Galileo Terrestrial Reference Frame (GTRF) - Status update
GRTF is provided under a contract with Spaceopal

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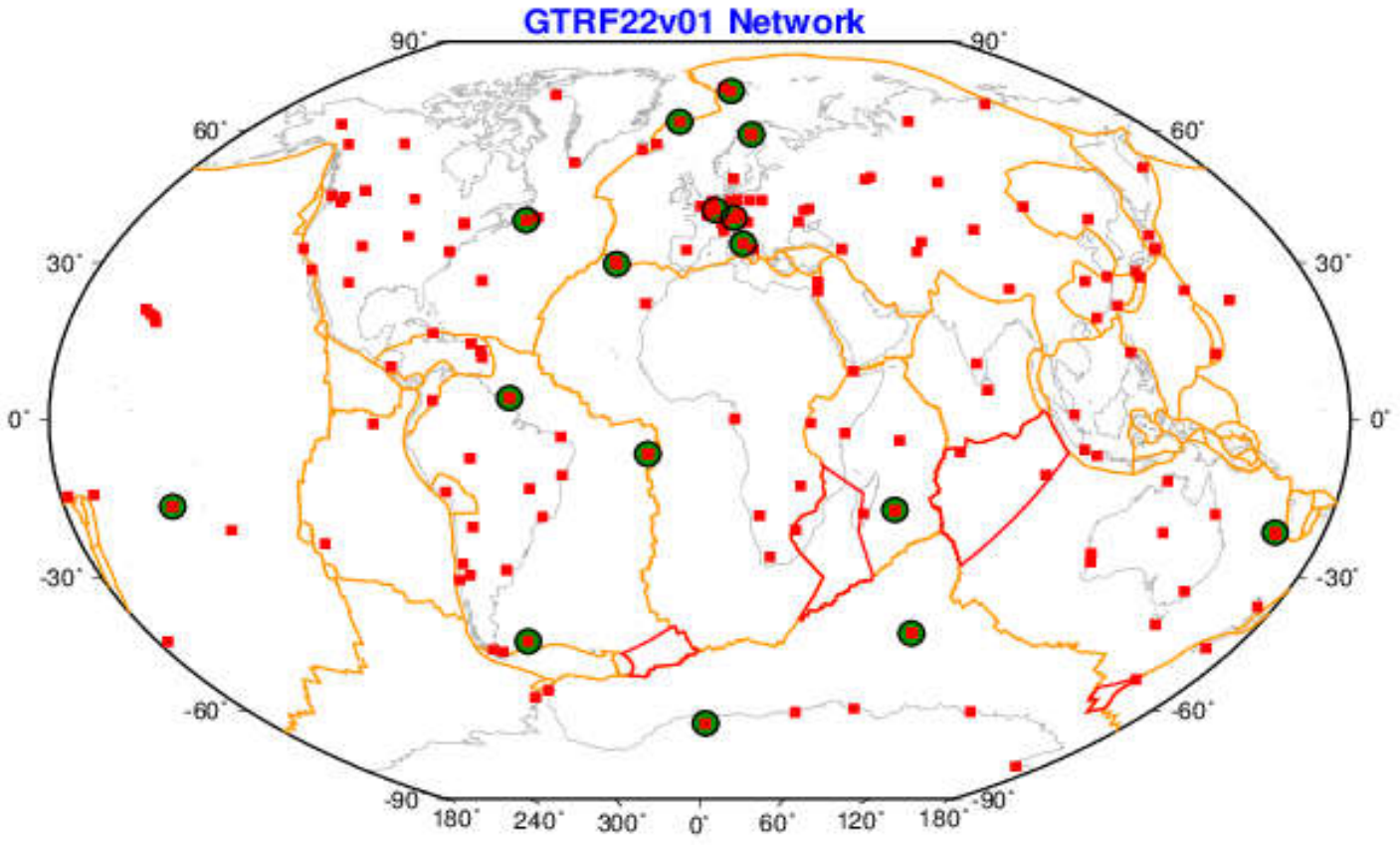
GTRF Generation - Latest realization: GTRF22v01

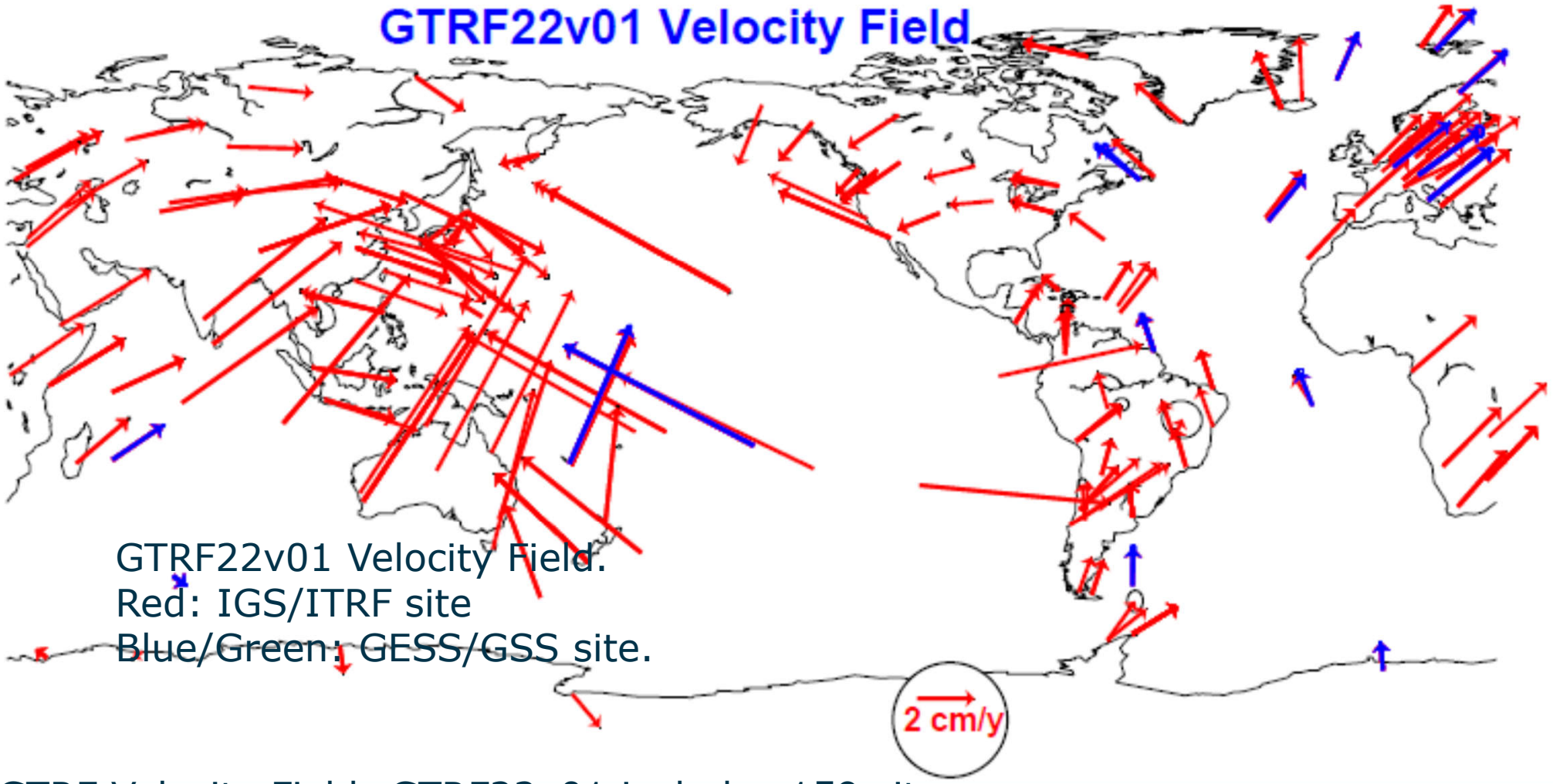
- The GTRF22v01 was obtained by accumulating (rigorously stacking) all the weekly GTRF combined solutions since 2006 (598 weeks spanning 15 years)
- GTRF22v01 is aligned to ITRF2014 (through IGS14) using the minimum constrains approach over a set of 49 IGS/ITRF sites
  - 32 in the northern and 17 in the southern hemisphere
- The GTRF22v01 combination process makes use of:
  1. annual and semi-annual signals present in the station position time series were estimated during the stacking, and
  2. Post Deformation (PSD) parametric models were applied to the coordinates of IGS stations that are subject to major earthquakes before stacking the time series.

Tracking Network for the GTRF – All stations



Latest GTRF Realisation: GTRF22v01 includes 159 sites
Red squares: ITRF/IGS stations including 49 reference frame sites
Green/blue: GSS/GESS sites

GTRF Velocity Field



GTRF22v01 Velocity Field.
Red: IGS/ITRF site
Blue/Green: GESS/GSS site.

GTRF Velocity Field: GTRF22v01 includes 159 sites
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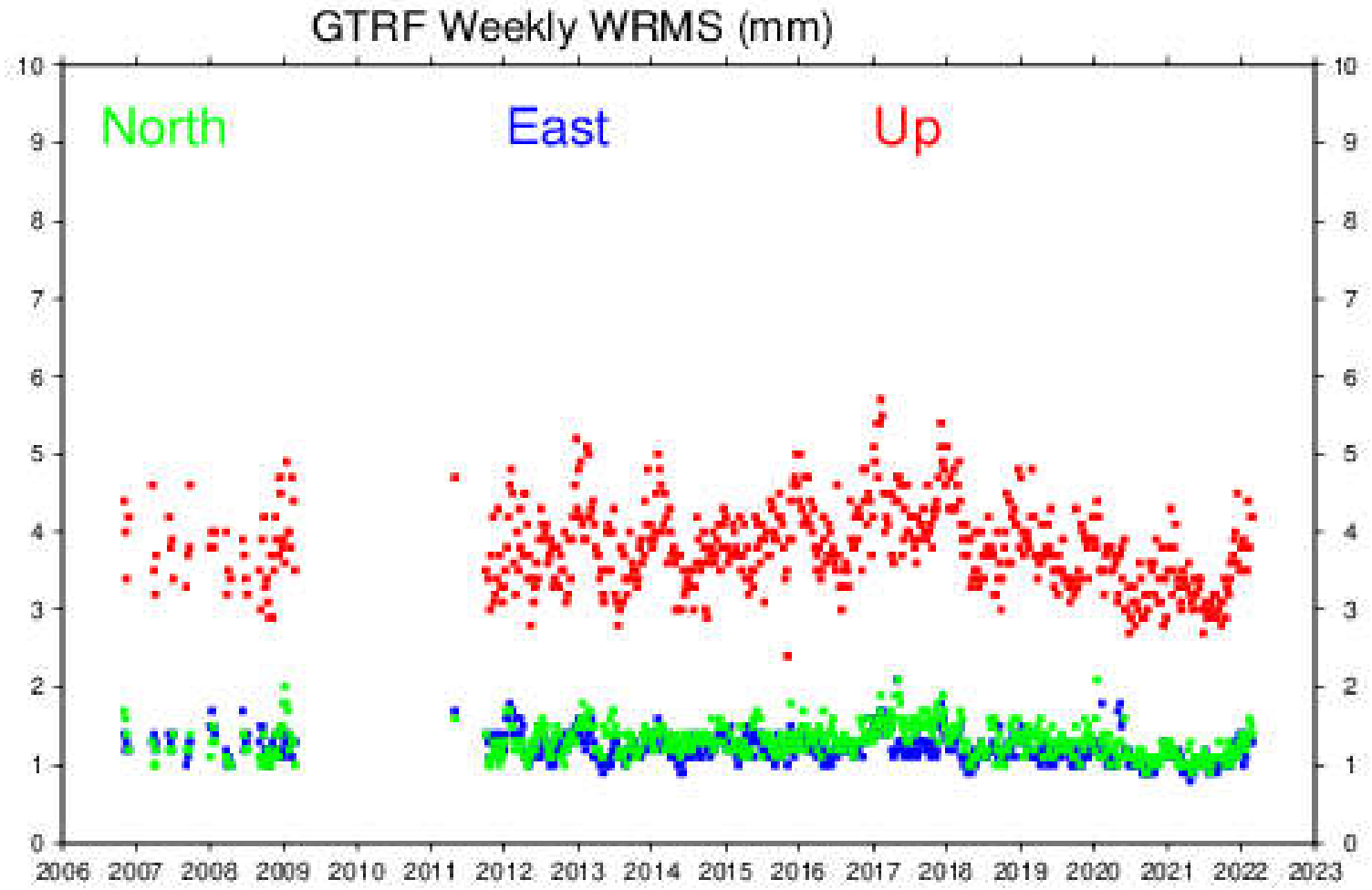
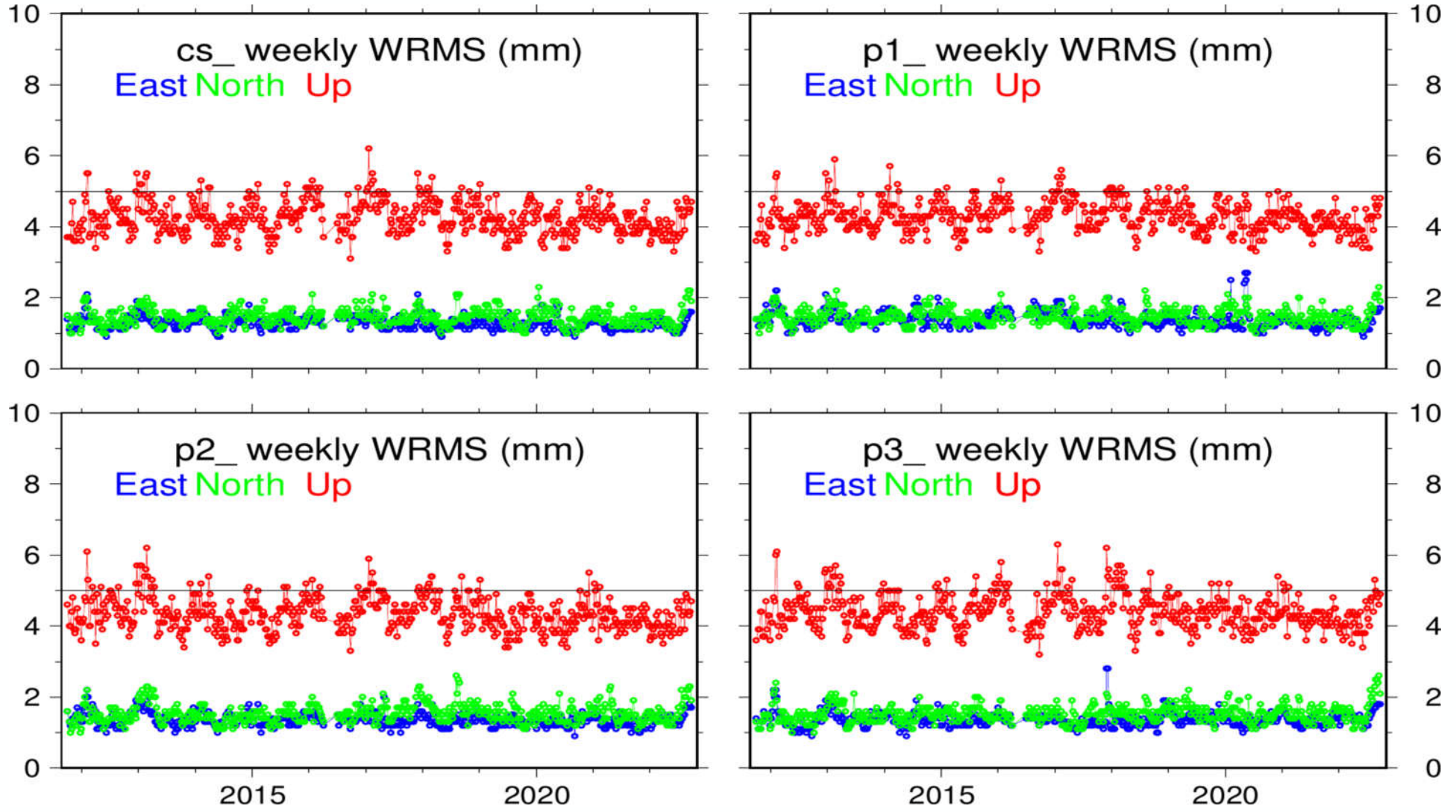
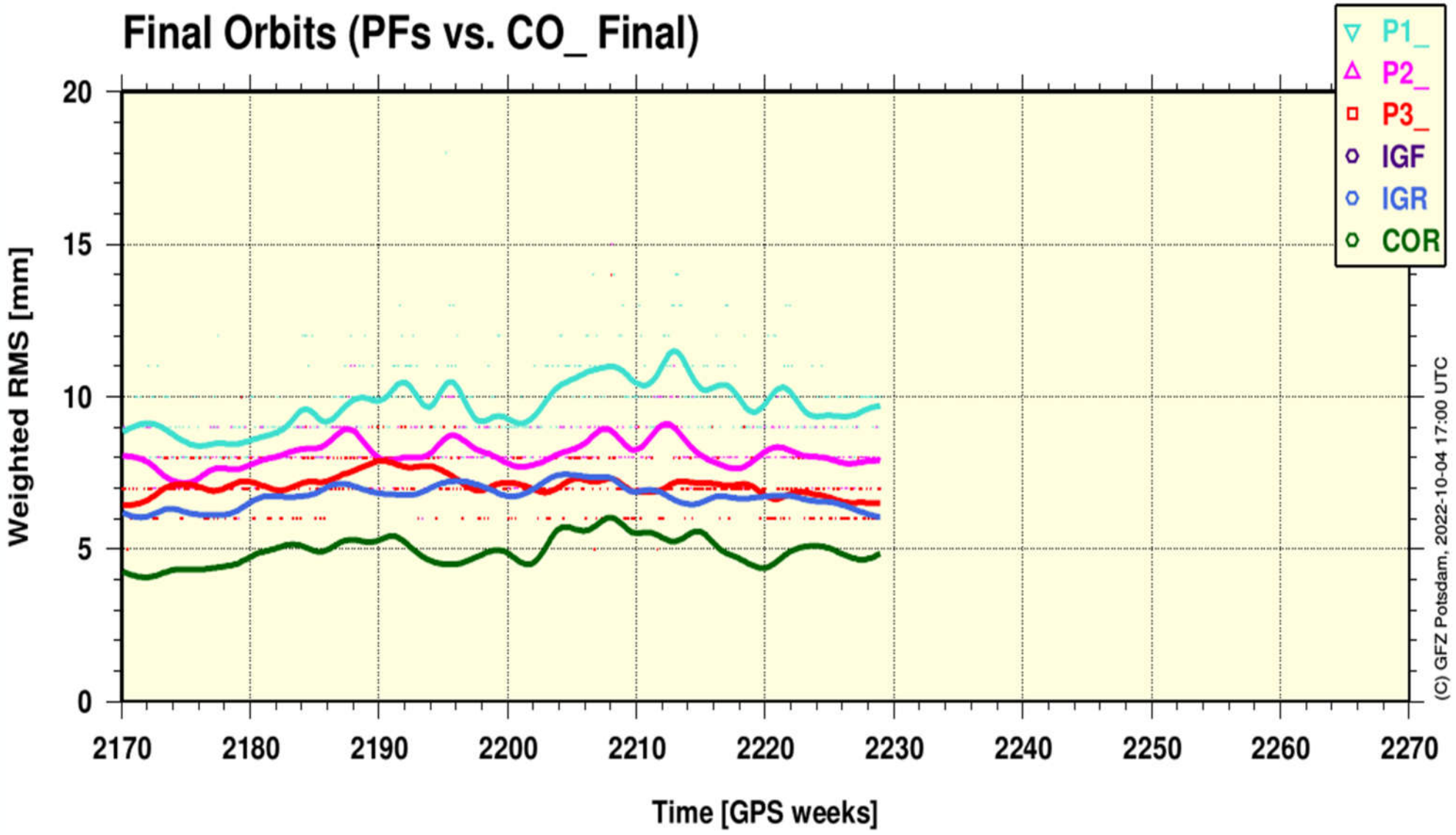
GTRF Weekly Weighted RMS



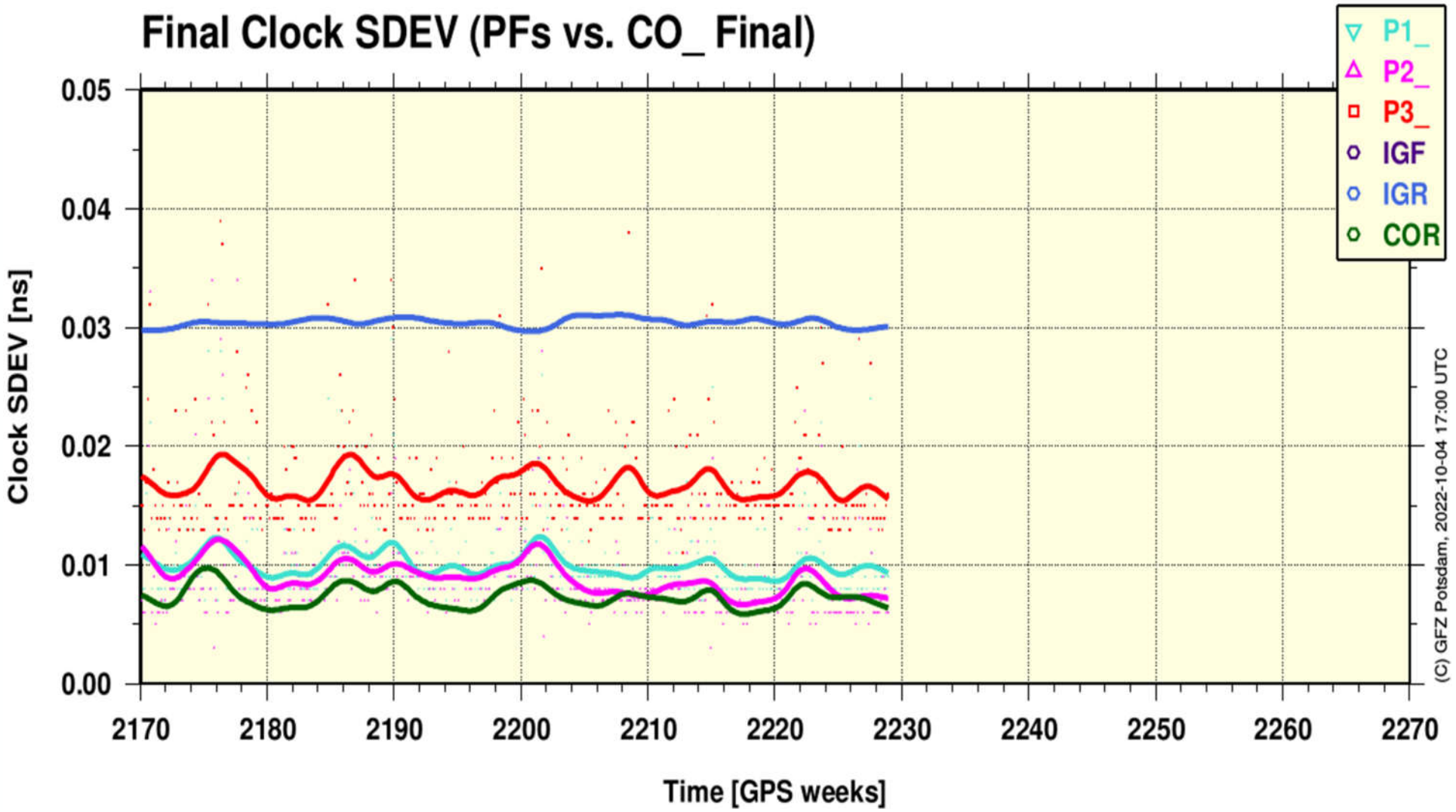
Weekly station coordinate WRMS for the PF's and the combined solution (CS)



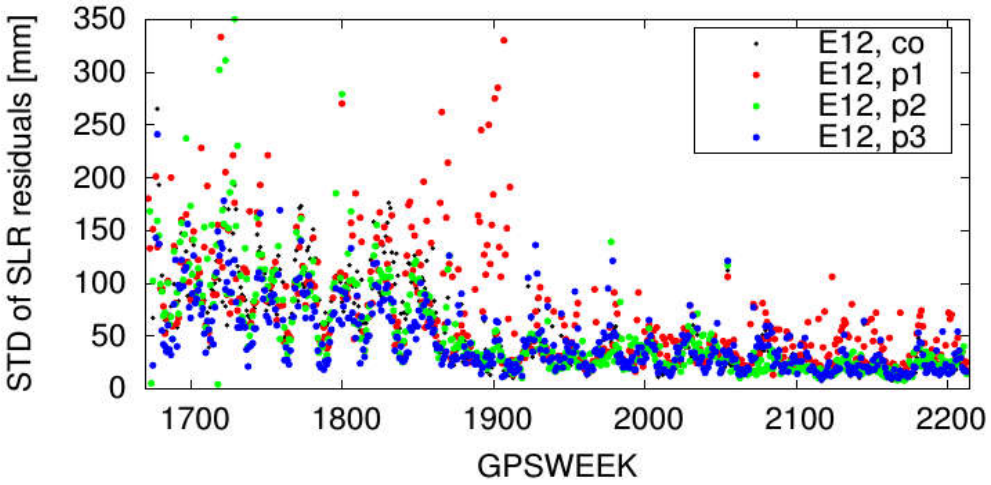
Orbit Combination

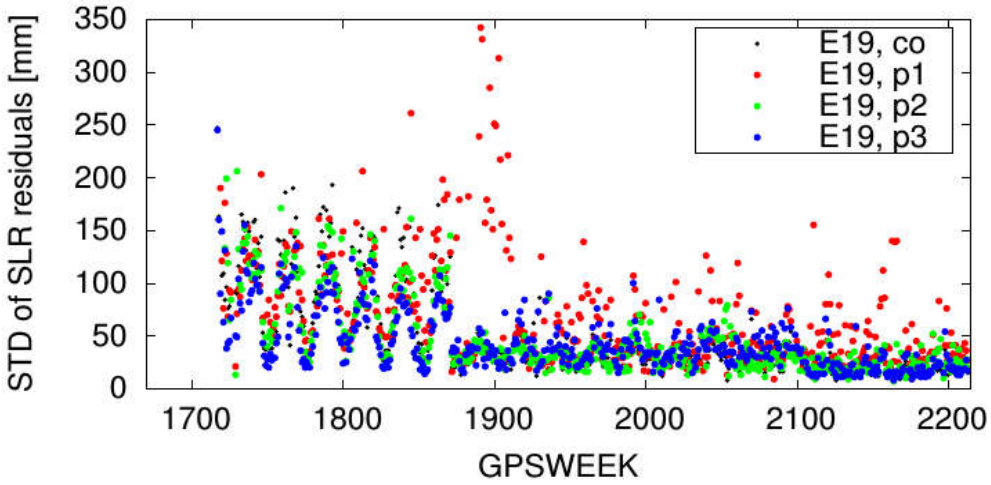


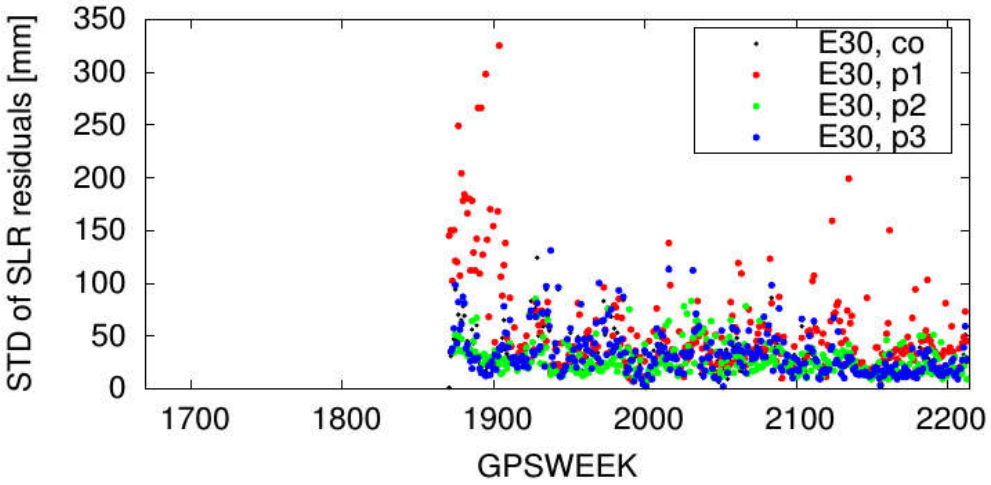
Clock Combination

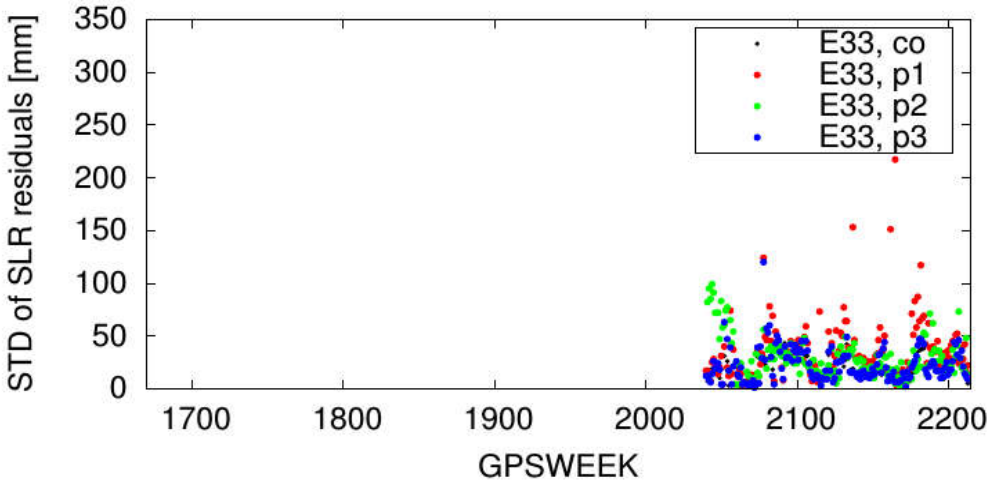


SLR Residuals - Standard deviation









The SLR residuals are confirming the overall orbit accuracy (3D – 1 Sigma) of 10 – 20 cm

Notice improvement thanks to improved modelling starting week 1873

Validation

- Validation is carried out on a weekly basis when the last reference product is available (in general, the IGS troposphere solution)
- Validation result is a weekly summary file (vf_wwww7.sum)
- High quality, demonstrated by the RMS of Helmert-transformation (see table below) of the weekly solution vs different RFs

		#sites	North [mm]	East [mm]	Up [mm]
IGS14	RMS / COMPONENT	80	2.73	2.59	5.86
IGS22P37	RMS / COMPONENT	121	2.41	2.59	5.64
GTRF22v01	RMS / COMPONENT	180	2.73	1.91	5.11

Conclusions

- GTRF is a state of the art realisation of the ITRS for Galileo
- GTRF is rigorously aligned to ITRF2014
  - No scale offset nor rotation w.r.t. ITRF2014
- GTRF updated on a yearly basis considering the latest plate tectonics
- GTRF has the same high accuracy as the ITRF
  - But more frequently updated!