

# Comparison of Trends from 5 and 15 Years Absolute Gravity Measurements

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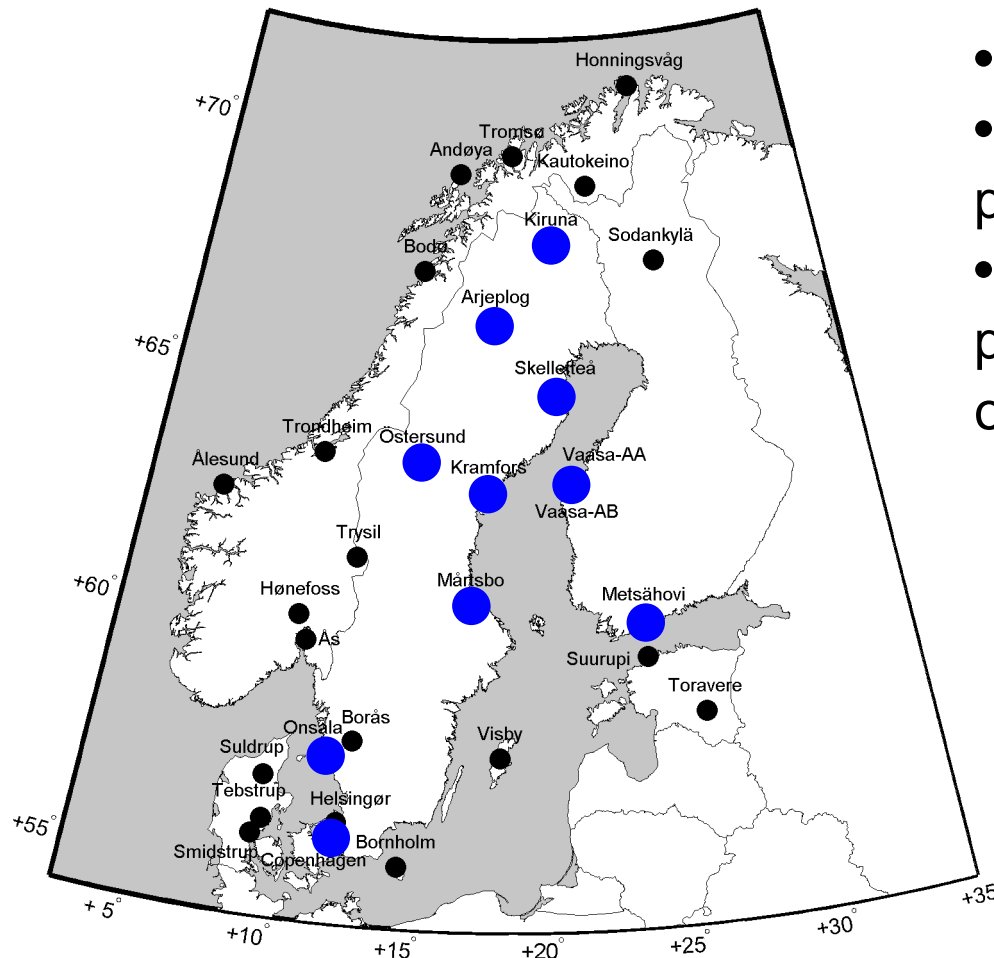
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# Contents

Objective: Comparison of short-term and long-term trends as one criterion for future absolute gravimetry observation plans

- Observational gravity trends from 5 years absolute gravity measurements with FG5-220
- Observational gravity trends from 15 years absolute gravity measurements with FG5-gravimeters from IfE, BKG and NOAA

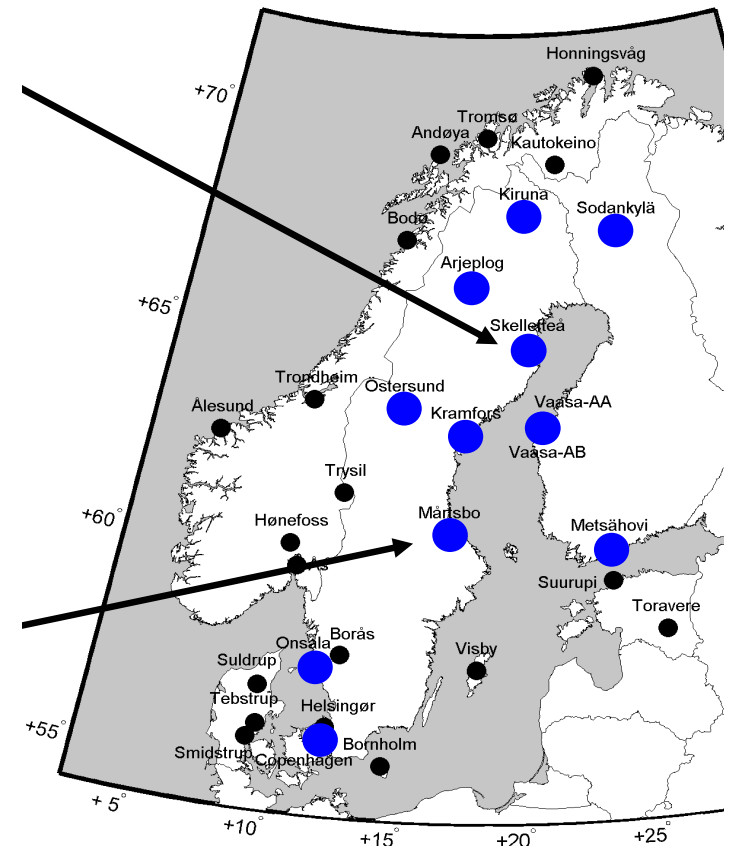
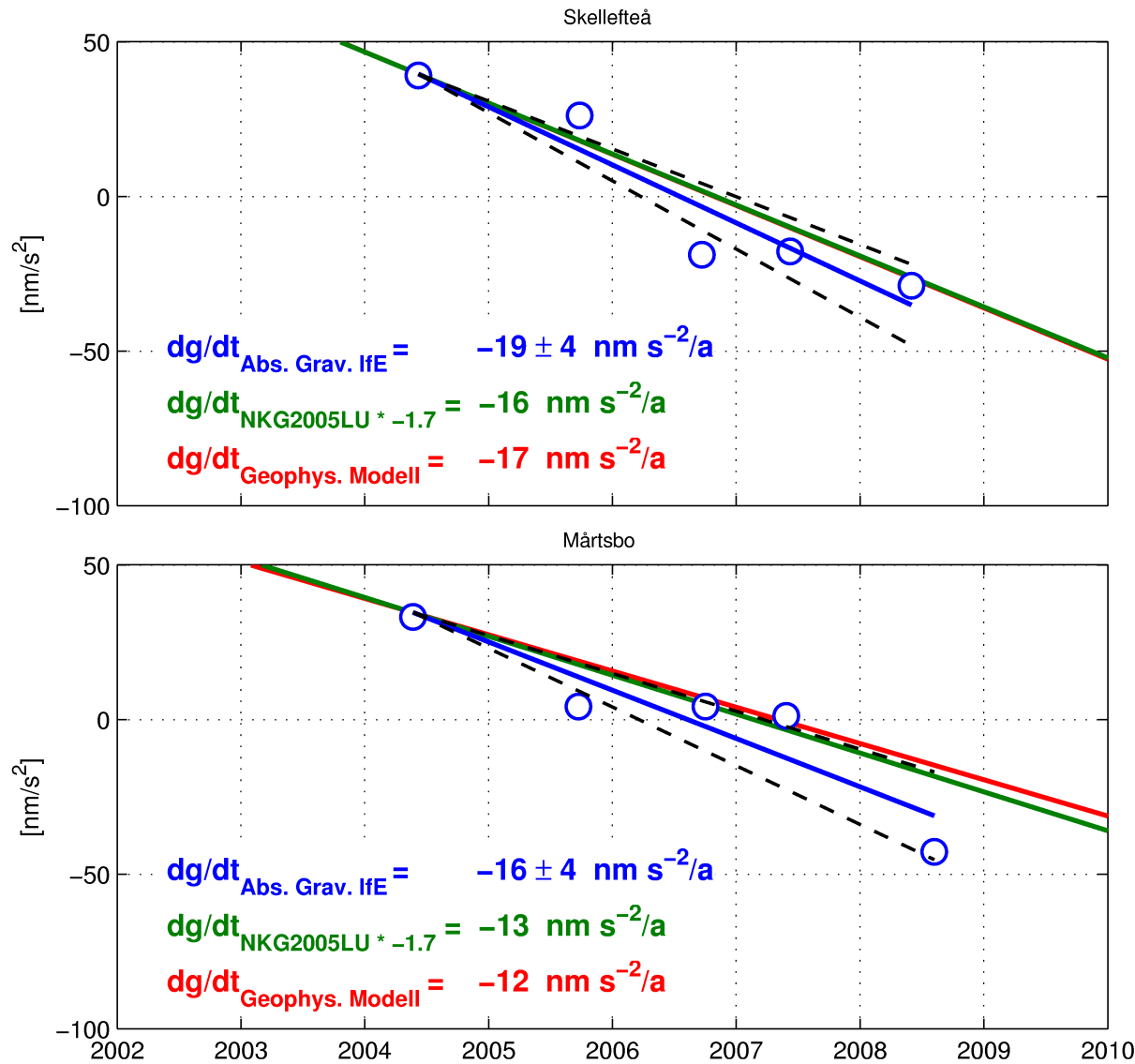
# IfE Absolute Gravity Station Determinations 2003 – 2008



- 34 different stations
- ~100 station determinations performed by IfE with FG5-220
- 10 stations along North-South profile and close to the uplift centre occupied multiple (>3 times)

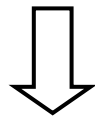
→ Annual observations at nearly same season (similar gravity effects due to environmental noise average out)

# Linear Gravity Changes from 5 Years Measurements with FG5-220



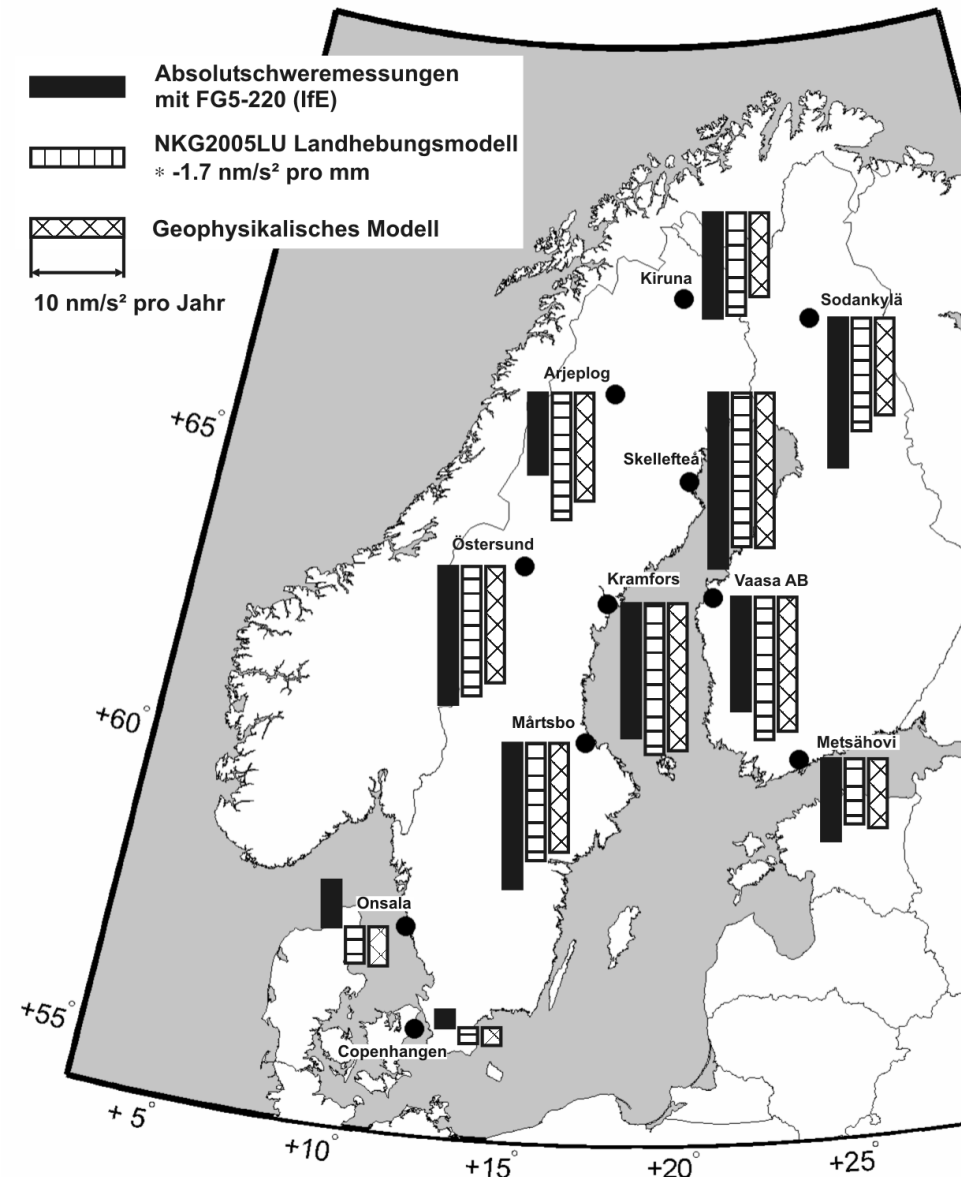
# Linear Gravity Changes from 5 Years Measurements with FG5-220 and from models

- **good agreement** between predicted and observed trends (with FG5-220 mean std.dev. of  $5.9 \text{ nm/s}^2$ )
- discrepancies between predicted and measured trends vary in the mean with  **$2.5 \text{ nm/s}^2$  per year** (20%, rms diff.)



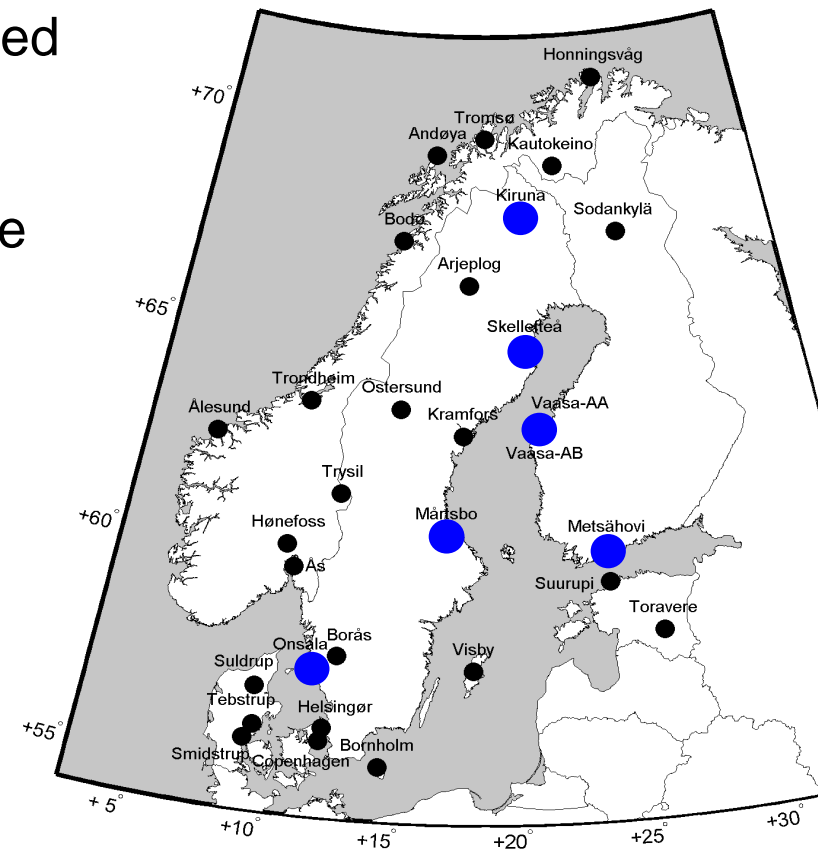
**Realistic secular gravity changes**  
after 5 years measurements  
with FG5-220

Trends are still interfered with other environmental gravity effects which have to be investigated in the future.

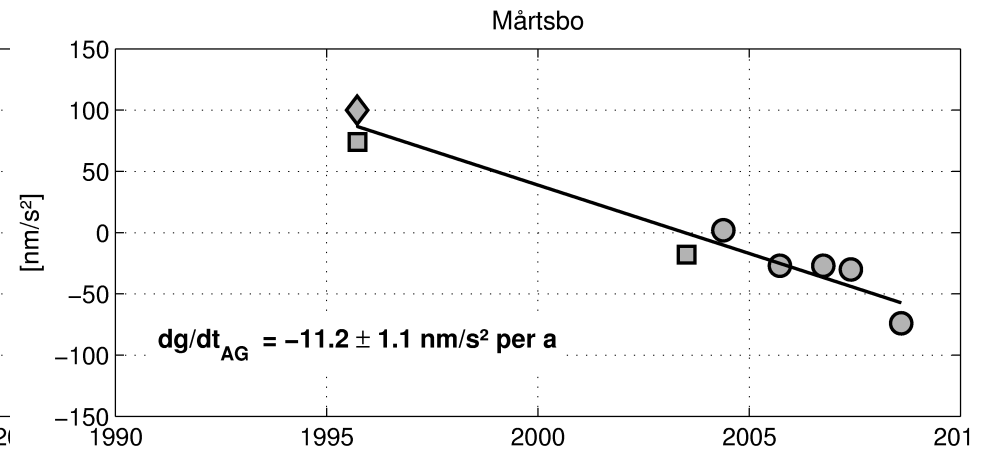
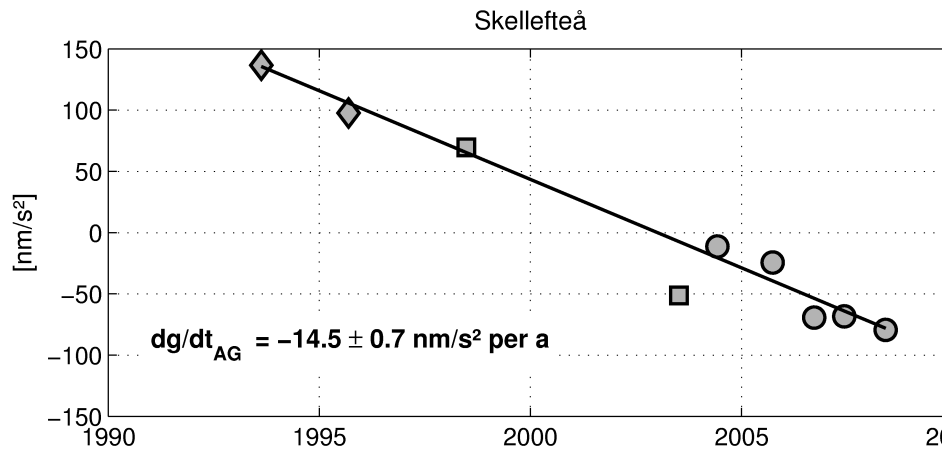
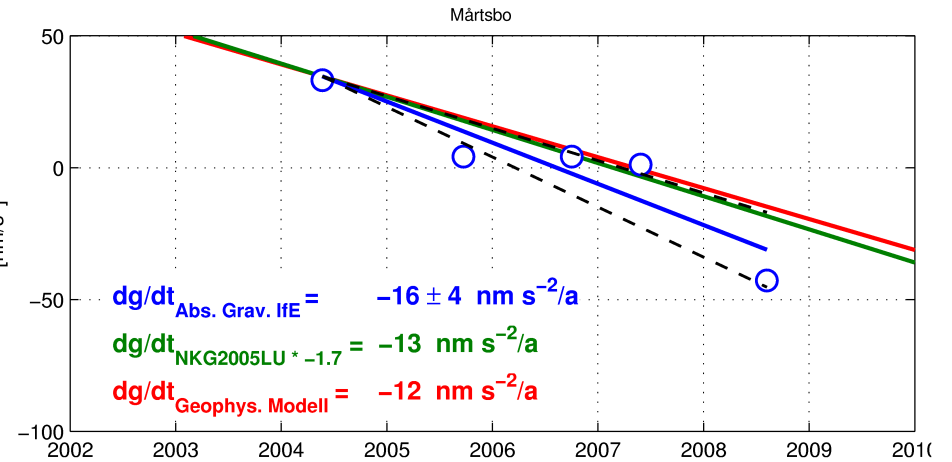
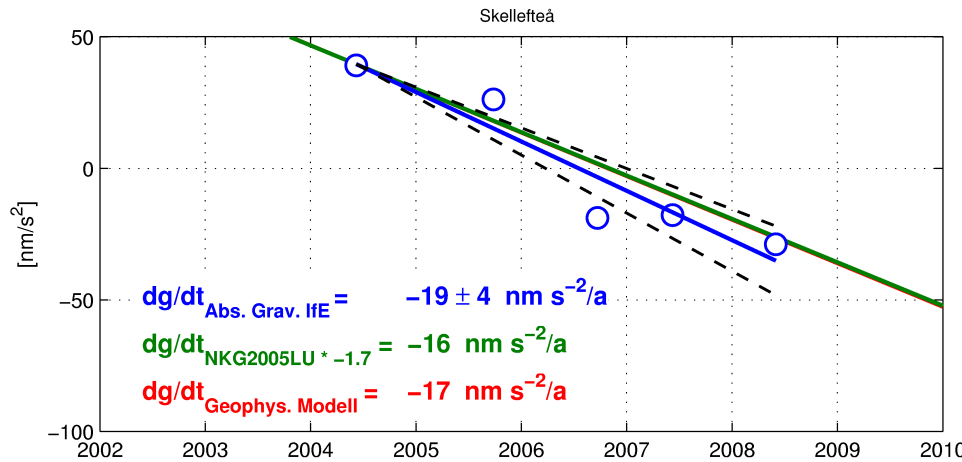


# Linear Gravity Changes from 15 Years Measurements

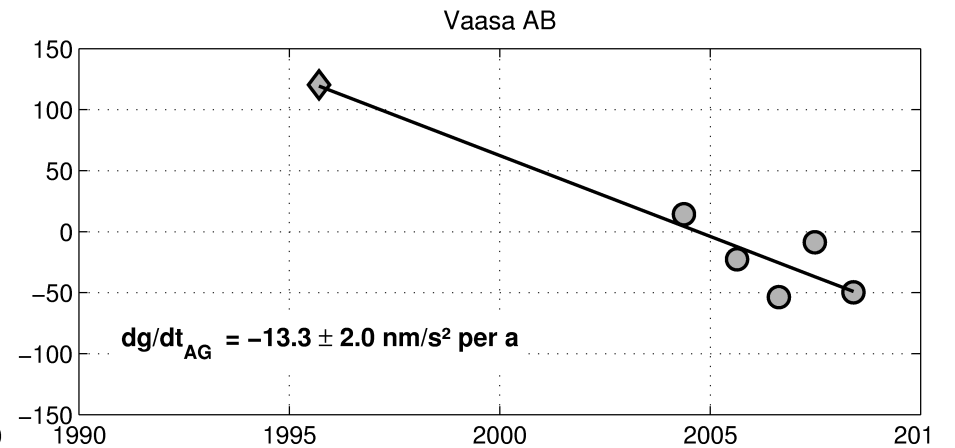
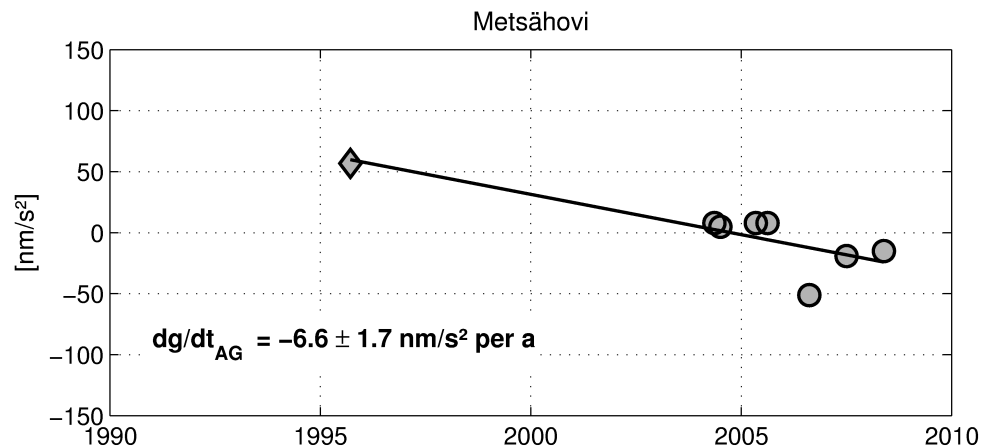
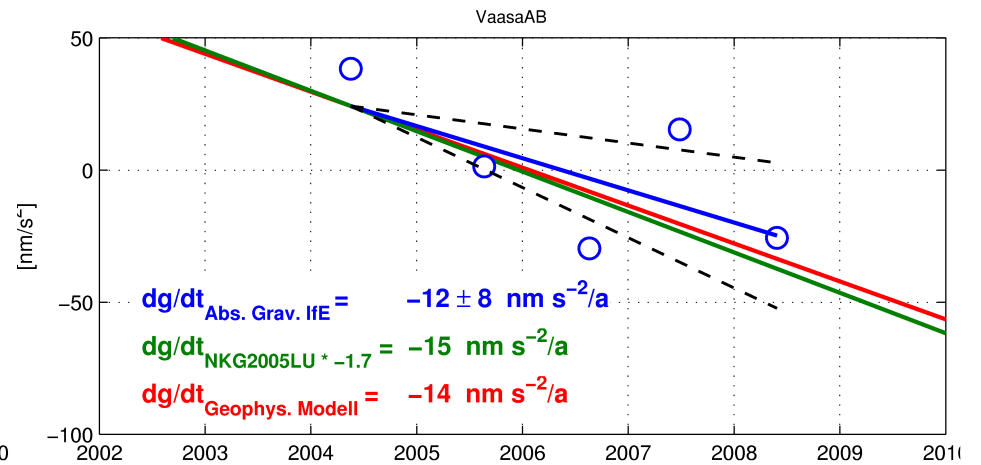
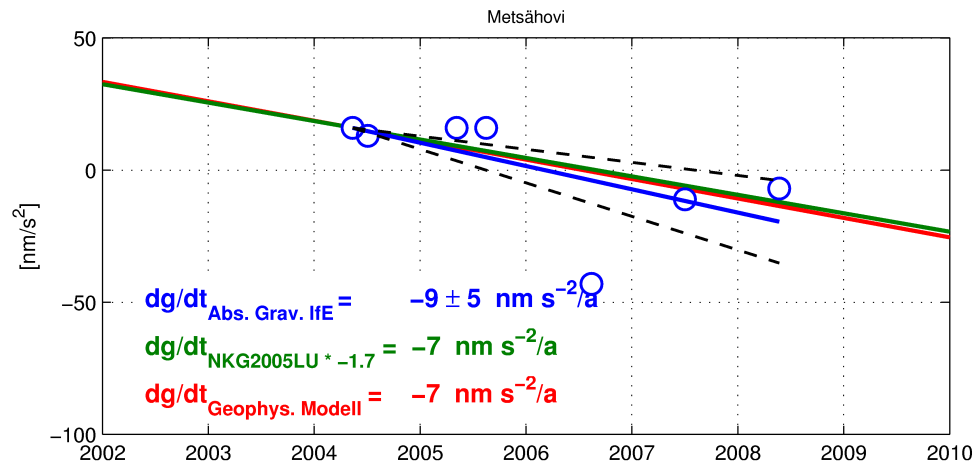
- Since 1993 measurements were performed in Fennoscandia by BKG and NOAA.
- Gravity results from BKG and NOAA were complemented to IfE-measurements.  
→ Long-term trends calculated for 6 Stations



# Linear Gravity Changes from 15 Years Measurements

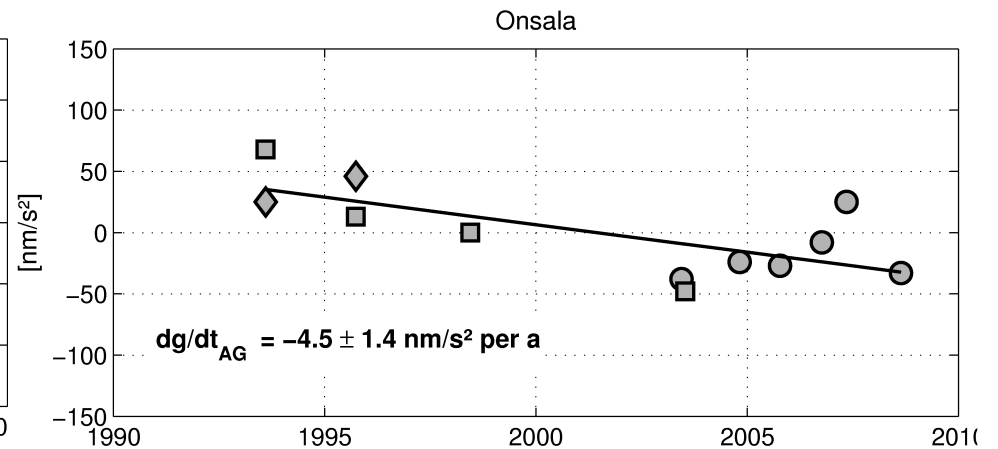
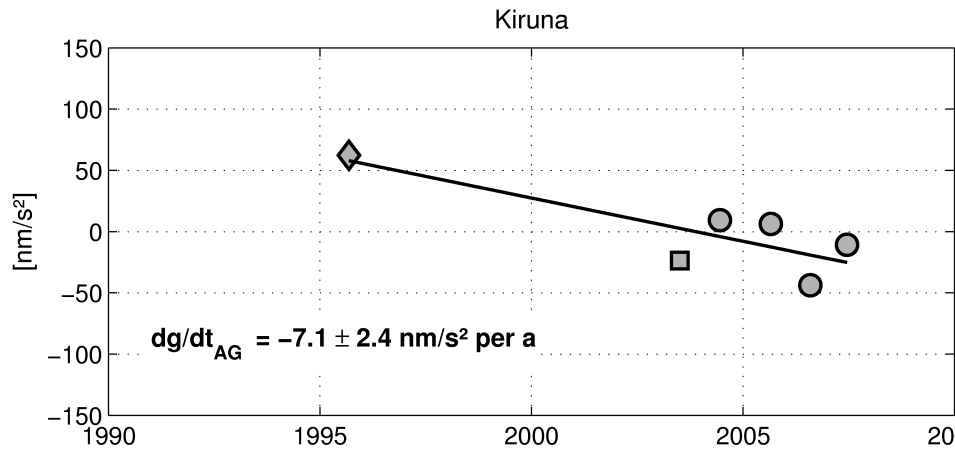
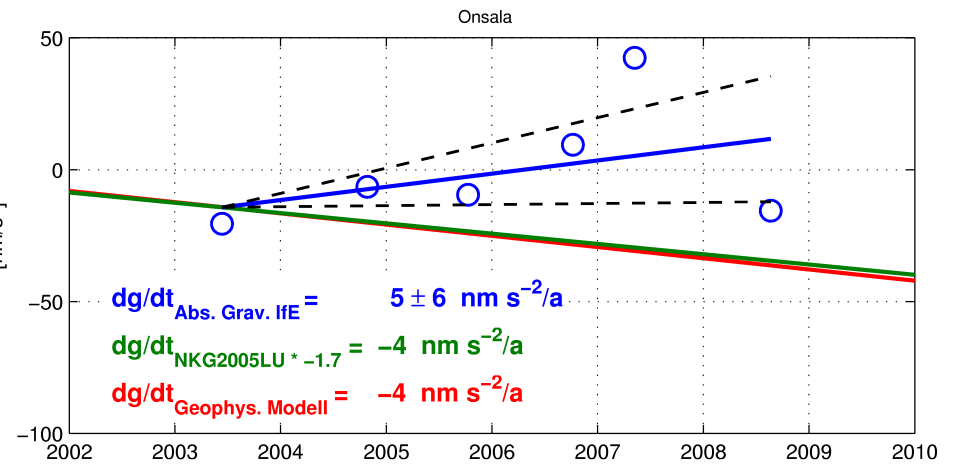
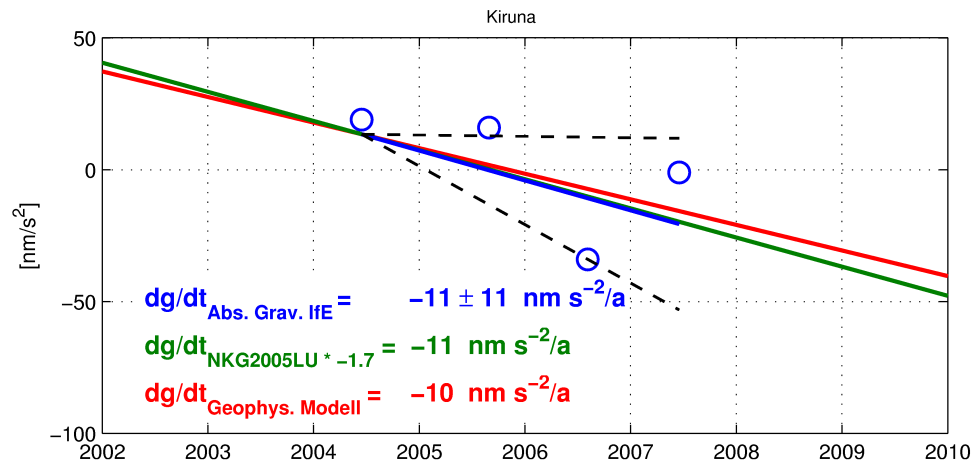


# Linear Gravity Changes from 15 Years Measurements





# Linear Gravity Changes from 15 Years Measurements



# Summary and Conclusions

- FG5-220 measurements 2003/2004-2008 provide reasonable and reliable gravity trends and accuracy estimates.
- Absolute gravimetry has shown its capability to observe the secular gravity variations in the Fennoscandian PGR area in a time span of 4 to 5 years only.
- Short- and long-time trends agree within the standard deviation.
- Absolute value of short-term trends 4 nm/s<sup>2</sup> per year higher (excl. Onsala)
- The mean std. dev. of the trends decreased by factor 4
- after measurement time span of 15 years.
- Suggested to perform absolute gravity measurements
  - every year at new stations for a period of 5 years
  - every year at stations with discrepancies/contradictions to models
  - every year at stations with too large std. dev. of trends
  - every 5 years at stations with already available accurate and reliable results