Absolute gravity measurements by the FGI in 2008 & An update of absolute gravity time series in Finland

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Introduction

- Measurements in 2008
  - Estonia
  - Finland
- Time series at Finnish stations untill 2009
- Comparisons with rates from other sources
- Prelimitary loading studies
- Plans for 2009

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Measurements in Estonia

- In co-operation with Estonian Land Board
- 14.07. - 14.08.2008
- 7 stations

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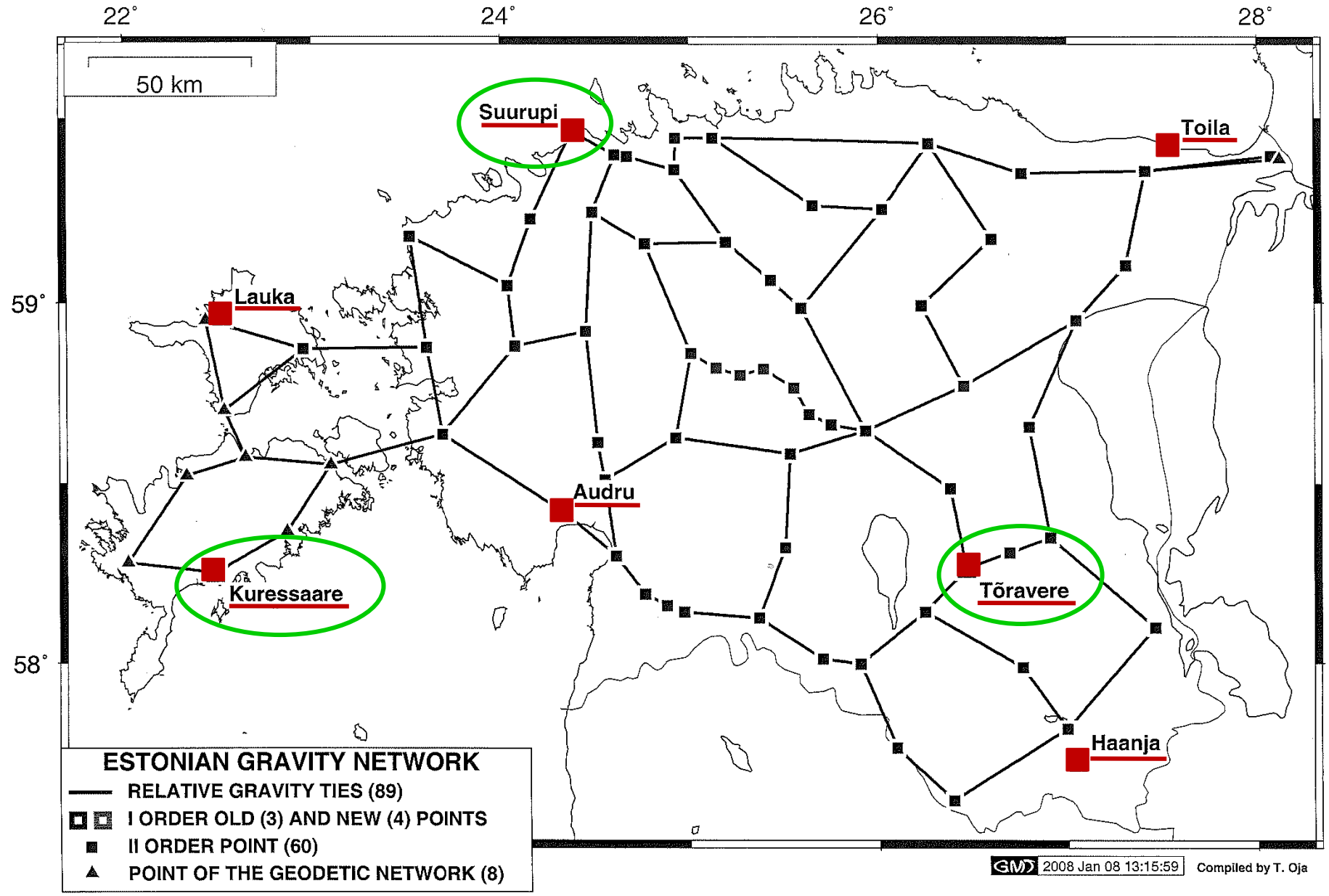
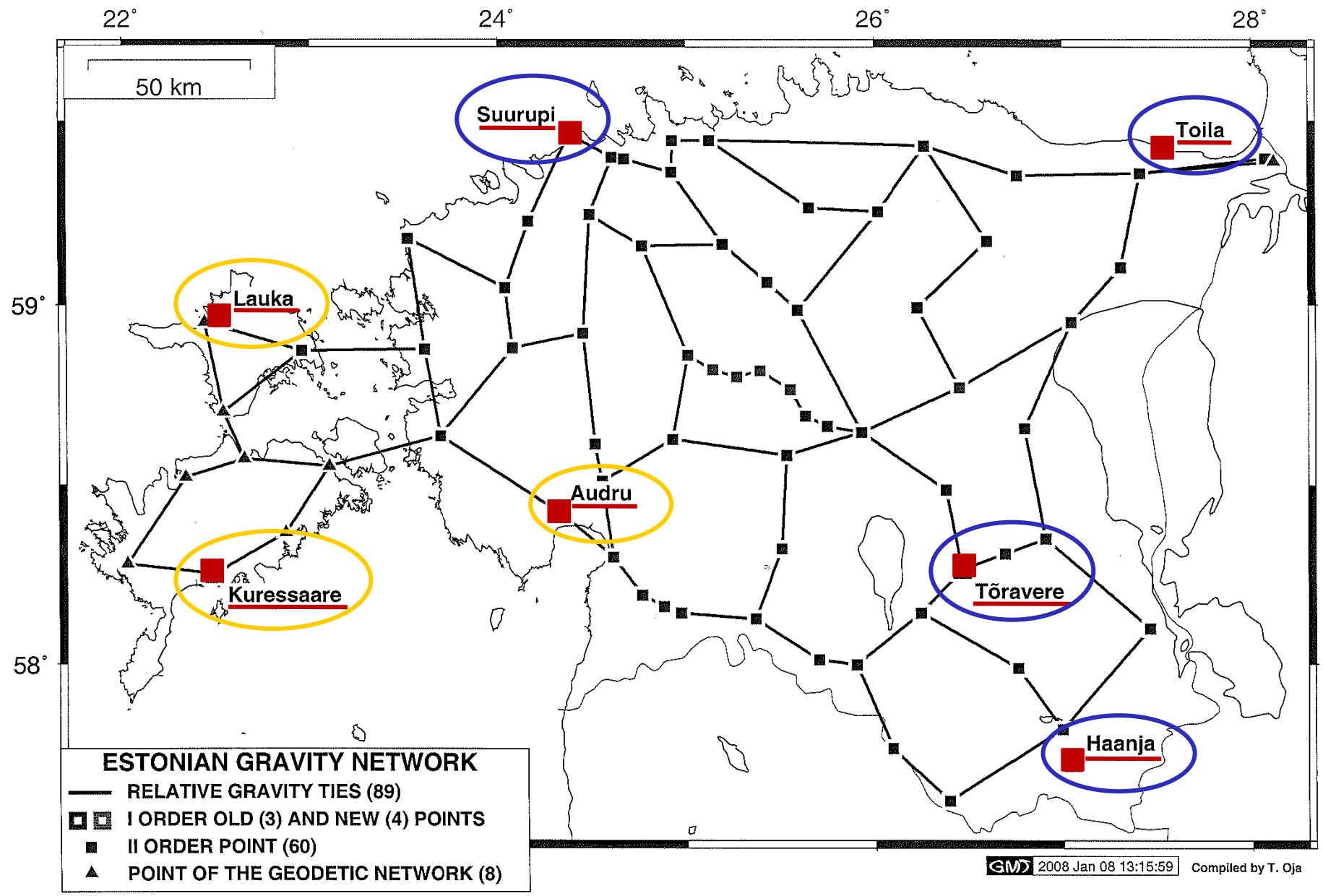
3 existing stations & 4 new



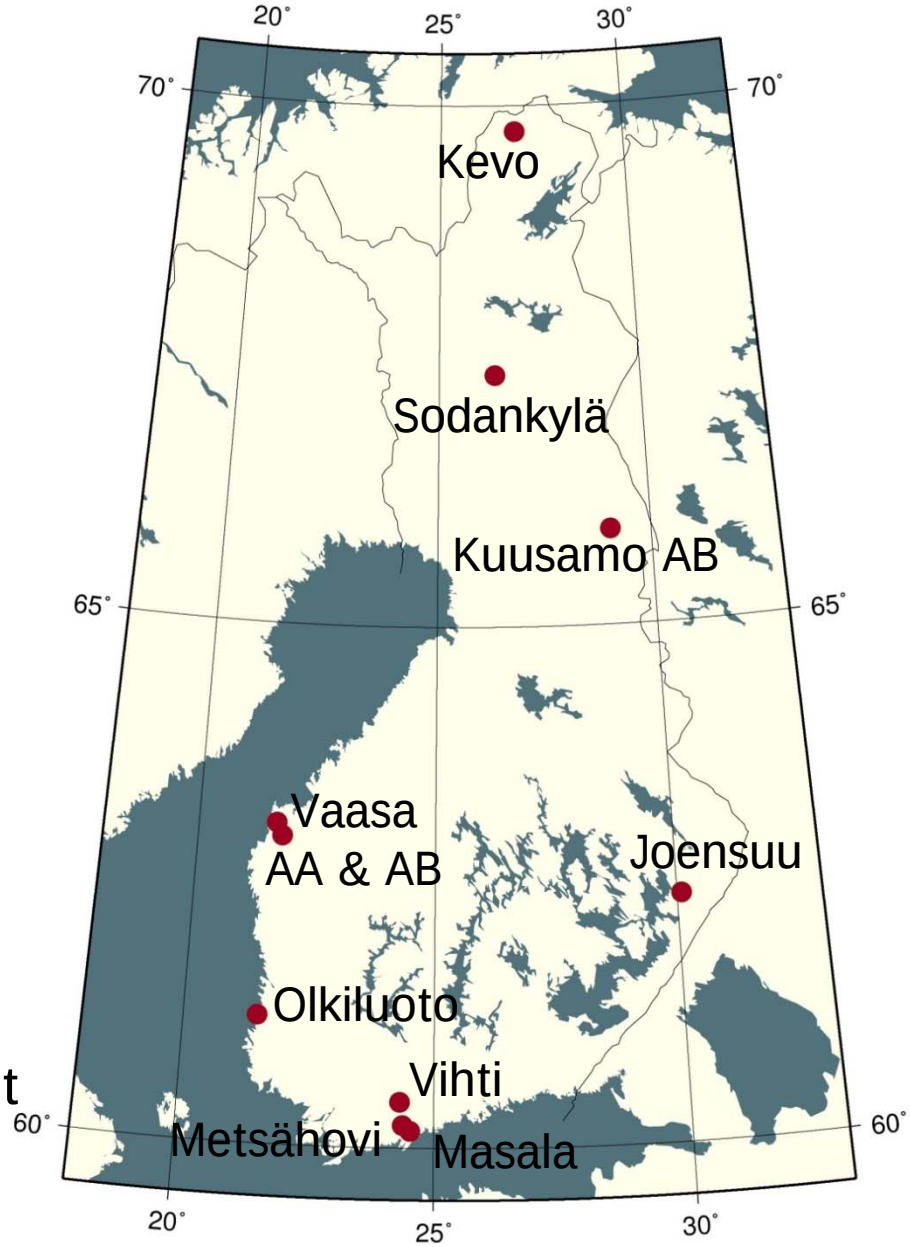
14. July - 14. August 2008



Finland 2008

- Micro-g service
- 3 observers

  Jaakko, Mirjam, Hannu R
- 2 comparisons at Metsähovi
  - 21.05. – 25.05.2008
    - FG5-220 IfE
    - FG5-221 FGI
  - 8.9. – 11.9.2008
    - FG5-233 Lantmäteriet
    - FG5-221 FGI



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Measurements in Finland II

- End points of Masala – Vihti calibration line
  - Vihti
  - Masala AA
- In new laboratory space
  - Masala AB
  - Masala AC

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Time series in Finland

- Recalculated FG5-221 data
- Change rate calculation
- Weighted least squares
  - FG5 2.5 µGal
  - JILAg 5.0 µGal
  - Others 10.0 µGal

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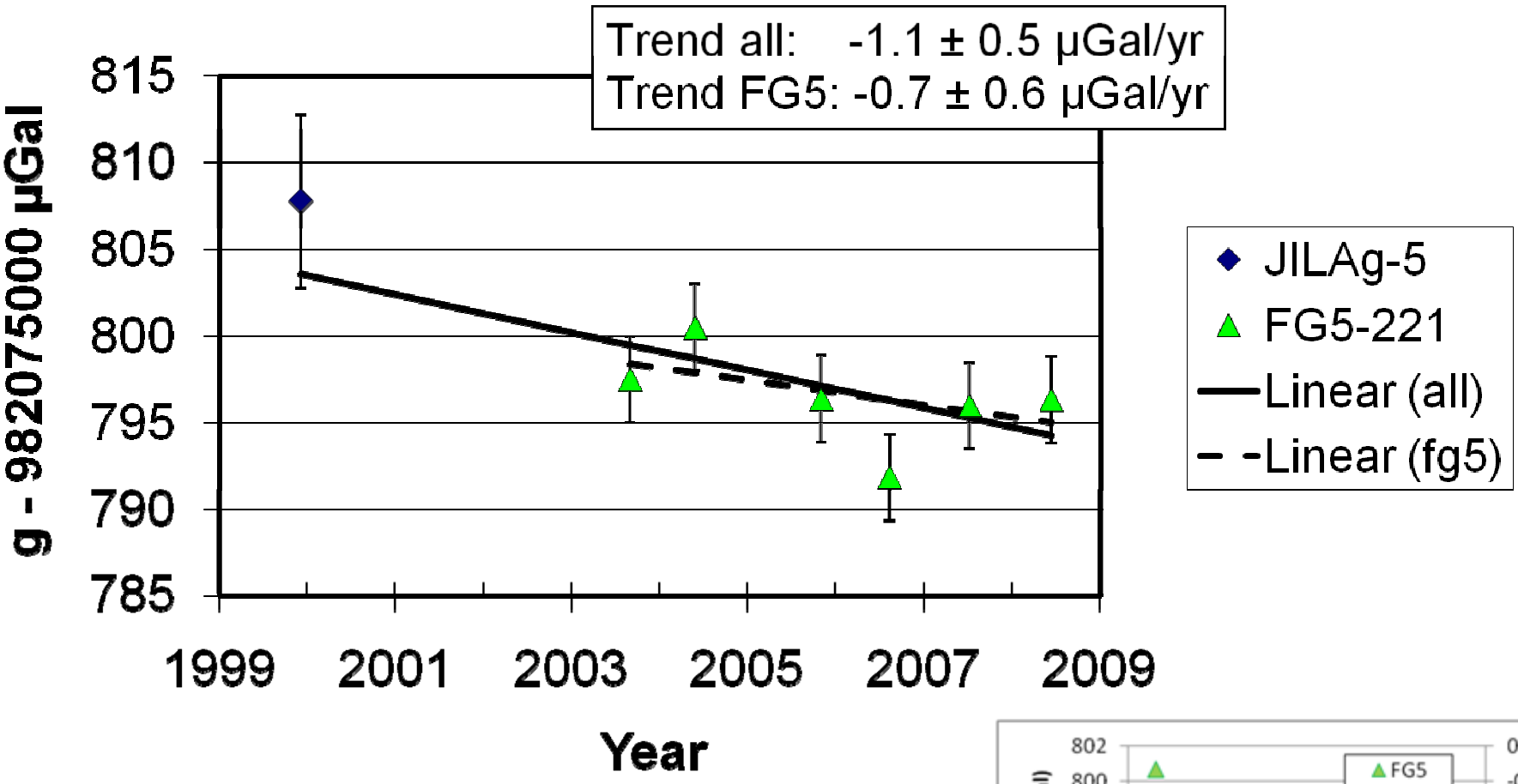
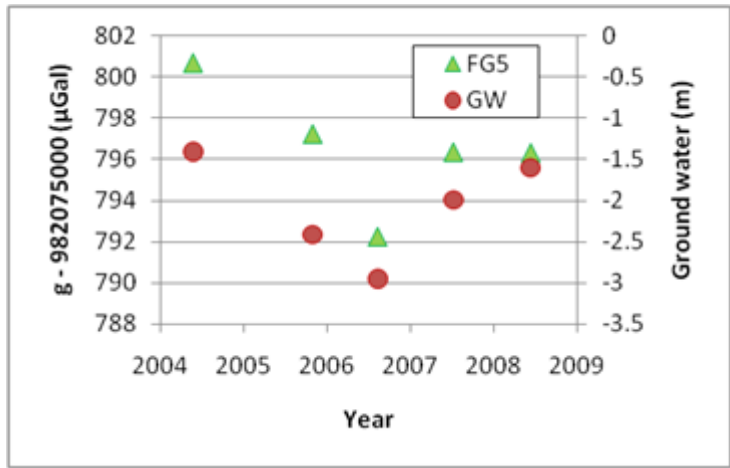
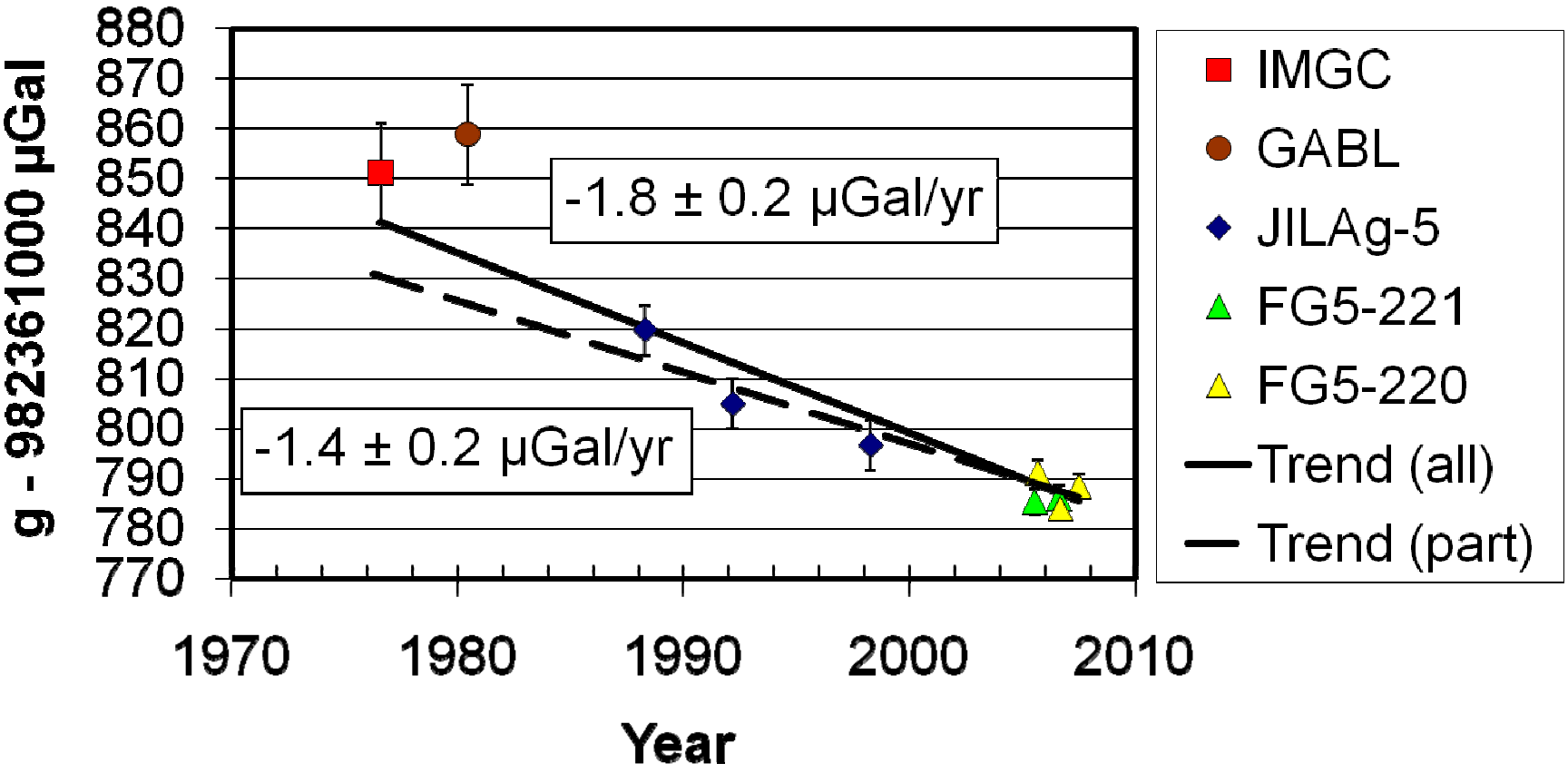
Absolute gravity at Joensuu





Absolute gravity at Sodankylä



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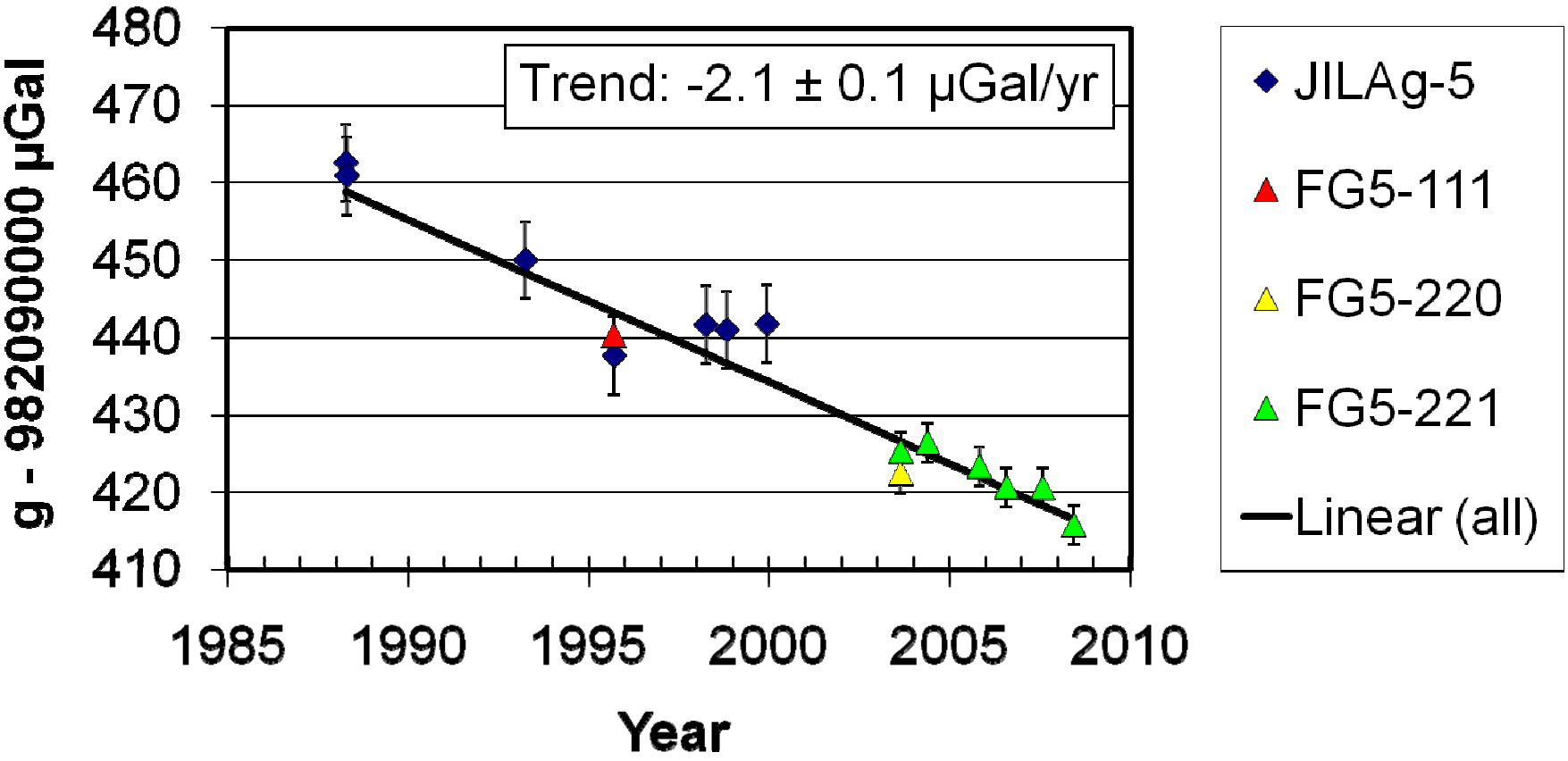
Absolute gravity at Vaasa AA at 100 cm



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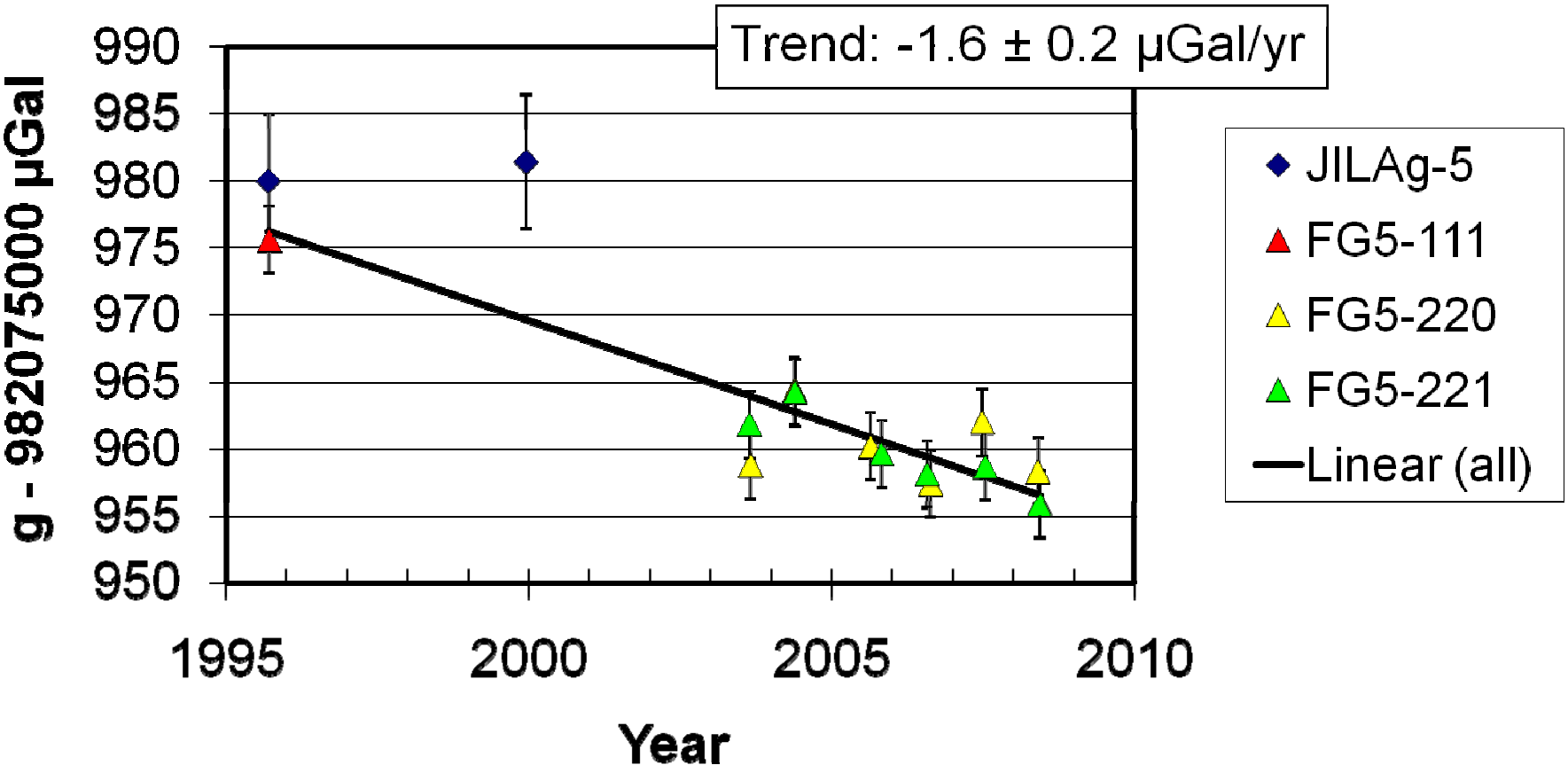
Absolute gravity at Vaasa AB at 100 cm



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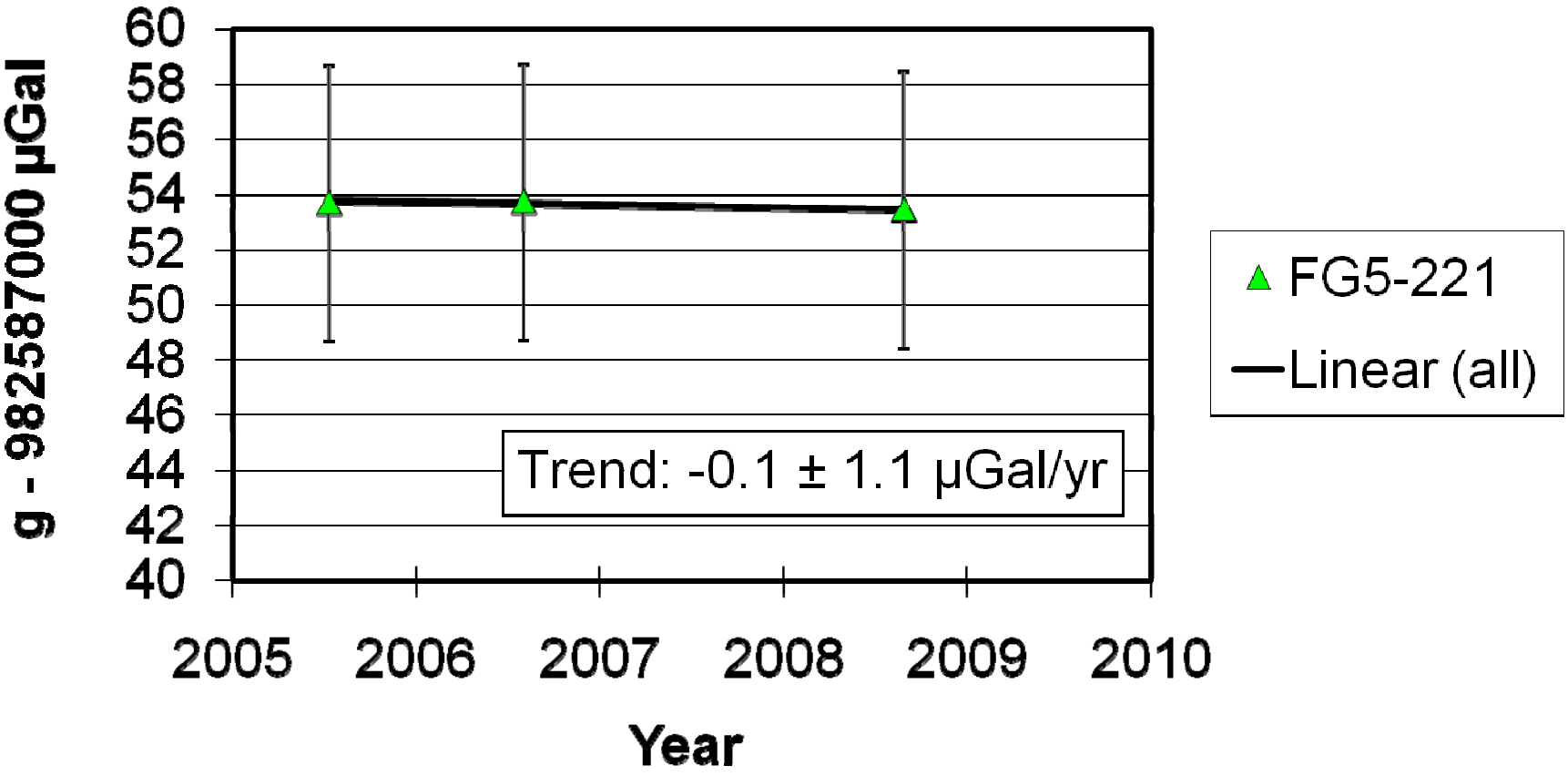
Absolute gravity at Kevo AA at 120 cm



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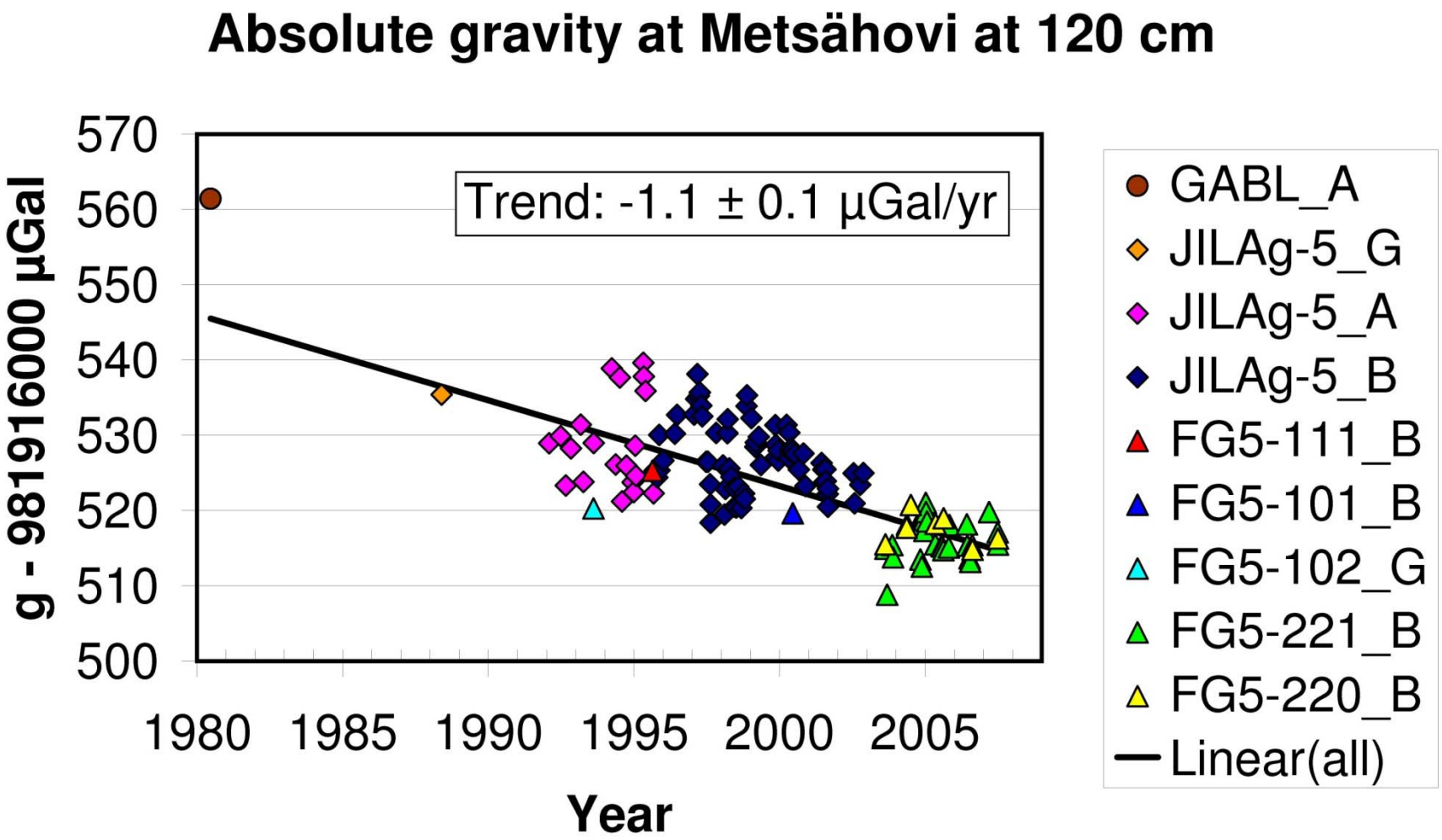
Metsähovi I



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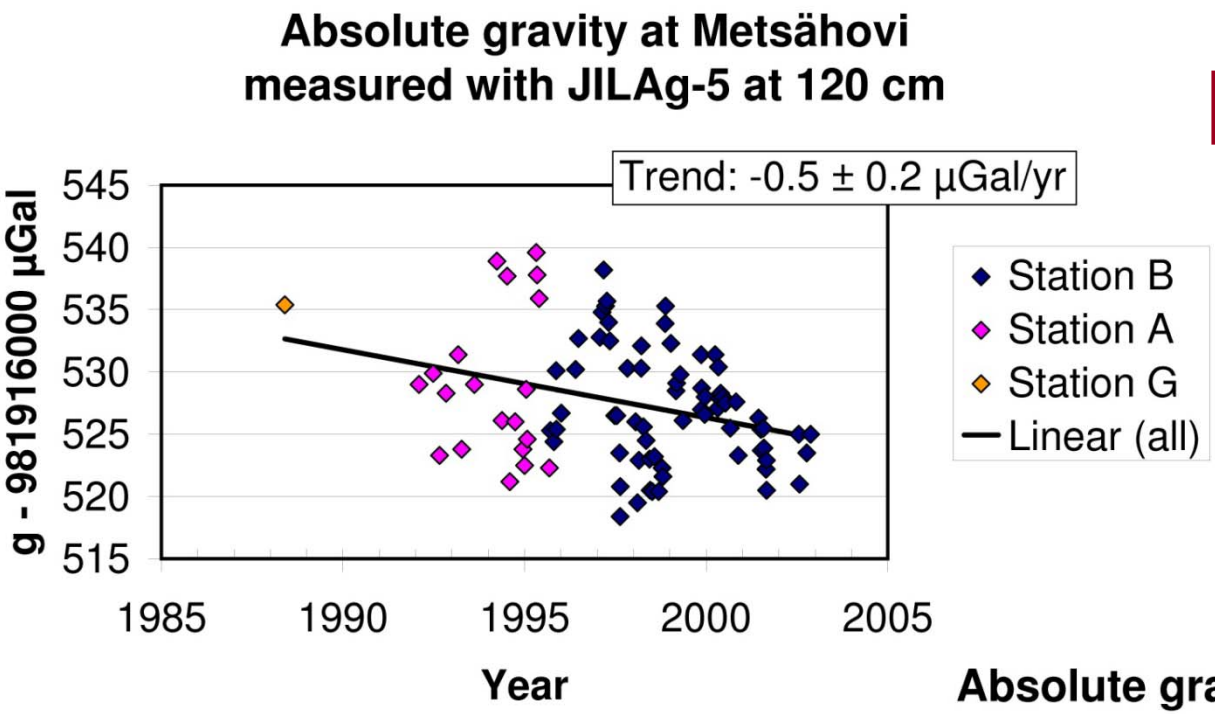
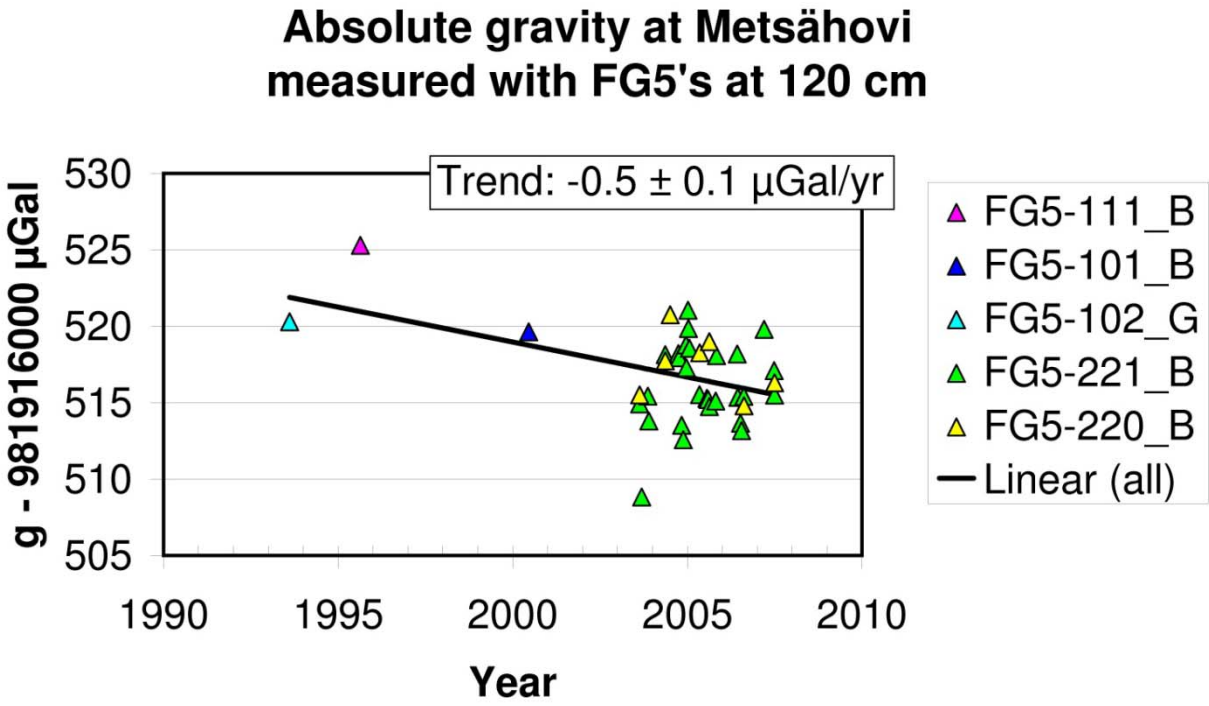
Metsähovi II





Rates

Station & data used		Meas.	Lambeck GIA	Ekman MAP	FinnRef GPS	Lev. FGI 3x	Bifrost GIA	NKG Model
Metsähovi	all	-1.1	-0.8	-0.9	-0.9	-0.9	-0.9	-0.8
	JILAg	-0.5						
	FG5	-0.5						
Vaasa AA		-2.1	-1.7	-1.9				-1.8
Vaasa AB		-1.6	-1.7	-1.9	-1.7	-1.8	-2.0	-1.8
Sodankylä	all	-1.8	-1.5	-1.5	-1.3	-1.4	-1.6	-1.4
	JILAg/FG5	-1.4						
Joensuu	All	-1.1	-0.9	-0.9	-0.5	-0.7	-0.9	-0.8
	FG5	-0.7						
Kevo		-0.1	-0.4	-0.7	-0.4	-0.3	-0.7	-0.7

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Loading effects on time series

- Air pressure
  - Difference: effect of global 3D/2D-model and conventional local -0.3 µgal/hPa
- Baltic Sea
  - Monthly tide gauge data interpolated to surface
  - Deformation & attraction
- Continental water
  - Global hydrological model GLDAS
  - Deformation & attraction outside 1.5 km radius
- Local water
  - Scaled bouguer plate with thickness of GLDAS grid value 30% & 10 %

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Metsähovi

Air pressure effect

Baltic Sea effect

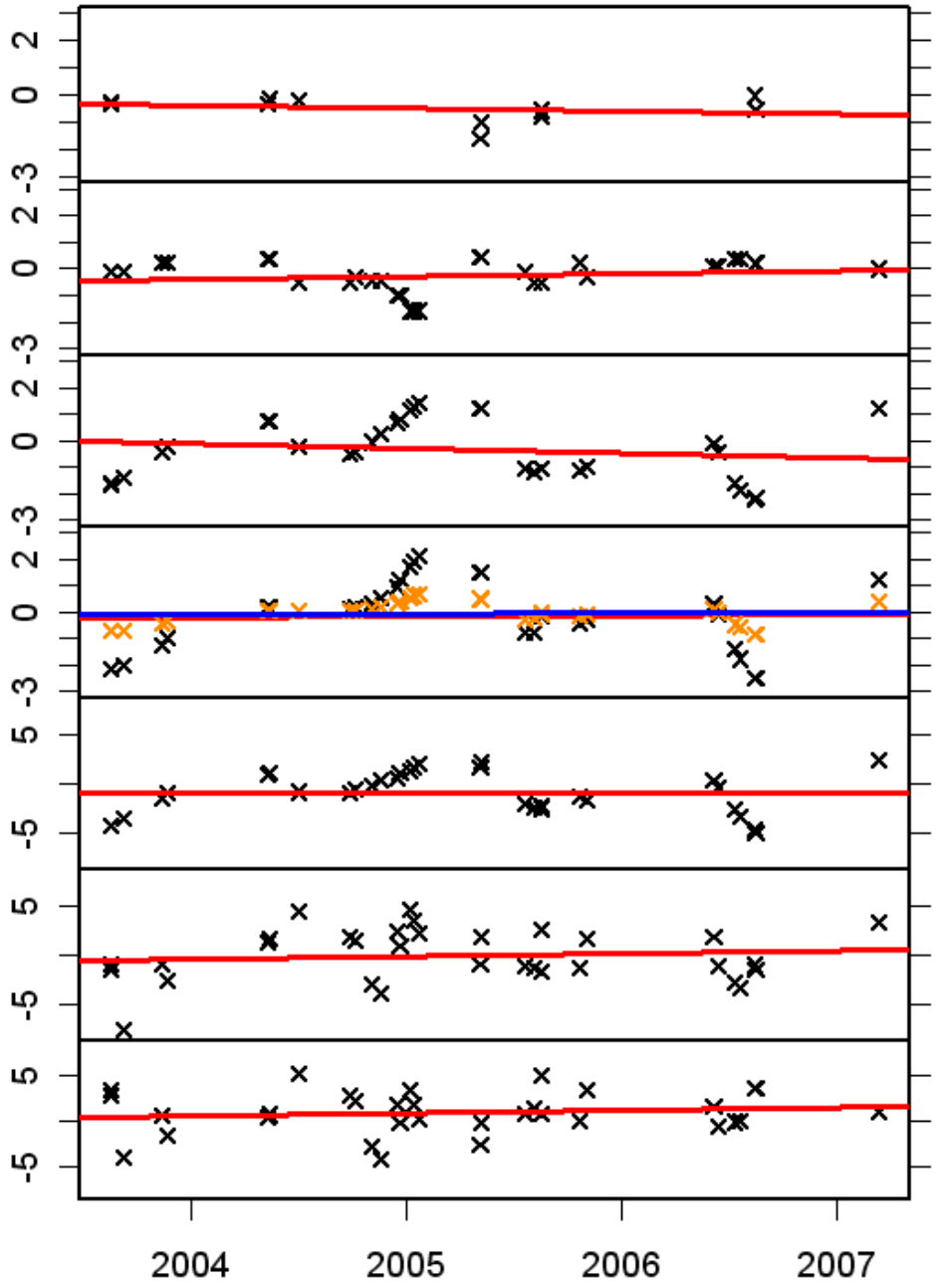
Continental water effect

Local water effect

Total effect

Observed gravity

Corrected gravity



Metsähovi

Metsähovi	Trend/yr (µgal)	Residuals after trend fitting				Reduction in std.
		Min. (µgal)	Max. (µgal)	Mean (µgal)	Std. (µgal)	
dg	0.3	-7.1	4.7	-0.0	2.7	
dg - all corr. (boug 30 %)	0.3	-5.0	4.5	-0.0	2.3	14 %
dg - all corr. (boug 10 %)	0.3	-5.6	4.7	-0.0	2.3	13 %

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Sodankylä

Sodankylä	Trend/yr (µgal)	Residuals after trend fitting Min. (µgal)	Max. (µgal)	Mean (µgal)	Std. (µgal)	Reduction in std.
dg	-2.8	-2.9	3.2	0.0	2.6	
dg - all corr. (boug 30 %)	-1.2	-3.2	3.5	0.0	2.8	-5.9 %
dg - all corr. (boug 10 %)	-1.7	-3.2	3.5	0.0	2.8	-5.7 %

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Vaasa AA

Vaasa AA	Trend/yr (µgal)	Residuals after trend fitting				Reduction in std.
		Min. (µgal)	Max. (µgal)	Mean (µgal)	Std. (µgal)	
dg	-1.0	-2.4	2.3	-0.0	1.8	
dg - all corr. (boug 30 %)	-0.9	-1.7	1.8	0.0	1.3	29 %
dg - all corr. (boug 10 %)	-1.0	-1.9	1.6	-0.0	1.3	26 %

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Vaasa AB

Vaasa AB	Trend/yr (µgal)	Residuals after trend fitting				Reduction in std.
		Min. (µgal)	Max. (µgal)	Mean (µgal)	Std. (µgal)	
dg	-1.3	-3.7	2.9	0.0	2.1	
dg - all corr. (boug 30 %)	-0.7	-1.7	1.4	-0.0	0.9	55 %
dg - all corr. (boug 10 %)	-0.9	-2.0	1.4	-0.0	1.1	48 %

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2009

- Measurements at 7 stations
  - Metsähovi
  - Vaasa AA & AB
  - Joensuu
  - Kuusamo
  - Sodankylä
  - Kevo
  - Possibly: Virolahti
    Oulu
- Article on updated time series
- ICAG2009, BIPM, France

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