STATUS OF THE WSG

Wolfgang Finsterle

The World Standard Group of Pyrheliometers (WSG) – established in 1977

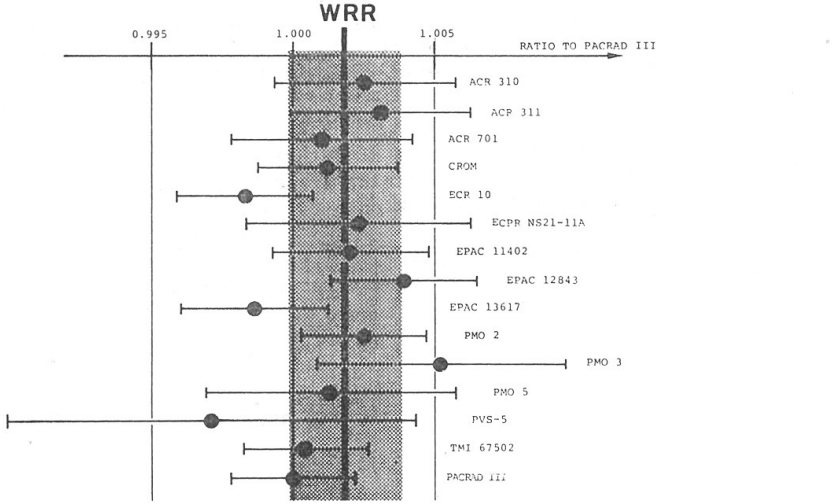
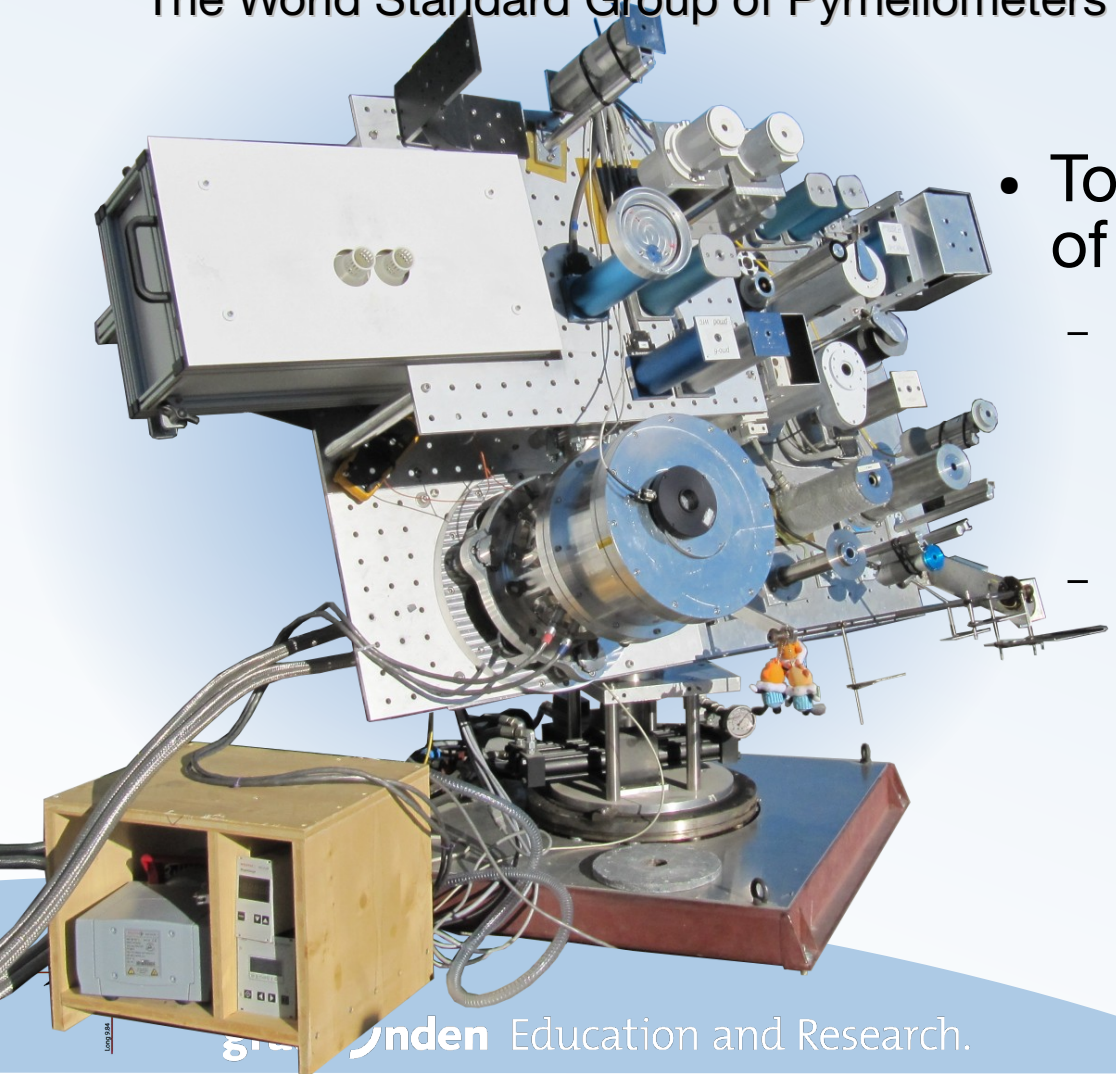


Figure 1: The definition of World Radiometric Reference (WRR) and the results of the Absolute Radiometer Comparisons 1970 - 1976. The shaded area represents a ± 0.2 % range around WRR

Fröhlich, 1977

The World Standard Group of Pyrheliometers (WSG) – in 2021



- Today the WSG consists of six pyrheliometers
  - 3 „active“ cavities
    - PMO2
    - PMO5
    - CROM2L
  - 3 „passive“ cavities
    - PAC3
    - HF18748
    - MK67814

pmod wrc

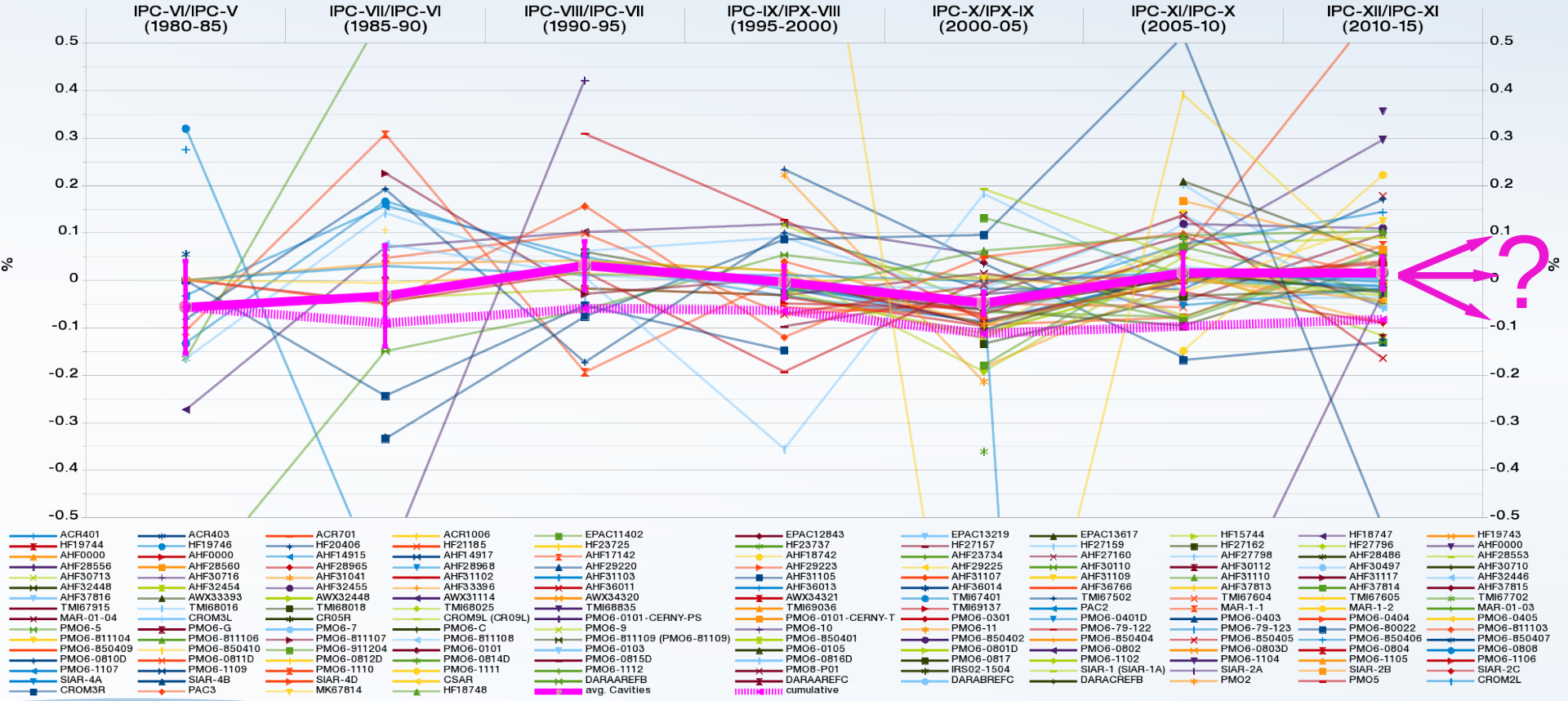
„Active“ vs. „Passive“ Cavity Principle

- „Active“ cavity radiometers employ temperature control of the cavity sensor
  - Servo controller, usually PID
  - Controller output is measured
- „Passive“ cavity radiometers employ a free floating cavity sensor
  - Electrical self-calibration every ~20 minutes
  - Cavity temperature is measured

The World Radiometric Reference (WRR)

- The WRR is the weighted average of the readings from the WSG pyrheliometers. The weights (WRR Factor) are re-defined every five years based on the IPC
- The long-term stability of the WRR can be checked in different ways
  - Consitency of the WSG
  - Consitency of the „rest of the world“ (apparent drift between IPCs)
  - Comparison to external reference

Consistency of the „rest of the world“ (apparent drifts between IPCs)



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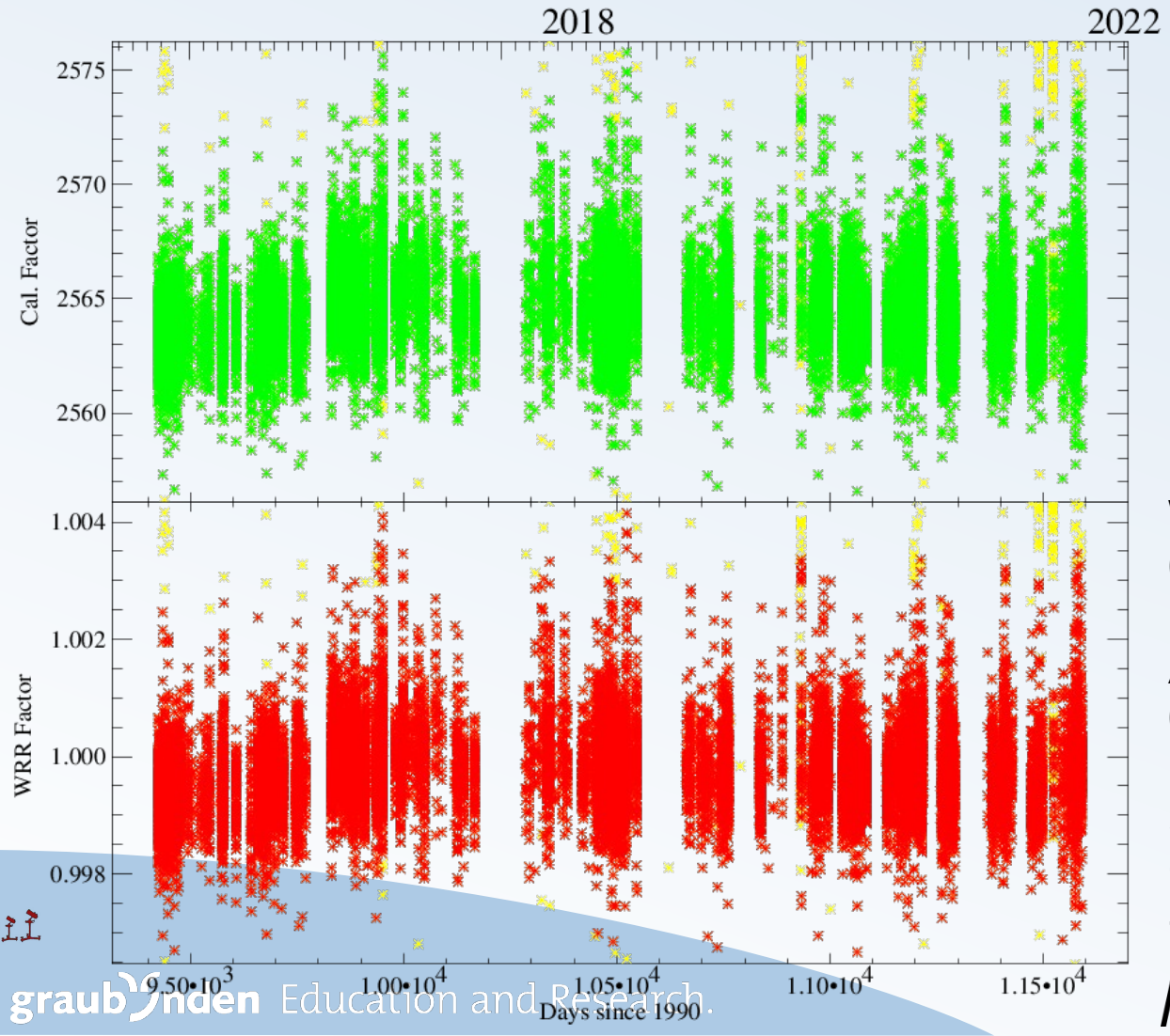
Consistency of the WSG



WRR Factor 2015:
0.998982

Avg. 2015 – 2021:
0.999781

Stability:
+800 ppm
-0 ppm/°C

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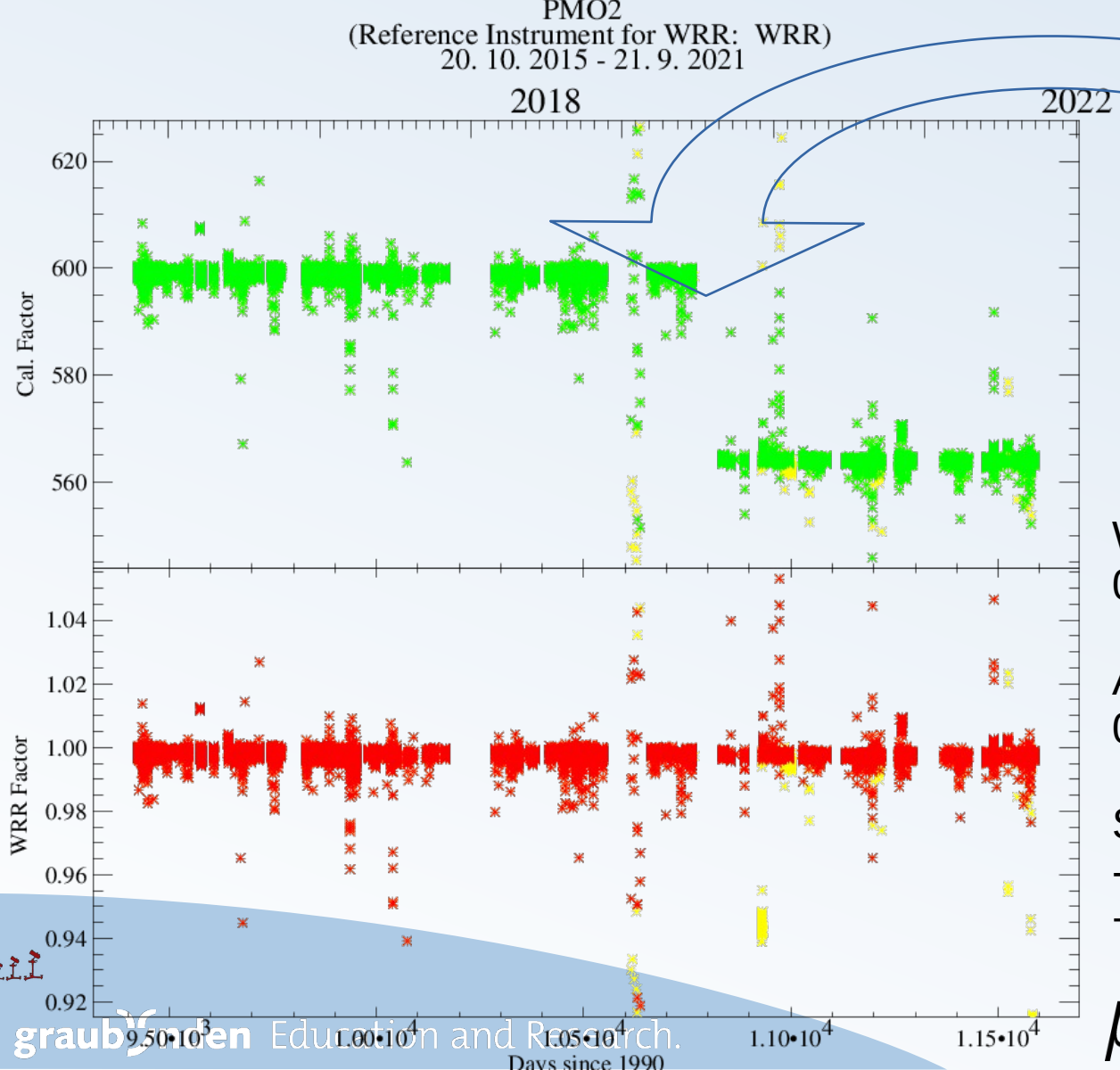

new control electronics in June 2019

WRR Factor 2015: 0.998189

Avg. 2015 – 2021: 0.997664

Stability:
-526 ppm
+10 ppm/°C

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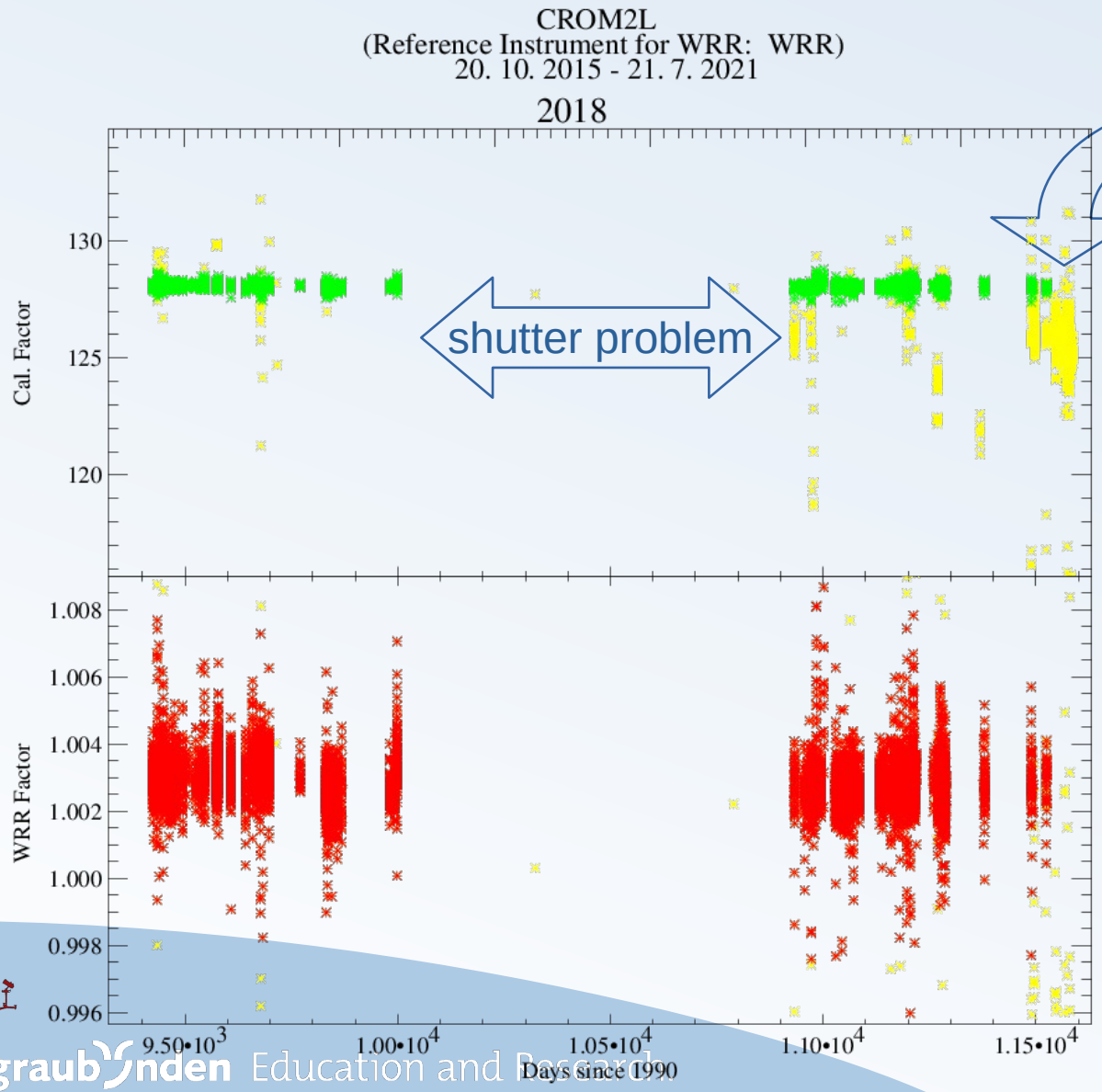

WRR Factor 2015:
1.002998

Avg. 2015 – 2021:
1.002848

Stability:
-150 ppm
+10 ppm/°C

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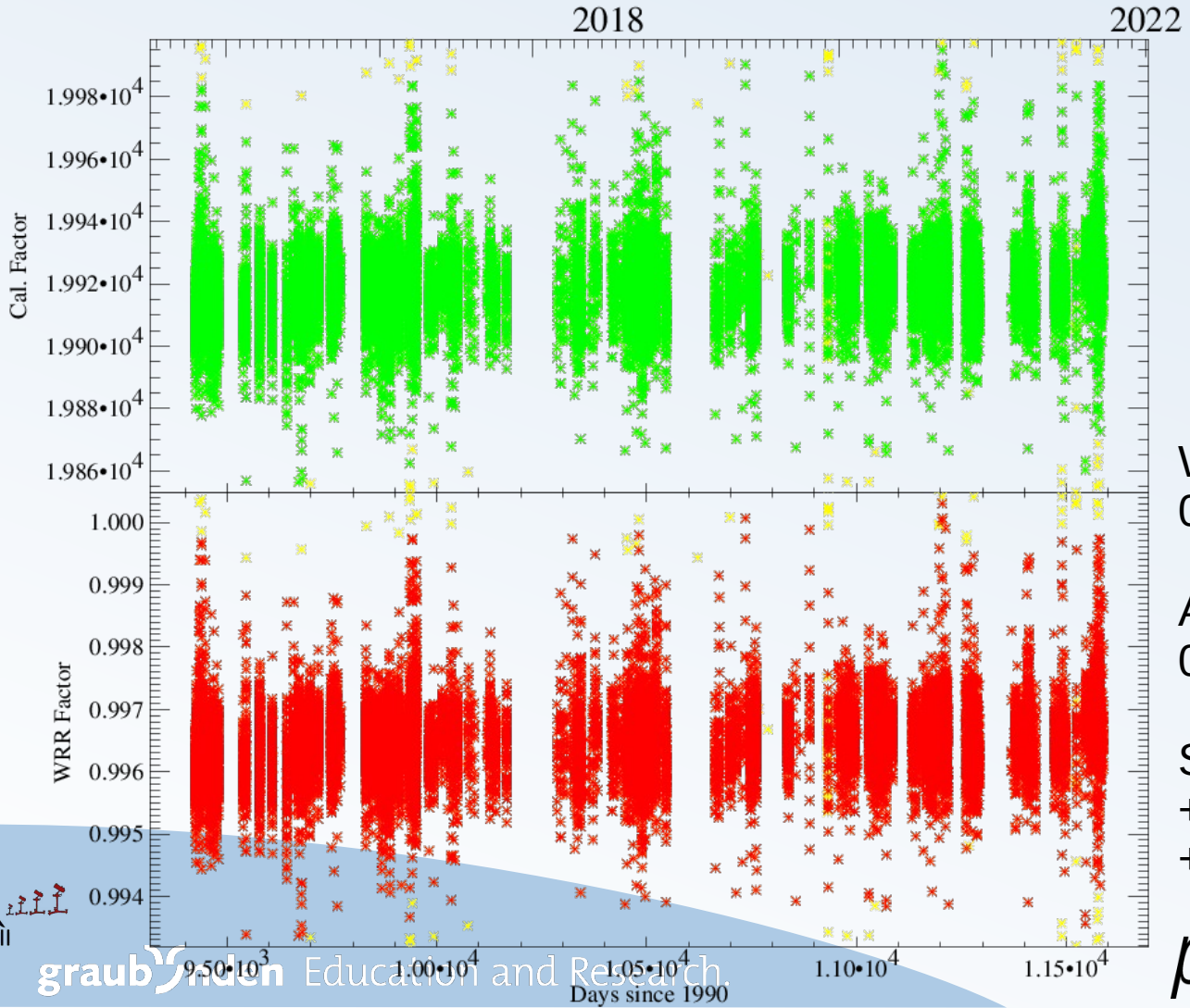

WRR Factor 2015:
0.996274

Avg. 2015 – 2021:
0.996488

Stability:
+214 ppm
+10 ppm/°C

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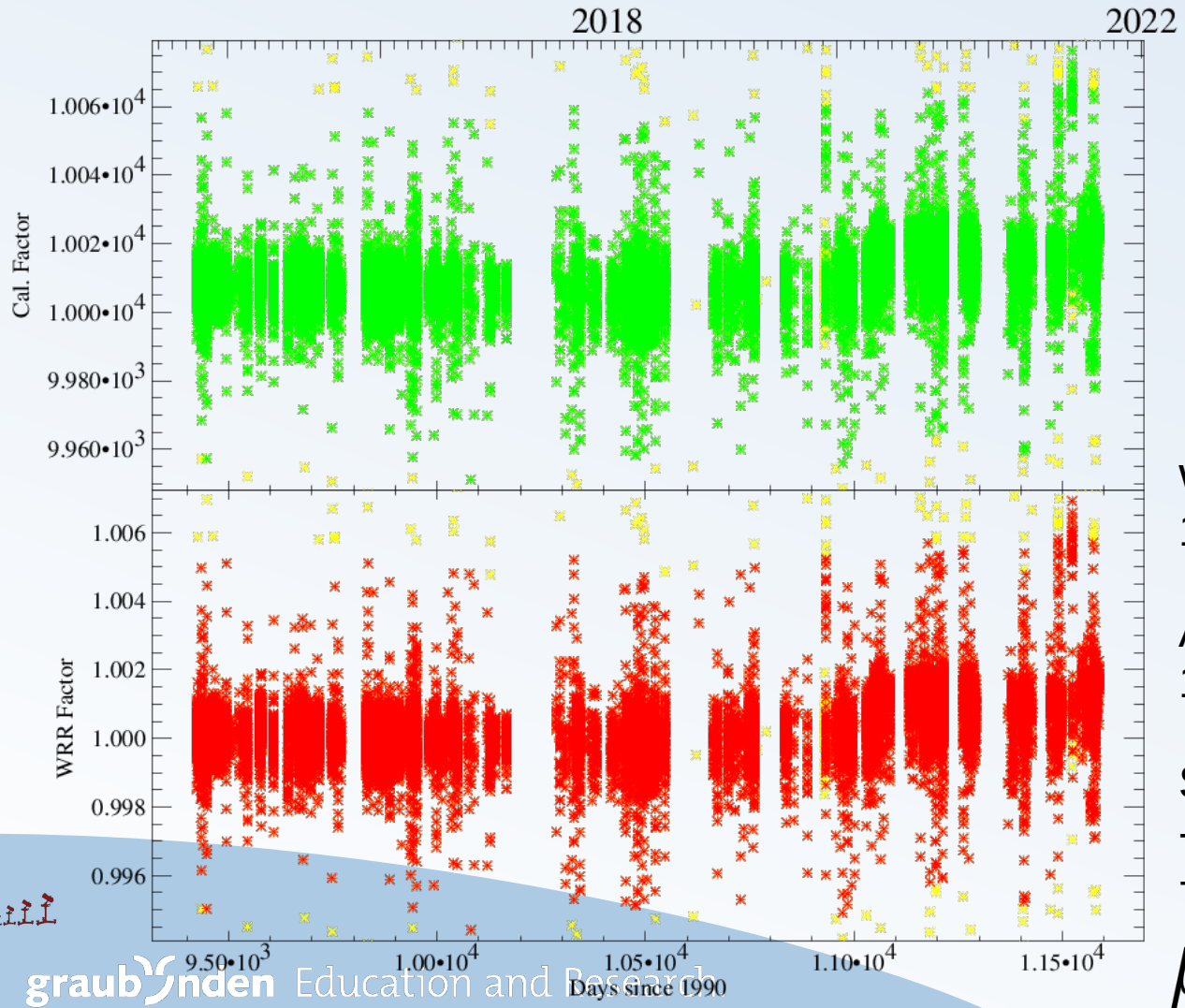

WRR Factor 2015:
1.000708

Avg. 2015 – 2021:
1.000290

Stability:
-418 ppm
+10 ppm/°C

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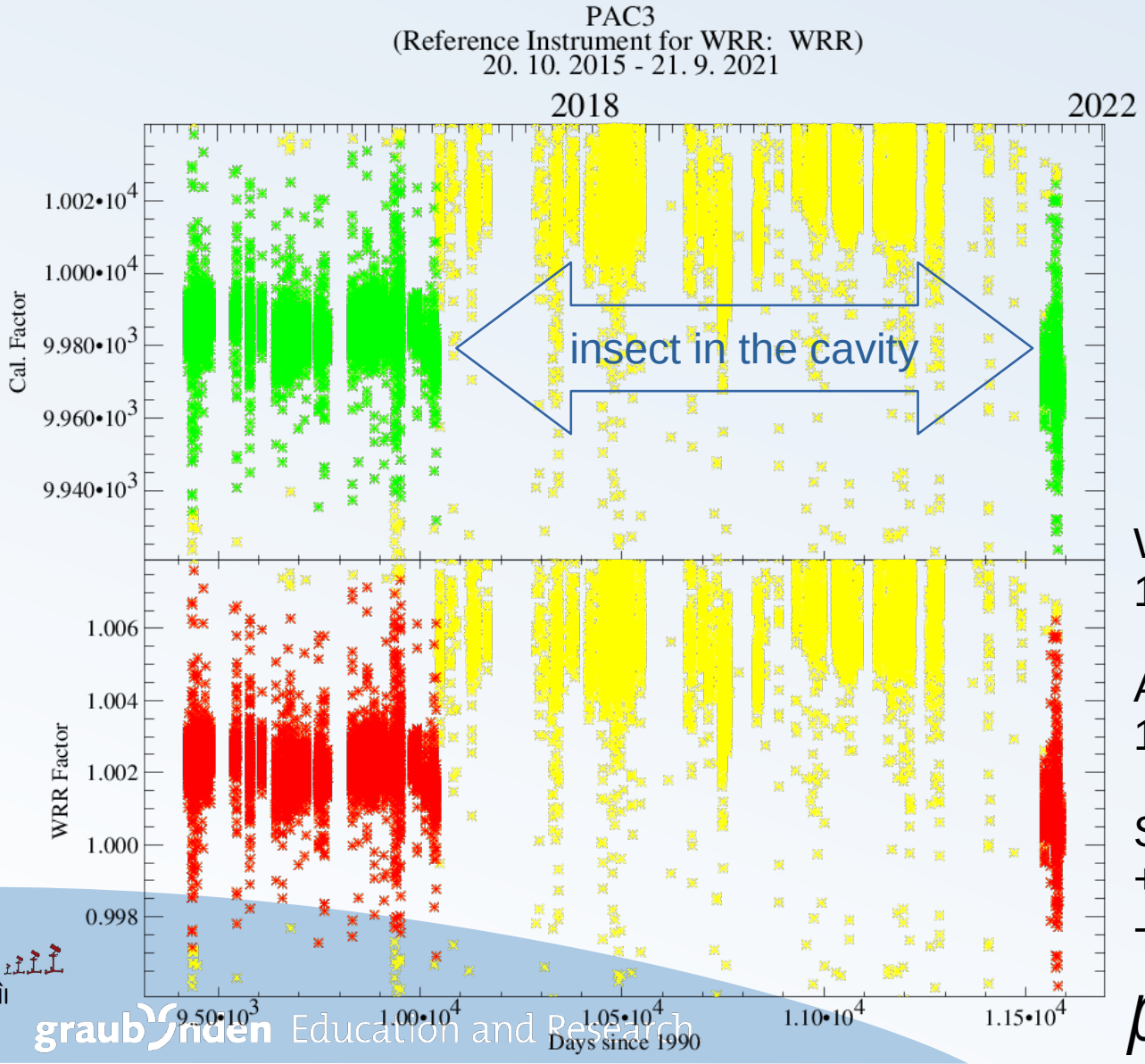

WRR Factor 2015:
1.001116

Avg. 2015 – 2021:
1.002079

Stability:
+962 ppm
-30 ppm/°C

pmod wrc

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