

First observations with the new dual sphere superconducting gravimeter OSG-073 and comparisons of parallel observations with older SG T020

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INSTITUTE

G2 Strasbourg, 17. – 19. Nov 2014

Superconducting gravimeters in the Metsähovi Geodetic observatory



Photo H: Virtanen 11.11.2014

< ---- 3 m ---- >

T020 10.08.1994 -

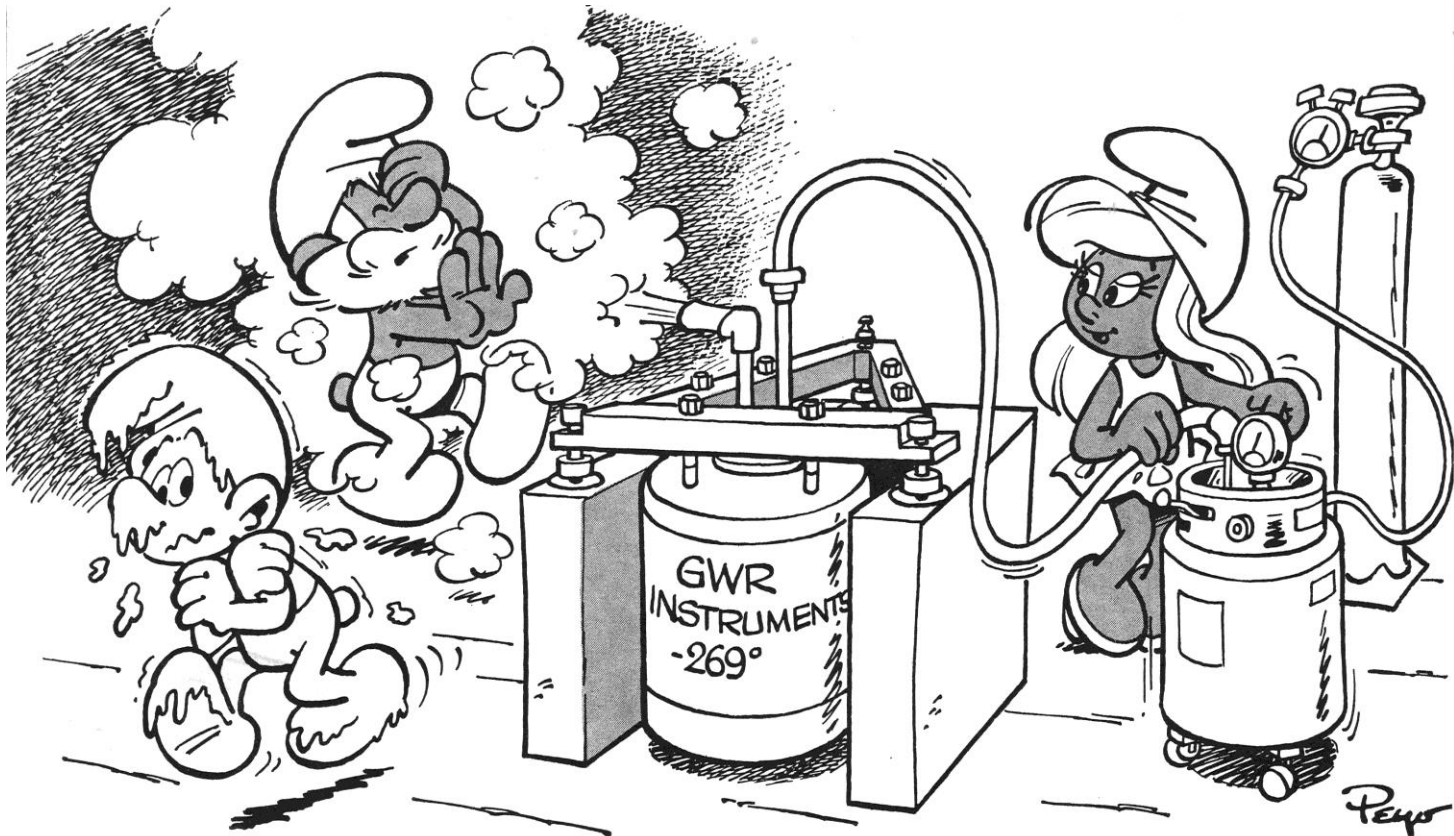
OSG-073 08.02.2014 -
The installation: 27.01. – 07.02.

Superconducting gravimeter GWR T020 20 years

Installed in August 1994 by Eric Brinton

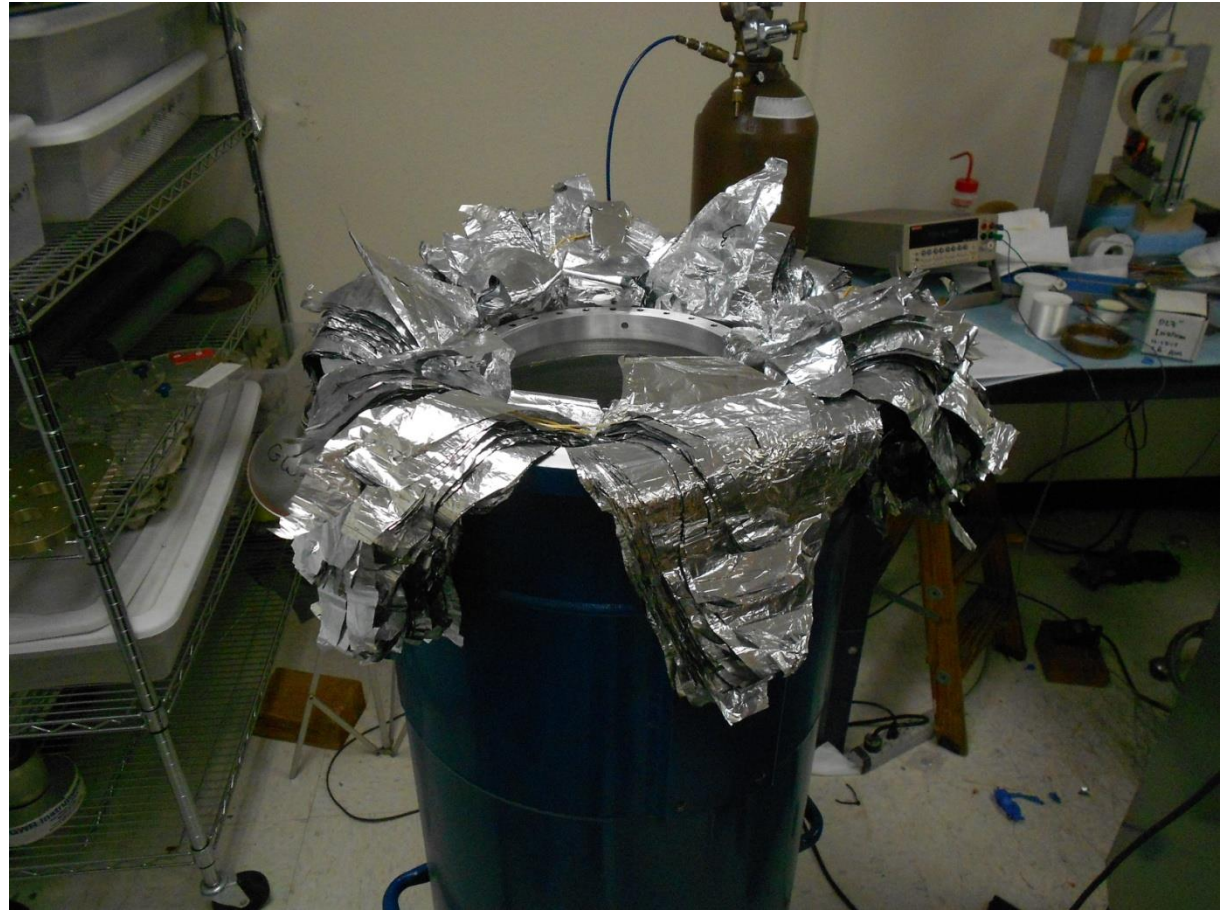
Continuous recording started 10.08.1994

Operation will continue until summer 2015 (?), one year parallel with OSG-073



The helium emissions effect on rubidium clock of AG

Problem can be avoided by using other frequency standards



Superconducting gravimeter OSG-073 at GRW in November 2013
Photos: R. Widmer-Schmidrig

The new dual sphere superconducting gravimeter GWR OSG-073

Installed by Richard Warburton
27.01. – 7.02. 2014

XP replaced by
Windows 7

Remote control by internet

Automatic data transfer (2x27 channels, 59 MB)

Dual sphere gravimeter OSG-073



4 K° cryogenic refrigerator (2x)
No need liquid helium

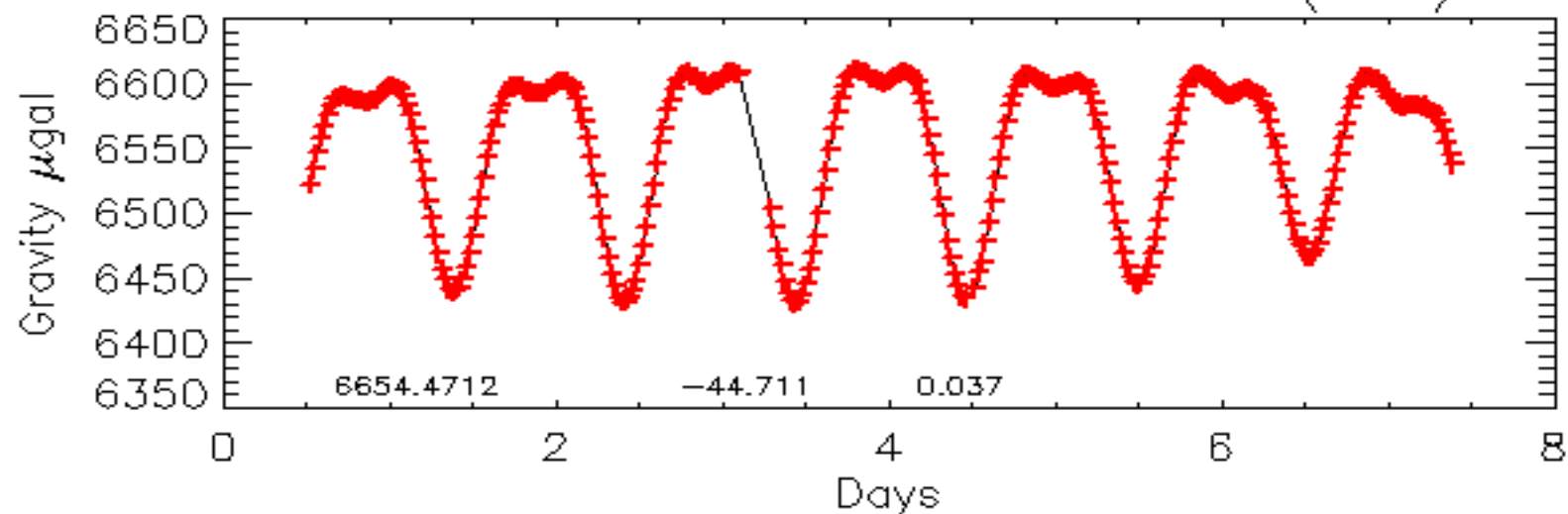
Sensors are side by side

Left (**Node 6**): High-Q, sphere
17 grams
- Very low noise sensor

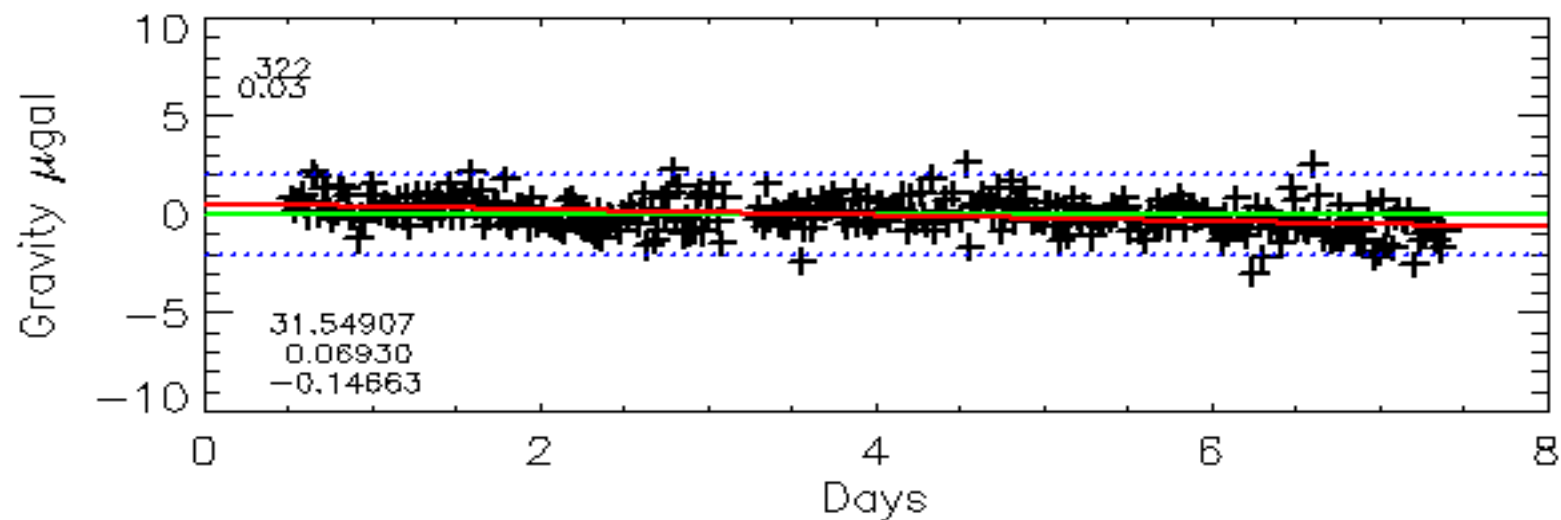
Right (**Node 7**): Standard iGrav,
sphere 5 grams
- Small drift

Calibration with FG5X 3 times

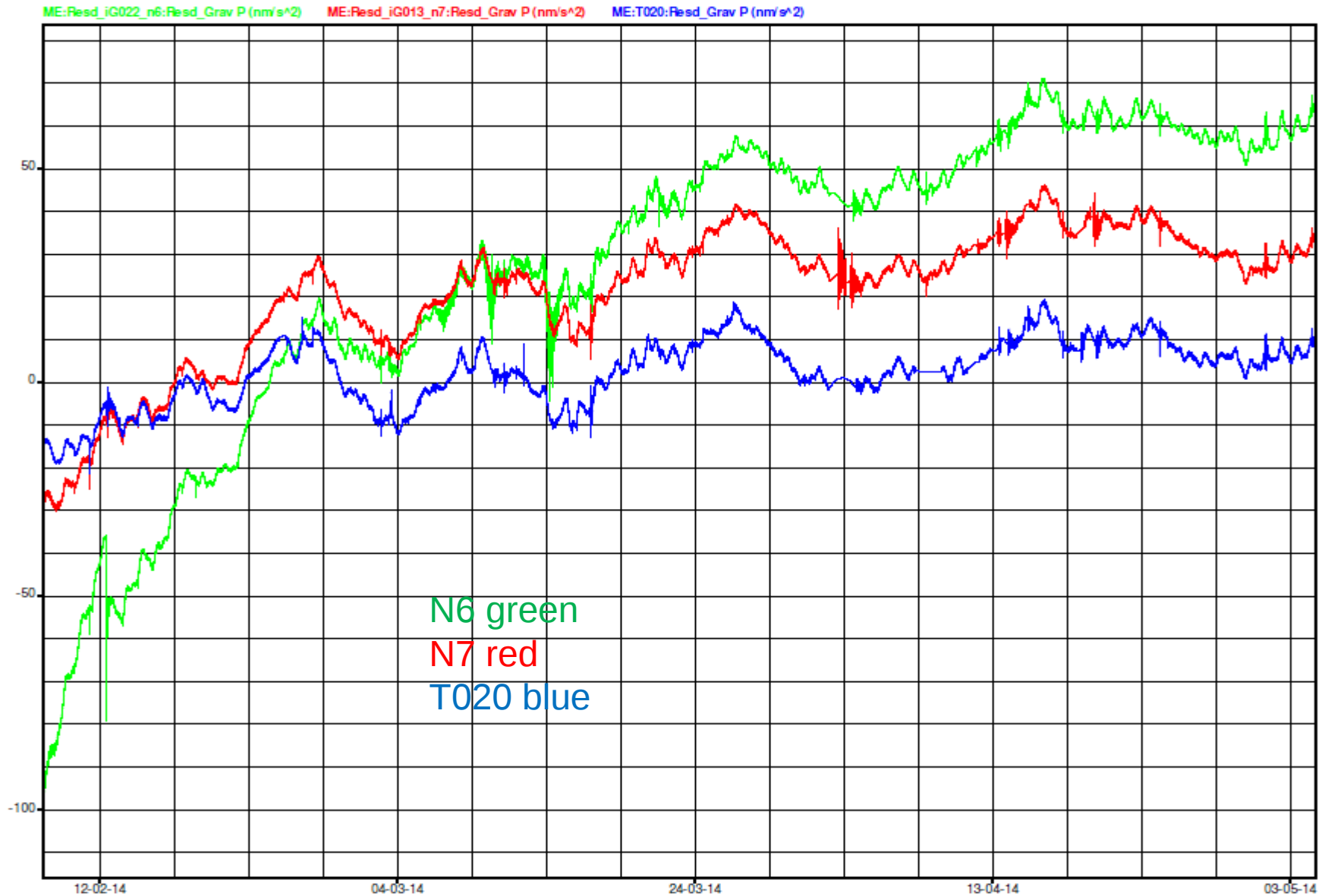
S20 N6 10.6. – 17.6. 2014 AB (331)



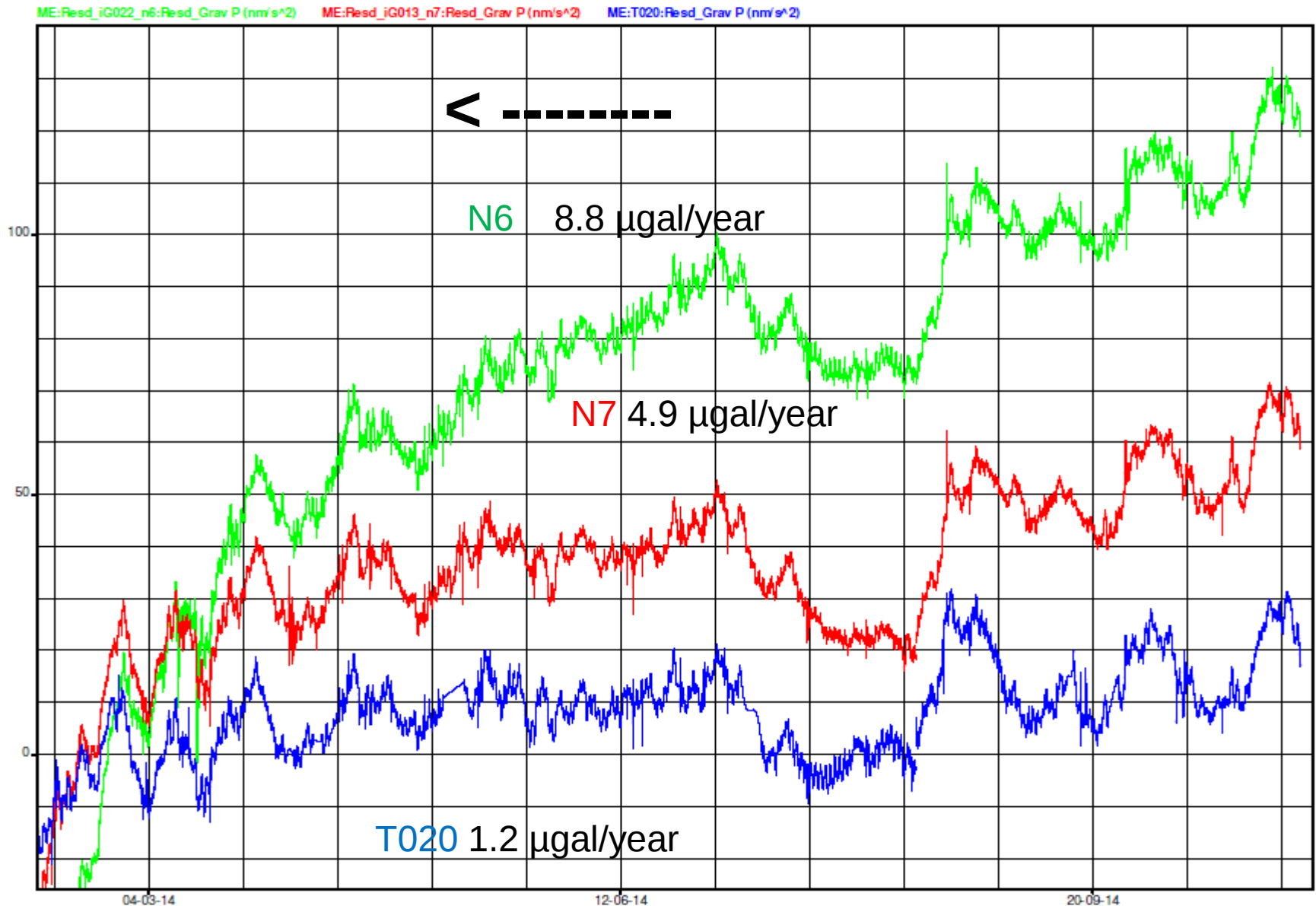
ABS – SG



First 3 months (8.2.2014 -)



9 months linear drifts (Tide, airpressure and polar motion corrected)



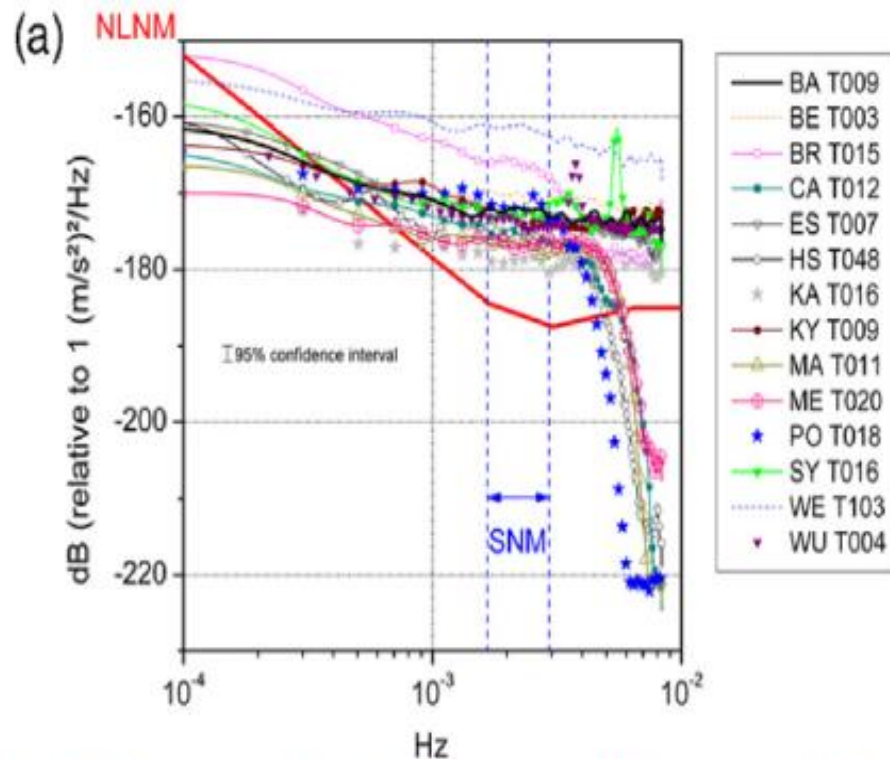


Fig. 2. Noise level of different GGP stations, Metsähovi SG T020 shown as “ME T020” (Rosat 2011)

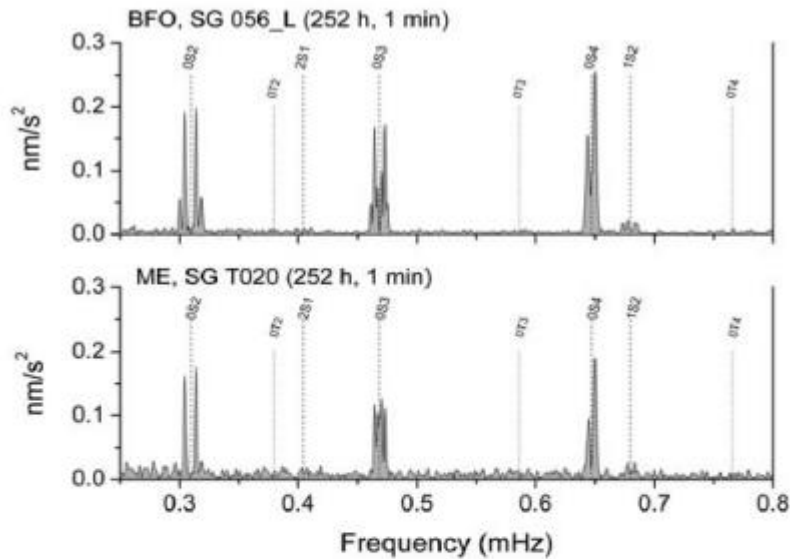
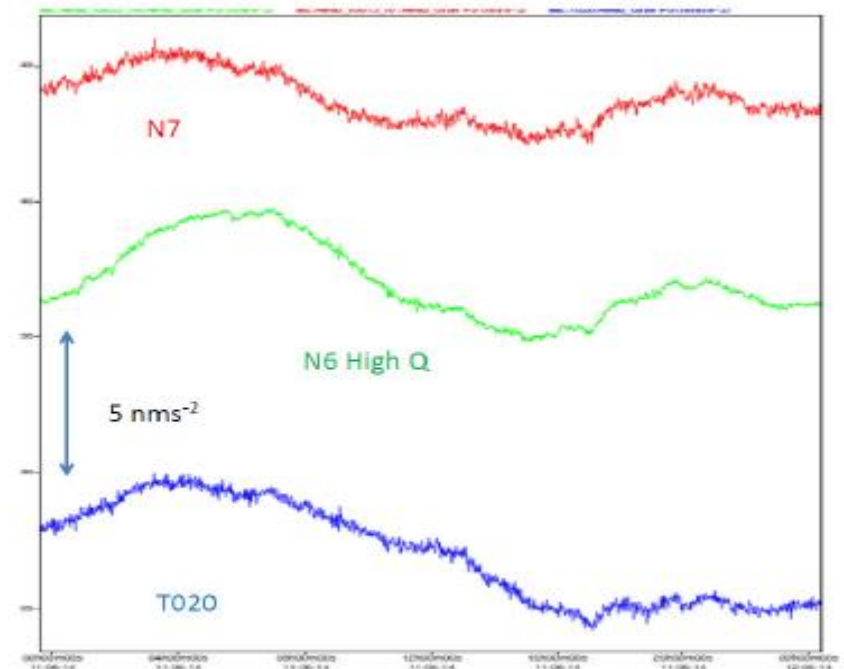


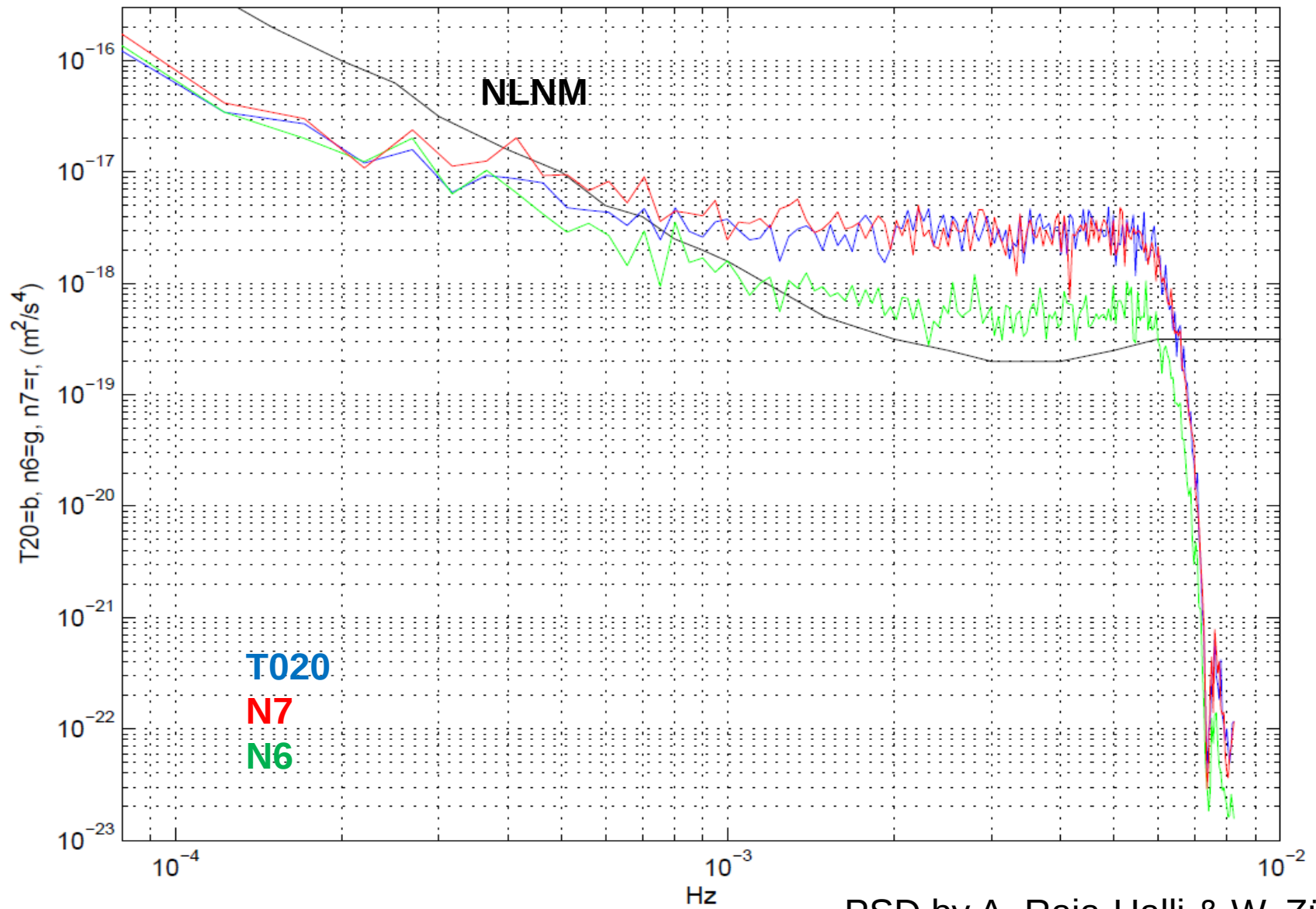
Figure 3. Amplitude spectra of the time-varying gravity residuals recorded at BFO (upper plot) and ME (lower plot) after the M_w 8.8 Maule, Chile, earthquake of 27 February 2010.

Fig. 3. Comparison of free oscillation spectra: The old SG T020 at Metsähovi (T020) and BFO 056_L (Rosat 2011).



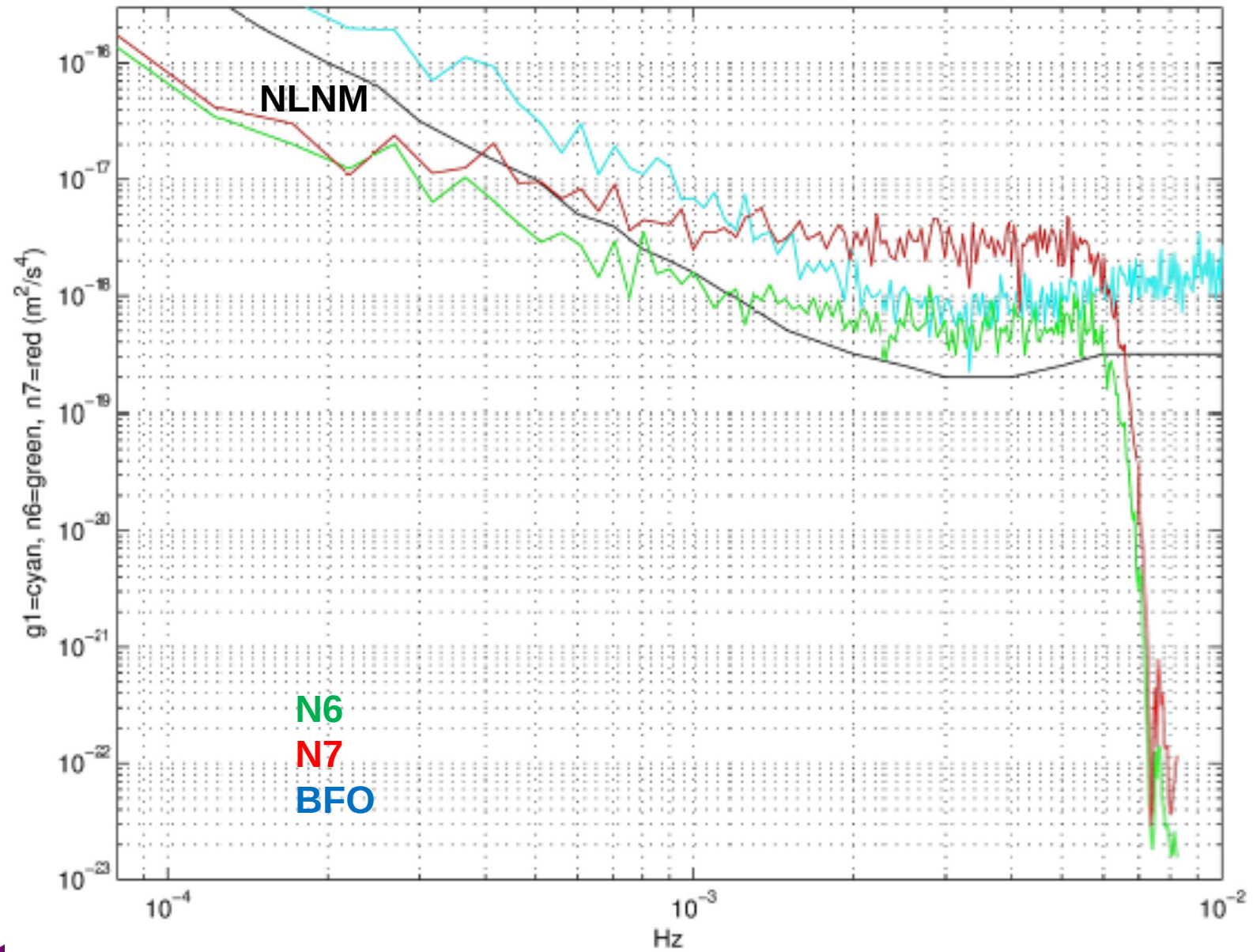
Time domain comparison N6, N7 and T020, 16.06.2014

Metsäphovi – SGs

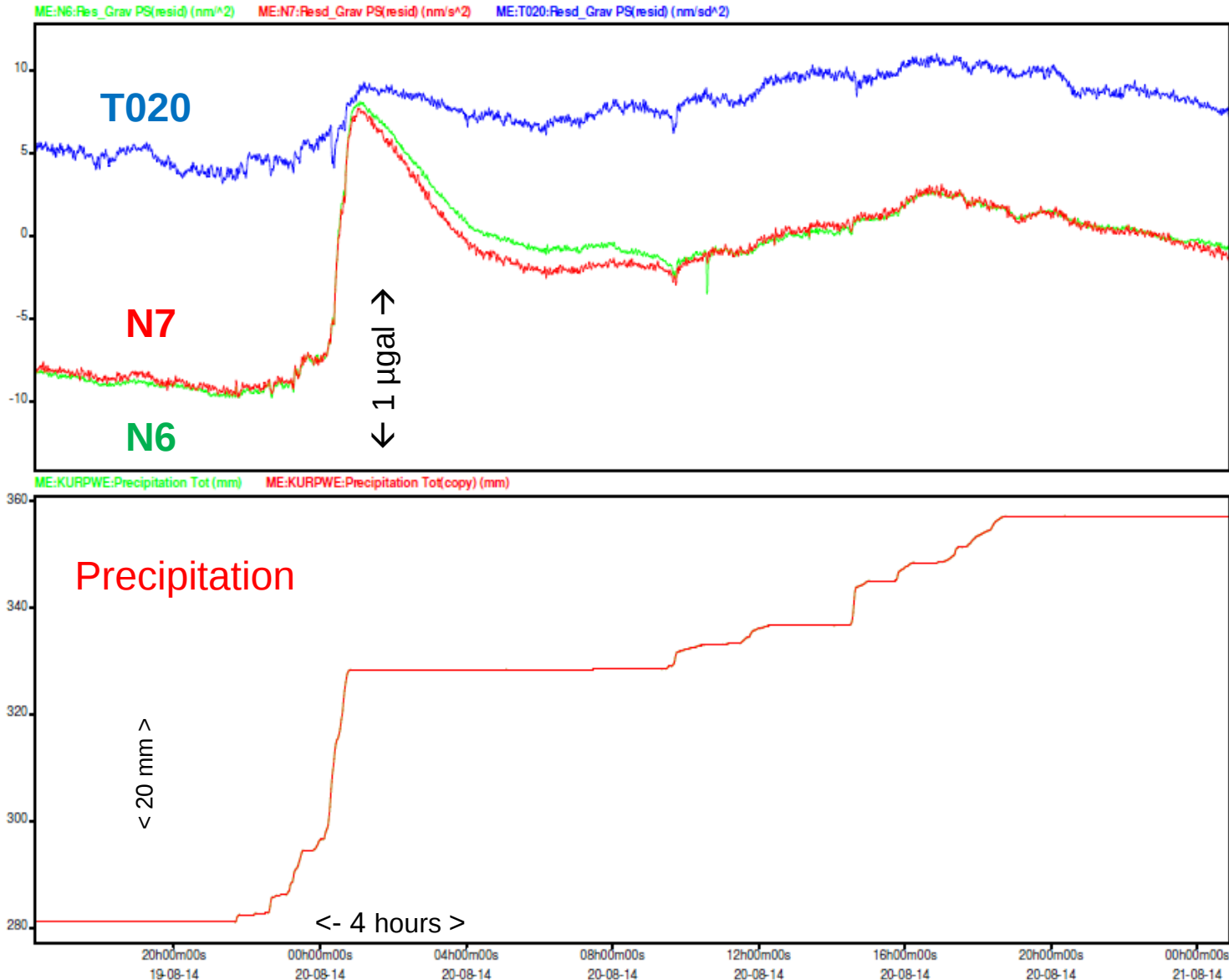


PSD by A. Raja-Halli & W. Zürn

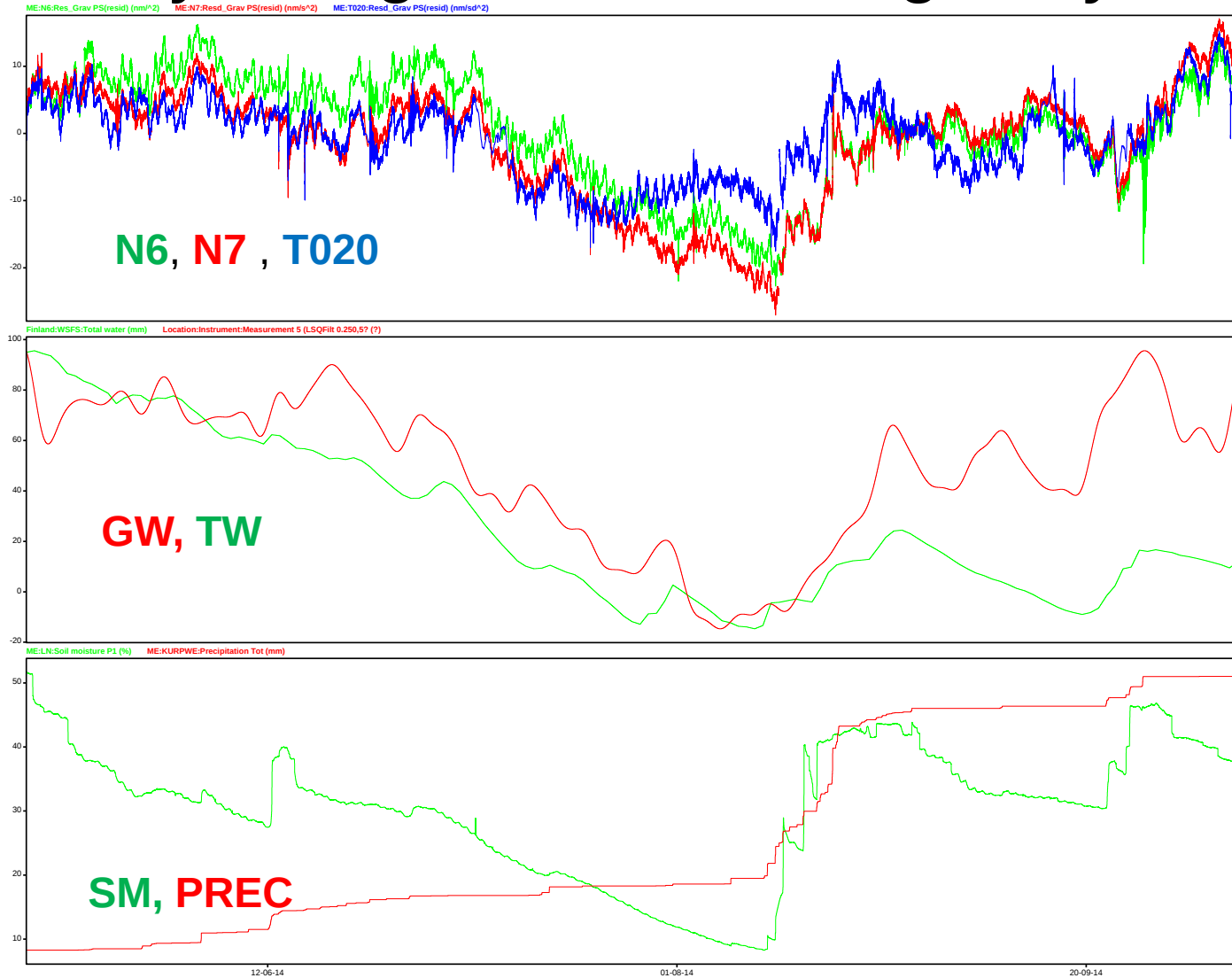
BFO/Metsaehovi – SGs – tides removed



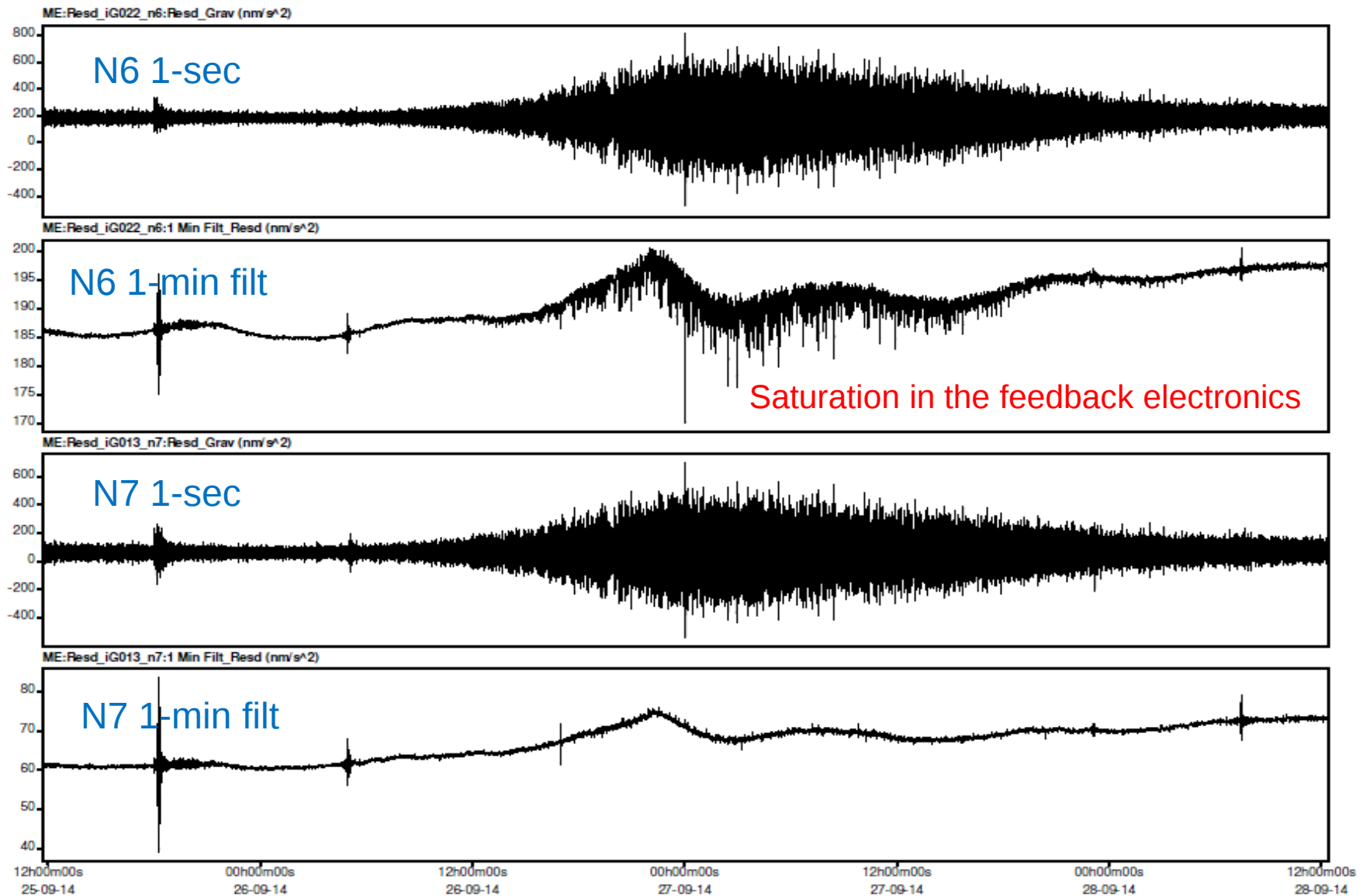
Gravity effects by strong rein



Hydrological effects on gravity



The effect of very strong microseism



Conclusions

N7 (iGrav) and T020 have similar noise level

N6 (High-Q) has considerably lower noise

N6 is comparable to BFO (or better ?)

All gravimeters work well

Dynamic range of N6 can cause problems due to MS
(during some days)

Horizontal distance of 3 m is notable
(local hydrology)

Thank for your attention