EGSIEM

European Gravity Service for Improved Emergency Management

Simulated recovery of various hydrological signals using real GRACE data at CNES

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HORIZON 2020

Principle of the simulation

- Starting from a monthly GRACE solution (May 2013): **Pot_A**

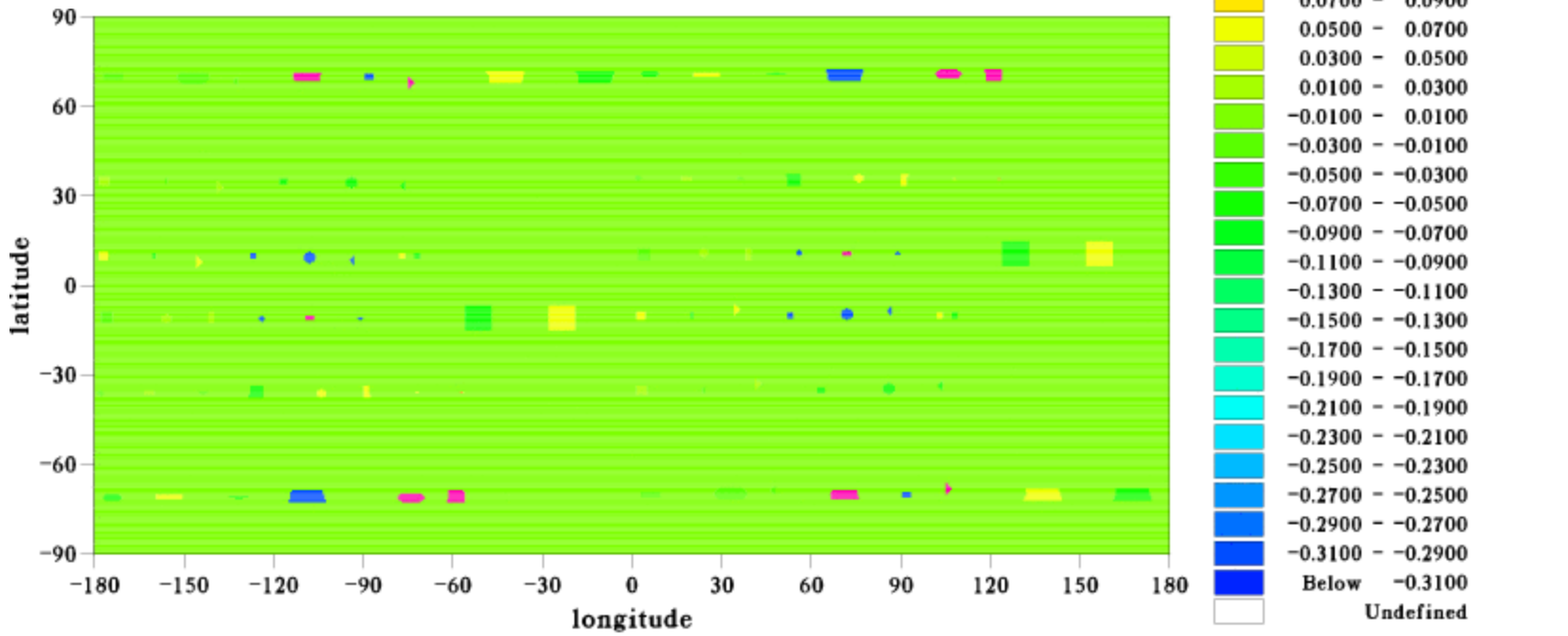
- Re-computing the normal equations using Pot_A and real GRACE data, solving using the same algorithm as for Pot_A → **Pot_B** = very similar to Pot_A

- Re-computing the normal equations using a ***perturbed*** version of Pot_A and real GRACE data, solving using the same algorithm as for Pot_A → **Pot_C**

Ideally Pot_C should be as close as possible to Pot_B. The differences will reveal the sensitivity of the solutions to the a priori gravity field.

Perturbed **GRID**

- 34 squares, 18 circles, 18 rectangles, 18 triangles with sizes ranging from 250 to 1000 km and amplitudes ranging from 1 to 30 cm EWH



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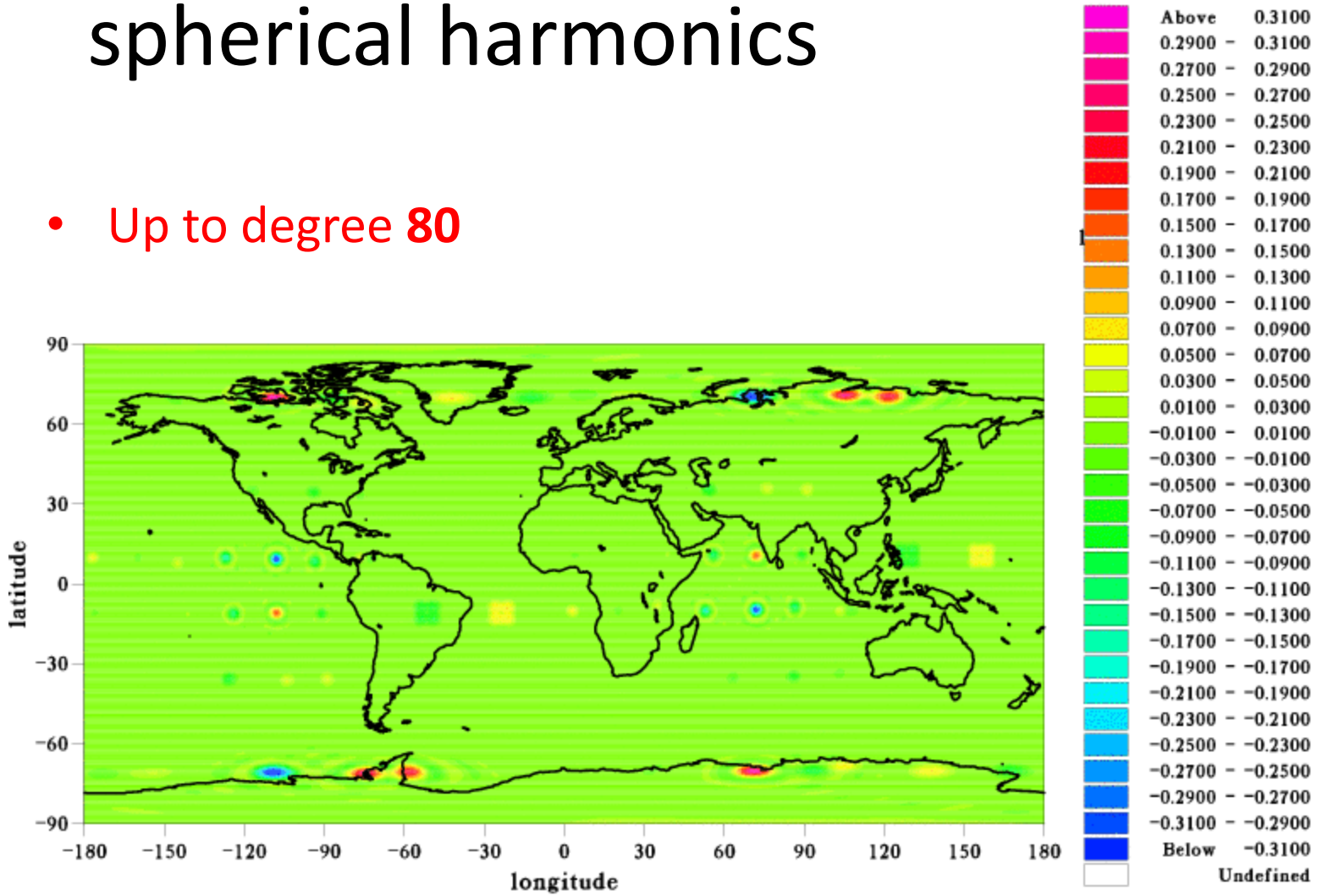
After conversion in spherical harmonics

- Up to degree **80**



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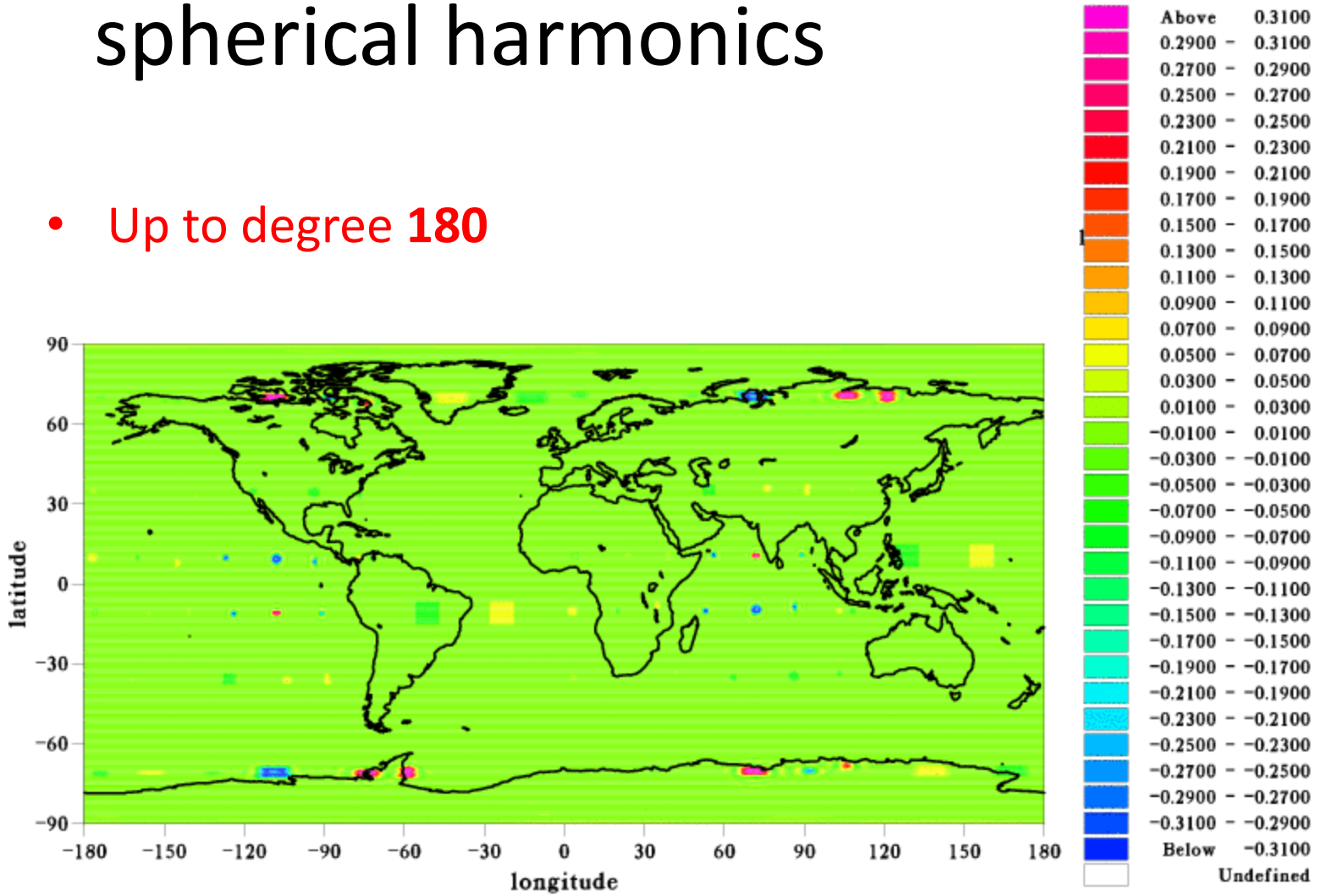
After conversion in spherical harmonics

- Up to degree **180**



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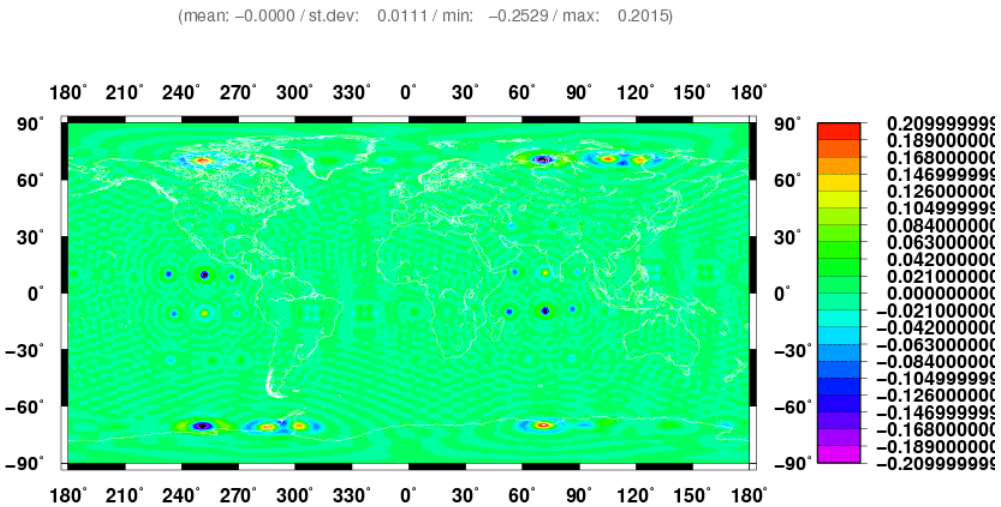
Simulations

- **A priori gravity field...** 2 cases:
  - 1) Pot_A perturbed to degree 80
  - 2) Pot_A perturbed to degree 180

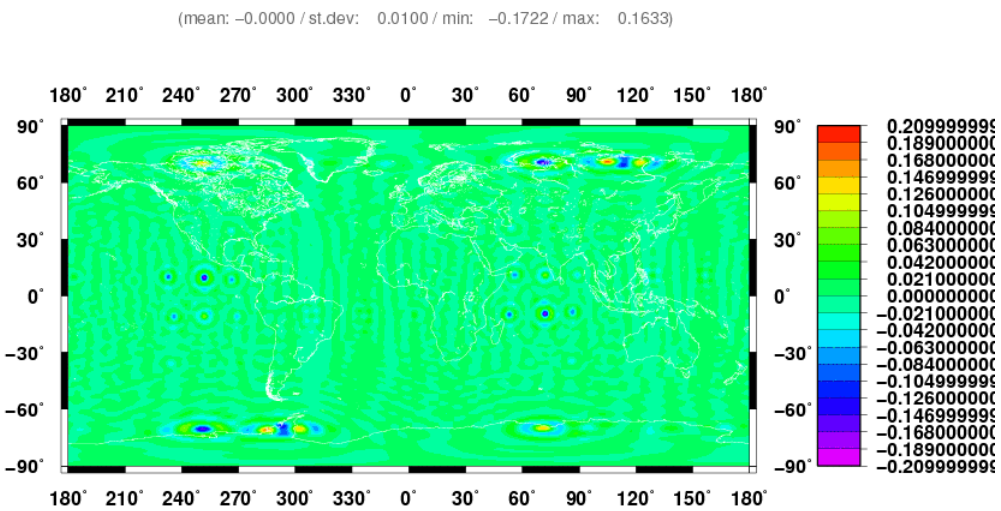
- **Solutions...** 3 cases:
  - 1) Unconstrained Choleski solution + a posteriory DDK-5 filtering
  - 2) Constrained Choleski solution
  - 3) Truncated SVD solution

First results

Constrained Choleski:
Min/Max = -0.25/+0.20



TSVD:
Min/Max = -0.17/+0.16



Summary

- On-going process

- When simulations are completed, we need to interpret the results in terms of:
  - Shape, size and orientation of the test basins
  - Amplitude of the perturbations
  - Location on Earth (Latitude)
  - Choice of the processing strategy