Status of ITRF2014 Analysis
Work is still in progress

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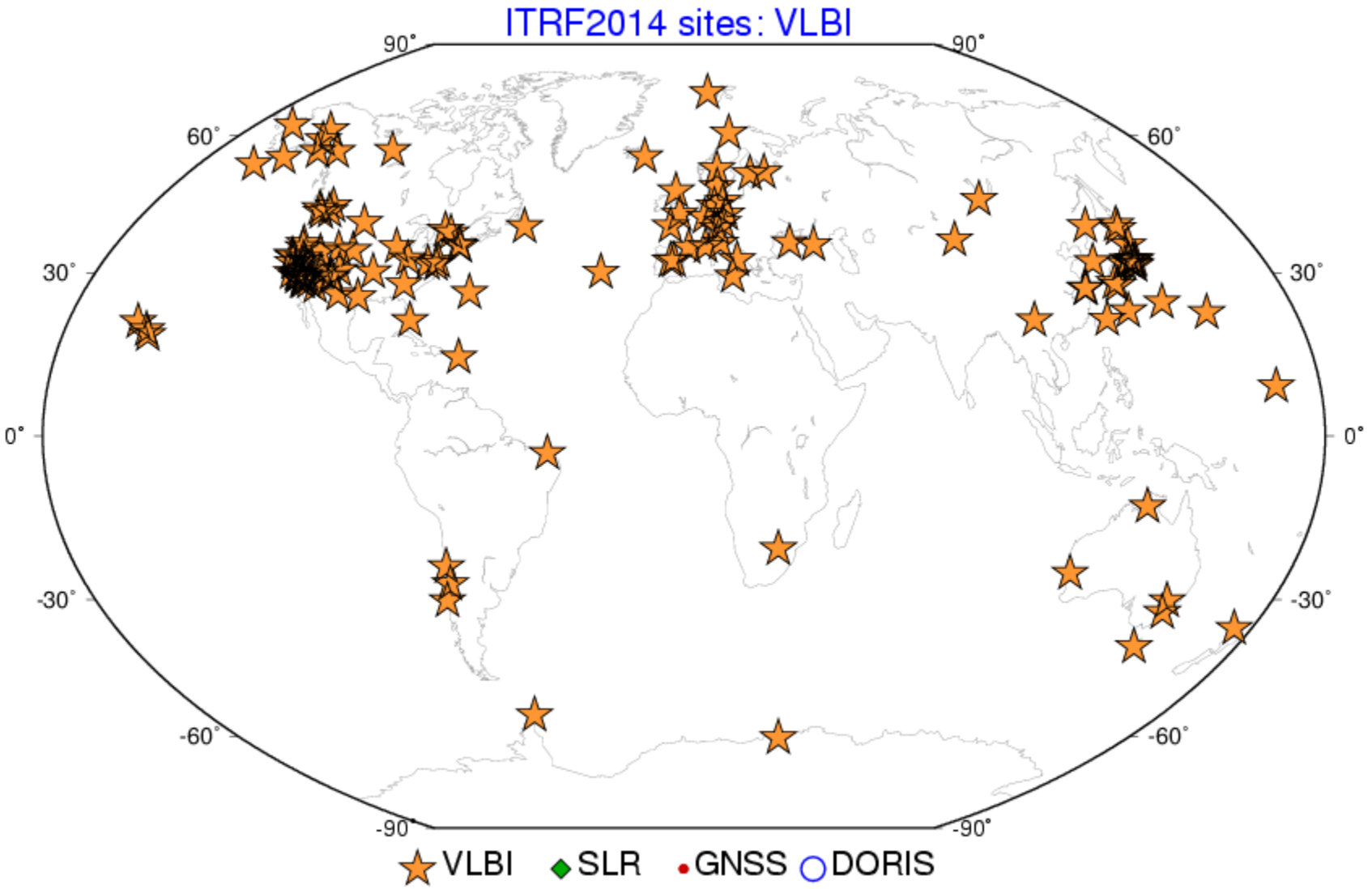
ITRF2014 Key points

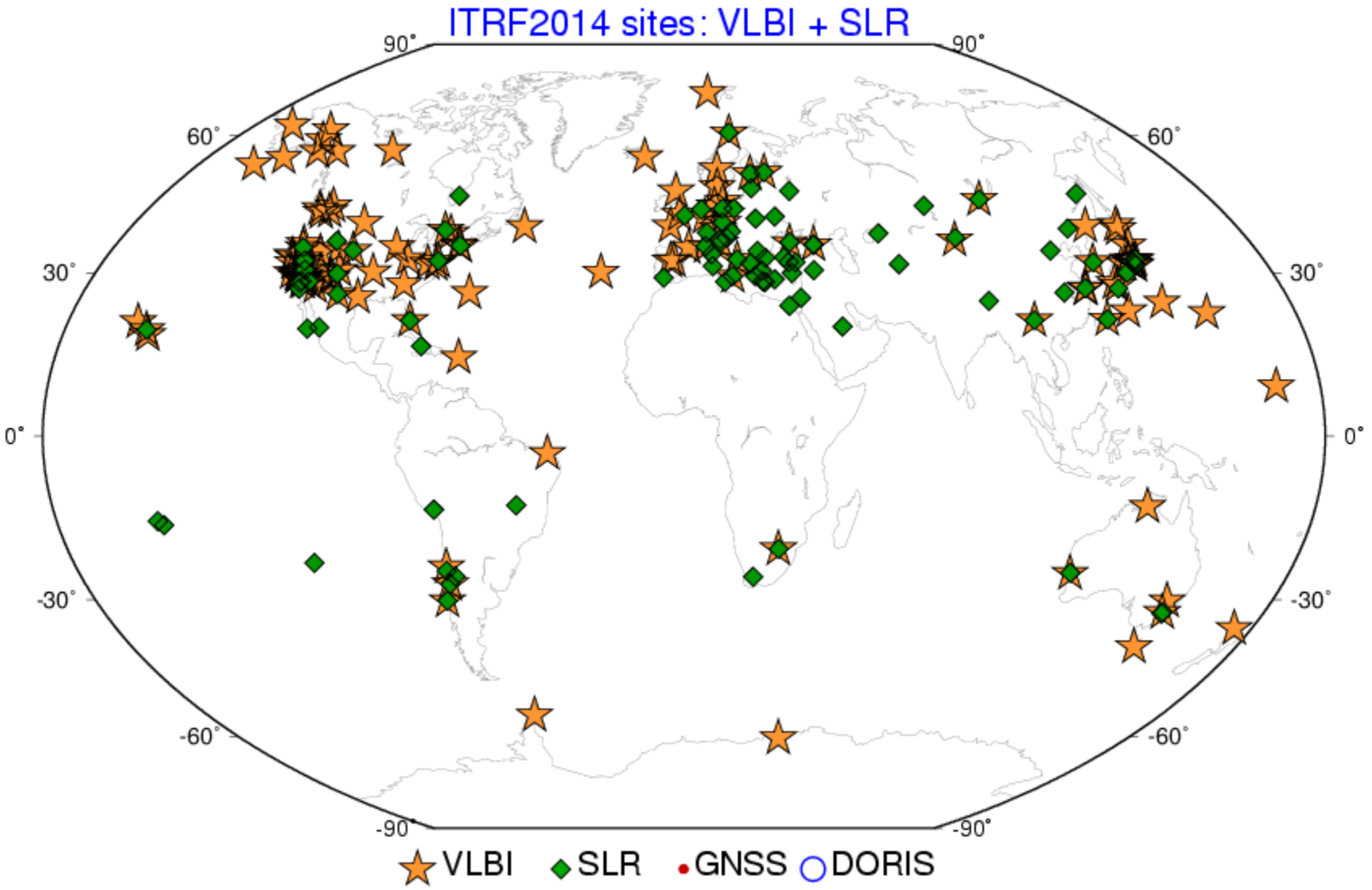
- Origin & Scale stability with time ?
- The reality of
  - a deformable Earth
  - technique systematic errors
- Linear motion
- Non-linear motion: modelling of:
  - Periodic: Seasonal & others (e.g. draconitics)
  - Post-seismic deformation, using parametric models
- Estimating seasonal signals vs applying non-tidal atmospheric loading model ?

ITRF2014 Network

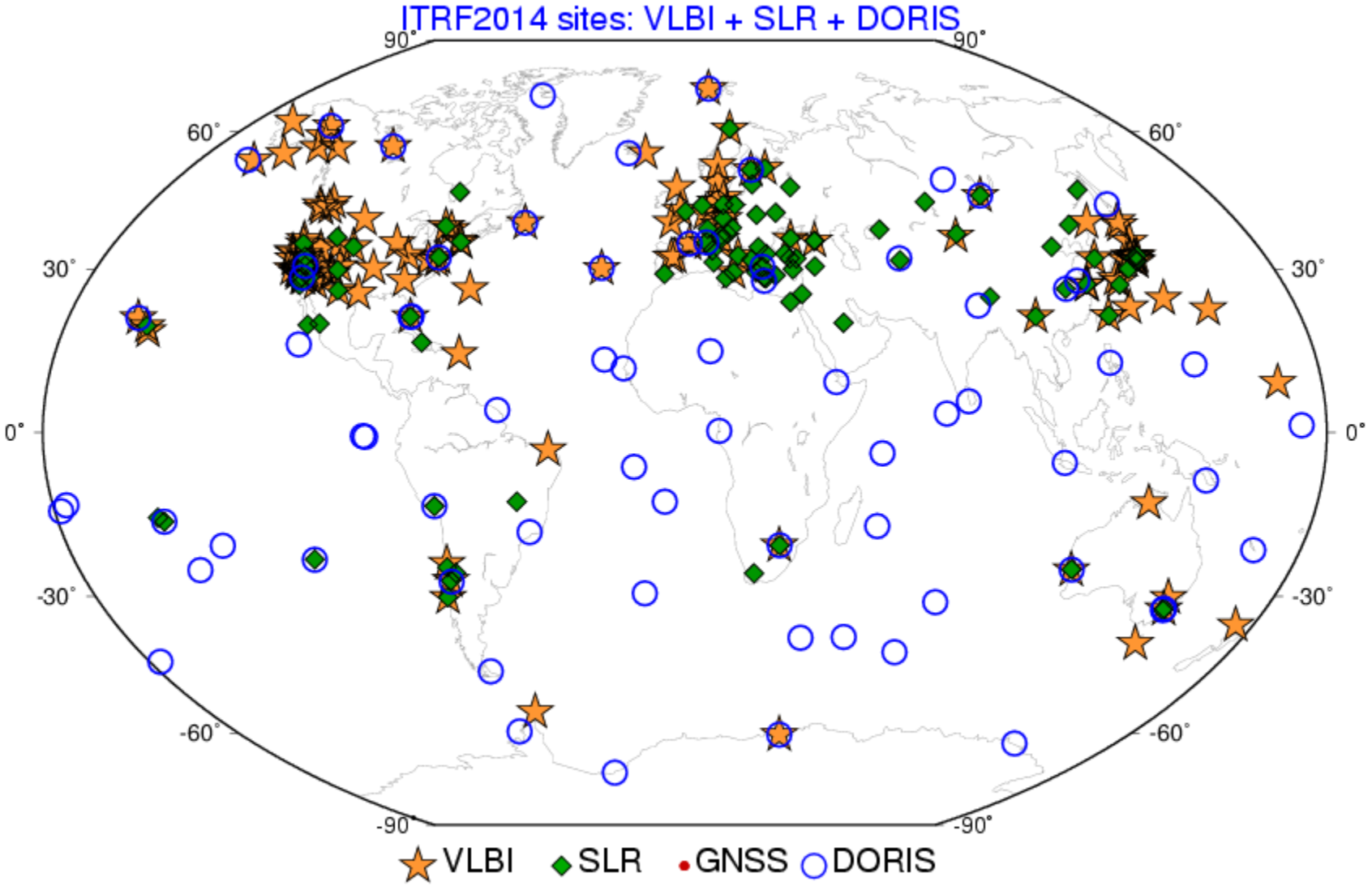
ITRF2014 Network : VLBI



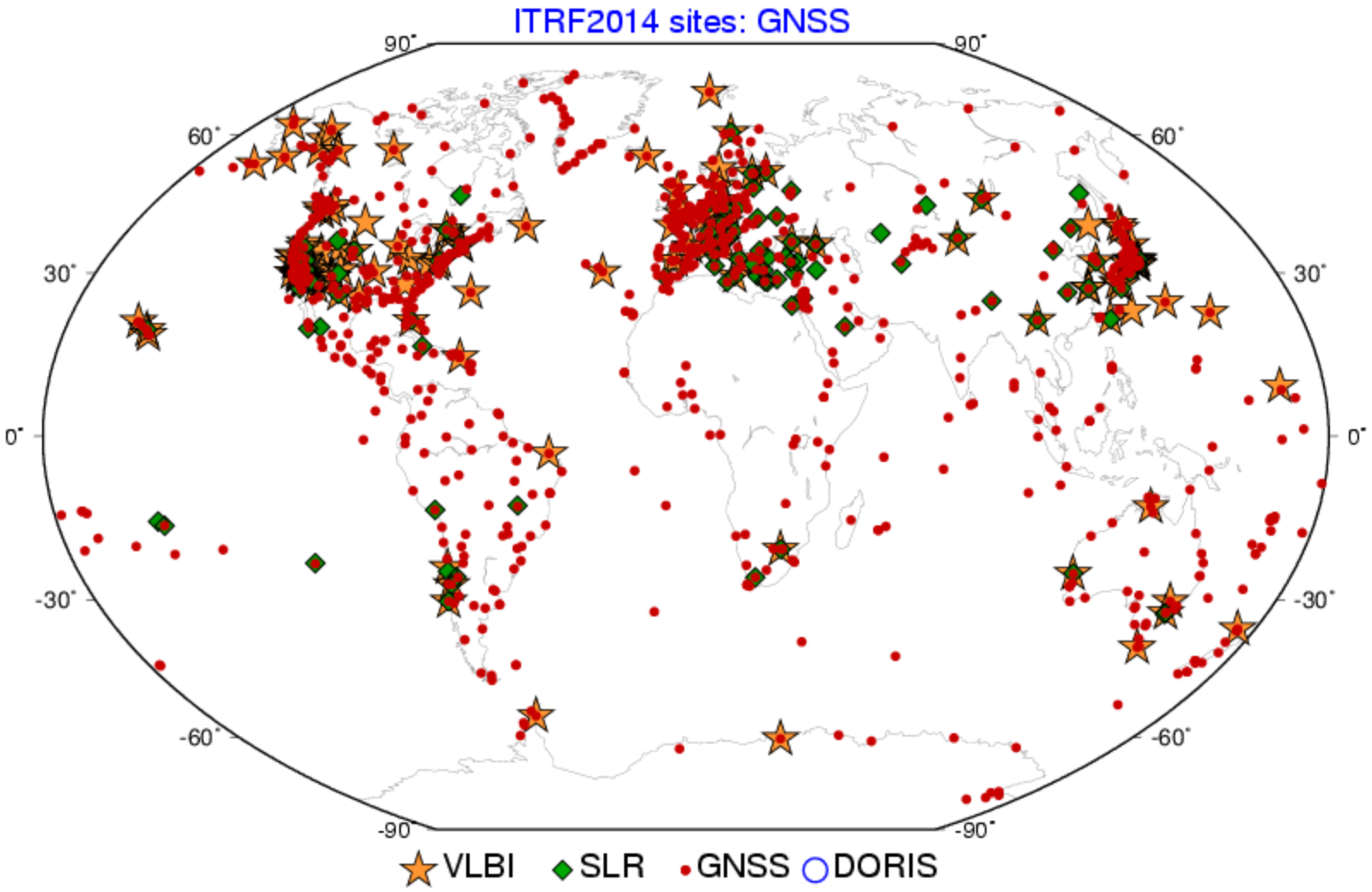
ITRF2014 Network: VLBI + SLR



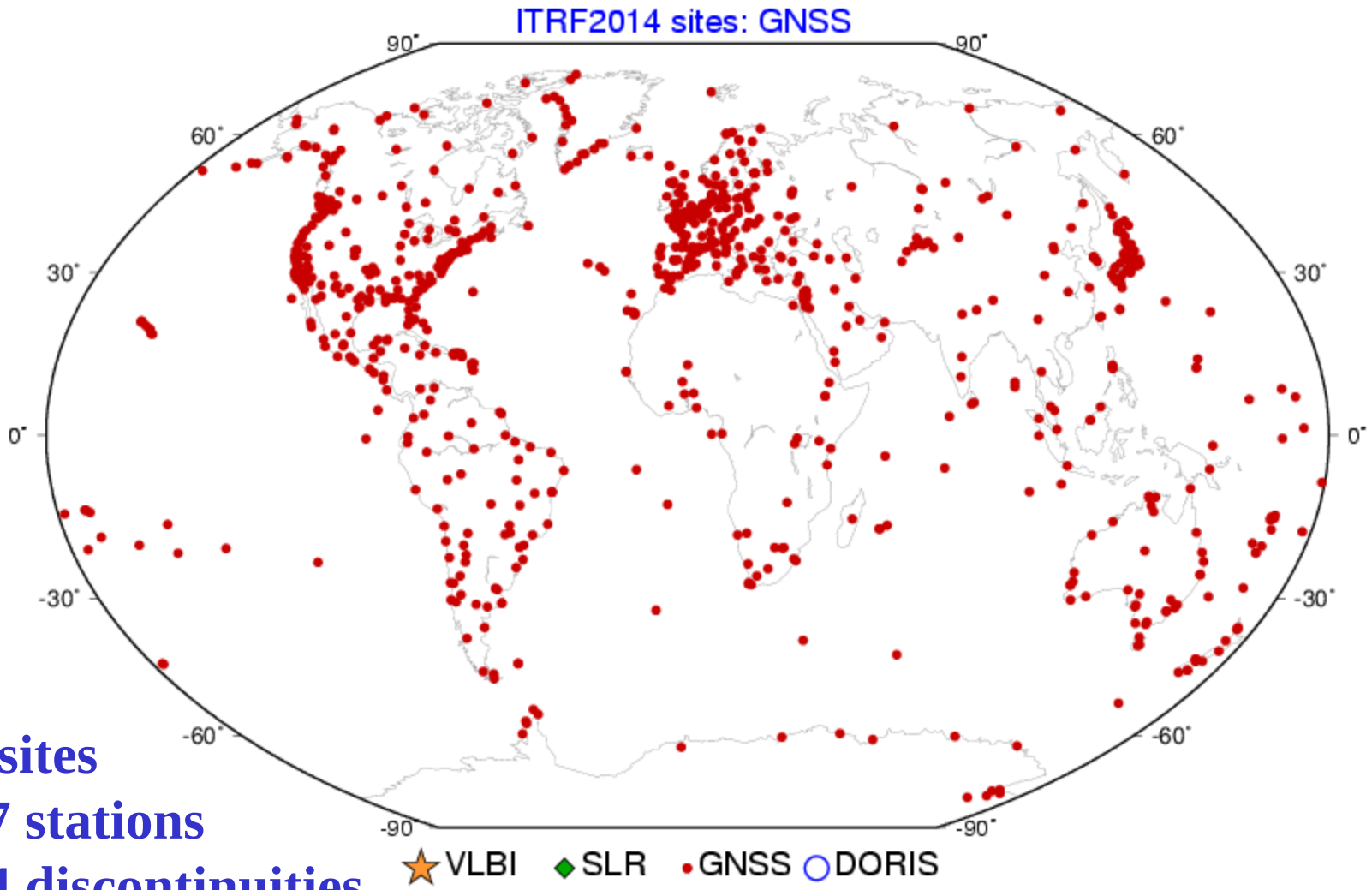
ITRF2014 Network: VLBI + SLR + DORIS



ITRF2014 Network

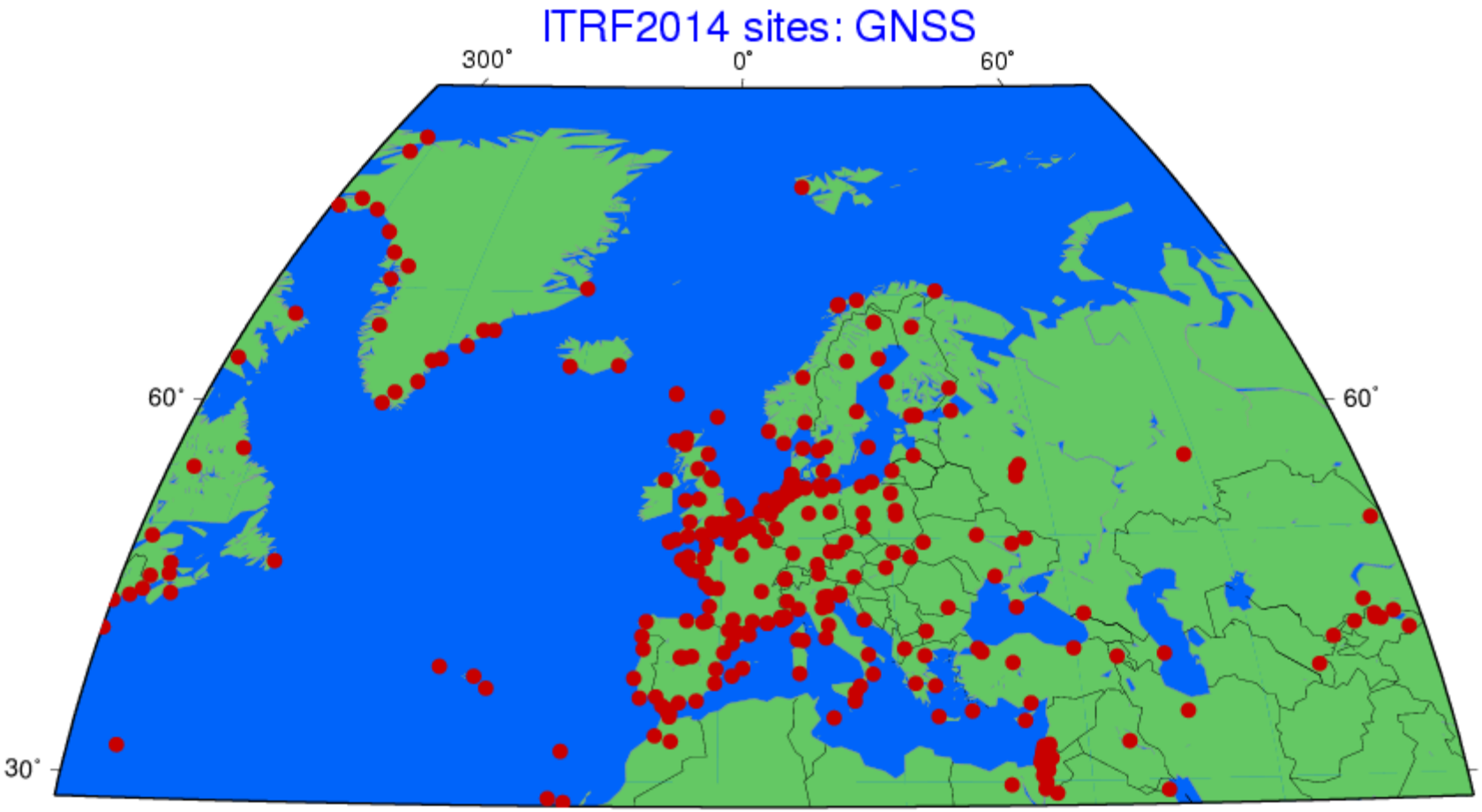


ITRF2014 Network: GNSS



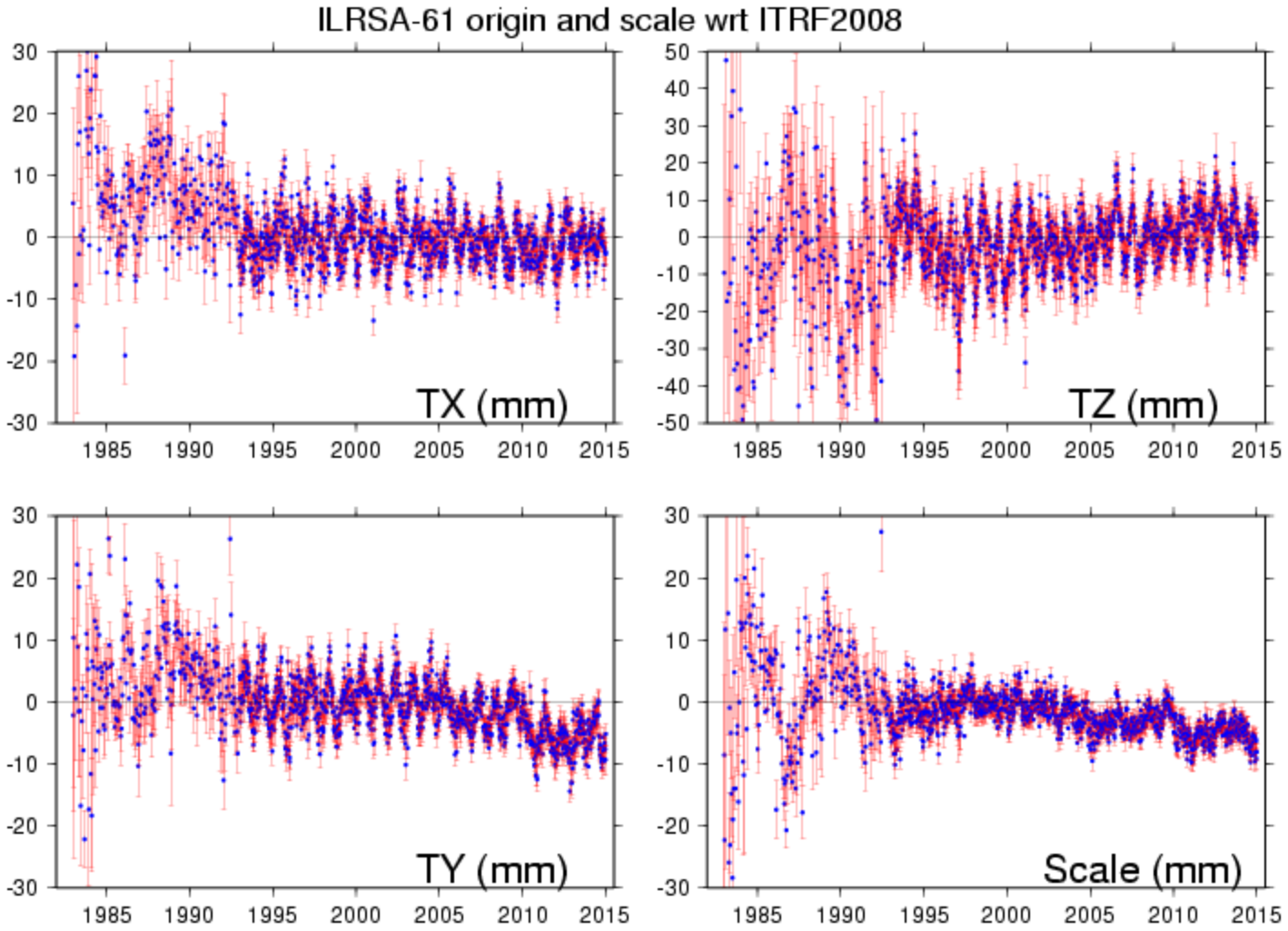
894 sites
1037 stations
1814 discontinuities

ITRF2014 Network: GNSS



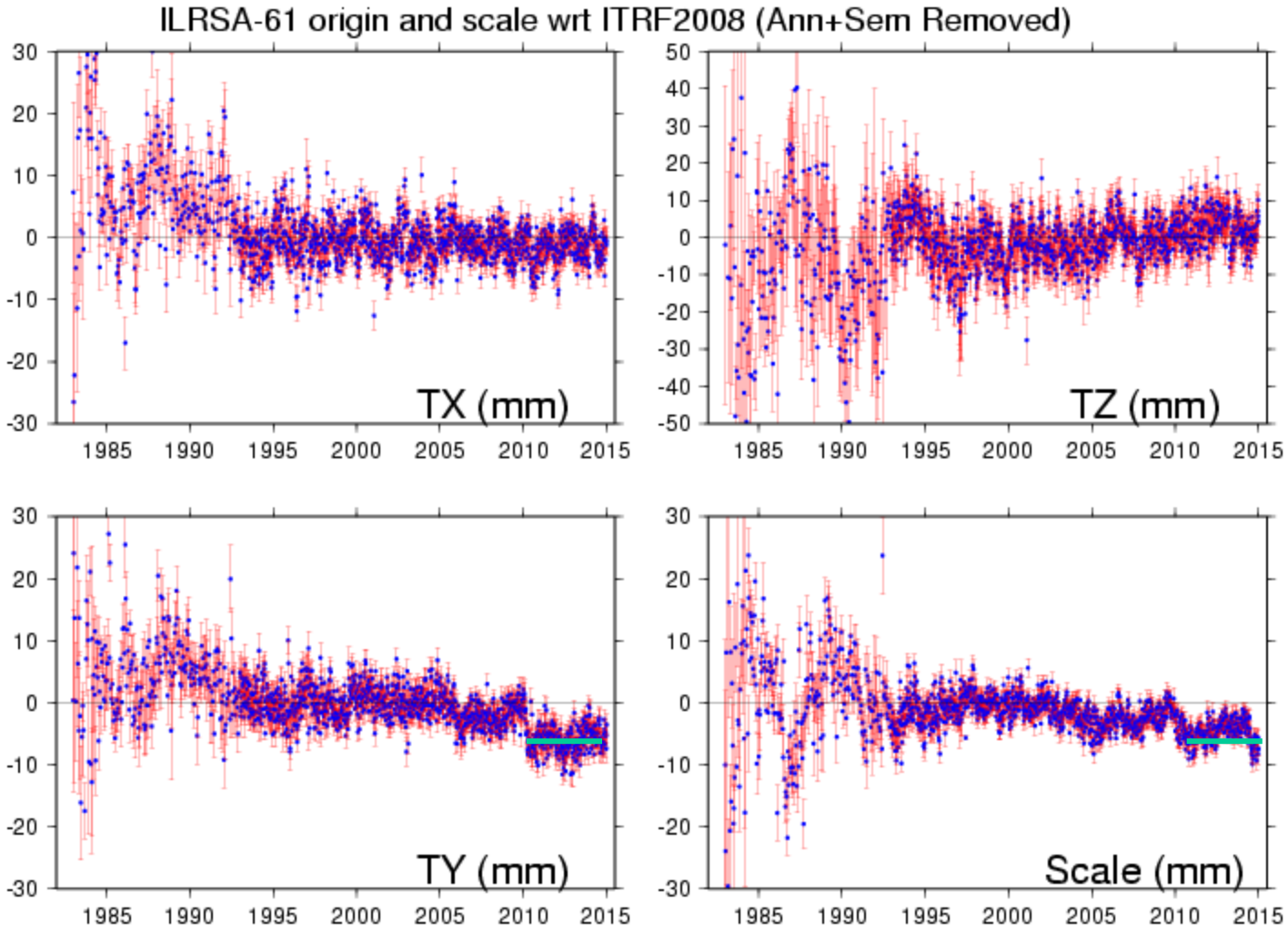
Origin & Scale stability with time ?

SLR/ILRS Origin & Scale WRT ITRF2008



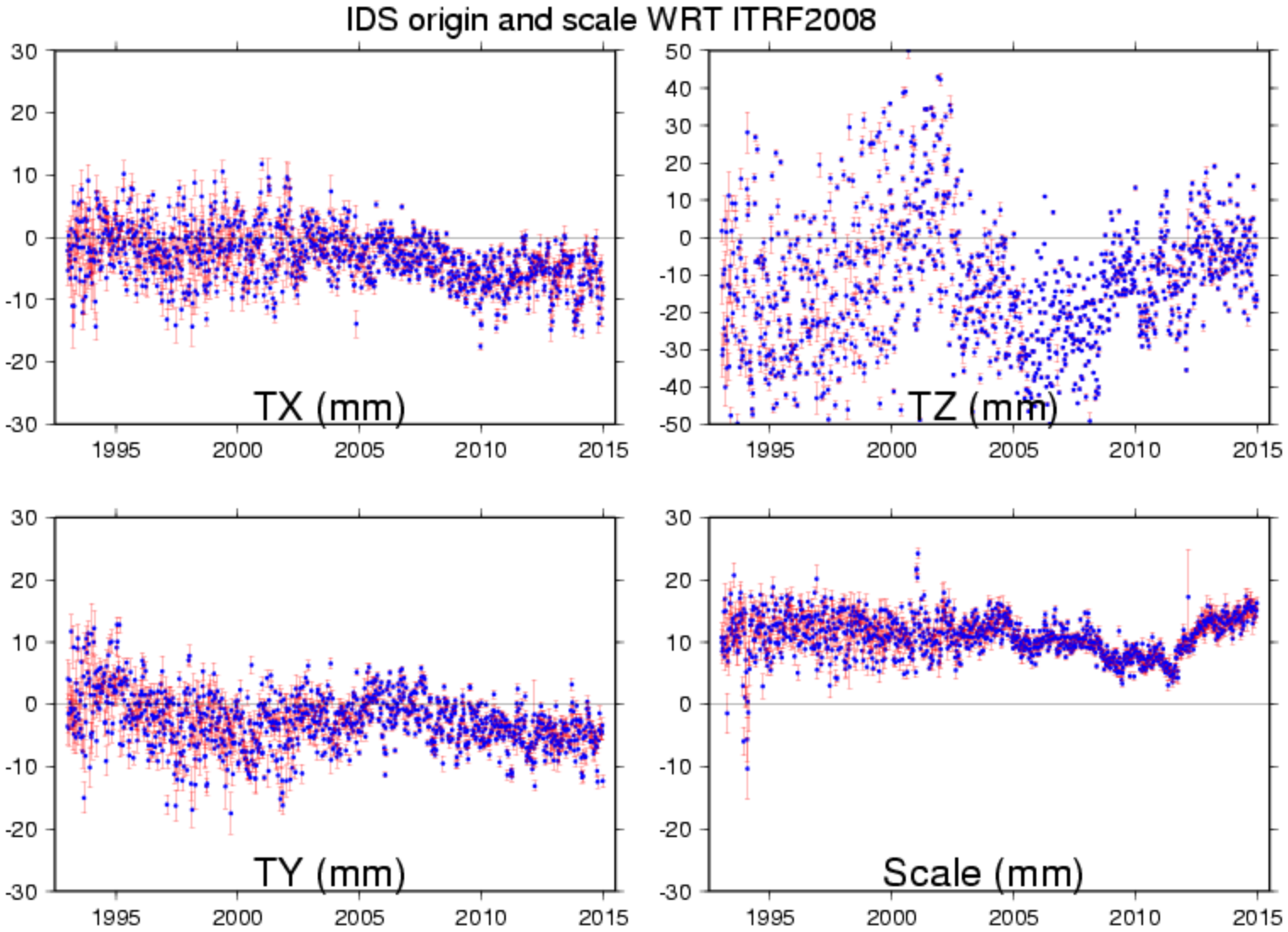
SLR/ILRS Origin & Scale WRT ITRF2008

Remove Annual + Semi-annual + Post-seismic deformation

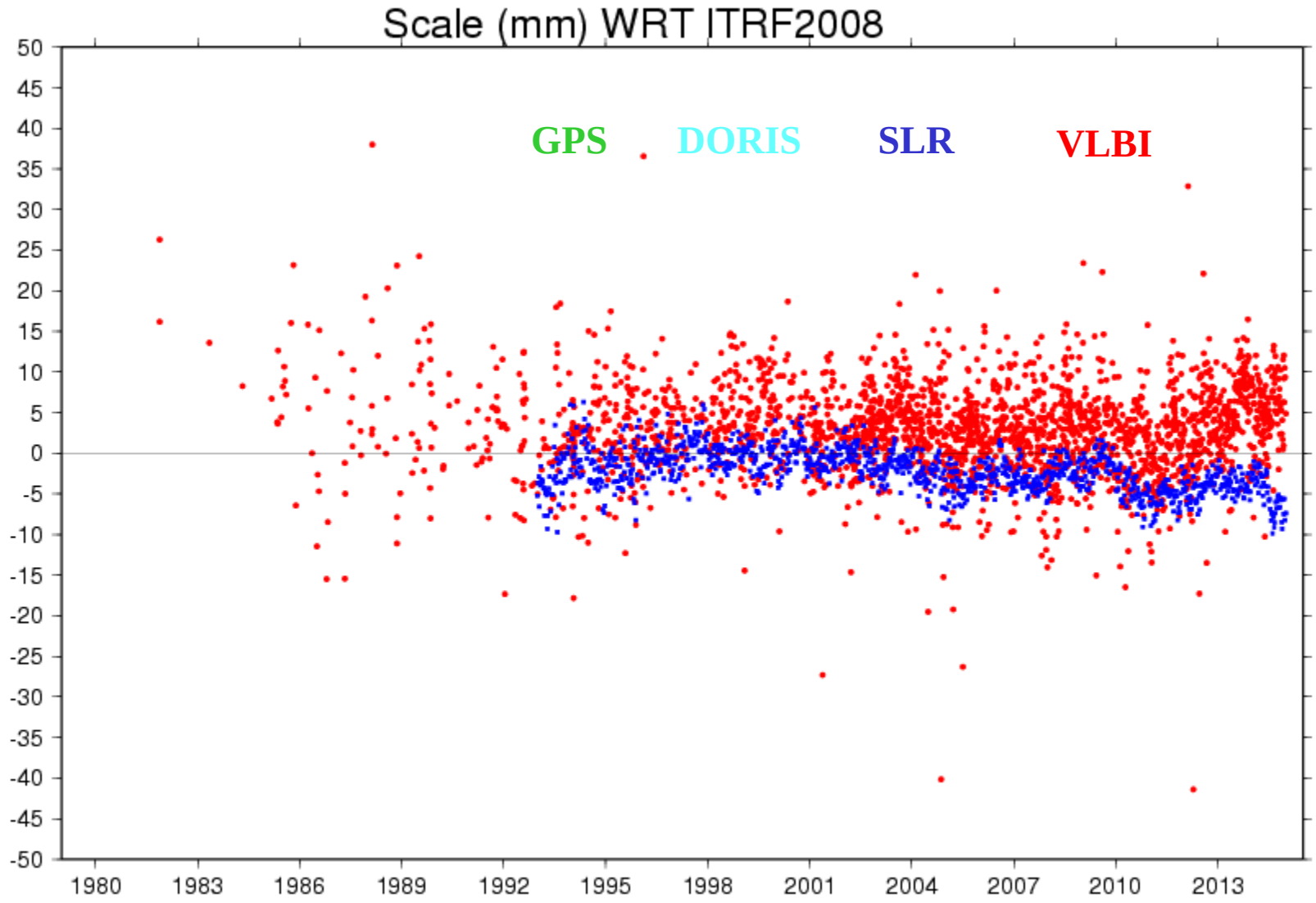


DORIS/IDS Origin & Scale WRT ITRF2008

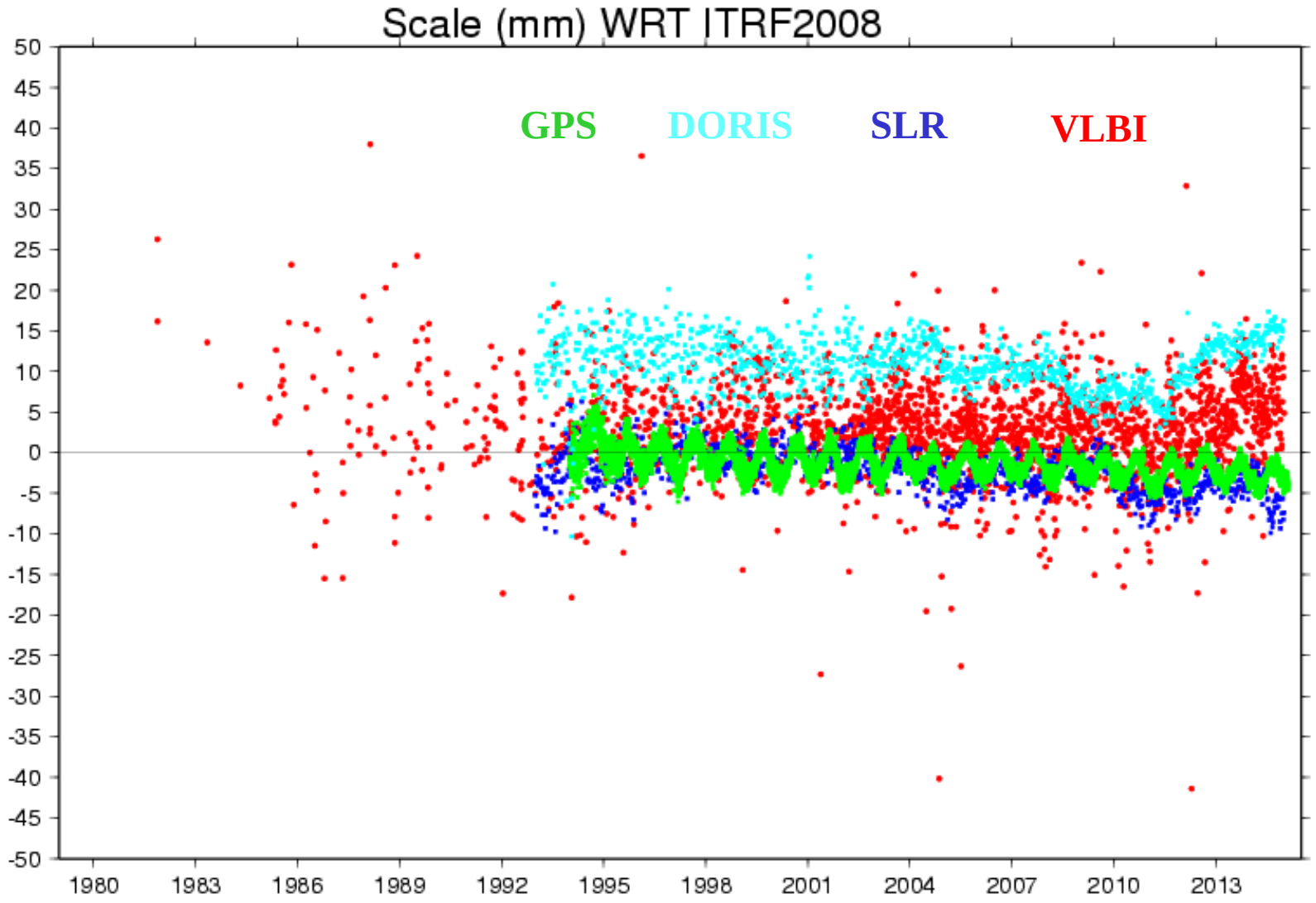
Annual + Semi-annual signals removed



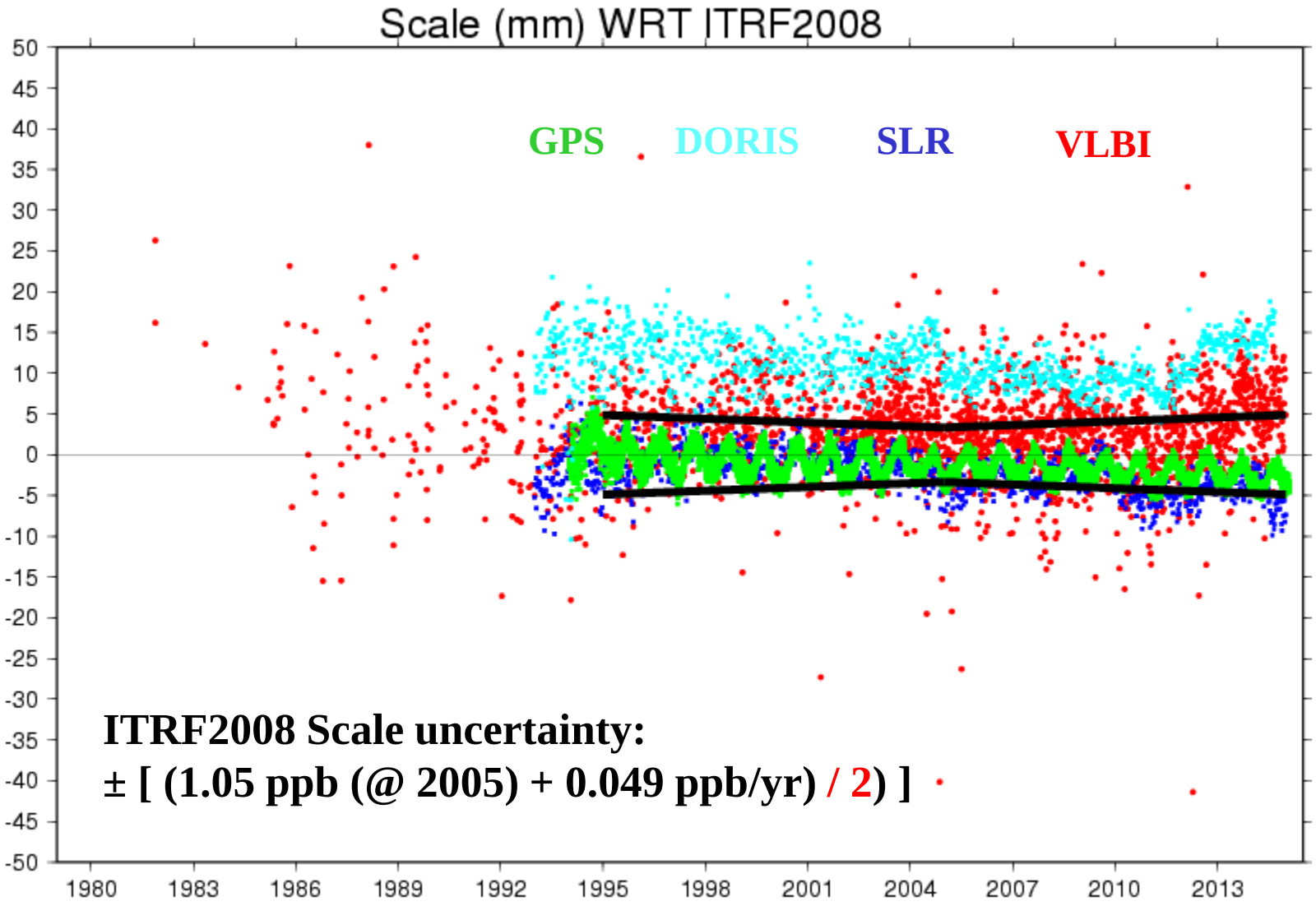
VLBI, SLR, DORIS & GPS Scales wrt ITRF2008



VLBI, SLR, DORIS & GPS Scales wrt ITRF2008



VLBI, SLR, DORIS & GPS Scales wrt ITRF2008



ITRF2008 Scale uncertainty:
± [(1.05 ppb (@ 2005) + 0.049 ppb/yr) / 2)]

Post-seismic deformations

Parametric post seismic models

Parametric models for postseismic displacements :

$$\forall i \in \{E, N, U\}, X_i(t) =$$

$$\begin{cases} X_1(t_0) + V_1 \times (t - t_0) & , \quad t < t_{eq} \\ X_2(t_{eq}) + V_2 \times (t - t_{eq}) + D(t - t_{eq}), & t > t_{eq} \end{cases}$$

Parametric postseismic models use logarithmic or exponential functions :

$D(t - t_{eqk})$ with

$$D(t - t_{eqk}) = A \; log(1 + \frac{t - t_{eqk}}{\tau}) \tag{1}$$

or

$$D(t - t_{eqk}) = A \; (1 - e^{-\frac{t - t_{eqk}}{\tau}}) \tag{2}$$

[e.g. : Kreemer et al., 2006]

or

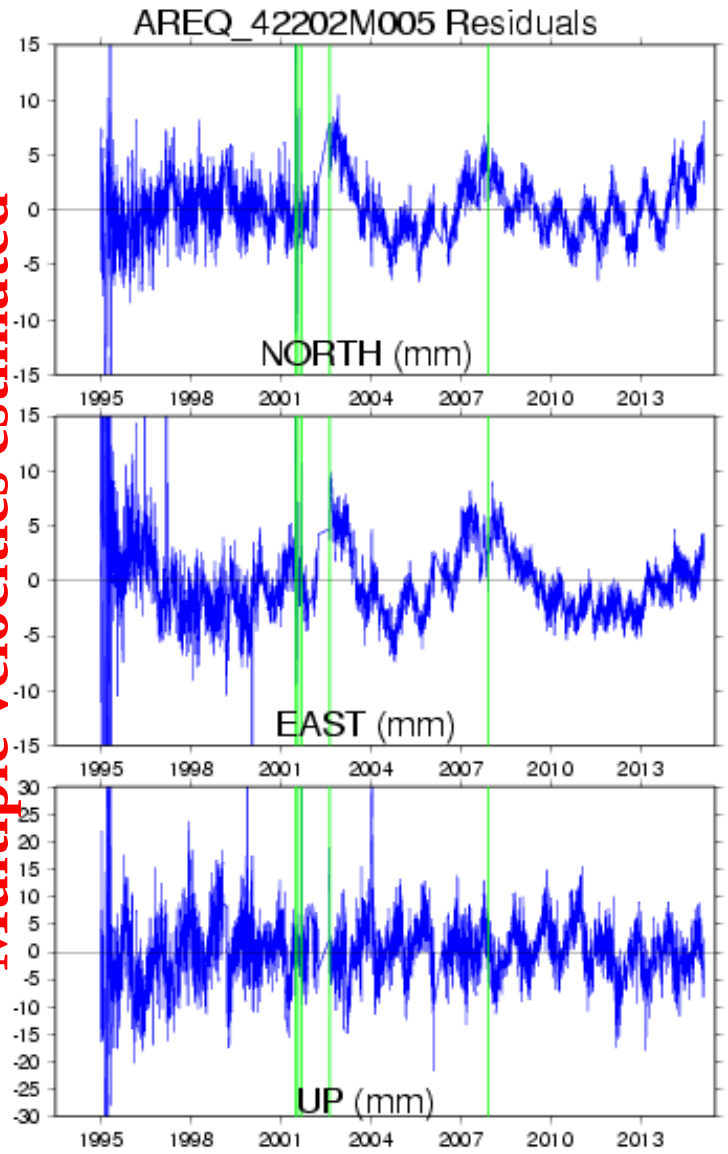
$$D(t - t_{eqk}) = A_1 \; log(1 + \frac{t - t_{eqk}}{\tau_1}) + A_2 \; (1 - e^{-\frac{t - t_{eqk}}{\tau_2}}) \tag{3}$$

or

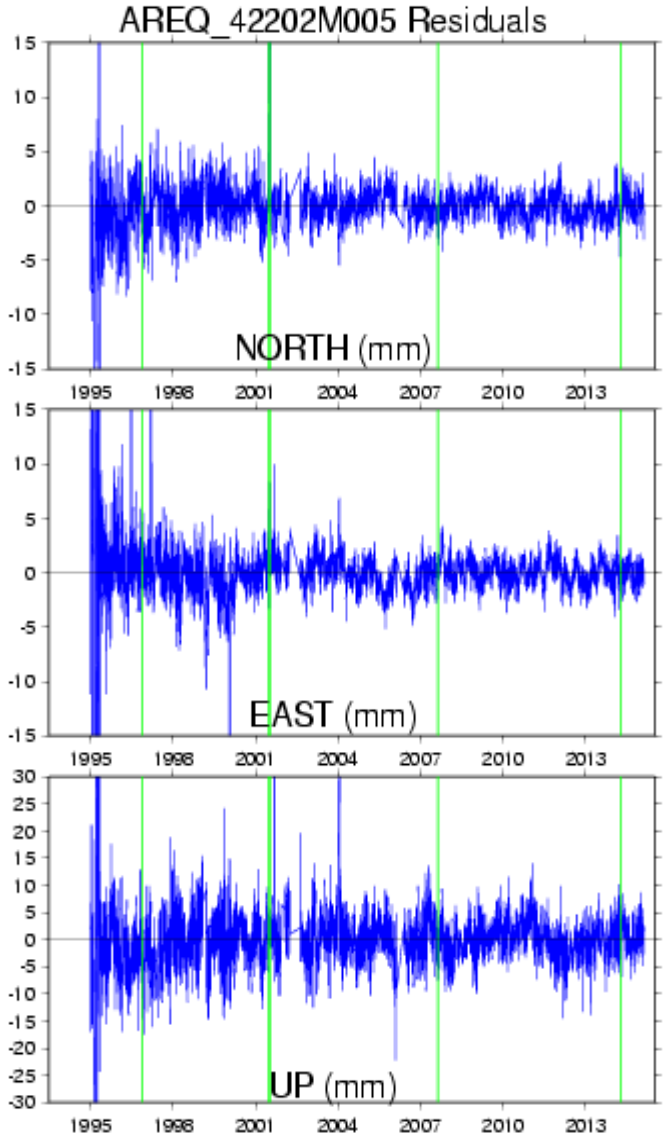
$$D(t - t_{eqk}) = A_1 \; (1 - e^{-\frac{t - t_{eqk}}{\tau_1}}) + A_2 \; (1 - e^{-\frac{t - t_{eqk}}{\tau_2}}) \tag{4}$$

Linear Function Arequipa-GPS Parametric Model

Multiple velocities estimated



Post-fit residuals

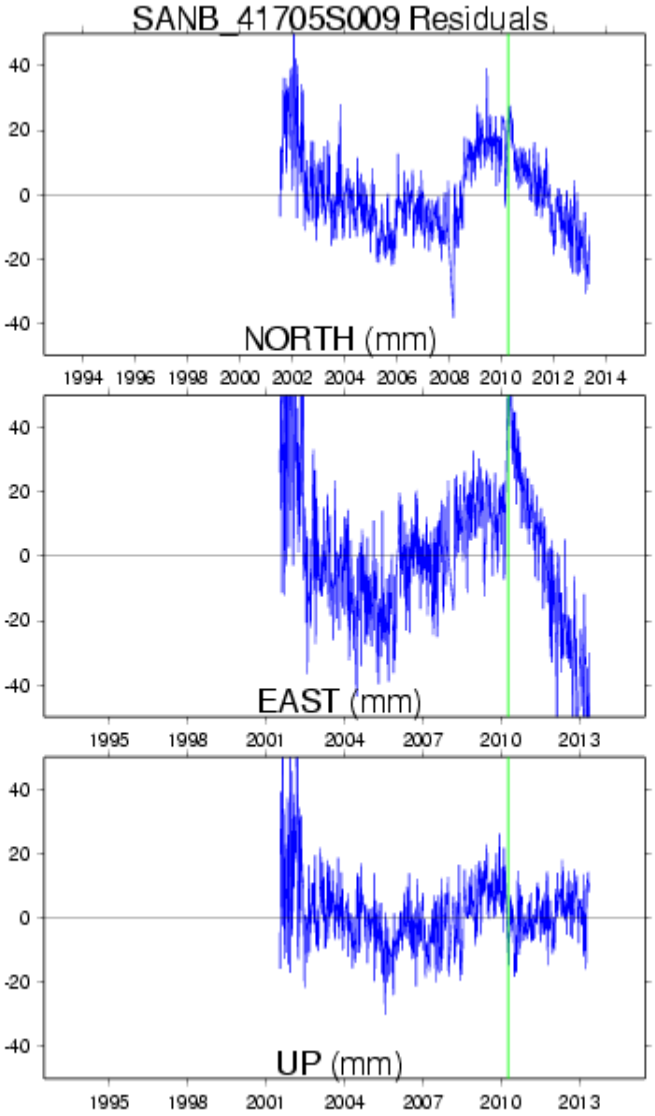


One velocity estimated

Santiago (SANB) - DORIS

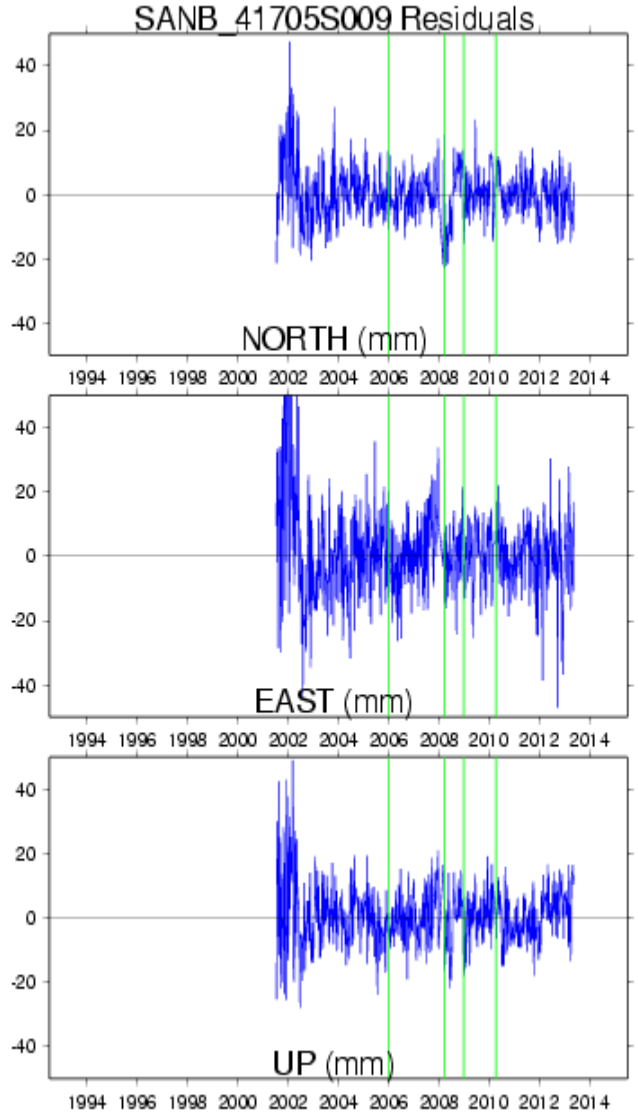
One velocities estimated

Linear Function



Post-fit residuals

Parametric Model

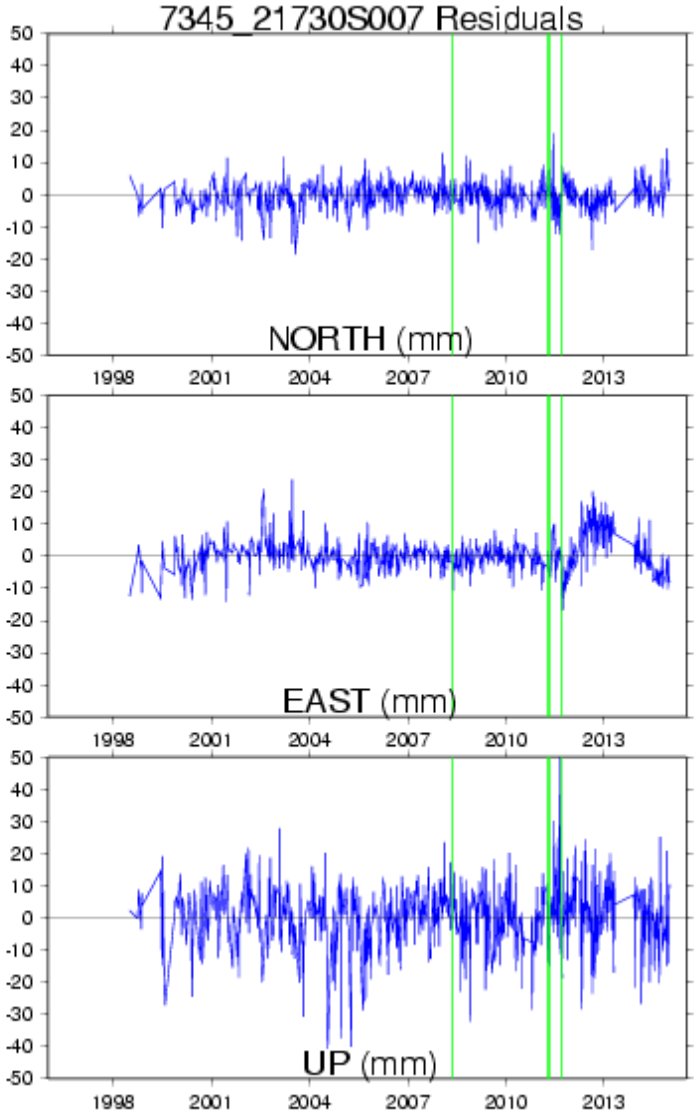


One velocity estimated

Tsukuba - VLBI

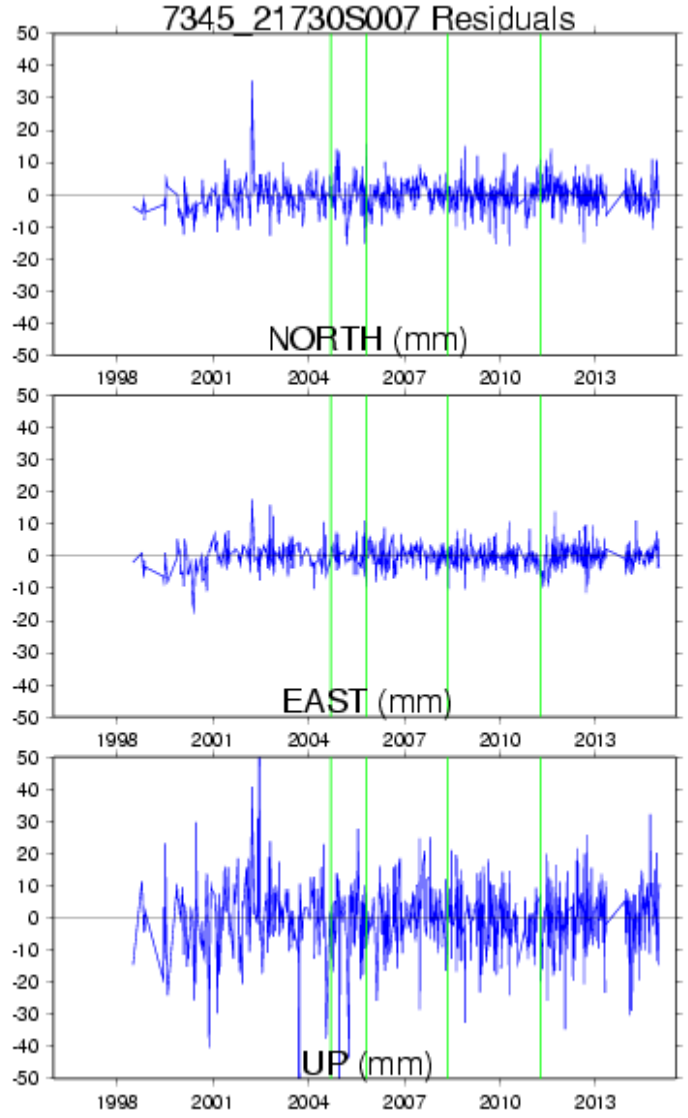
One velocities estimated

Linear Function



Post-fit residuals

Parametric Model

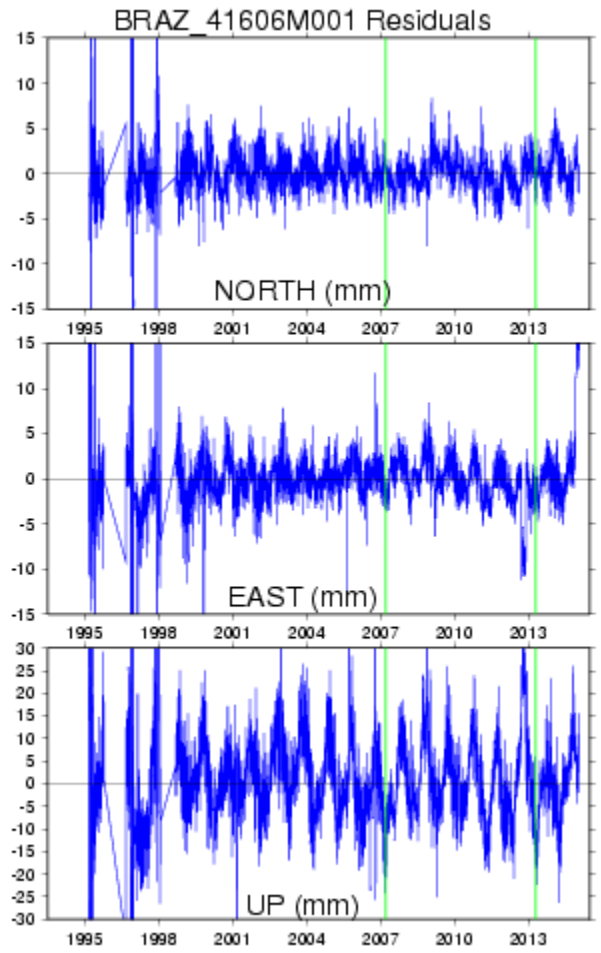


One velocity estimated

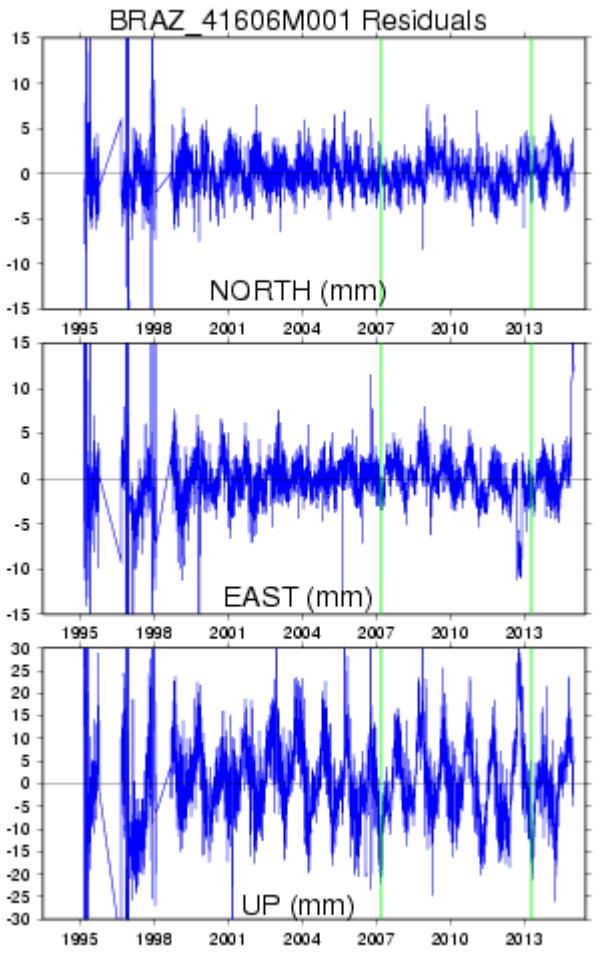
Estimating seasonal signals
vs
applying NATML model ?

Brasilia GNSS site

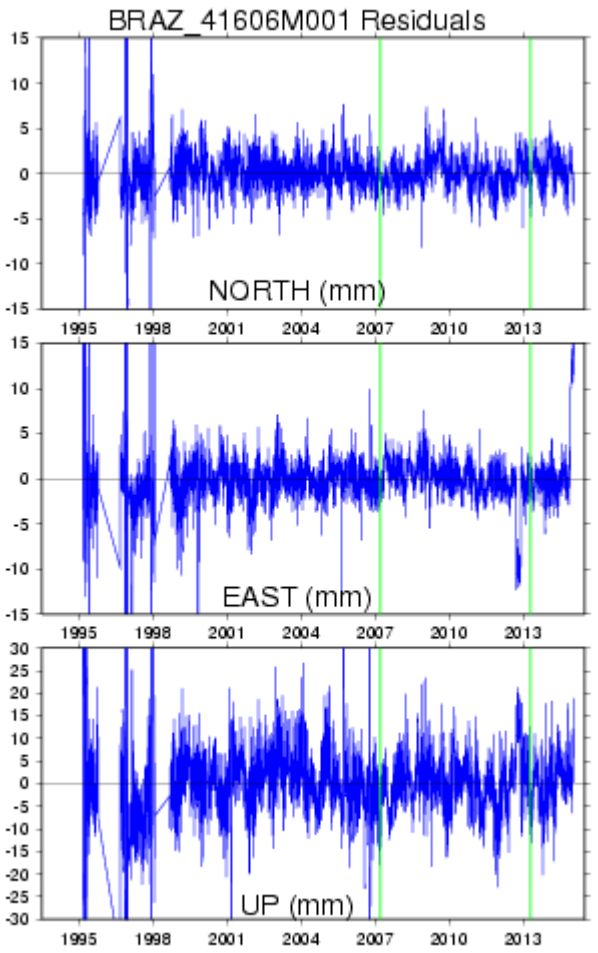
Standard residuals



ATML-corrected before stacking



Annual & semi-annual estimated



ITRF2014 Products

- **The usual products:**
  - Station positions, velocities and residuals;
  - EOPs
- **Additional/new products**
  - Geocenter motion model (amplitude & phase per component: X, Y, Z), probably from SLR only
  - Post-seismic parametric models (amplitude A & relaxation time τ) Necessary to propagate coordinates at any epoch
  - On request: periodic signals (amplitudes & phases), per technique

Conclusions

- **Work in progress: still a lot to do!**
- **When? hopefully by summer 2015**