

Comparison of the Current EPN Reference Frame Solution (C2220) with ITRF2020/IGS20

J. Legrand, Reference Frame Coordinator
Royal Observatory of Belgium

Contact: Juliette.Legrand@oma.be

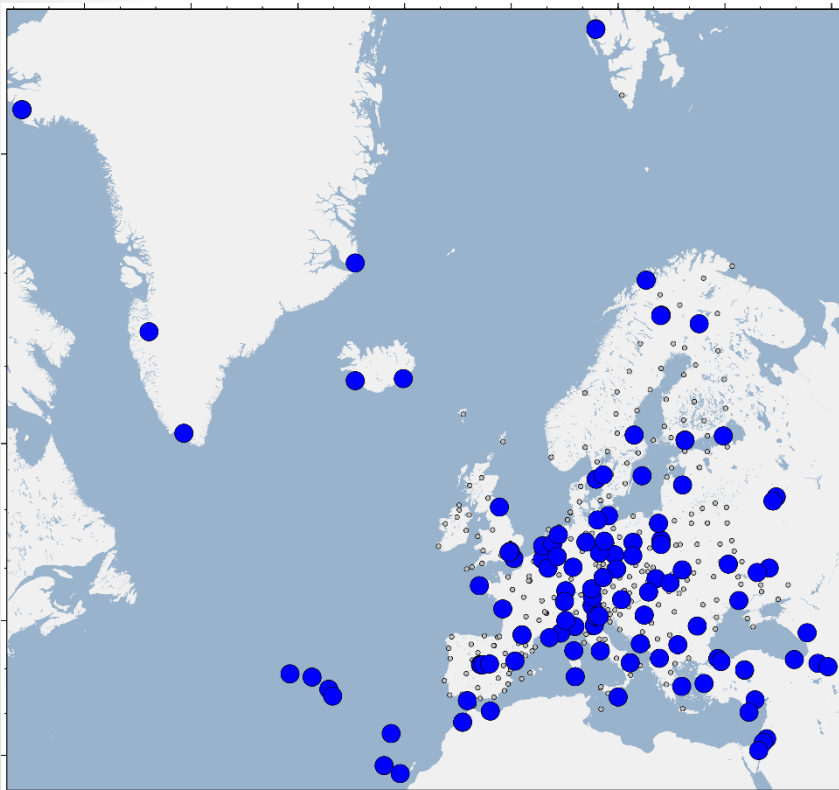
- Networks
- Stations with Post Seismic Deformation Models
- Position and Velocity Discontinuities
- Position and Velocity Differences
- Conclusion

Networks

EPN Stations in IGS Network, ITRF2020 and IGS20

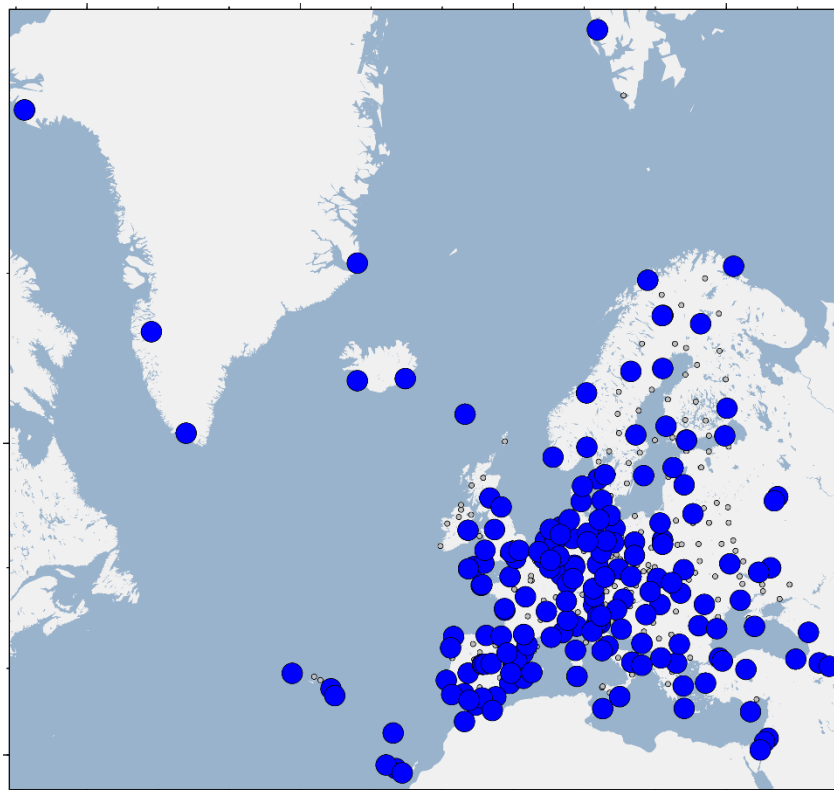
EPN Stations with a site log in IGS

144 Stations



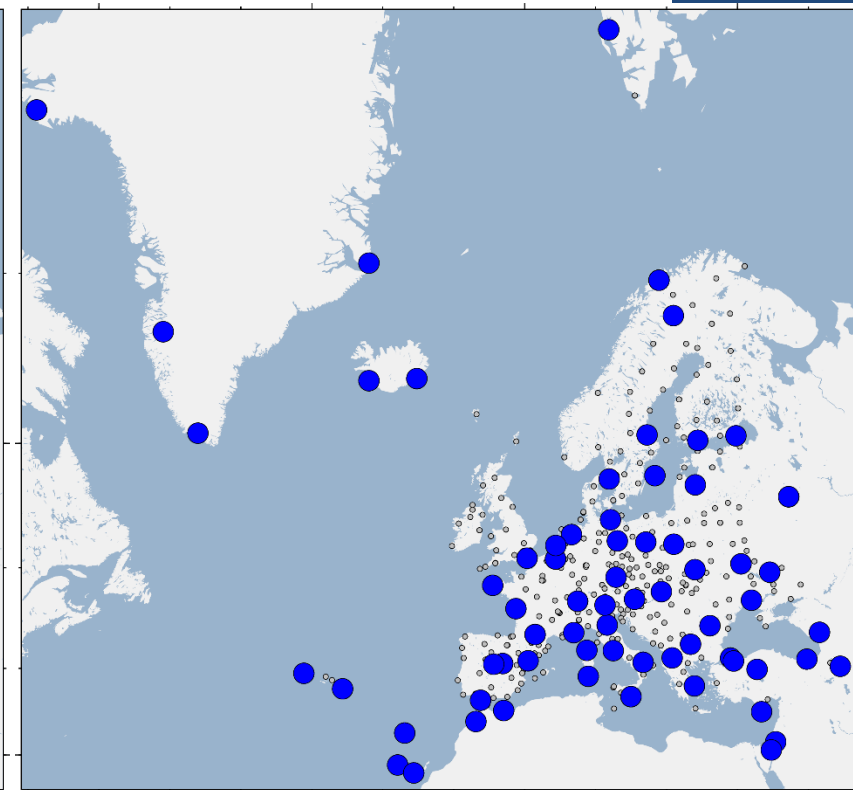
EPN Stations in ITRF2020
based on IGS Repro 3

209 Stations



EPN Stations in IGS20

74 Stations

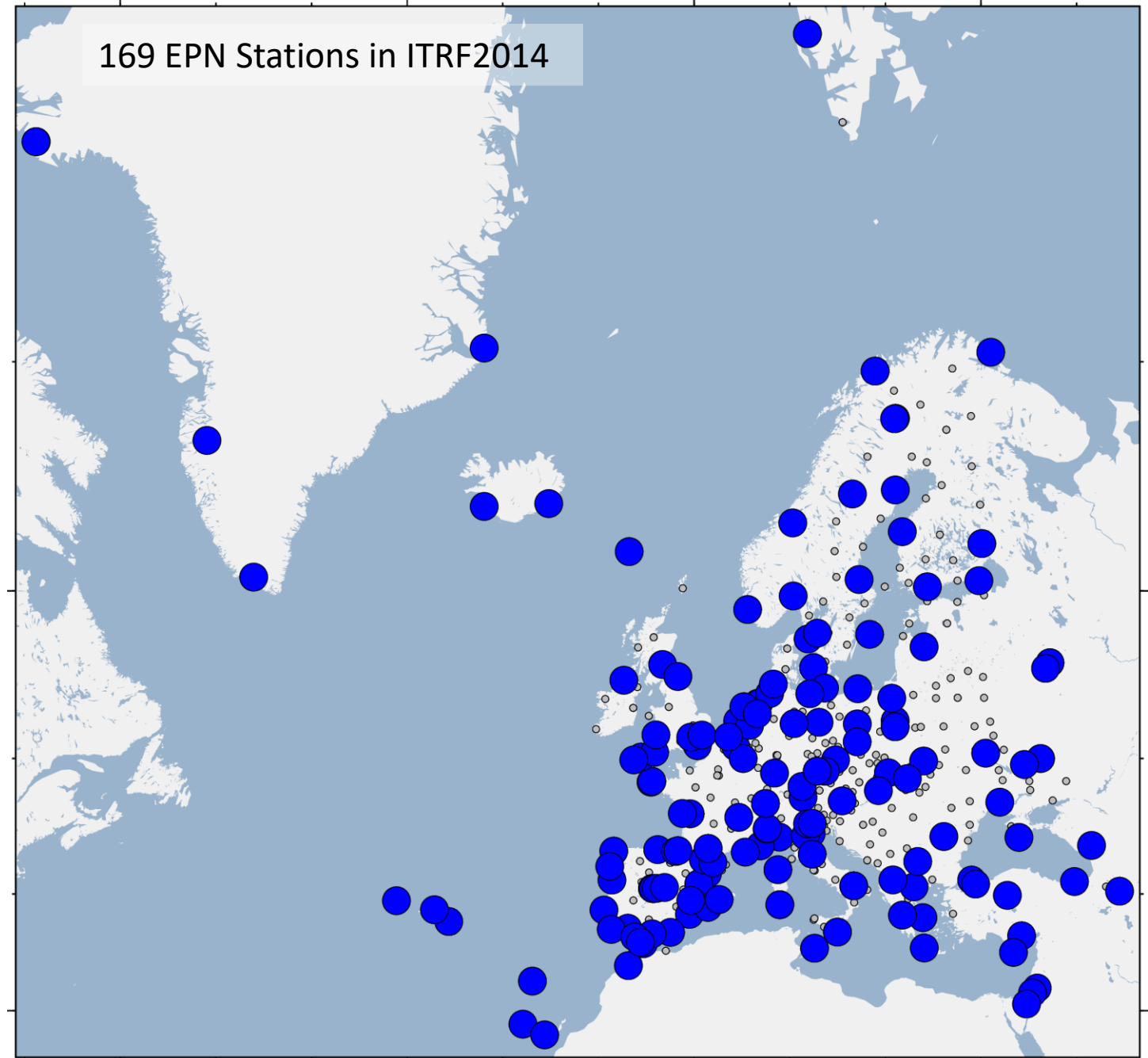


Networks

ITRF2014/ITRF2020

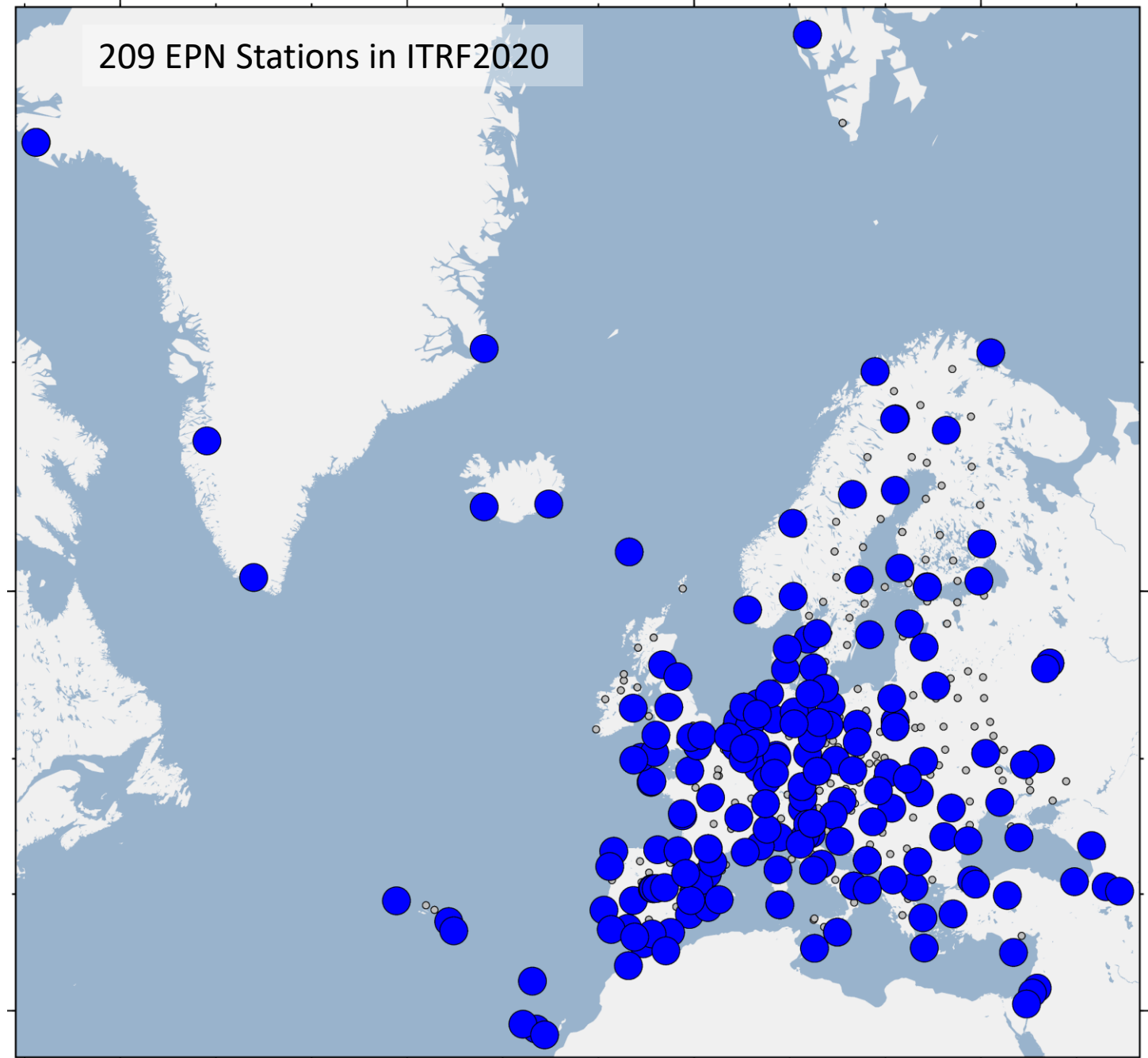
ITRF2014/ITRF2020

- EPN Stations in ITRF2014: 169



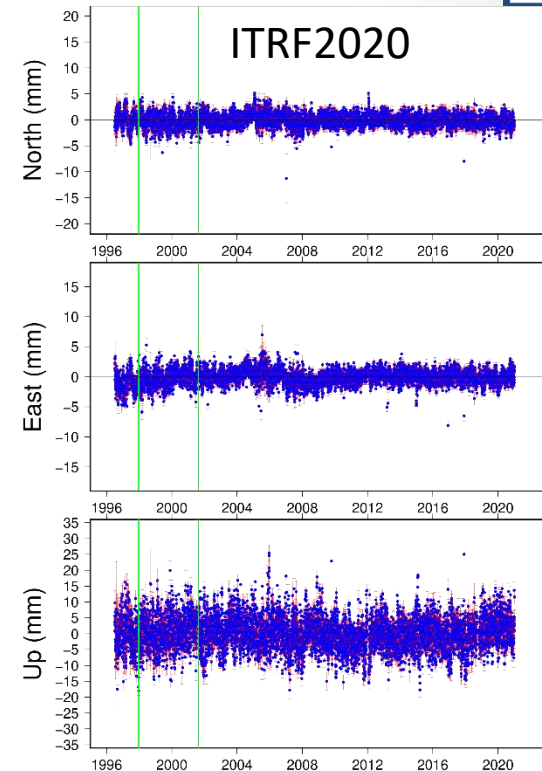
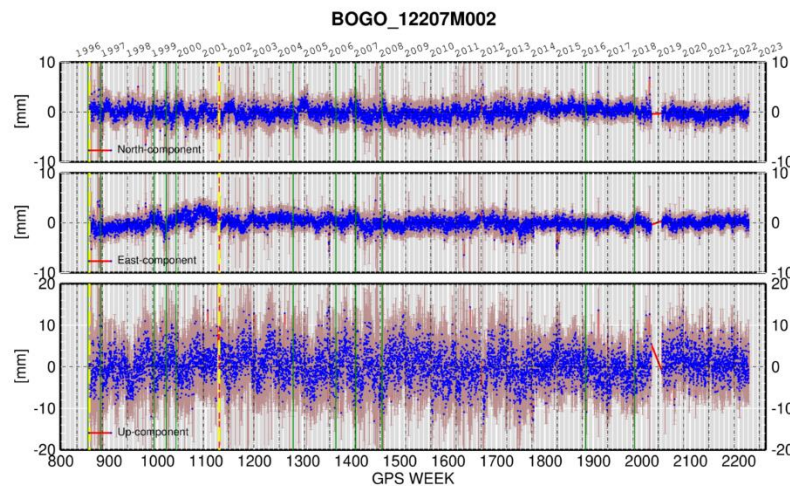
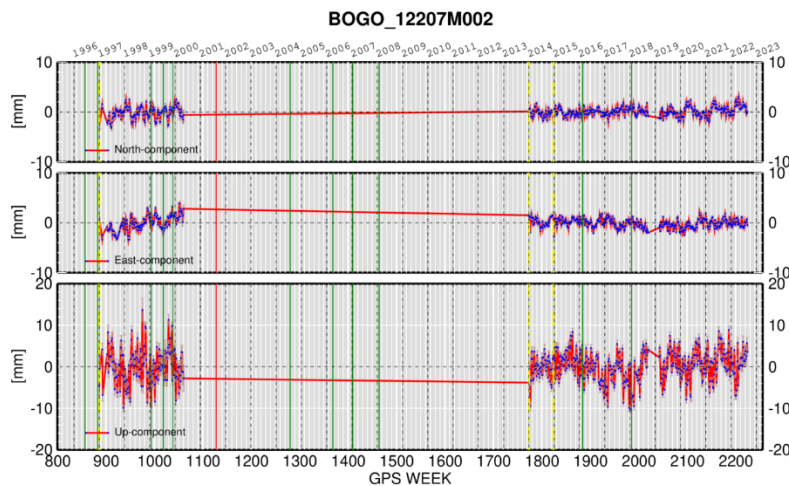
ITRF2014/ITRF2020

- EPN Stations in ITRF2014: 169
- EPN Stations in ITRF2020: 209

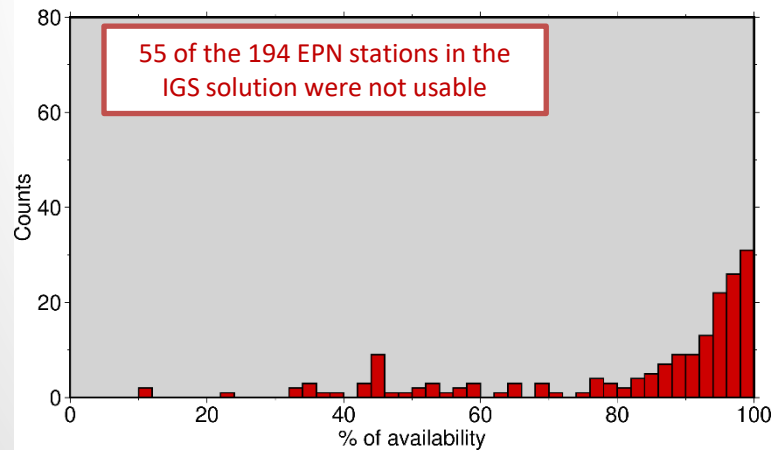




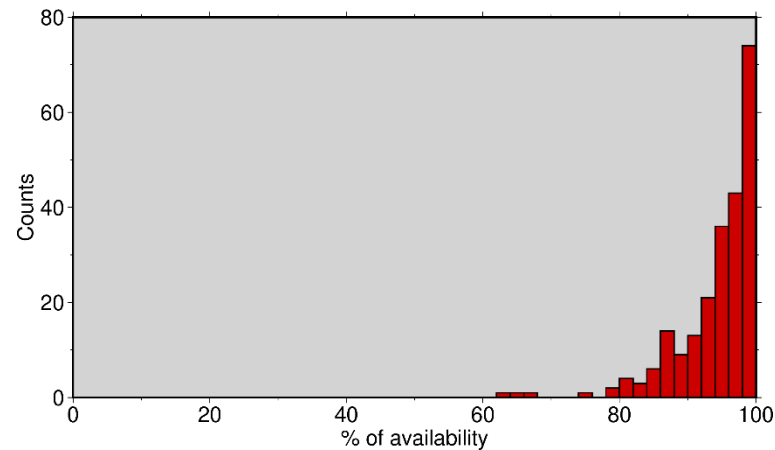
More complete time series in IGS Repro 3



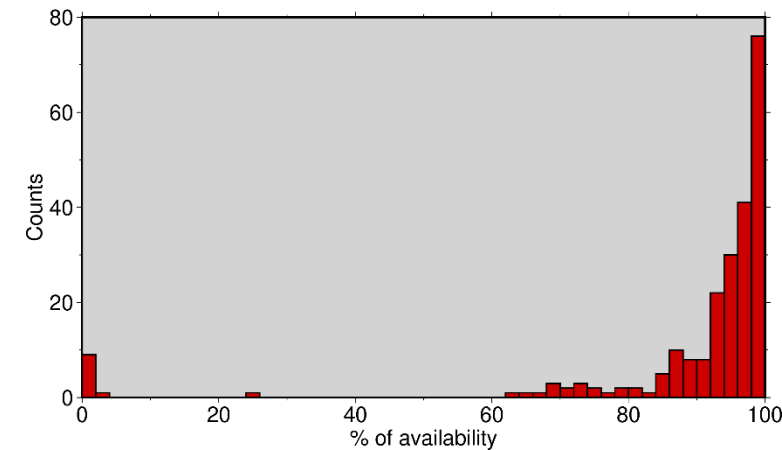
IGS22P30 Solution



EPN solution C2220



IGS Repro3 (preliminary)

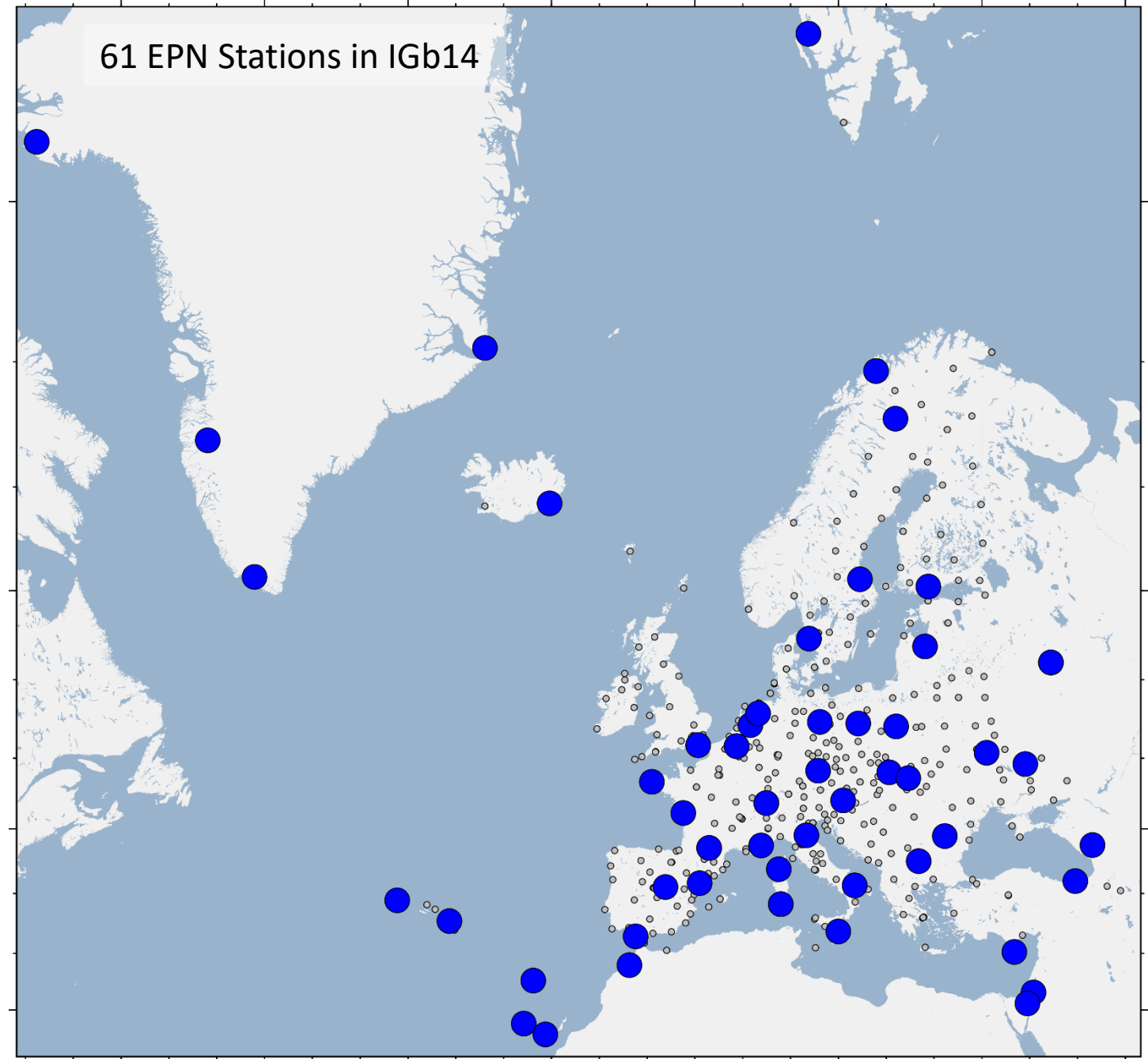


Networks

IGb14/IGS20

IGb14/IGS20

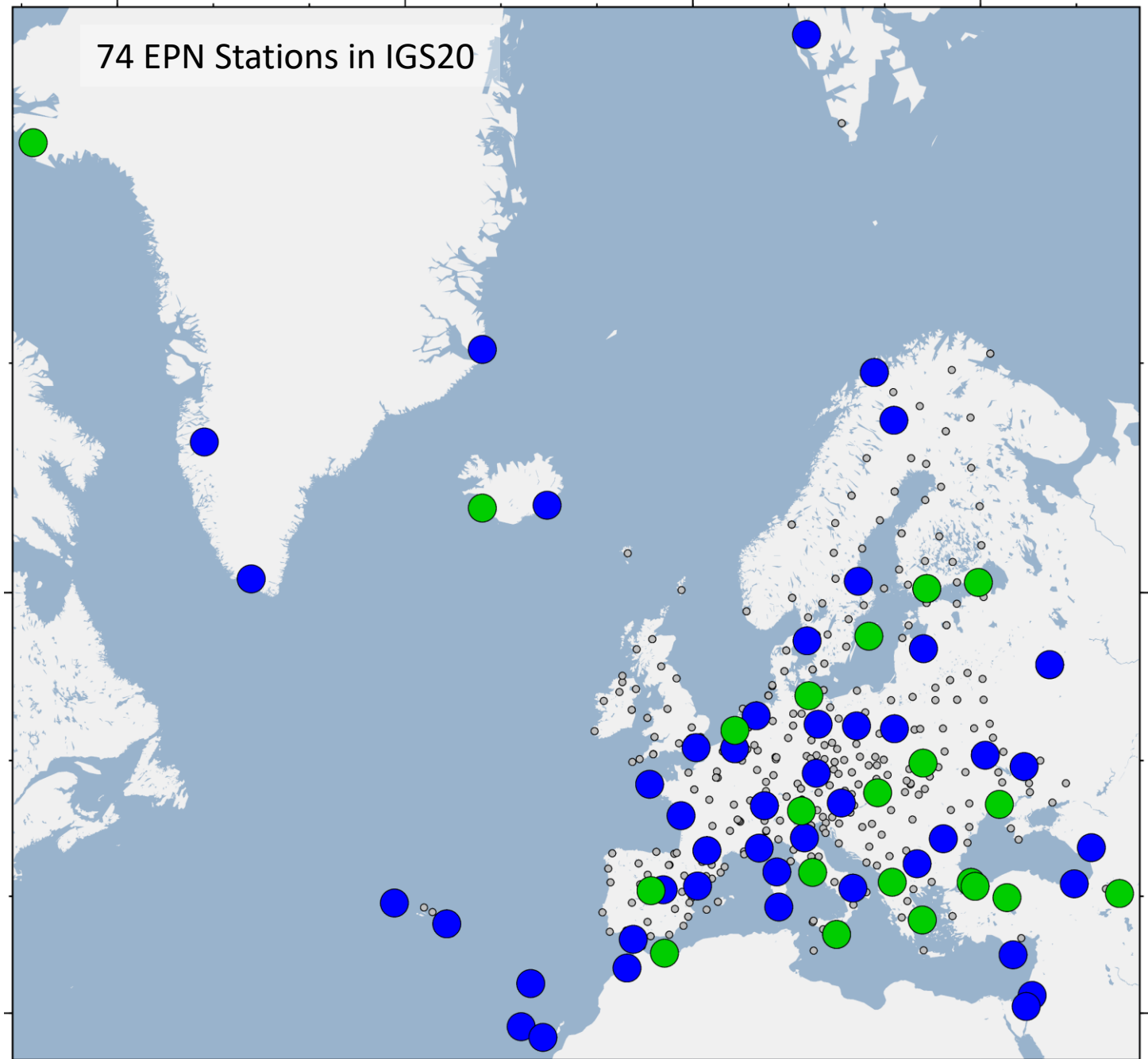
- EPN Stations in IGb14: 61



IGb14/IGS20

- EPN Stations in IGb14: 61
- EPN Stations in IGS20: 74
- 21 New Stations compared to IGb14

ANKR00TUR, BZRG00ITA, CEBR00ESP,
DLF100NLD, DYNG00GRC, ISTA00TUR,
MOSE00ITA, MELI00ESP, MET300FIN,
MIKL00UKR, NOTO00ITA, NSSP00ARM,
ORID00MKD, PENC00HUN, REYK00ISL,
SULP00UKR, SVTL00RUS, THU100GRL,
TUBI00TUR, VIS000SWE, WARN00DEU



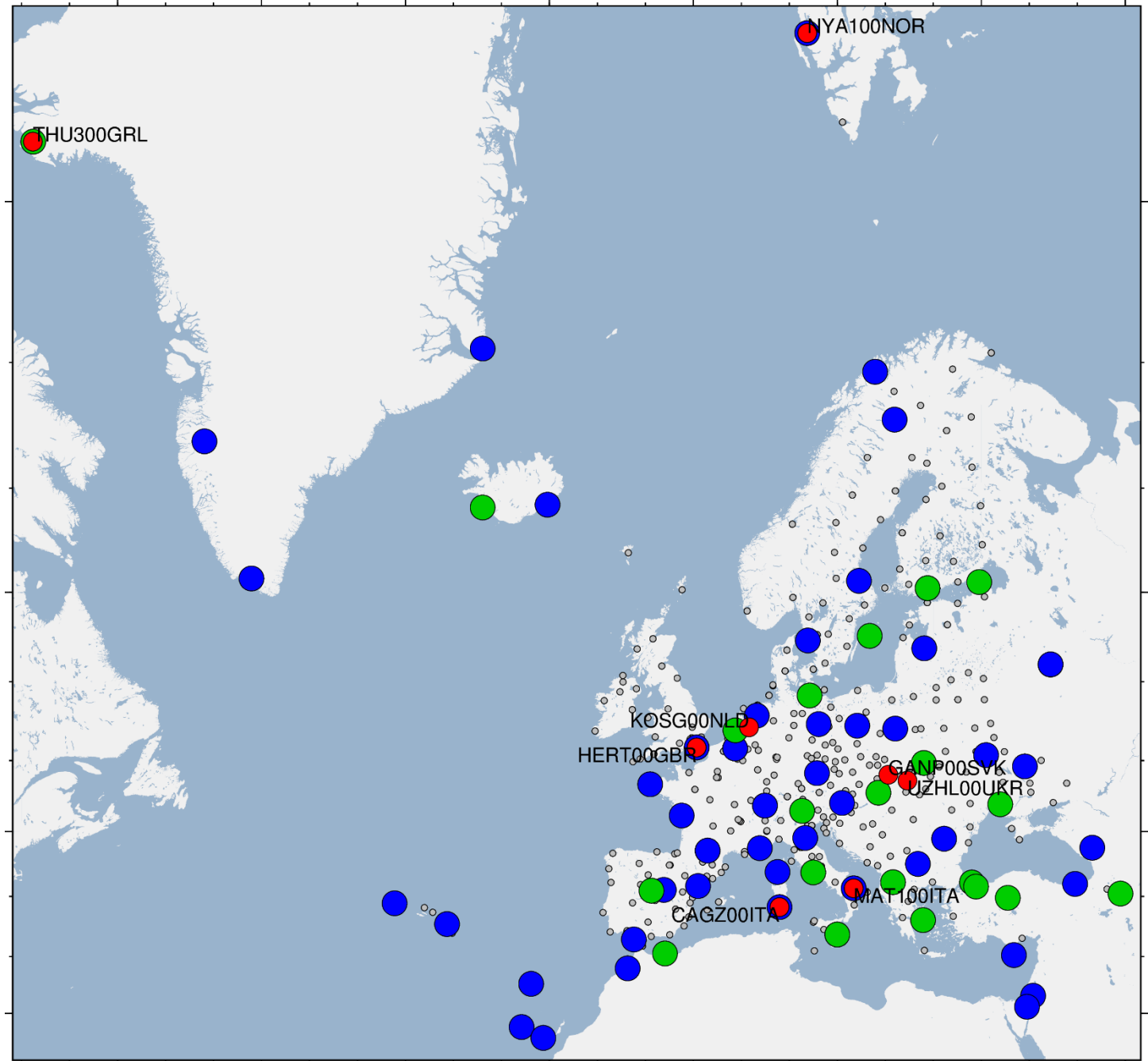
IGb14/IGS20

- EPN Stations in IGb14: 61
- EPN Stations in IGS20: 74
- 21 New Stations compared to IGb14

ANKR00TUR, BZRG00ITA, CEBR00ESP,
DLF100NLD, DYNG00GRC, ISTA00TUR,
MOSE00ITA, MELI00ESP, MET300FIN,
MIKL00UKR, NOTO00ITA, NSSP00ARM,
ORID00MKD, PENC00HUN, REYK00ISL,
SULP00UKR, SVTL00RUS, THU100GRL,
TUBI00TUR, VIS000SWE, WARN00DEU

- 8 Stations removed

CAGZ00ITA, GANP00SVK, HERT00GBR,
KOSG00NLD, MAT100ITA, NYA100NOR,
THU300GRL, UZHL00UKR



Post Seismic Deformation Models

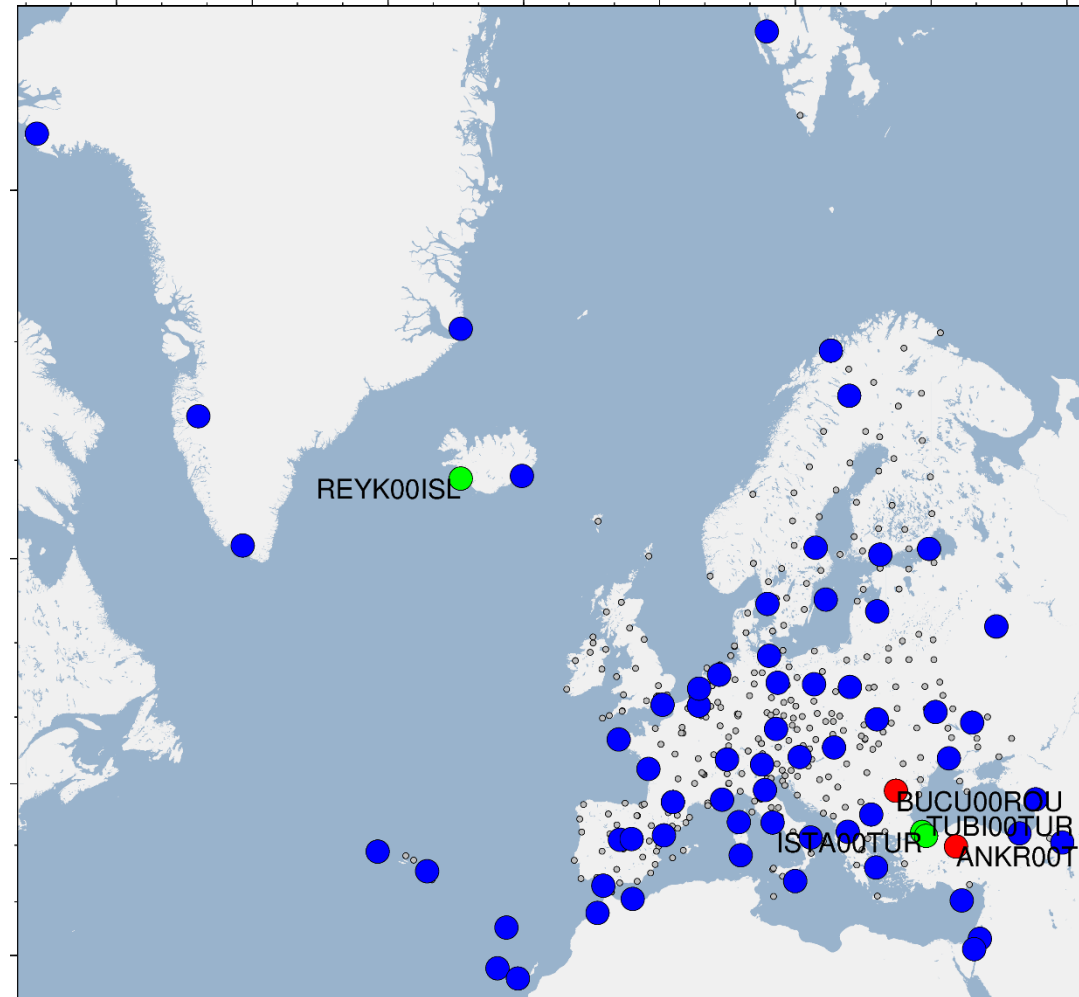
Stations with Post Seismic Deformation Models

- 5 EPN Stations with Post Seismic Deformation Models in IGB14/ITRF2014

ANKR00TUR
BUCU00ROU
ISTA00TUR
REYK00ISL
TUBI00TUR

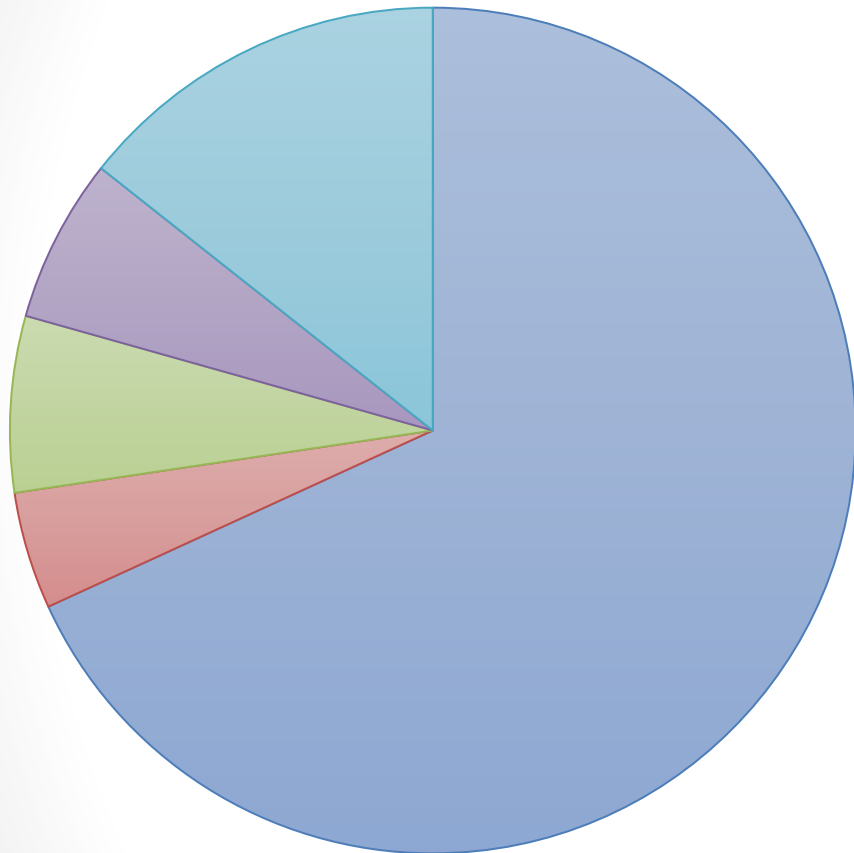
- 3 EPN Stations with Post Seismic Deformation Models in IGS20/ITRF2020

~~ANKR00TUR~~
~~BUCU00ROU~~
ISTA00TUR
REYK00ISL
TUBI00TUR



Position and Velocity Discontinuities

Position and Velocity Discontinuities in IGS20



■ Antenna ■ Receiver
■ Earthquakes or Volcanoes ■ non-linearity
■ Unknown

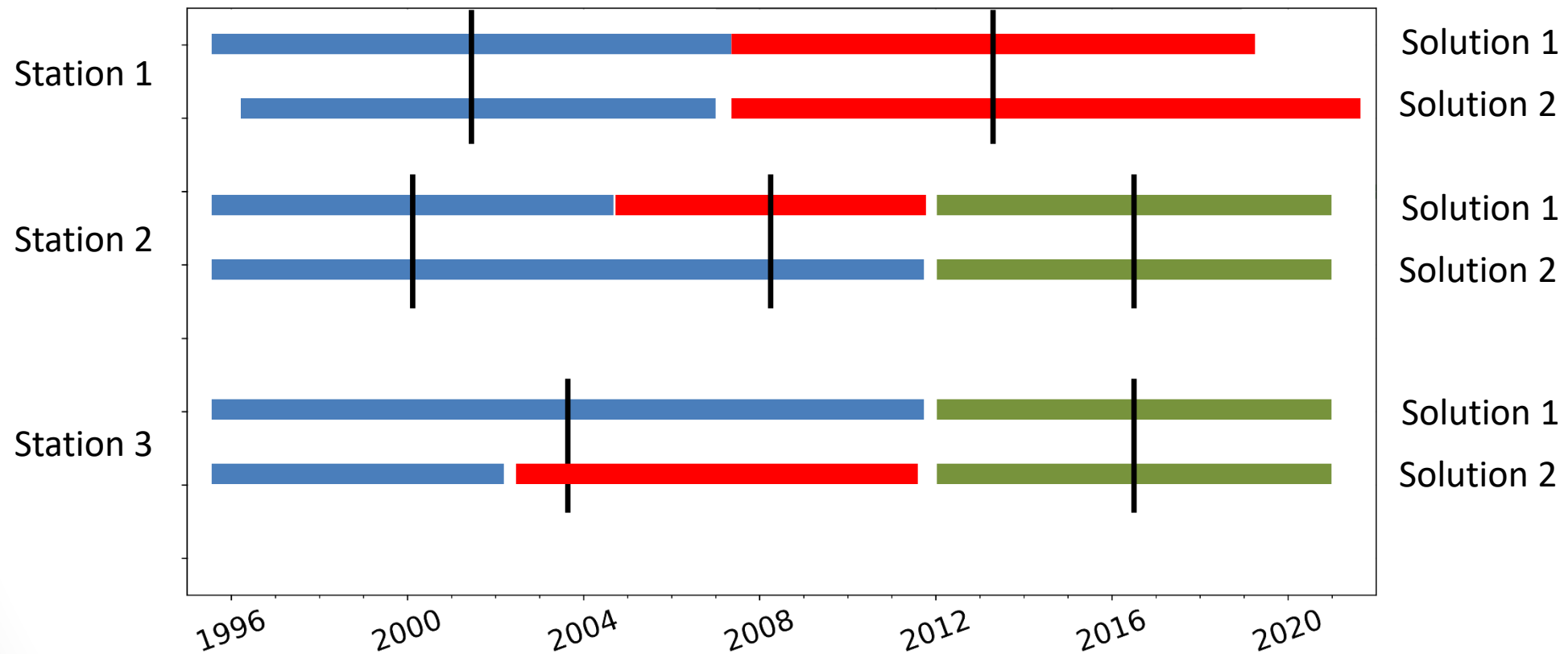
- 223 position discontinuities
- 30 velocity changes affecting 15 stations:
 ANKR00TUR GLSV00UKR HOFN00ISL ISTA00TUR KELY00GRL
 LPAL00ESP MIKL00UKR NYAL00NOR QAQ100GRL REYK00ISL
 SCOR00GRL SFER00ESP SOFI00BGR TRO100NOR TROM00NOR
- Comparison with EPN discontinuity list: 43 stations have different discontinuities
- It will require more investigations
 - POTS00DEU, TRO100NOR, ...

The discontinuity list will be revised

Position and Velocity Comparison

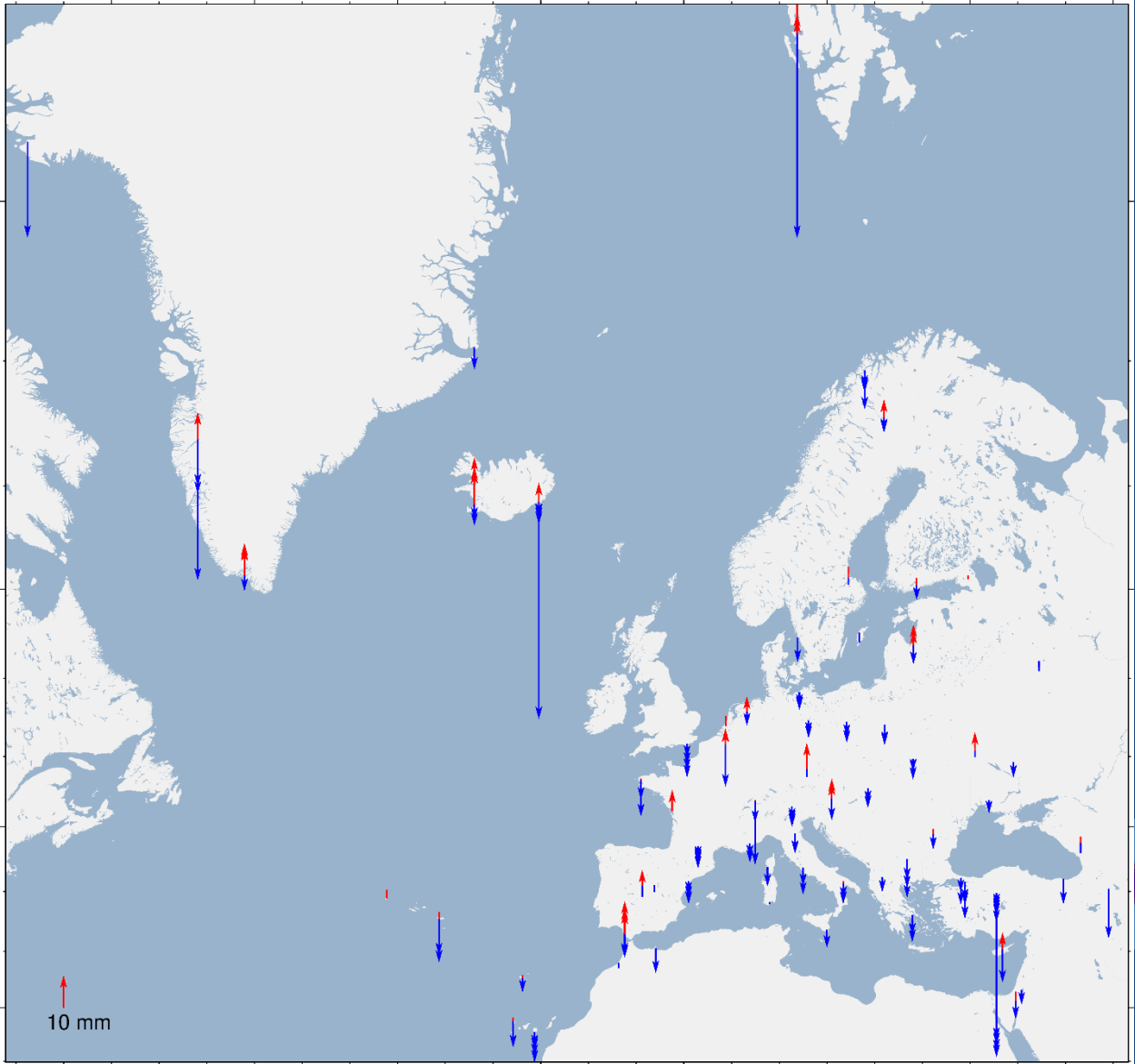
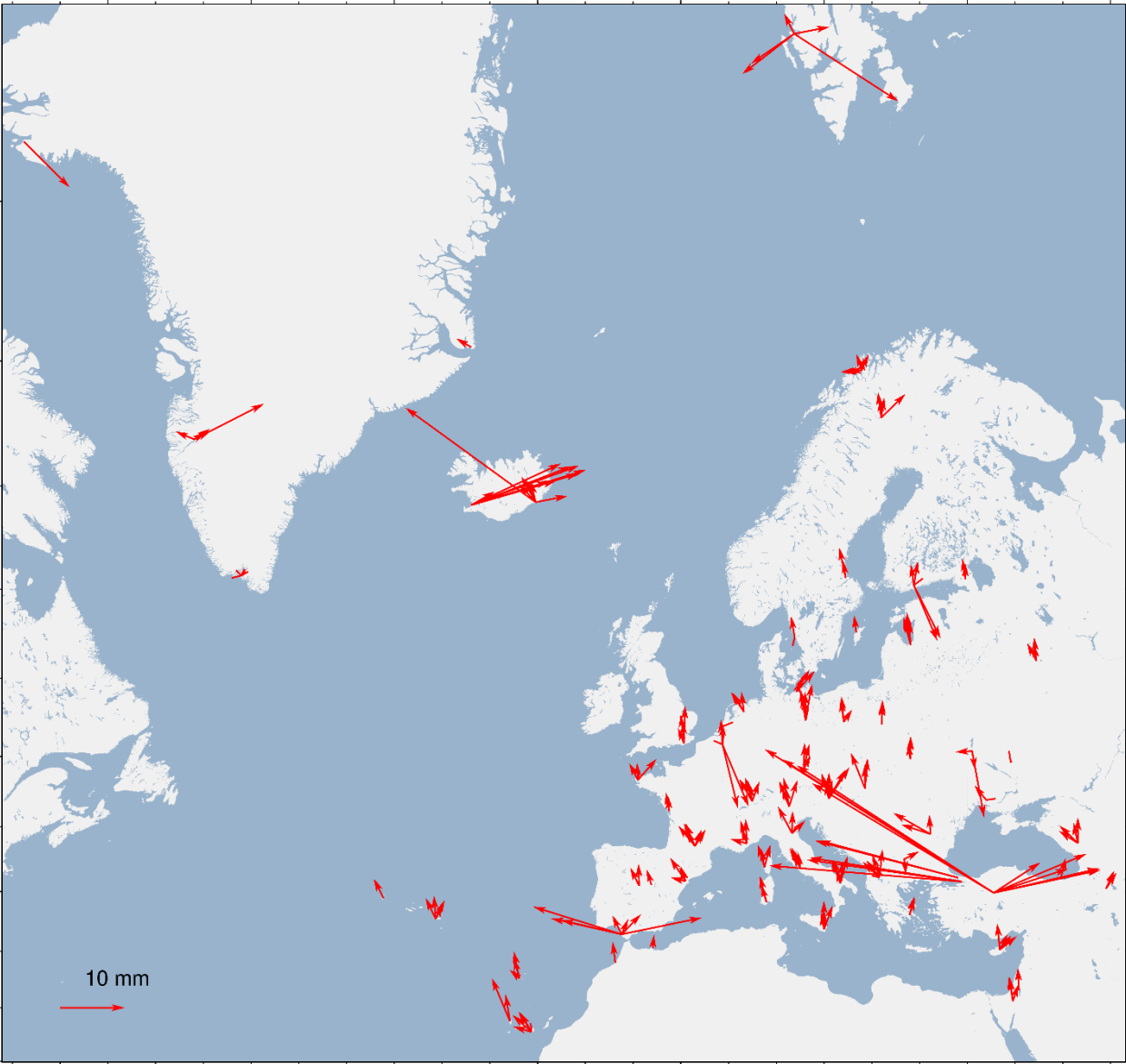
Comparison of Position and Velocity Solutions

- How to handle different position and velocity discontinuities when comparing the solutions?

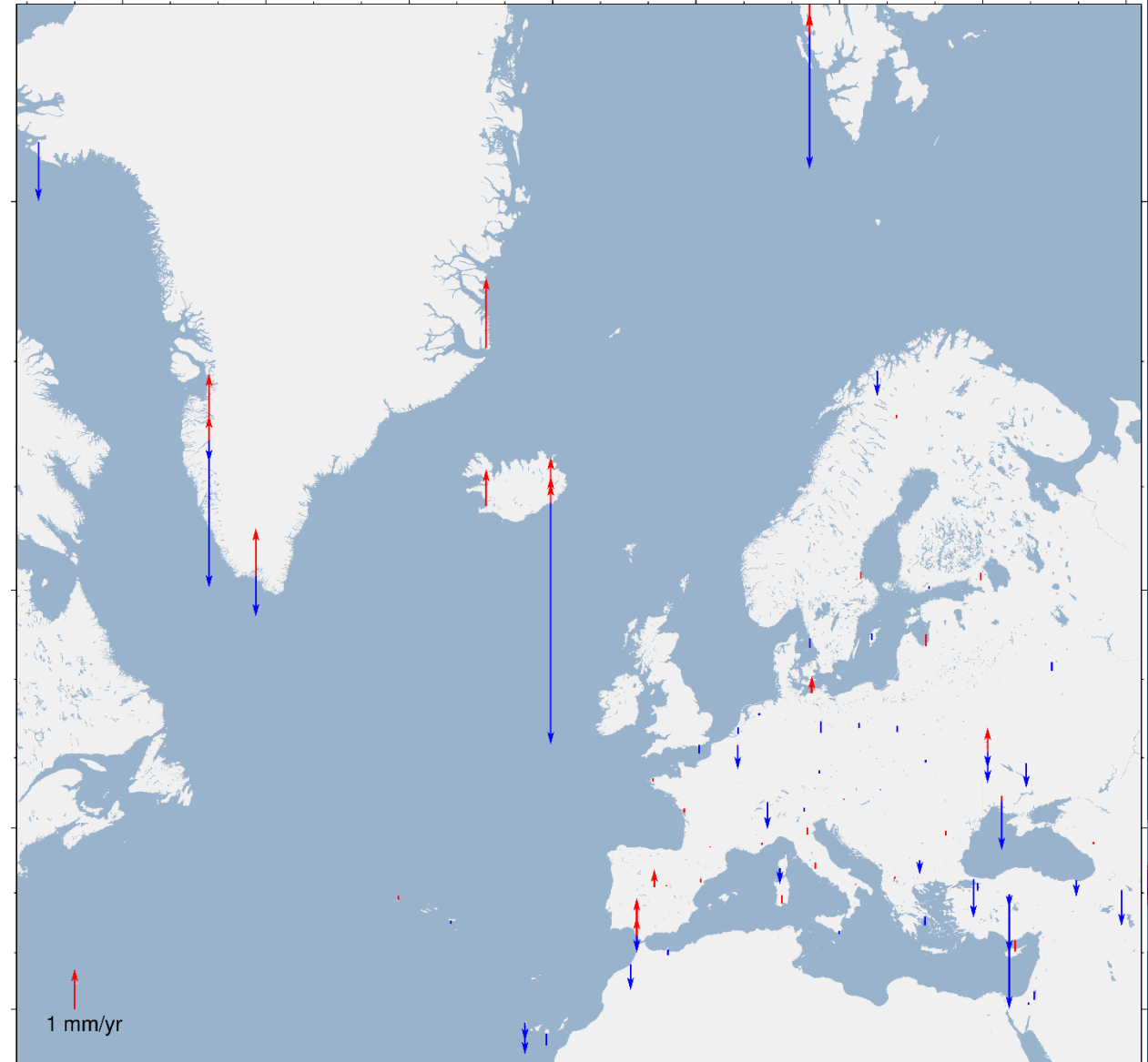
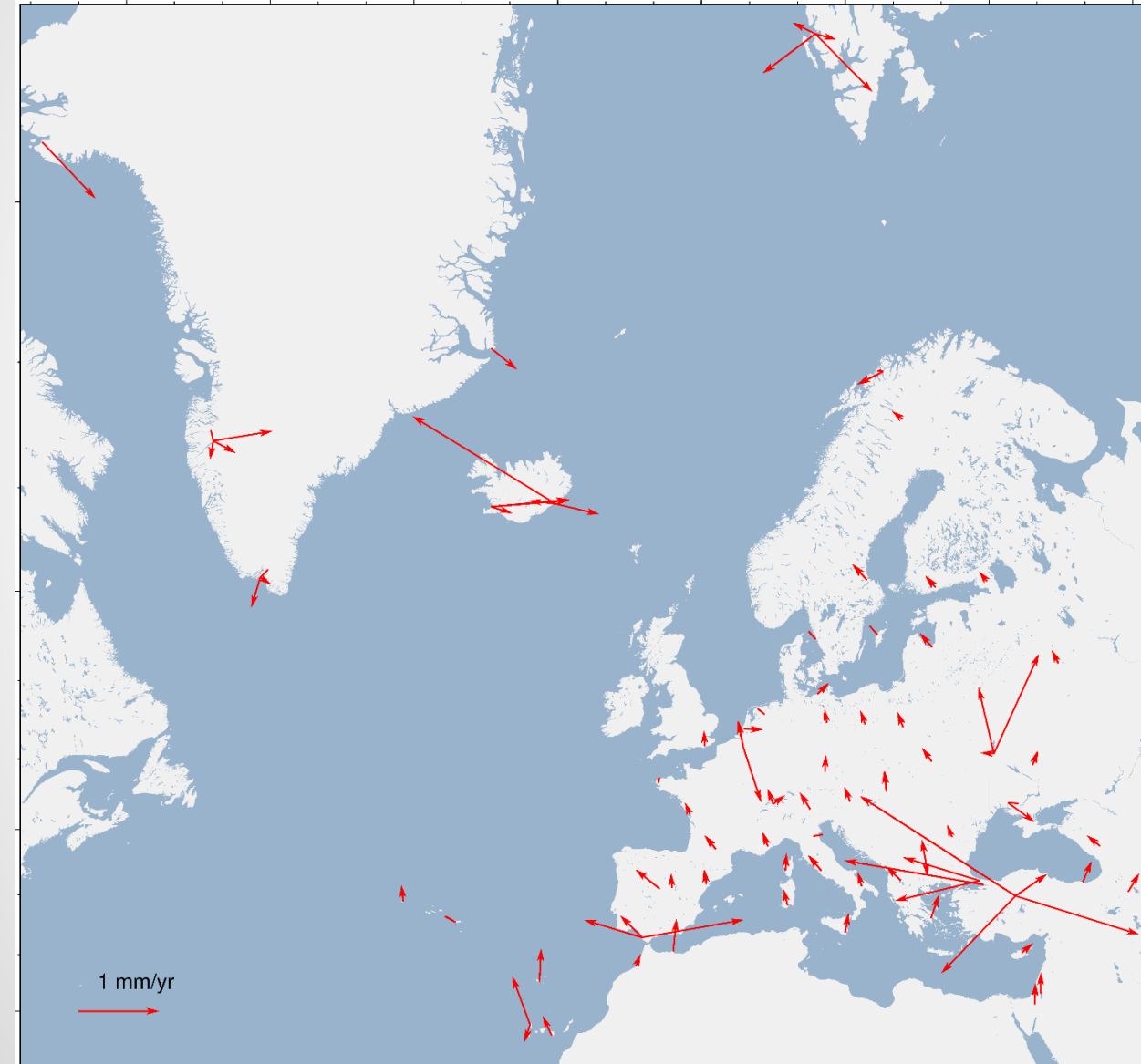


Position differences at the mean epoch of each position estimates of Solution 1

Position Differences: C2220 - IGS20



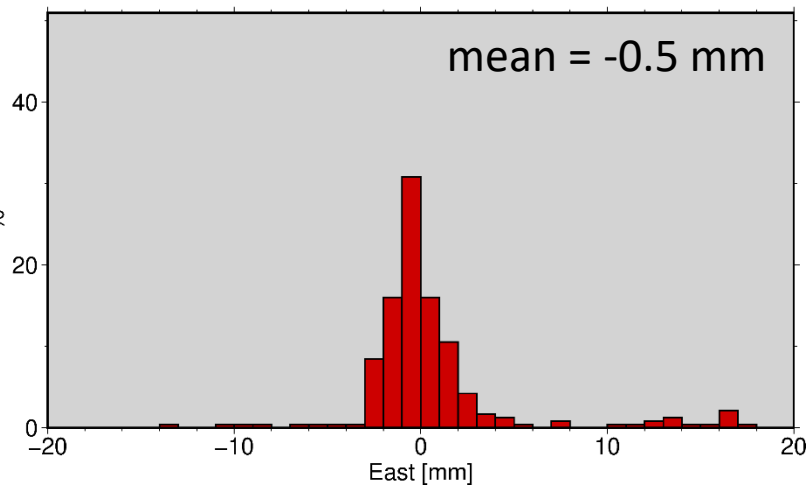
Velocity Differences: C2220 - IGS20



Position and Velocity Differences: C2220 - IGS20

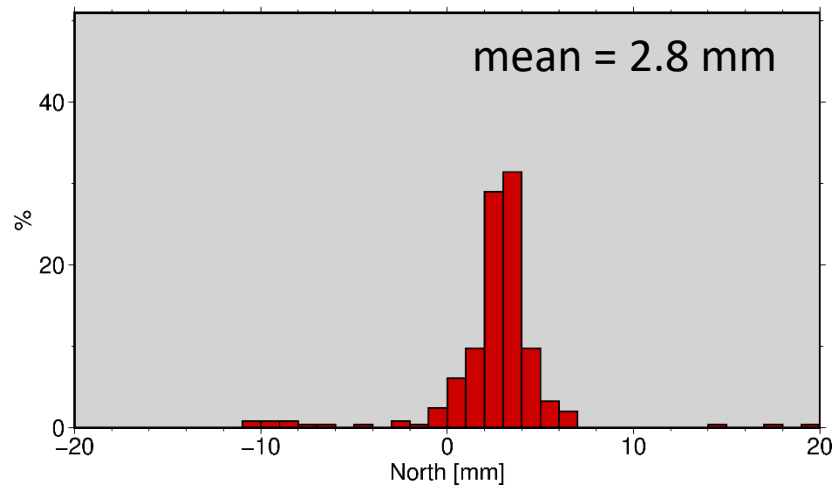
C2220 IGS20

mean = -0.5 mm



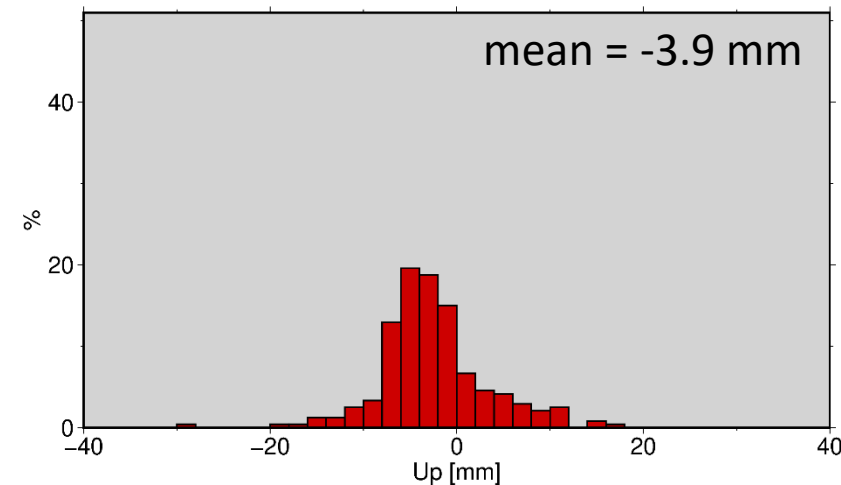
C2220 IGS20

mean = 2.8 mm



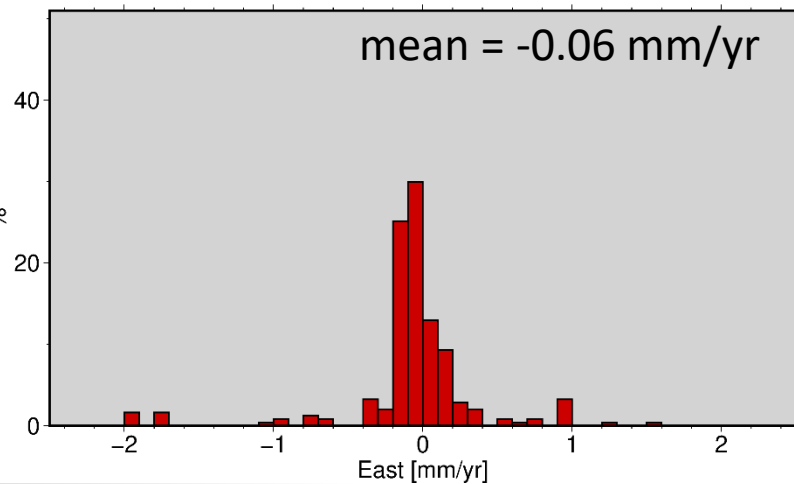
C2220 IGS20

mean = -3.9 mm



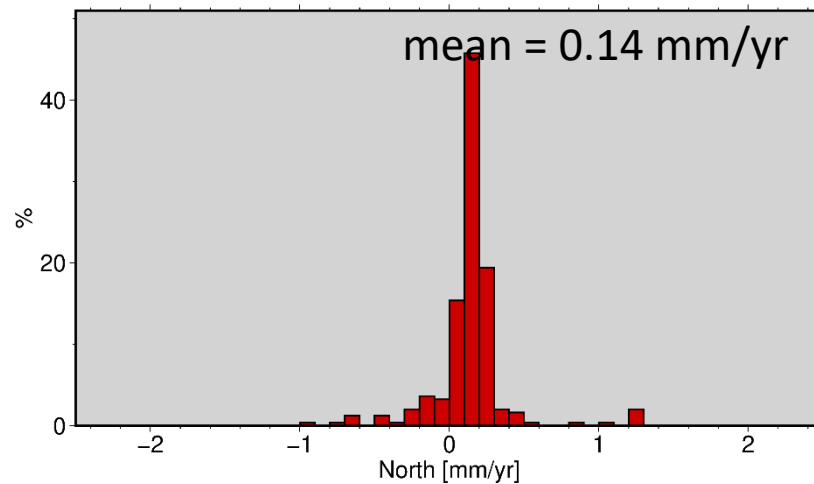
C2220 IGS20

mean = -0.06 mm/yr



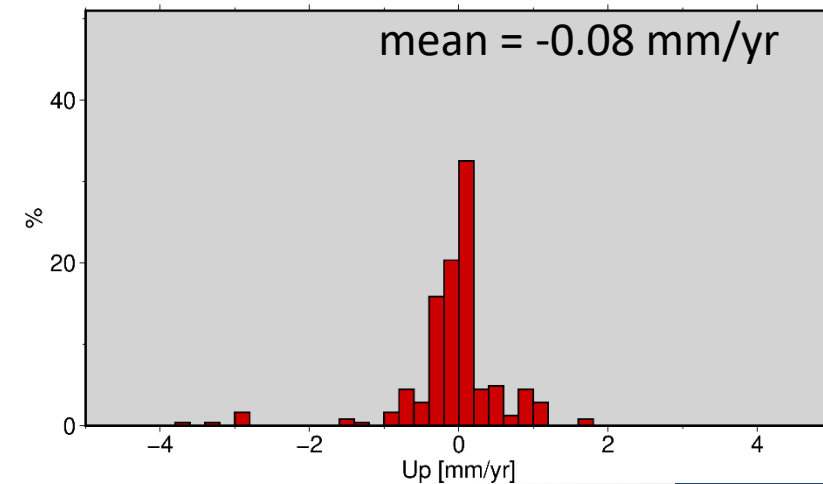
C2220 IGS20

mean = 0.14 mm/yr



C2220 IGS20

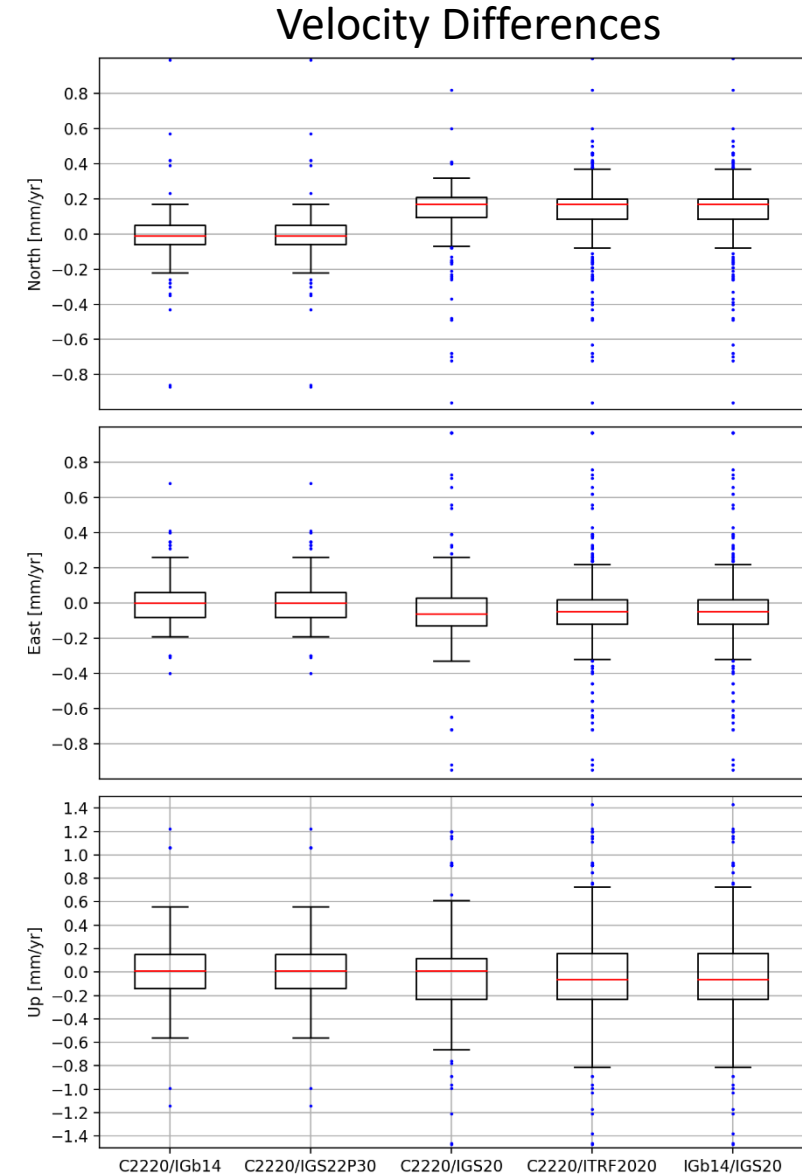
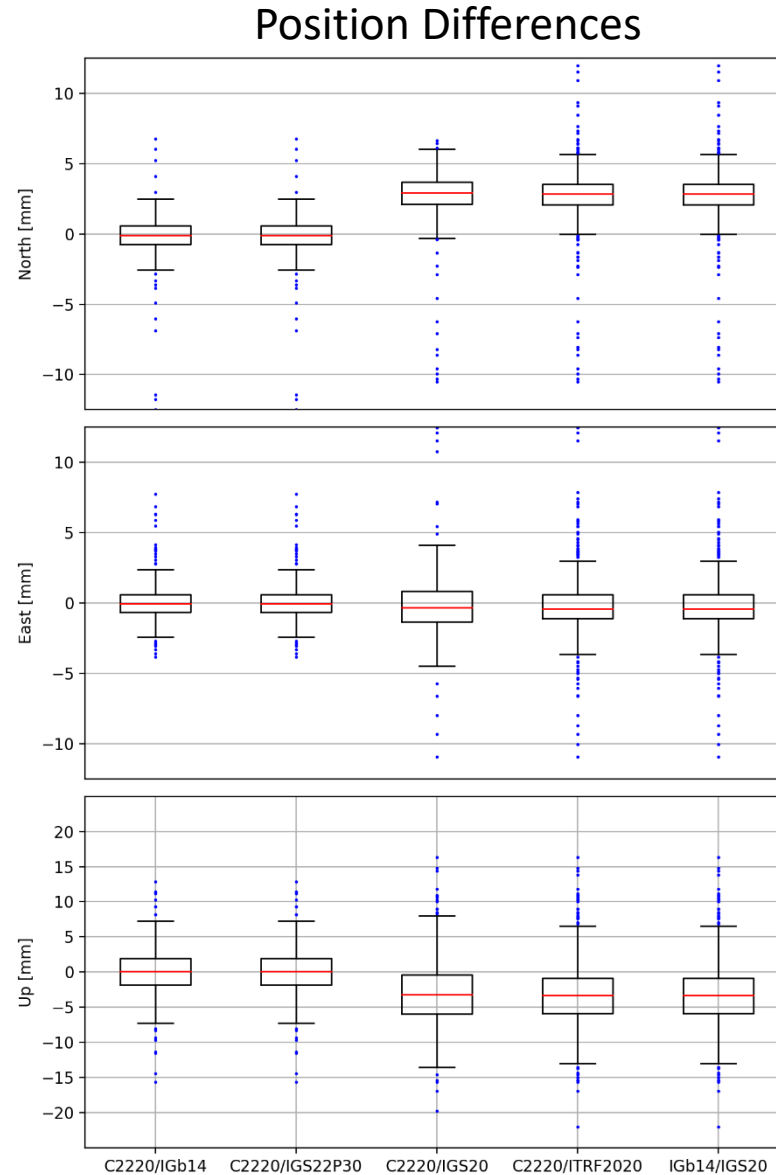
mean = -0.08 mm/yr



Position and Velocity Differences

Systematic effects also visible between C2220 and ITRF2020 and between IGb14 and IGS20

- Positions: mainly North and Up components are affected with a median ~ 7 mm
- Velocities: mainly North component is affected with a median of 0.3 mm/yr



Conclusions

- More stations in IGS20 compared to IGB14: 74 EPN stations in IGS20
- Great improvement of the completeness of the IGS Repro 3 time series compared to Repro 2
- Post Seismic model provided for 3 EPN stations (ISTA00TUR, REYK00ISL, TUBI00TUR)
- New set of position and velocity discontinuities, 43 stations show differences compared to the EPN discontinuity list
- Systematic position and velocity differences between C2220 and IGS20 is consistent with the systematic difference between IGB14 and IGS20