

# Combination of monthly gravity field solutions – transition from an EGSIEM prototype service into an IAG service

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Horizon2020

#### Contents

- EGSIEM Gravity Field Combination Service
- Individual Contributions
- Noise Assessment
- Combination on Normal Equation Level
- Transition to IAG service COST-G







### **EGSIEM Project – Three services are established**







### **Scientific Combination Service**









### **Scientific Combination Service**

- The EGSIEM combination service provides monthly GRACE K-band gravity fields combined on solution / normal equation (NEQ) Level.
- To ensure consistency, a set of common standards for reference frame, Earth rotation, force model and satellite geometry were defined.
- EGSIEM lately was extended to also include SLR and GPSonly NEQs.
  Why combine results based on the same observations?

Errors in GRACE monthly gravity fields are still dominated by analysis and background model noise, not observation noise => AC-specific errors are reduced by combination!





Degree Amplitudes of Anomalies 01/2006: orders 0 - 29 SH coefficients – model fit of secular/seasonal variations







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Why are formal errors so different?

Formal errors depend on the noise model applied!







#### **Noise Assessment**











#### **Noise Assessment**









#### **Noise Assessment**





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### Variance component estimation on solution level



Variance component estimation on solution level taking into account all SH coefficients up to degree and order 80 with equal weight.



RMS of anomalies restricted to ocean areas as quality criterion.





### **Combination on Normal Equation Level**





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### Combination: 2006/01







### Combination: 2006/01







# Combination: 2006/01







### **Combination results**





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### L3-Products: <u>www.egsiem.eu</u> -> Data -> EGSIEM-Plotter







## **Transition to IAG service COST-G**

- EGSIEM Scientific Combinatin Service is ready for transition into IAG service COST-G.
- Noise assessment by variance component estimation on solution level.
- Relative weigths based on noise levels.
- The EGSIEM combination service provides two test years (2006 + 2007):
  - SH-coefficients (Level-2): <u>www.icgem.de</u>
  - grids and de-aliasing (Level-3): www.egsiem.eu



