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A mascon adjustment of the Earth's gravity field using GOCE gradiometer data

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Gravity Field and Steady-State Ocean Circulation Explorer

- Mission duration: 2009-2013
- Altitude ~250 km
- Lagrange GPS receiver
- Six accelelerometers in a regular array: GRADIOMETER
- Sensitive measurement bandwidth: 5-100 mHz

GRAVNOR: Local gravity field from GOCE data using GEOSAT

GRAVNOR I: Compute GOCE orbits using accelerometer data (dynamic orbits)

GRAVNOR II: Interpret GRADIOMETER data in terms of mass blocks (mascons) at the Earth's surface

GRAVNOR III: Mascon quasigeoid comparison with GPS/levelling network, mainland Norway

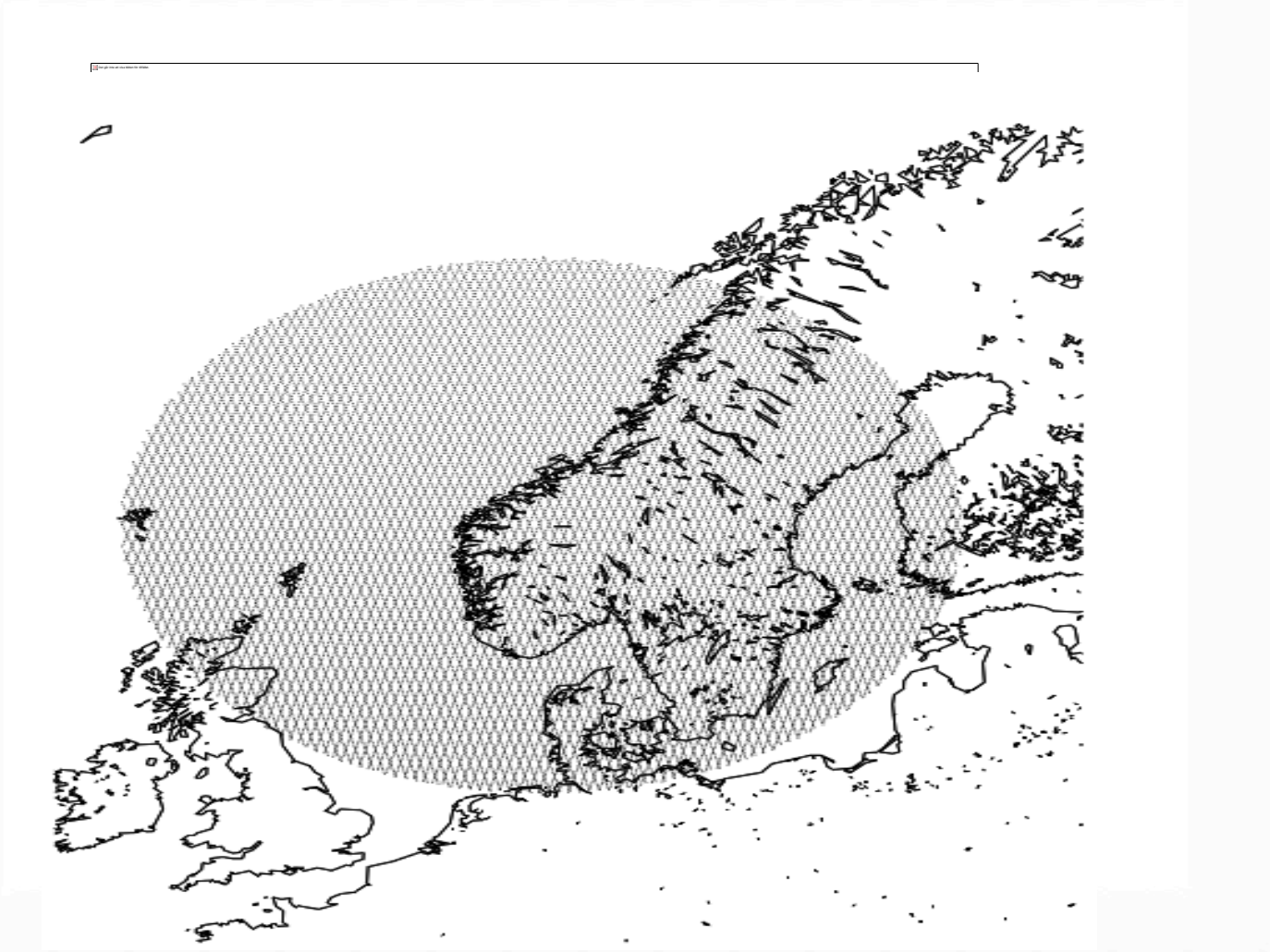
Motivation

- Need for a diversity of local field determination proceedures
- Spherical harmonic functions to degree and order ~250: truncated and global basis
- Local regularization

GEOSAT

- Per Helge Andersen, over 30+ years
- Undifference VLBI, GPS, SLR, DORIS data
- Combines at observation level
- Square-root Kalman filter for arc and inter-arc processing

341 mascons



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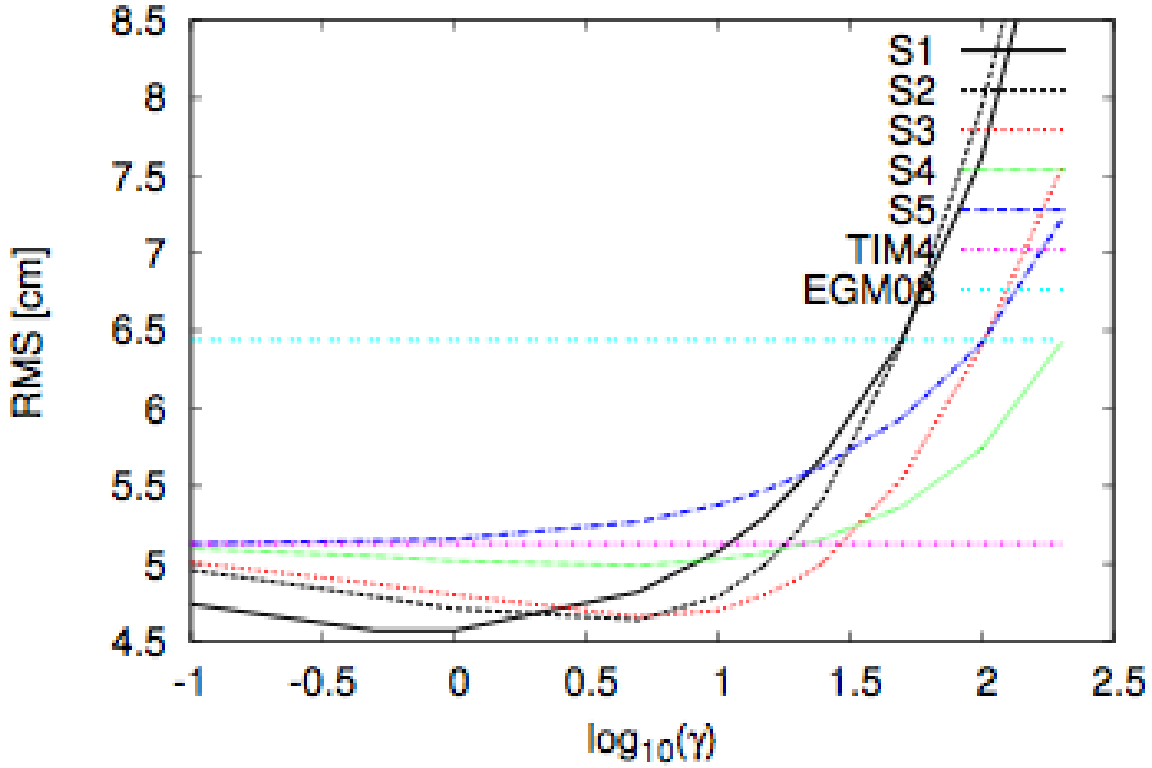
Scheme

- GRADIO-TIM4=residuals
- MBW: Bandpass filter data and observation eq.
- Arcwise accumulation of information
- More than one satellite cycle of 61 days

Quasigeoid-GPS/Levelling=RMS



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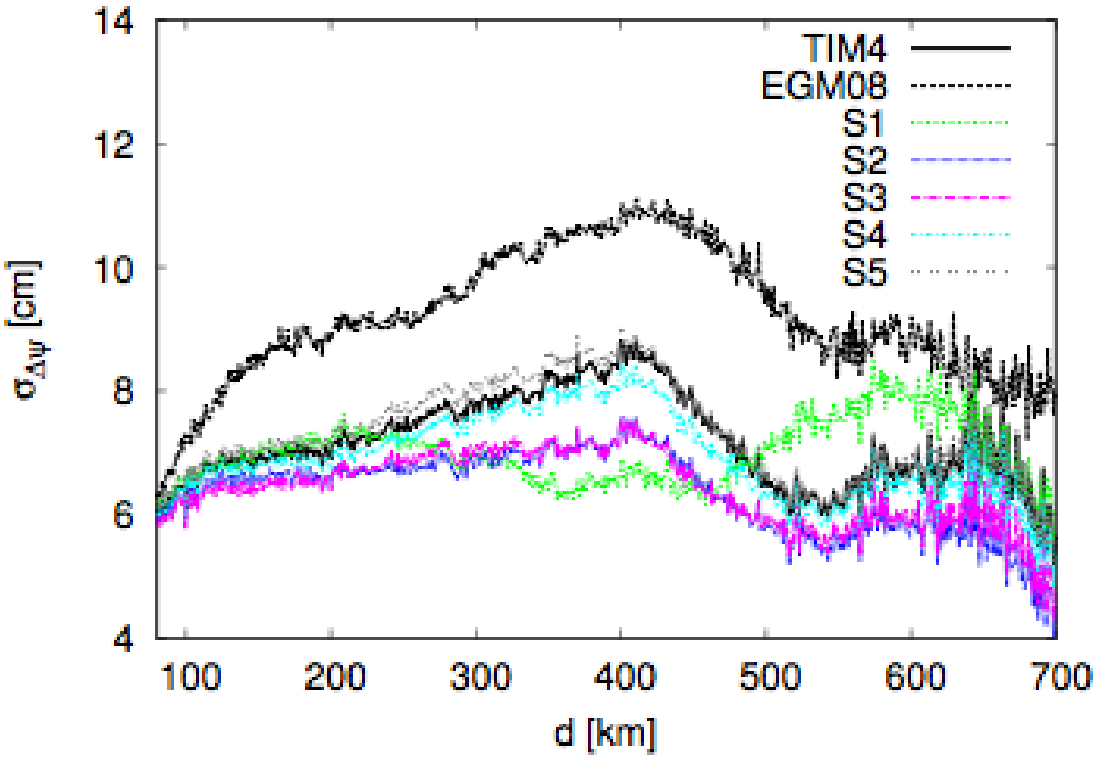
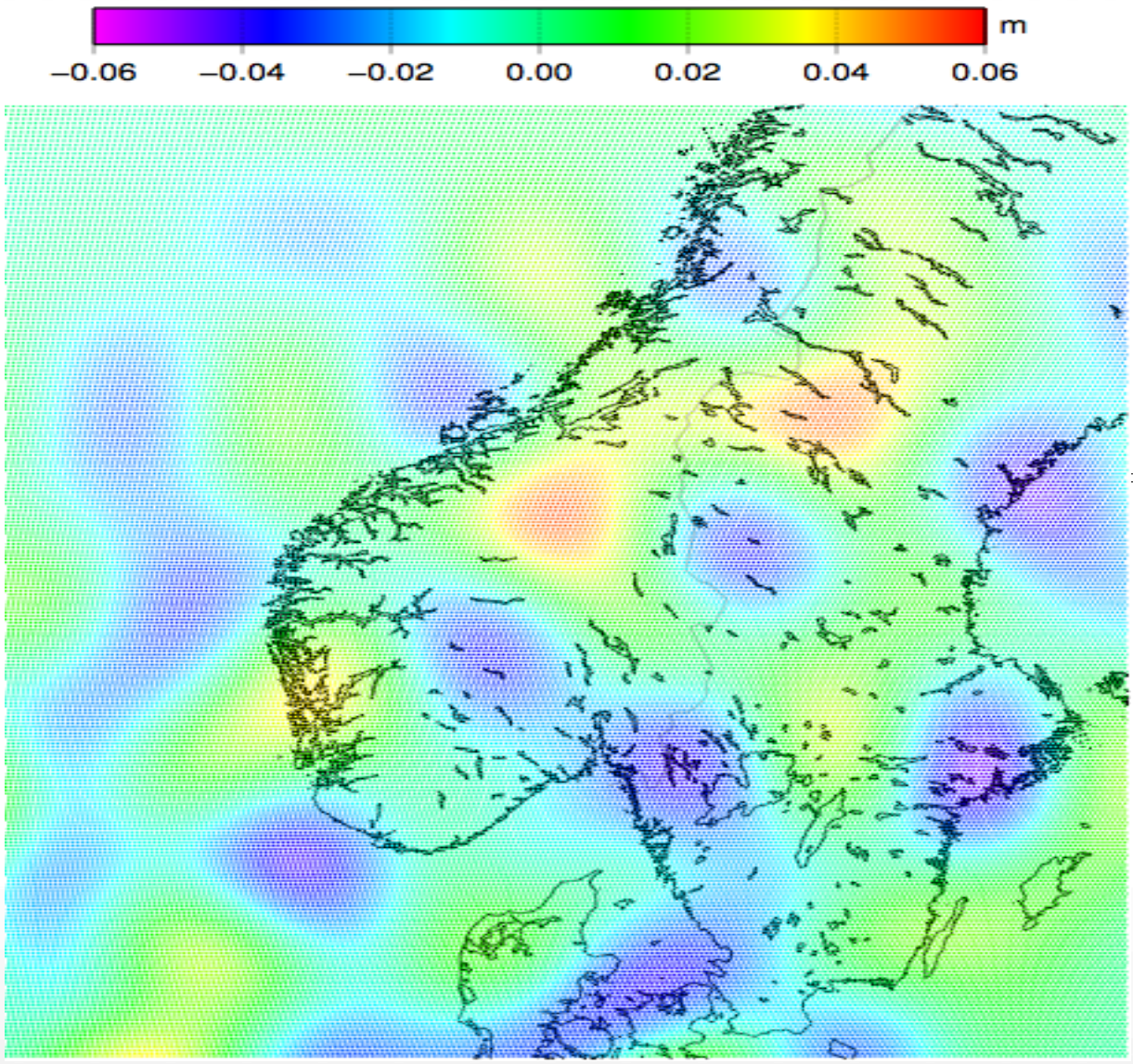
Accumulation of errors with distance



Quasigeoid: mascon adjustments



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Outlook

- Consolidate the whole data set
- Larger mascon region
- Methods: determination of regularization