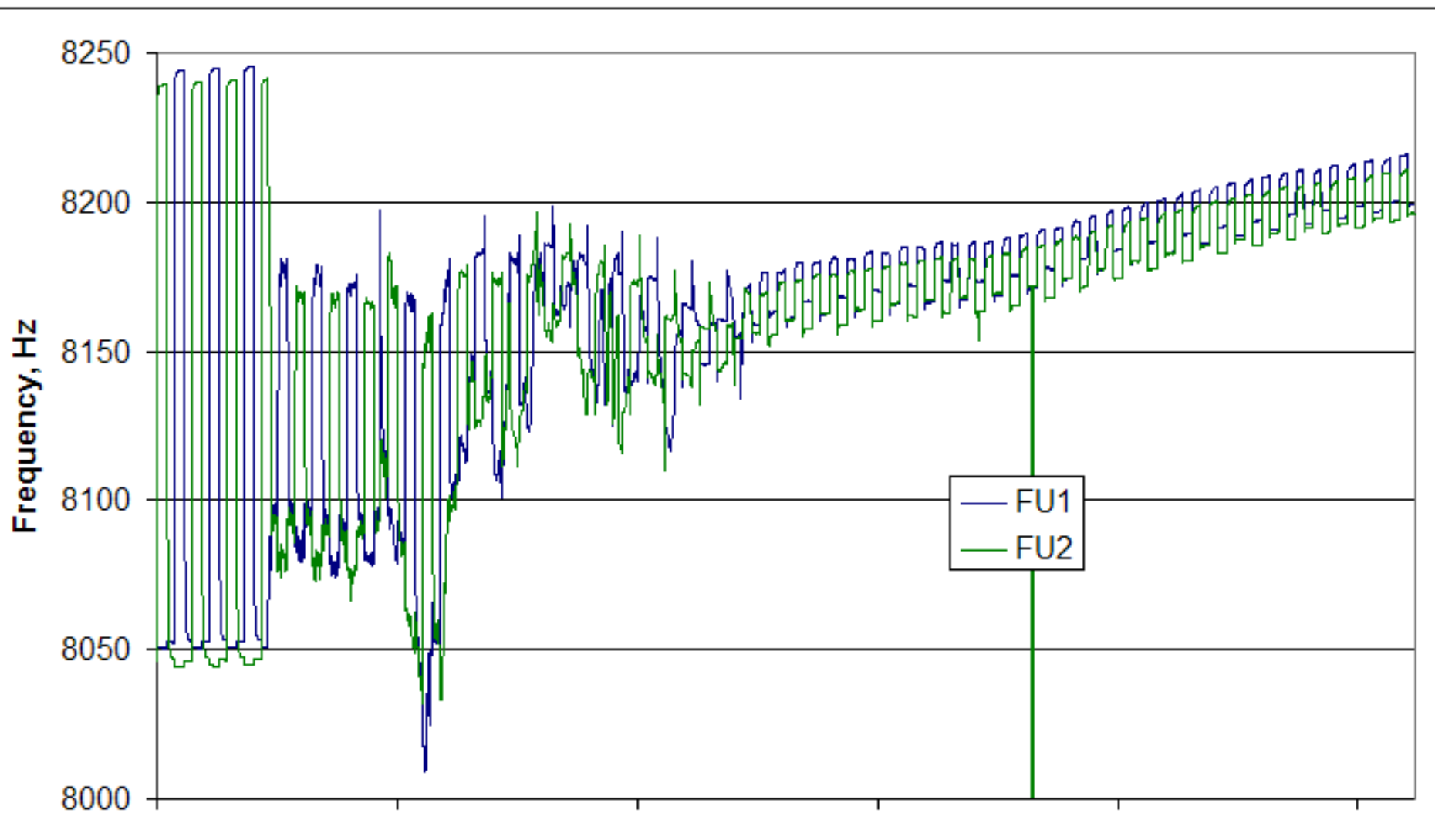
RS90/RS92 specific features



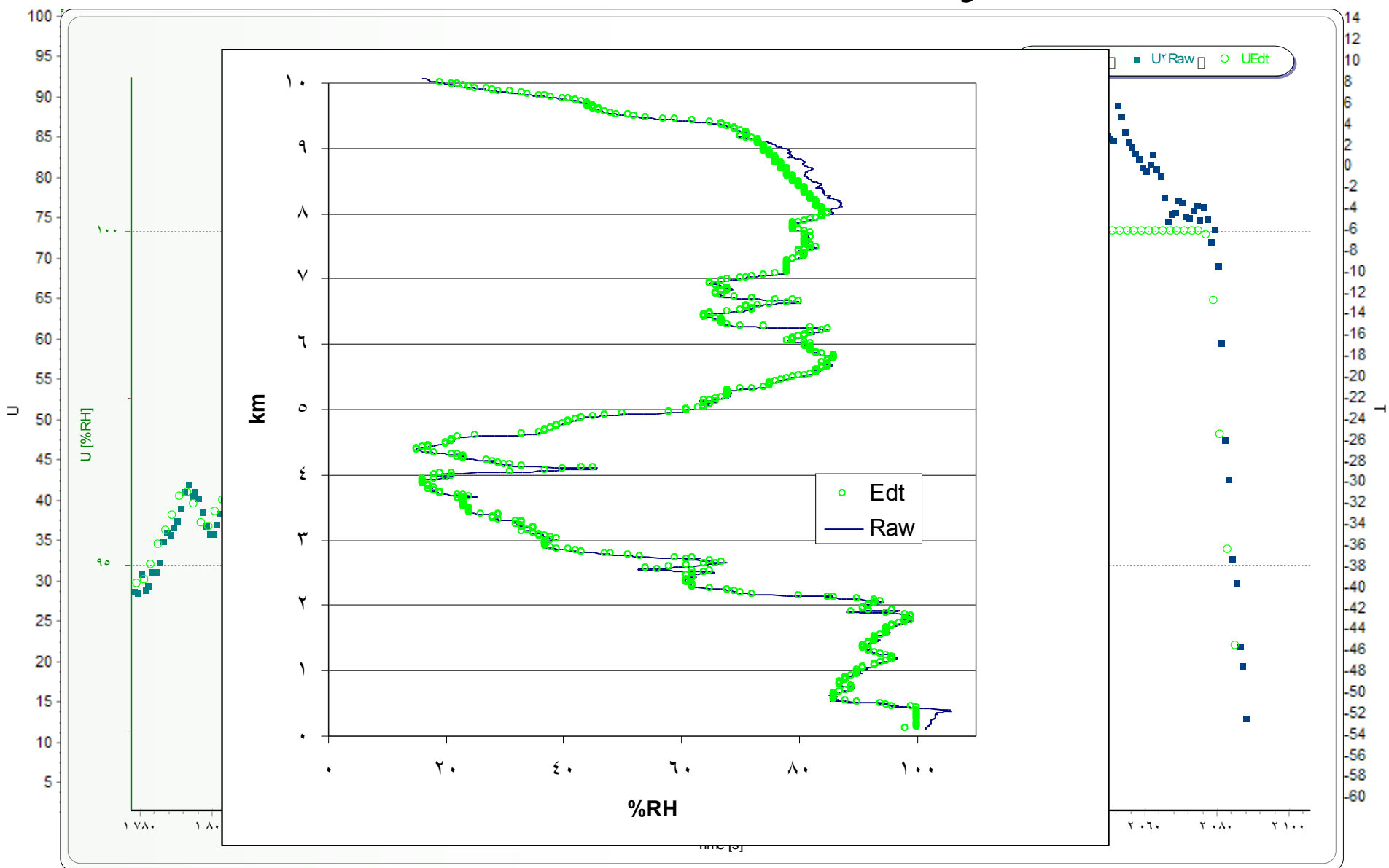
RS90/RS92 specific features



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Relative humidity



- Archiving and analysis of raw data are necessary (although not sufficient) to secure time series consistency
- A good cooperation between manufacturers, oversight scientists and operational staff is required to establish and implement relevant procedures