

The German joint research project
**Concepts for future gravity
satellite missions**

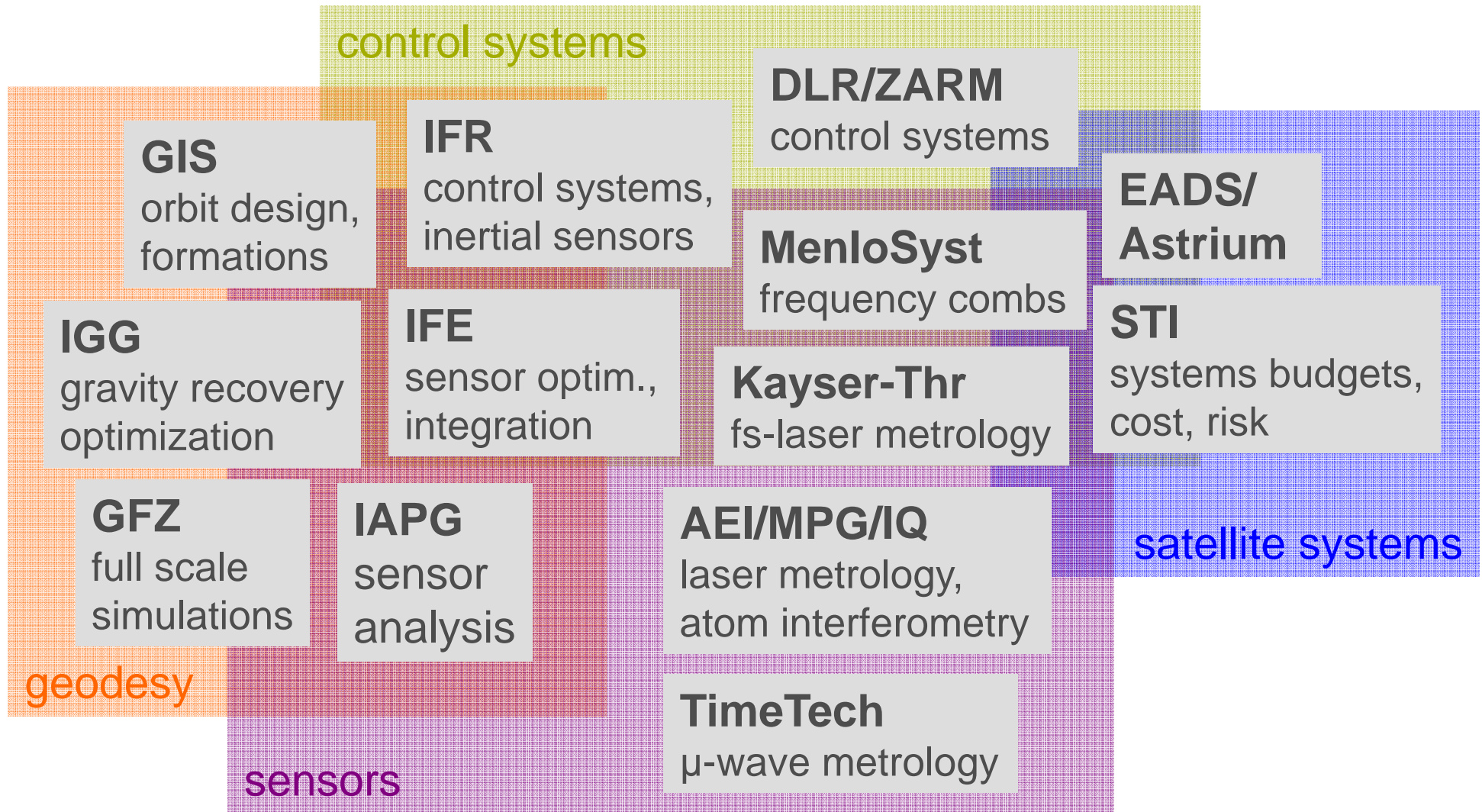
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Agenda

- Project structure
- Iterative activities
- Metrology comparison
- Full scale simulations
- Conclusions

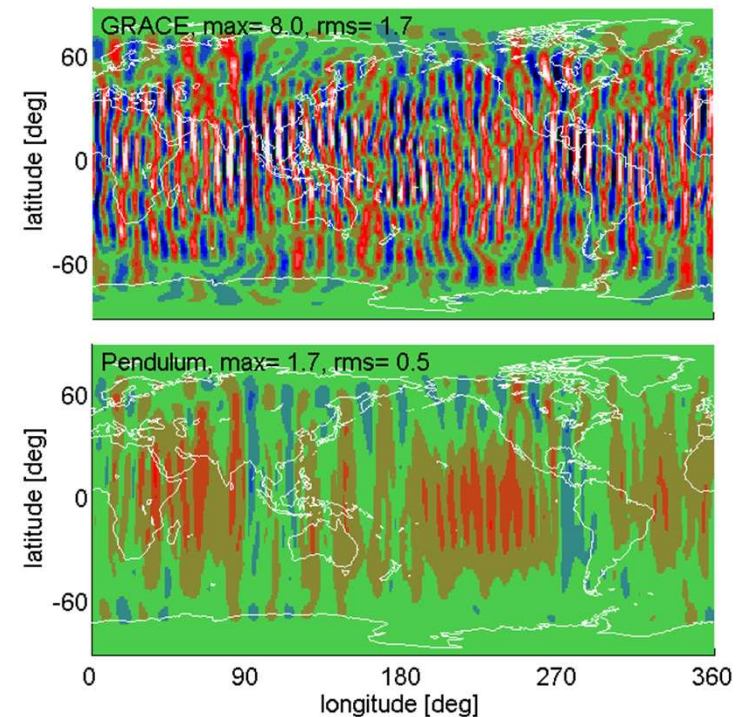
Project areas and participating teams



Geodetic goals

- Science requirements
→ resolution, sensitivity, duration
- Learning from GRACE

1. Observable
2. Sampling
3. Separation of sources



Iterative activities

- Mission option data sheets
- Sensitivity analyses
- Mission constraints
 - Relative velocity
 - Yaw/Pitch angle
 - Drag compensation

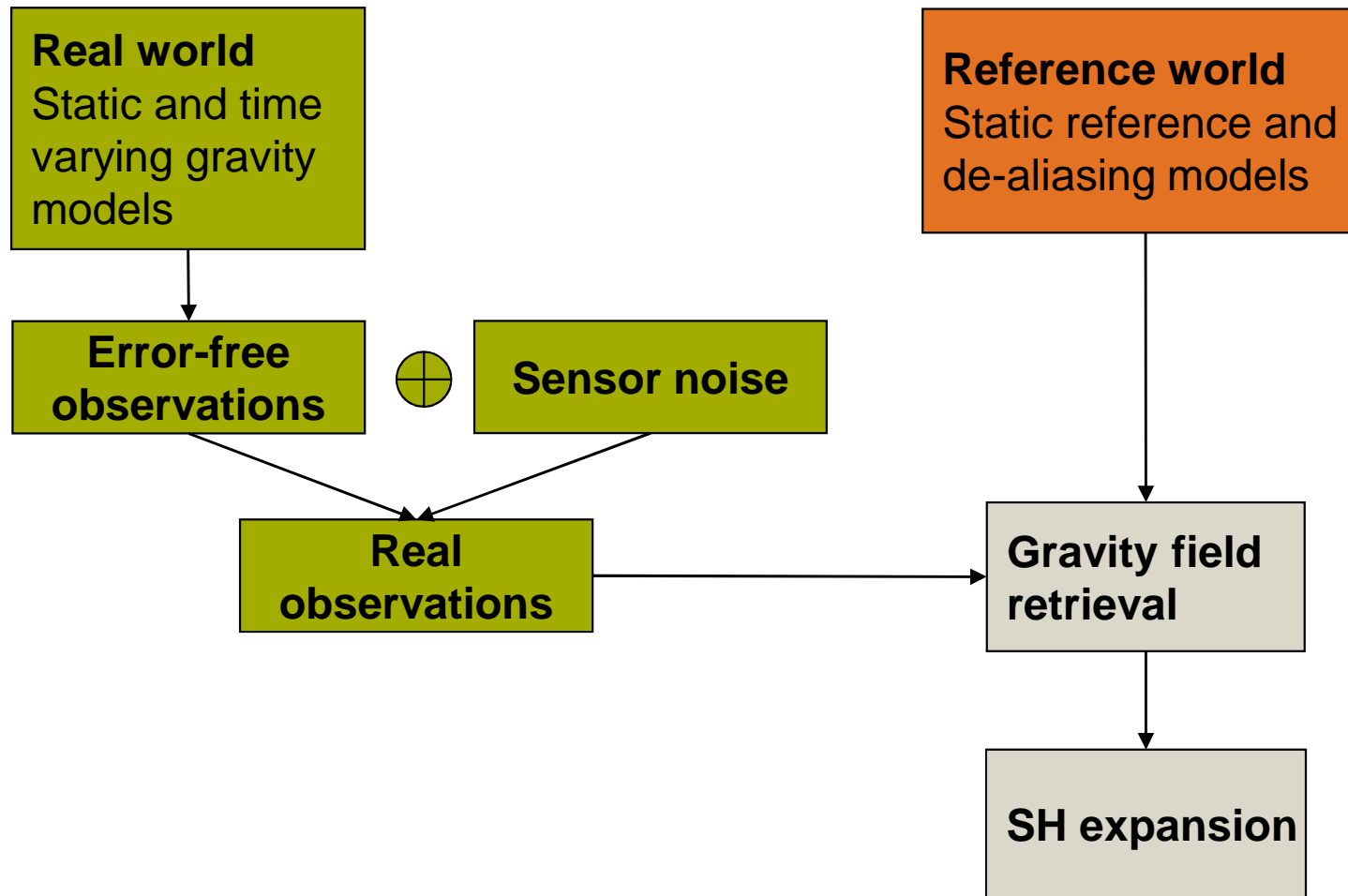
Metrology comparison

- Laser interferometer (AEI and partners)
- Heterodyne interferometer (STI)
- HAALDM with femto-second based laser (KT)
- Laser interferometer with dual comb (MS)

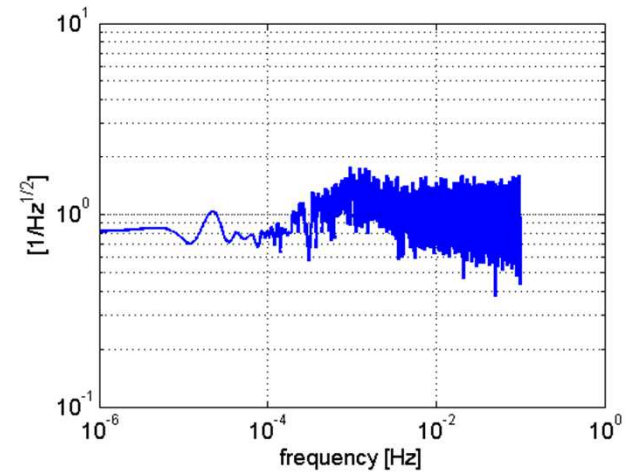
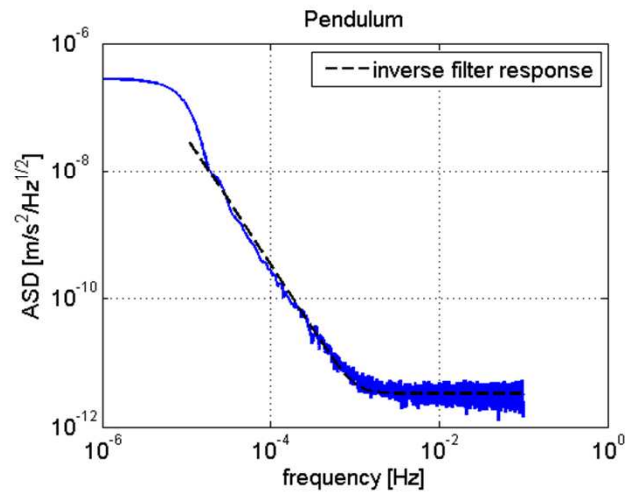
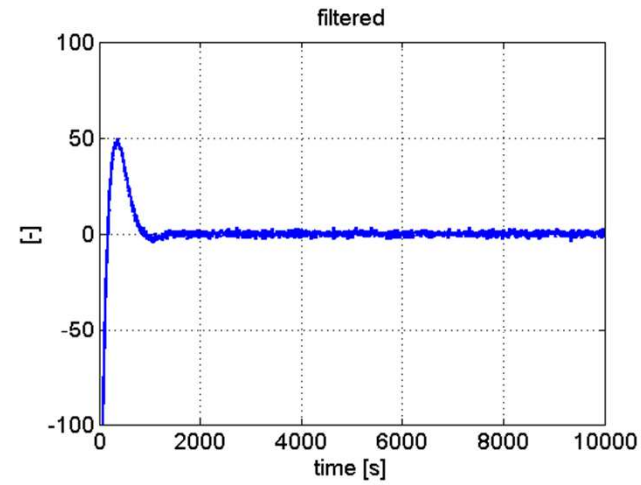
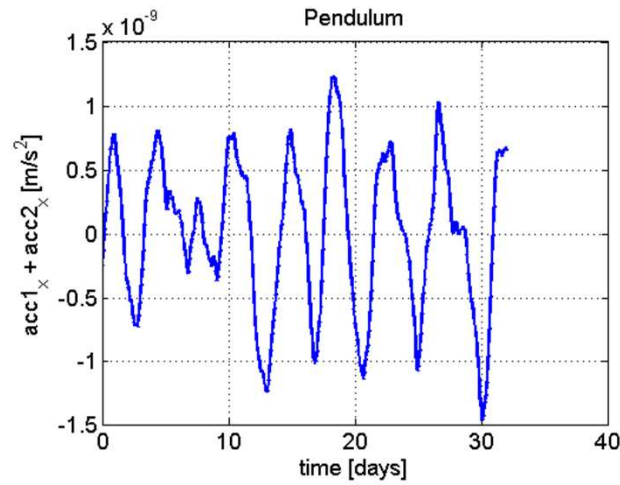
Metrology comparison

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- Range resolution: down to 10 nm
 - Optics with small apertures (few centimeters)
 - Range: up to 400 km - 500 km
 - Maximum relative velocity between S/C: about 10 m/s to 20 m/s

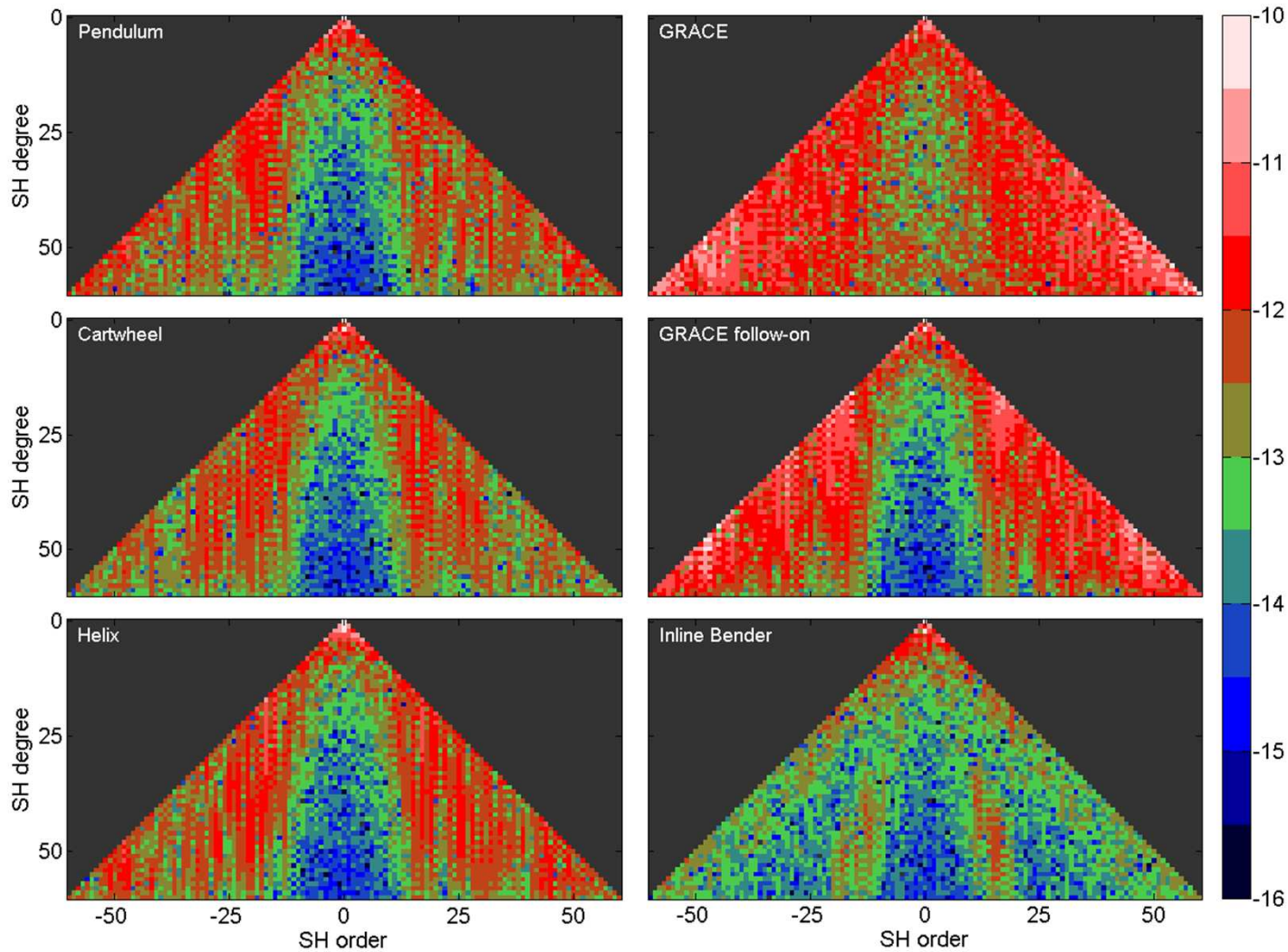
Full scale simulations



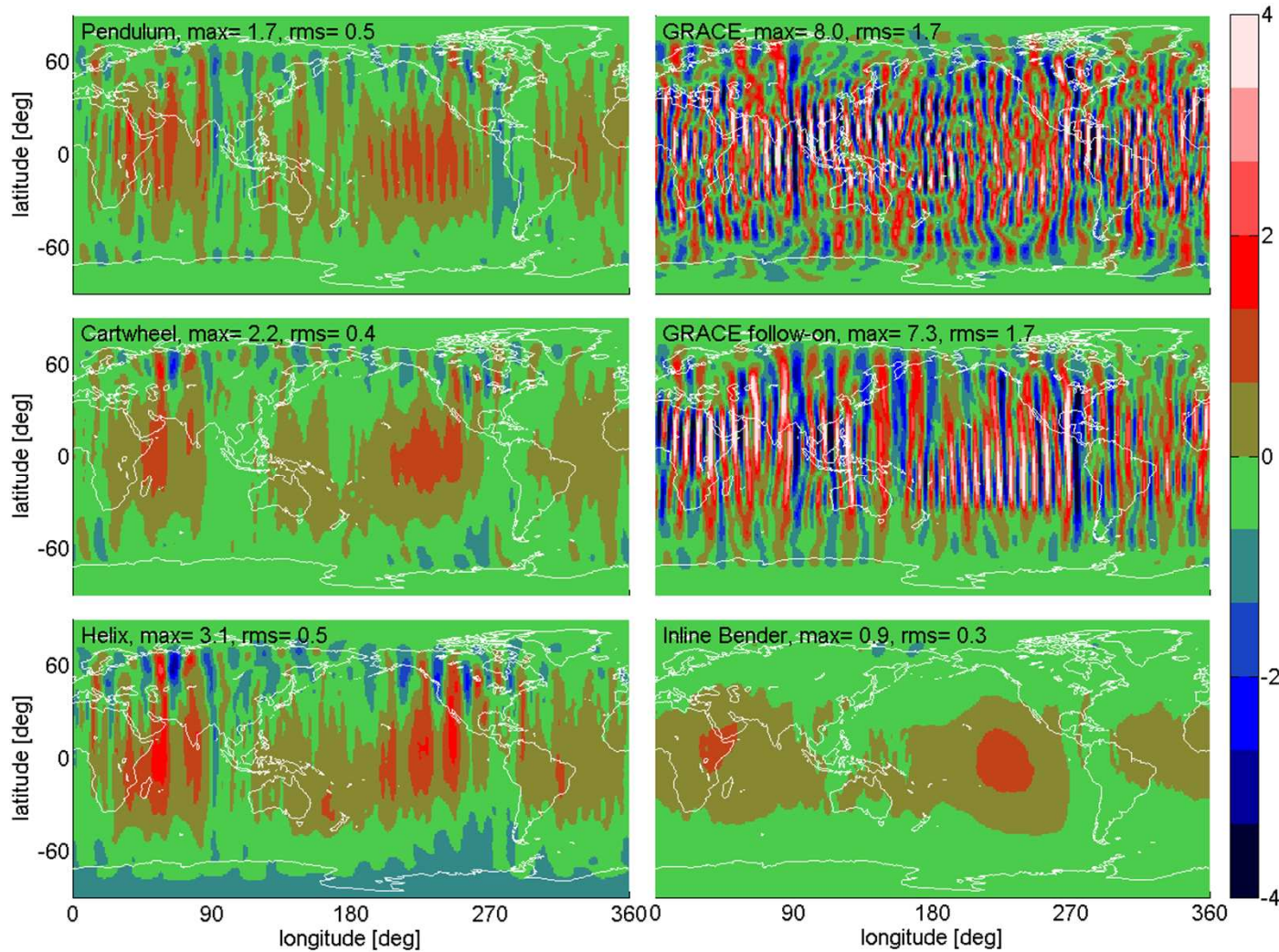
Accelerometer noise



Coefficient differences (\log_{10})



Geoid height differences [mm]



Conclusions & further steps

- Good communication inside the project
- Multitude of sensitivity studies
- Fine-tuning mission scenarios
- Definition of background model errors
- Full-scale closed-loop mission simulations