

Disclaimer

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The Radionuclide Network Quality Control Programme

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1. Introduction

During the operations of certified IMS (International Monitoring System) radionuclide particulate stations, a Quality Assurance and Quality Control (QA/QC) system is carried out to ensure that the data produced are of acceptable quality and the stations are working within the requirements (IMS Radionuclide Operational Manuals, CTBT/WGB/TL-11,17/18/Rev.5, Section 4.3 Quality Control). The station QA/QC is carried out by the station operators according to the operation and maintenance procedures, equipment manuals, and daily SOH (State Of Health) data monitoring. At the (P)TS (Provisional Technical Secretariat), in addition to the basic QA/QC functions, a network QC program is run to assess the station performances by independent measurements and analysis at the IMS radionuclide laboratories. The results of the network QC program for the period 2015-2016 are provided.

2. Status of the Laboratory based QC Program for Particulate Stations

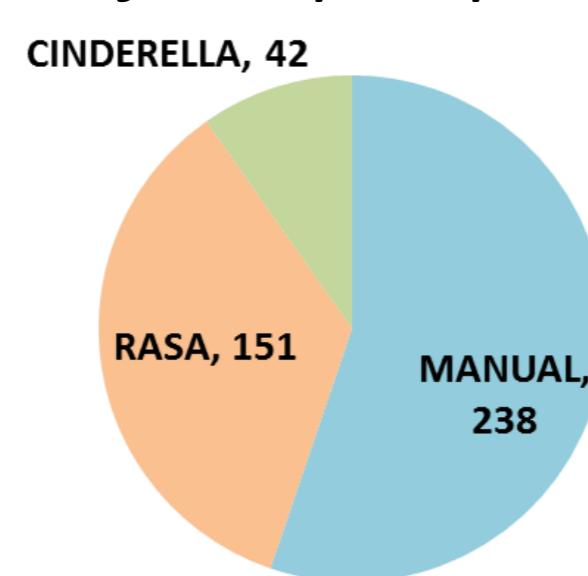
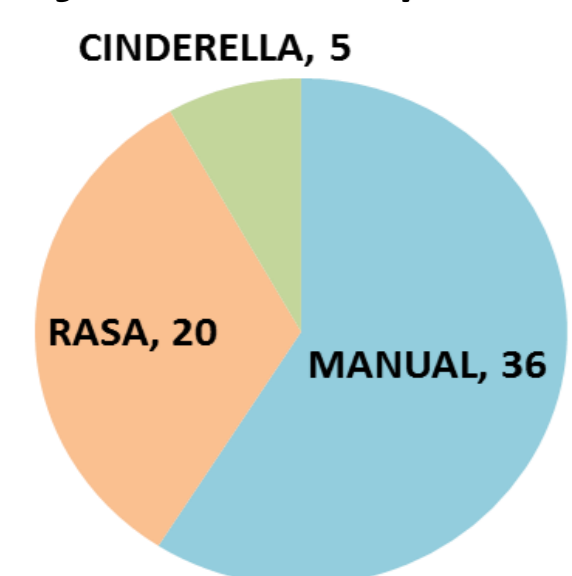
- Started in 2002, tested in 2002 and 2003.
- Since 2004, routine practice of PTS:
 - ✓ Randomly selected samples collected during normal operations are dispatched regularly from stations to the IMS certified radionuclide laboratories for reanalysis to verify system calibrations as part of this program.
 - ✓ On the basis of the laboratory results, the (P)TS may initiate a request for corrective actions.

3. Network QC Samples in 2015-2016

431 network QC samples have been sent from 61 stations to 10 laboratories.

Number of stations per technology:

Number of samples per technology:



4. Result Evaluation Criteria based on Be-7 metrics

Metric	Method	Acceptance Limit
Estimate of bias	% Difference test (%Deviation)	%D ≤ 15%
Accuracy	U-test (En test)	En ≤ 3

$$\%D = \frac{A_{idc} - A_{lab}}{A_{lab}} \times 100$$

$$En = \frac{|A_{idc} - A_{lab}|}{\sqrt{U_{idc}^2 + U_{lab}^2}}$$

A_{idc} = activity concentration reported by IDC
 A_{lab} = activity concentration reported by laboratory
 U_{idc} = expanded uncertainty reported by IDC
 U_{lab} = expanded uncertainty reported by laboratory

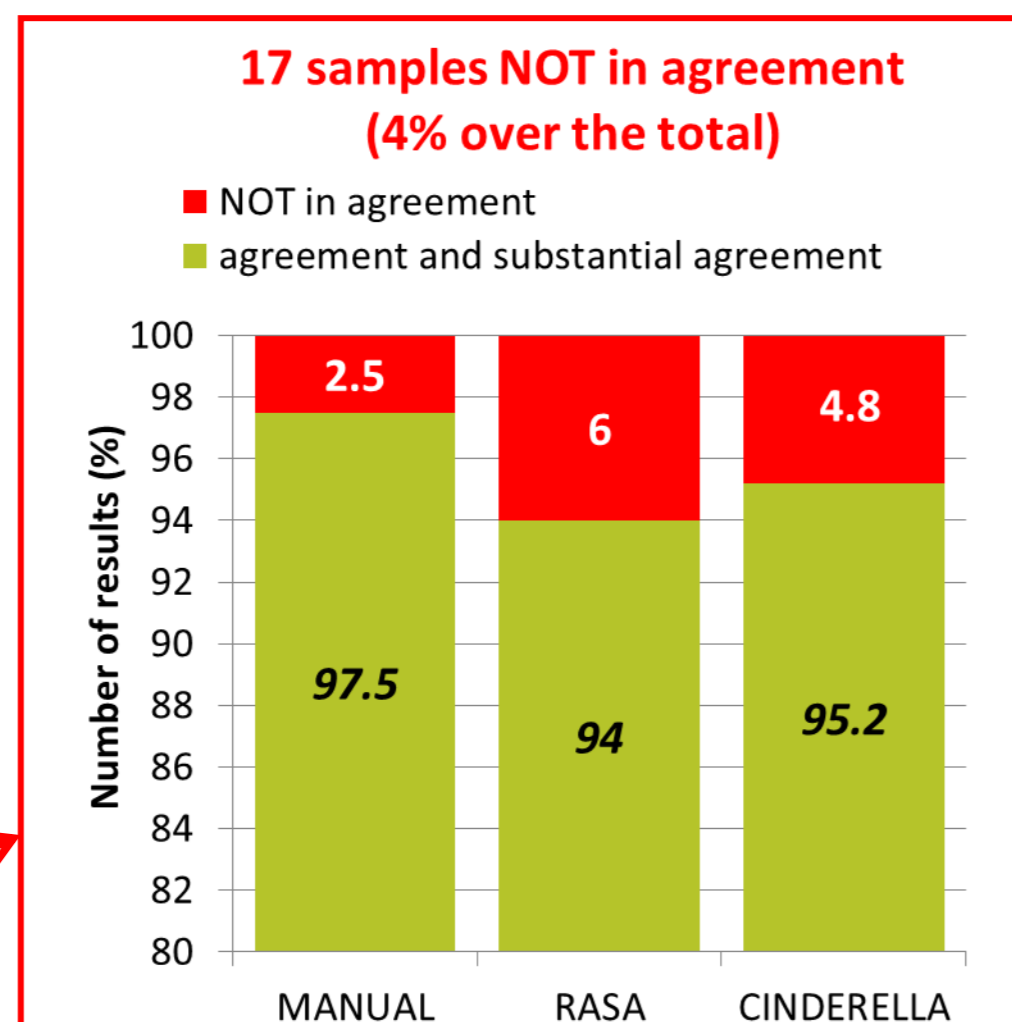
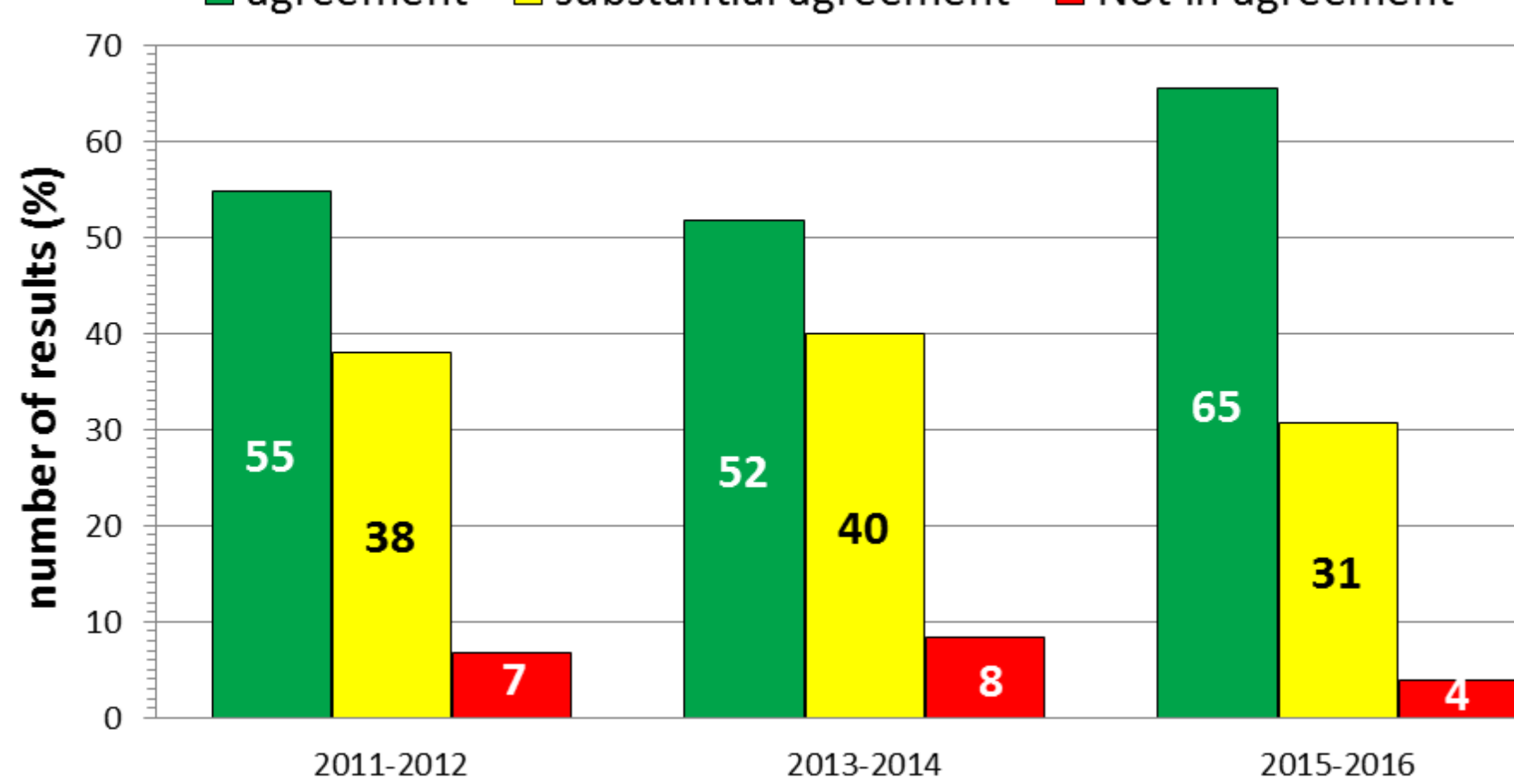
En < 1 → results in agreement

1 ≤ En ≤ 3 → results in substantial agreement

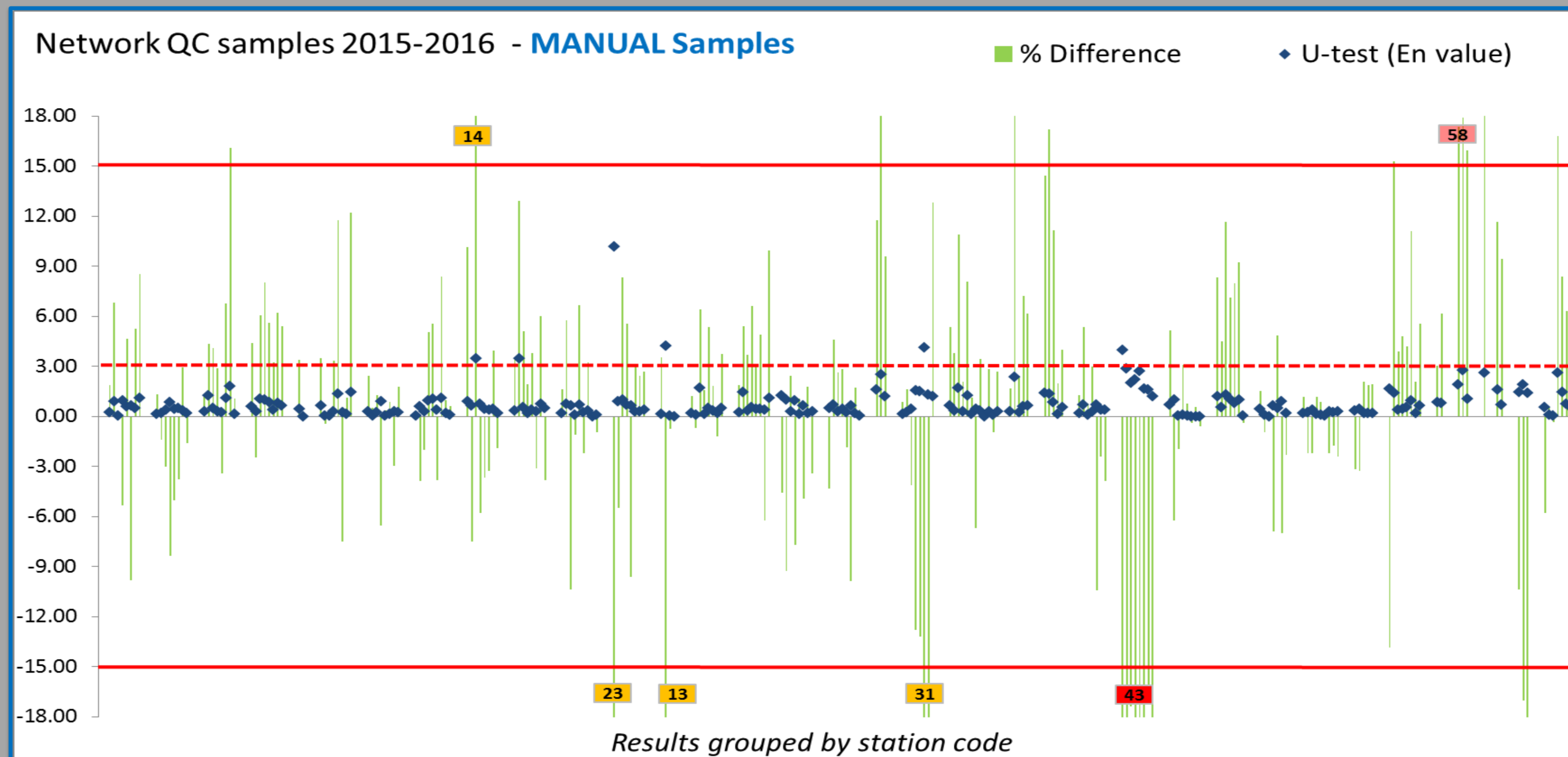
En > 3 → results not in agreement
 if En > 3 and %D (absolute value) > 15% → warning or action

5. Result Comparison based on Be-7 metrics

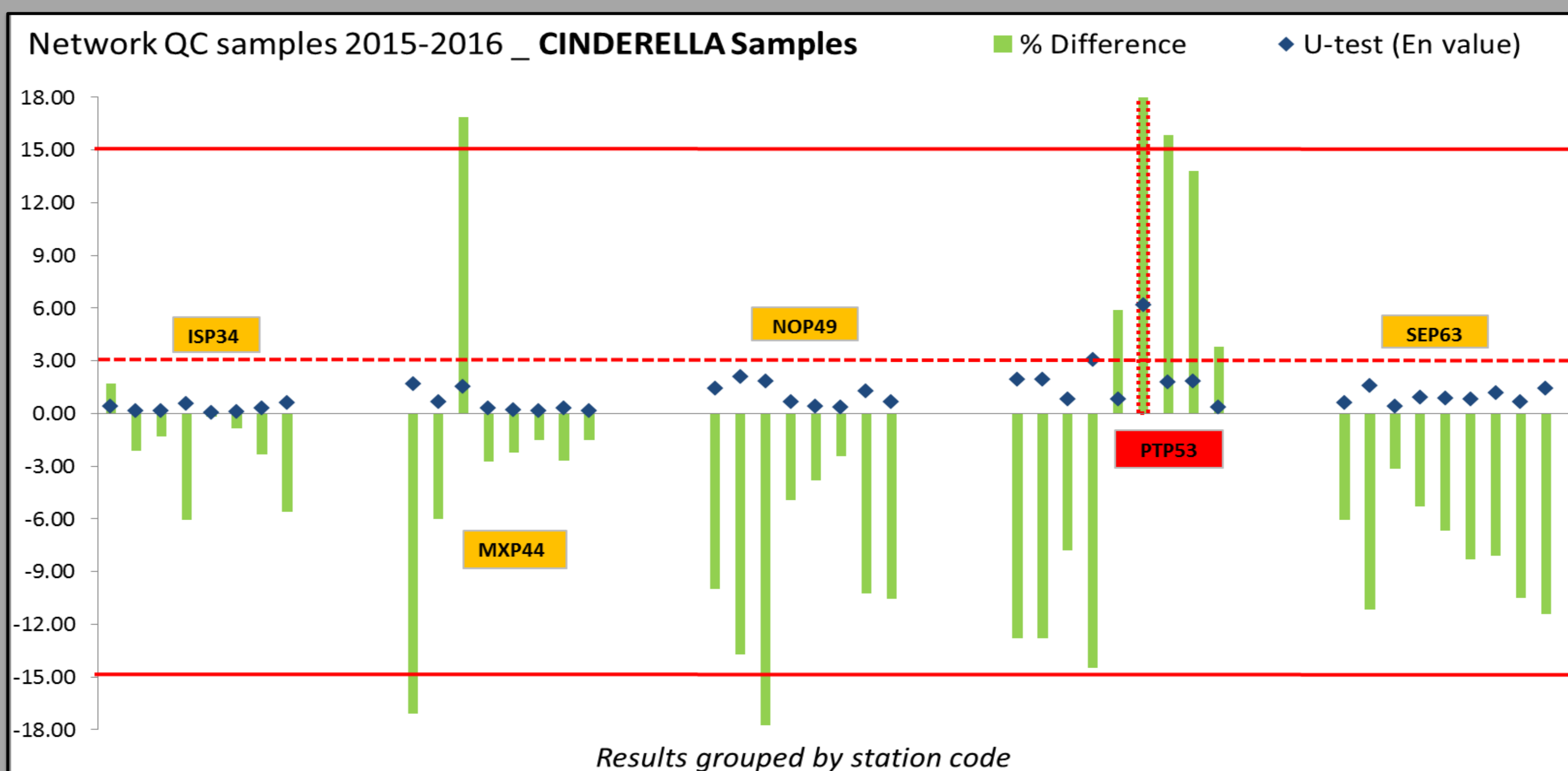
■ agreement ■ substantial agreement ■ Not in agreement



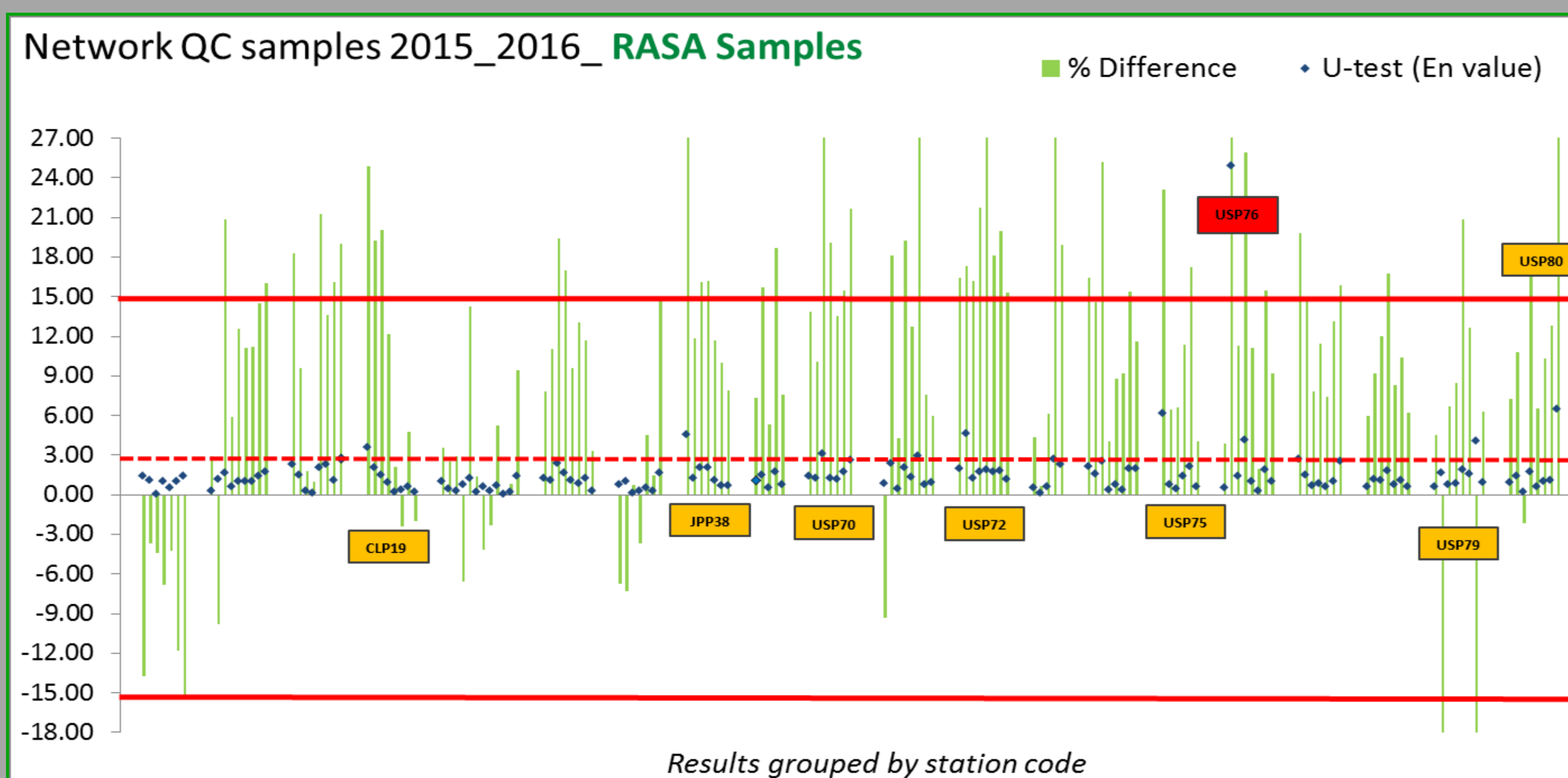
6. Results sorted by station



- General good agreement
- CAP14, CKP23, CMP13 and FRP31: single observations for results not in agreement
- MRP43: systematic bias and high %Deviations → new calibration is planned in July
- RUP58: systematic bias and high %Deviations → calibration will be checked

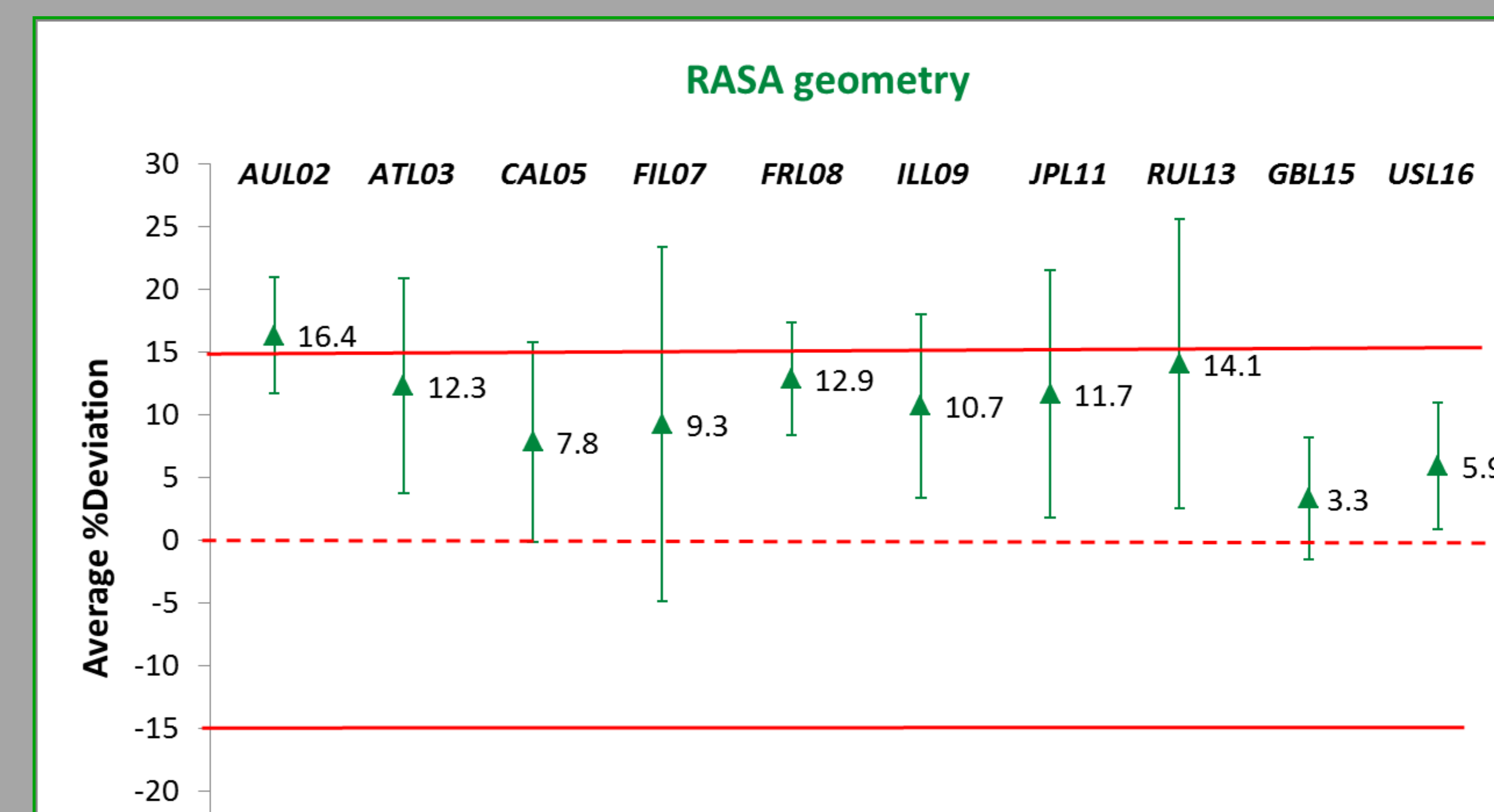
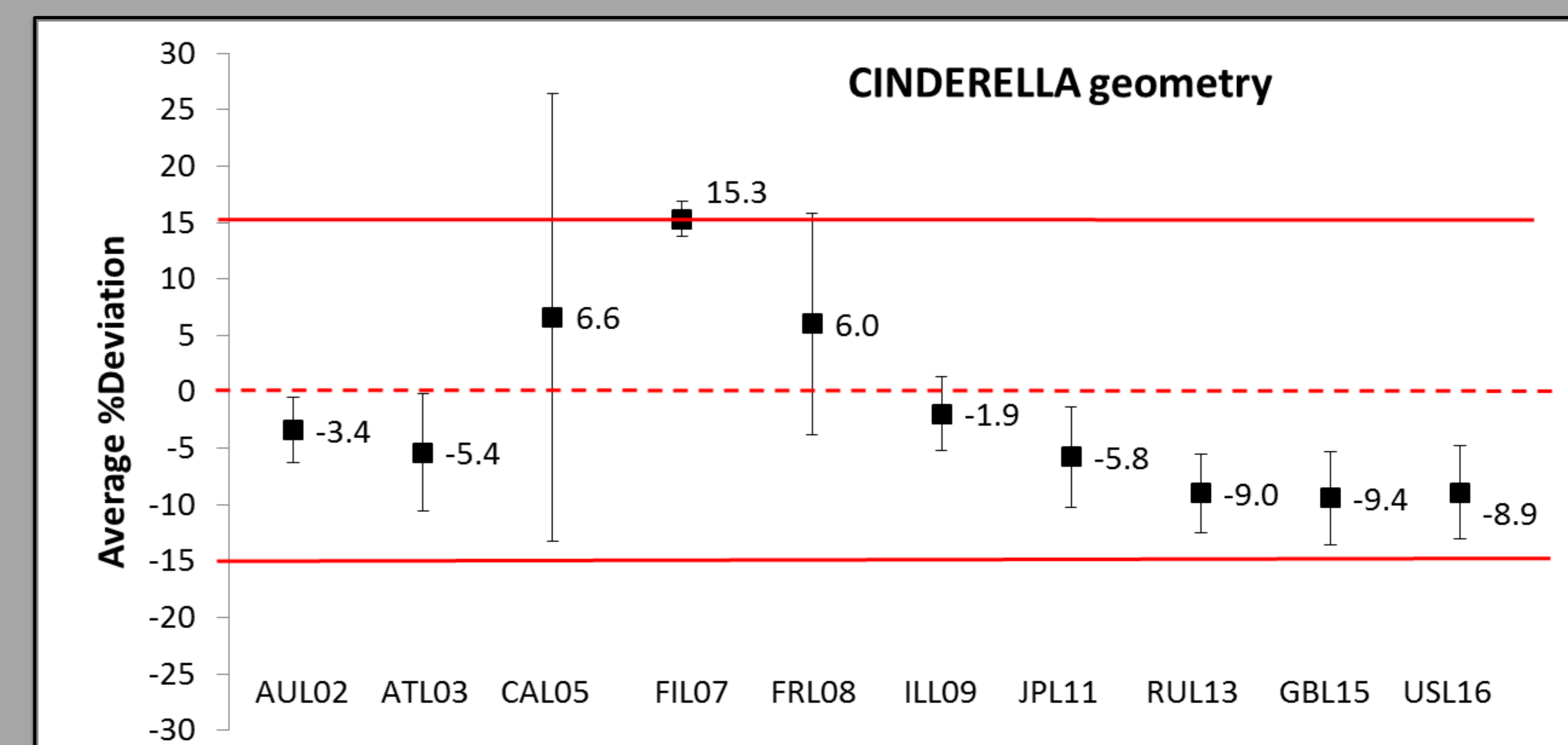
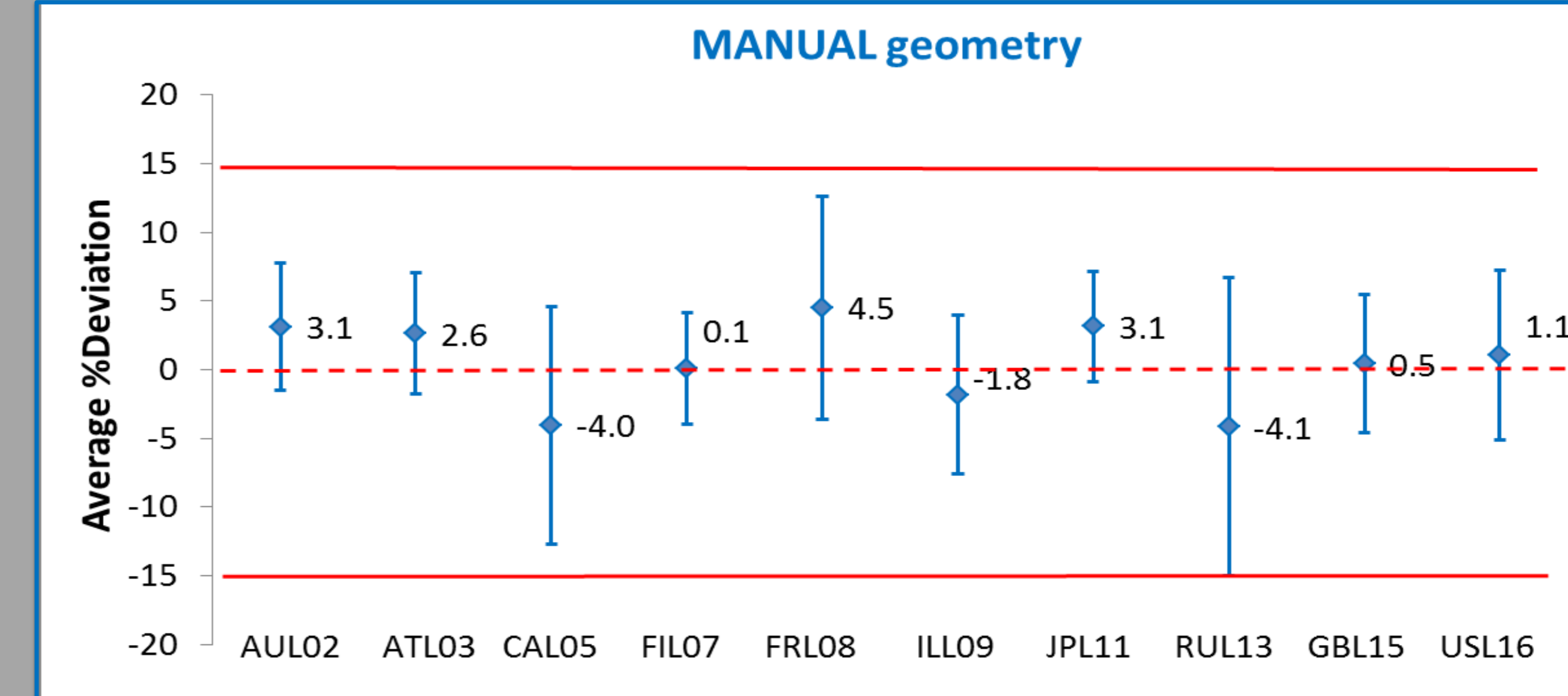


- General good agreement
- PTP53: single observation for results not in agreement and large deviations for the next two samples → result comparison was back to normal values after the detector maintenance in July 2016



- Large deviations and systematic bias are observed for many RASA samples
- CLP19, JPP38, USP70, USP72, USP75, USP79 and USP80: single observations for results not in agreement
- CLP19: large deviations in 2015 → good result comparison in 2016 after detector change
- JPP38: detector replacement in March 2017
- USP76: two observations for results not in agreement in 2015 → detector replacement in April 2016

7. Results sorted by laboratory



8. Conclusions and way forward

- ✓ Stations results are generally in good agreement with laboratory results: **MANUAL (97.5%) CINDERELLA (95.2%) RASA (94%)**
- ✓ However, large %Deviations and systematic bias between station and laboratory results are still observed for about 30% of RASA samples. Possible reasons for such deviations are still under investigation:
 - procedure for RASA sample preparation at laboratories
 - station dispatch procedure of RASA samples at stations
 - specific calibration issues
- A routine QC programme for noble gas samples is under development.