Gravity field coefficients from SLR data

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Procedure (1)


Starlette · 10x · 1-day NEQ

Stella · 10x · 1-day NEQ

Ajisai · 10x · 1-day NEQ

LAGEOS-1/2 · 1x · 10-day NEQ

10-day NEQ with stacked parameters

30-day NEQ

with stacked parameters:

gravity field
station coordinates
ERPs
geocenter
range biases

monthly gravity field
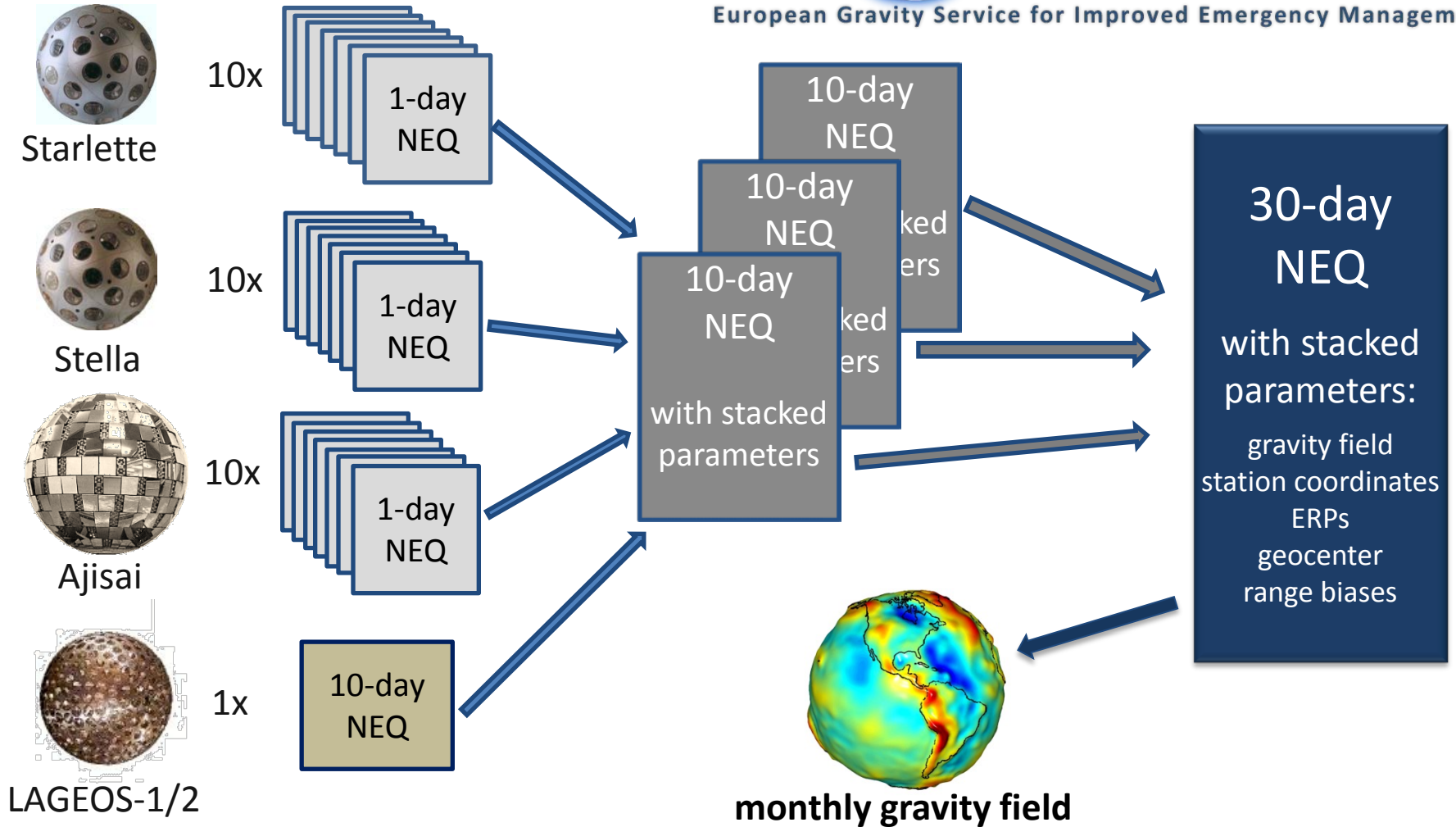
Procedure (2)

Reference frame	SLRF2008
A priori gravity field model	AIUB-GRACE03 (up to d/o 30 for LAGEOS, up to d/o 90 for LEOs)
Ocean tide model	EOT11a (up to d/o 30)
AOD applied at observation level	RL05
Atmospheric drag model (LEOs)	NRLMSISE-00
Albedo	monthly reflectivity coefficients in a 2.5 x 2.5 degree grid (CERES mission)
…	…
Weighting of satellite-specific NEQs	LAGEOS: 8mm Ajisai: 25mm Starlette/Stella: 20mm

Procedure (3)

European Gravity Service for Improved Emergency Management

|		SLR solutions
Estimated parameters		LAGEOS-1/2, Starlette, Stella, Ajisai (LEOs)
Orbits	Osculating elements	a, e, i, Ω, ω, u_0 (LAGEOS: 1 set per 10 days, LEOs: 1 set per day)
	Dynamical parameters	LAGEOS: const. and 1/rev along track (1 set per 10 days) LEOs: const. and 1/rev along track, 1/rev cross track (daily)
	Pseudo-stochastic pulses	LAGEOS: none LEOs: 1/rev in along track
Earth rotation parameters		X_P, Y_P, UT1-UTC (piecewise linear, 1 set per day)
Geocenter coordinates		1 set per 30 days
Earth gravity field		up to d/o 6 (1 set per 30 days)
Station coordinates		1 set per 30 days
Range biases		LAGEOS: for selected stations (1 set per 30 days) LEOs: for all stations (1 set per 30 days)

Results (EGU)
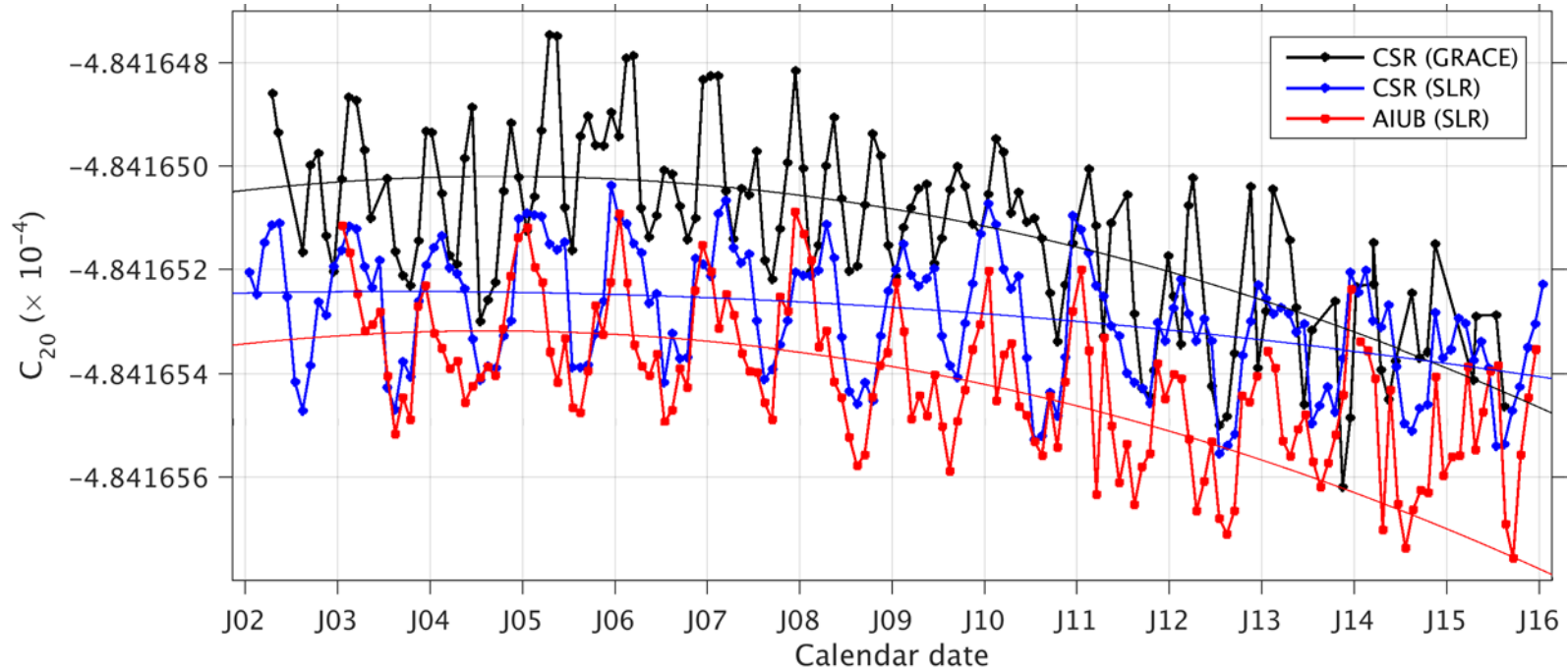
→ 1. bias of ~1.e-10 between our solution and CSR

2. the long-term trend of our solution is similar to the GRACE-based solution of CSR but not to the SLR-based solution of CSR

Latest results

- the estimated number of gravity field coefficients was reduced from degree and order (d/o) 6 to d/o 3

- a LAGEOS-only solution was set up
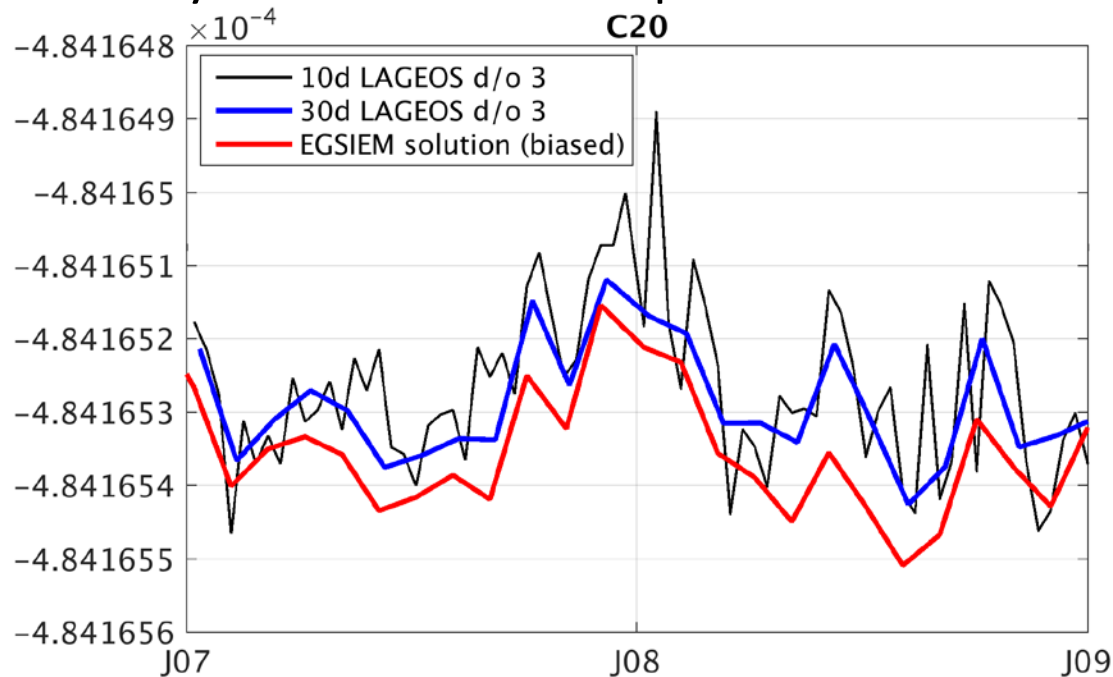
Next steps

- combine LAGEOS with LEOs
- find the issue that is responsible for the bias between the biased EGSIEM solution (LAGEOS+LEOs) and the new unbiased LAGEOS-only solution
- find the reason for the differernt long-term behaviour of C20 computed at AIUB and CSR