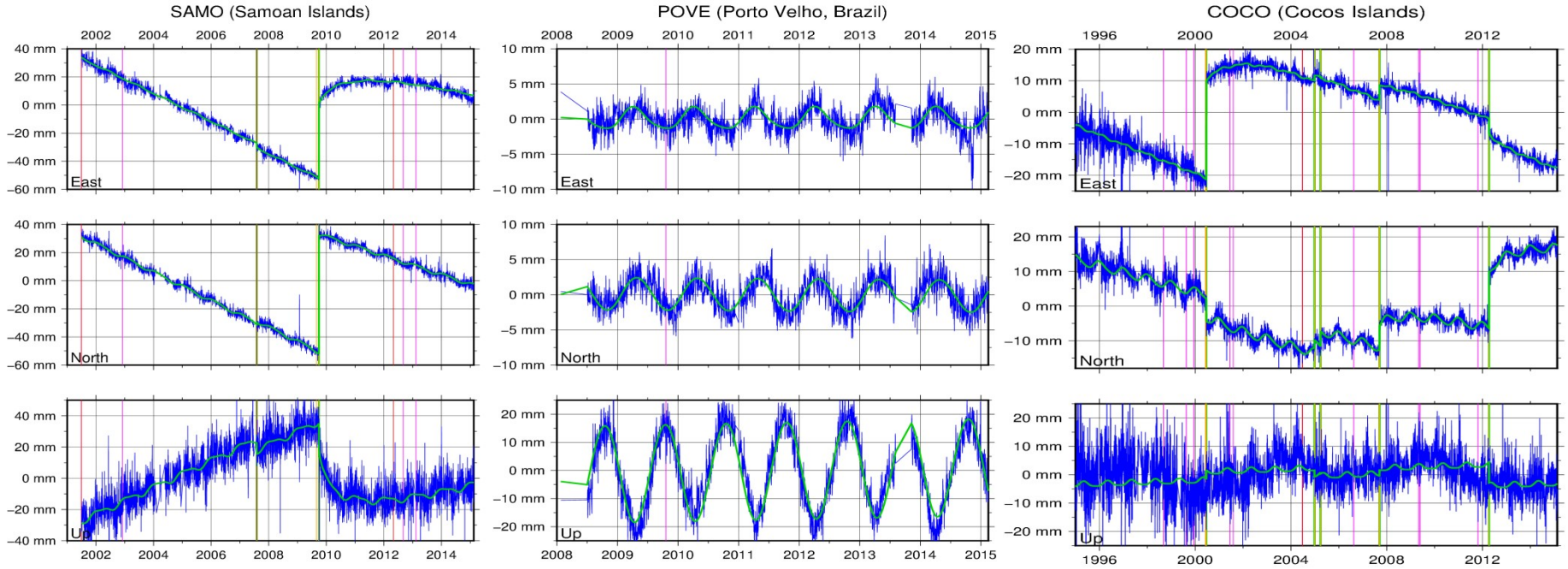
Status of ITRF2014 analysis



Zuheir Altamimi,
Paul Rebischung, Xavier Collilieux, Laurent Métivier

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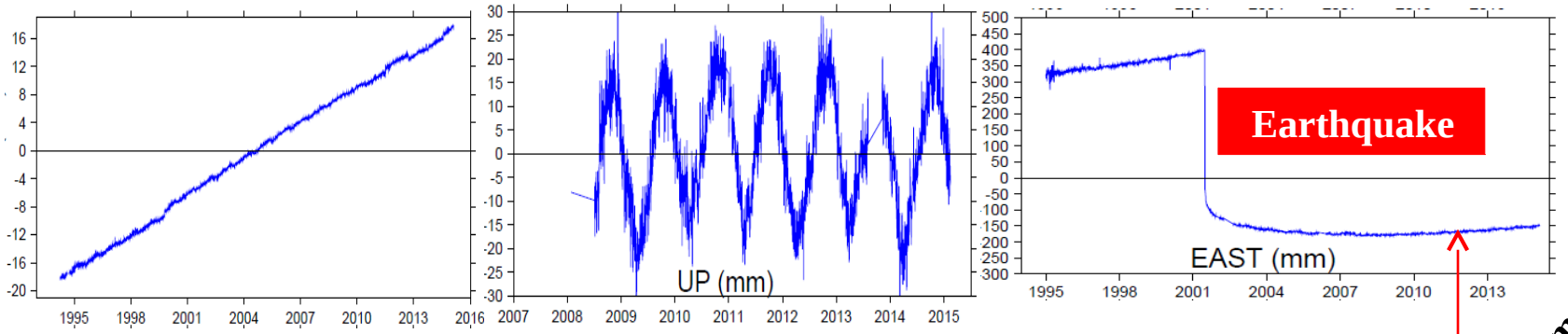
Key Points of ITRF2014

- The Network: DORIS, GNSS, SLR & VLBI
- Linear & Non-linear motions
  - Periodic signals: seasonals (e.g. annual, semi-annual) & others (e.g. draconitics for certain satellites)
  - Post-seismic deformation

Preliminary results, but close to final

Power of station position time series

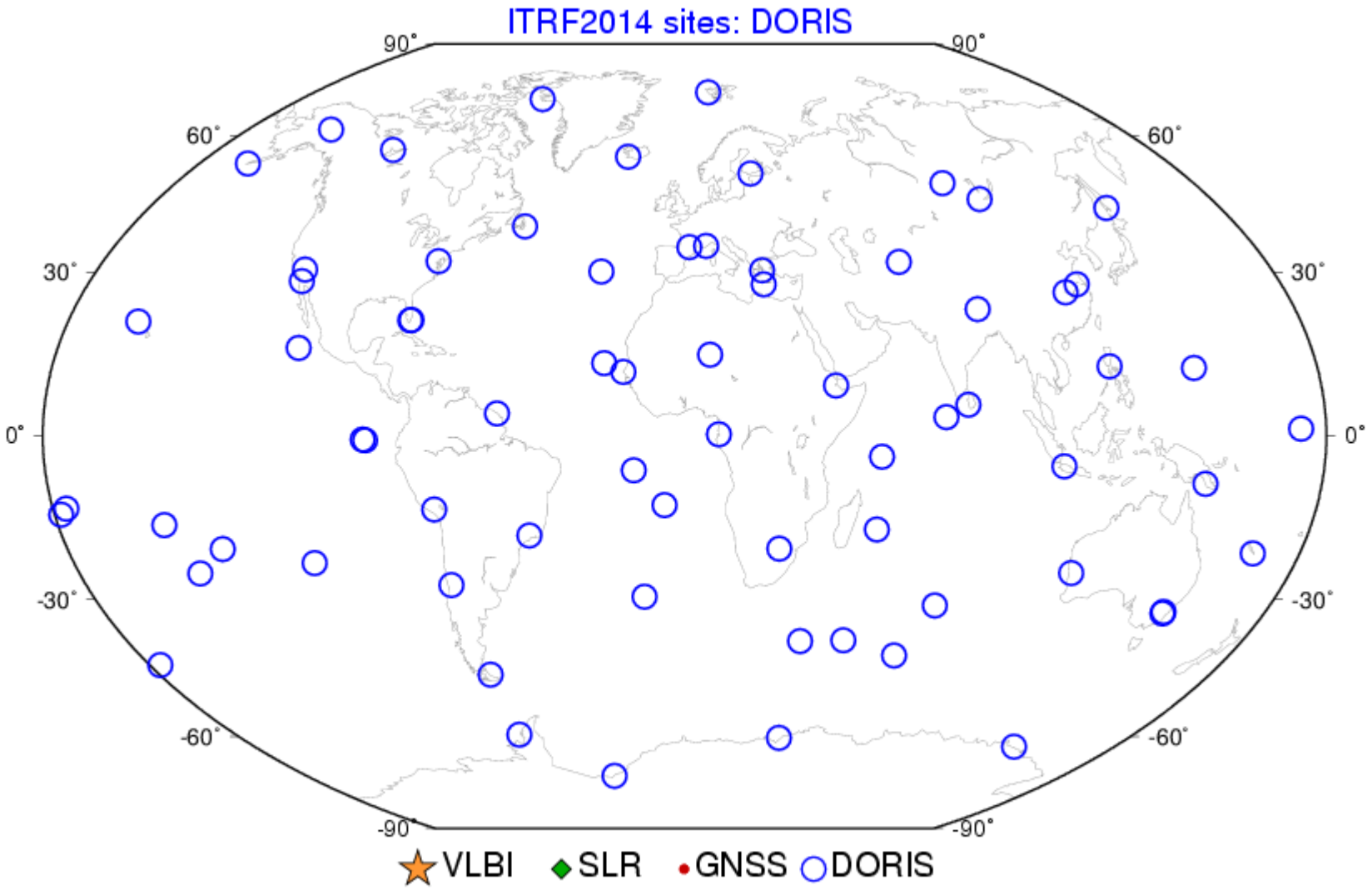
- **Monitor station behavior**
  - **Linear, non-linear: periodic, discontinuities, post-seismic**



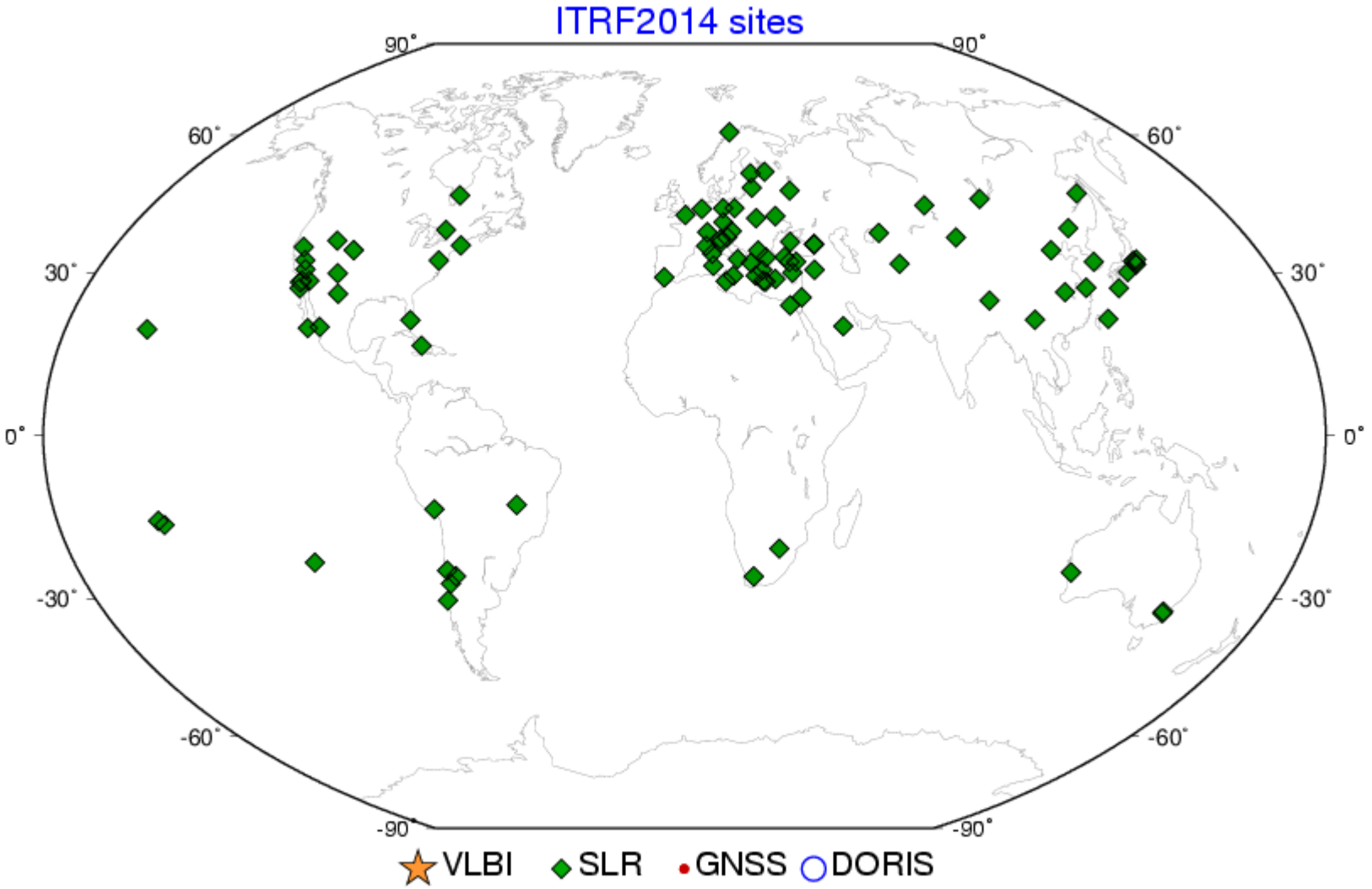
- **Monitor time evolution of the frame physical parameter (origin and scale)**

- **Estimate a robust long-term secular frame**

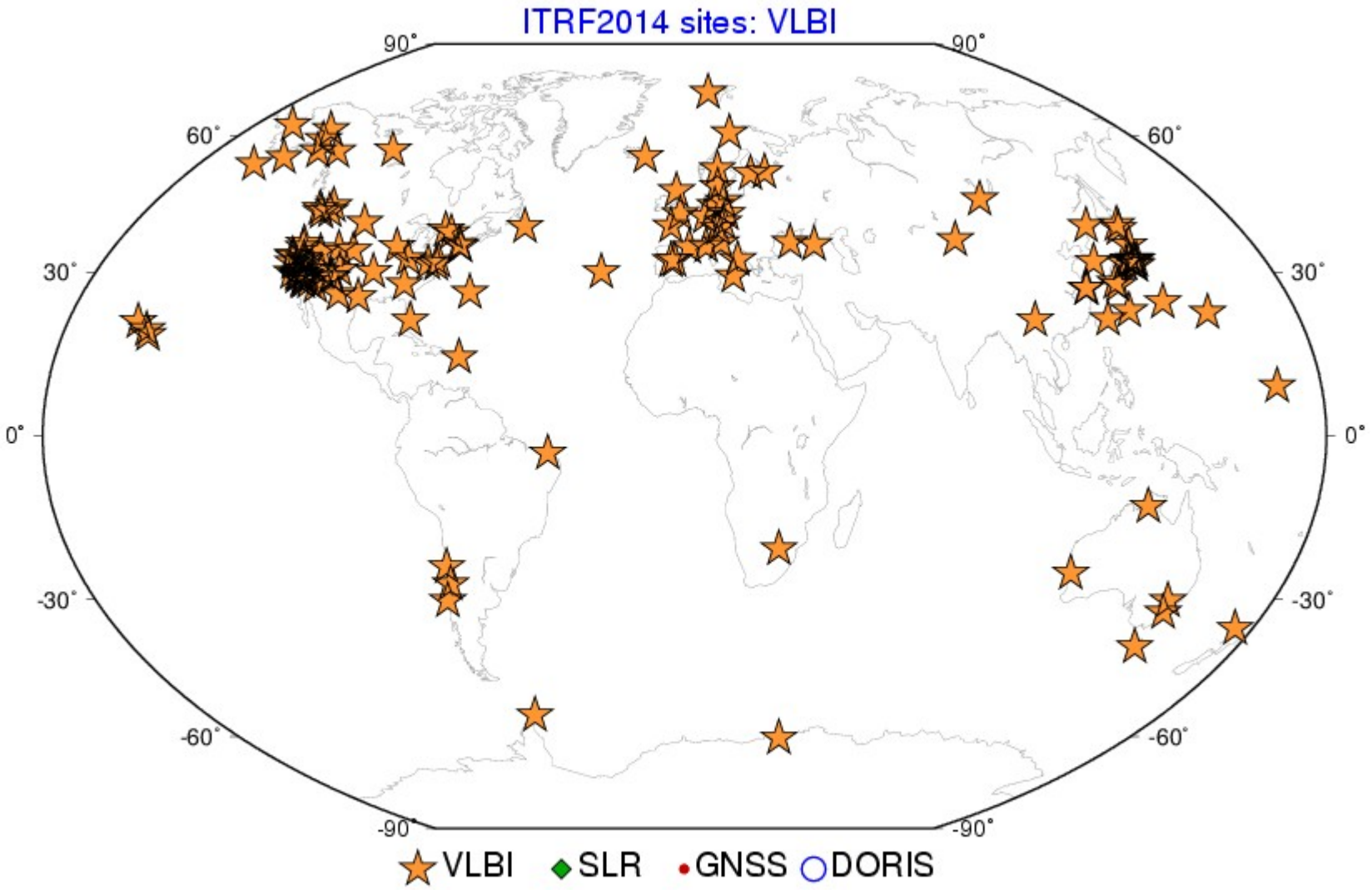
ITRF2014: DORIS



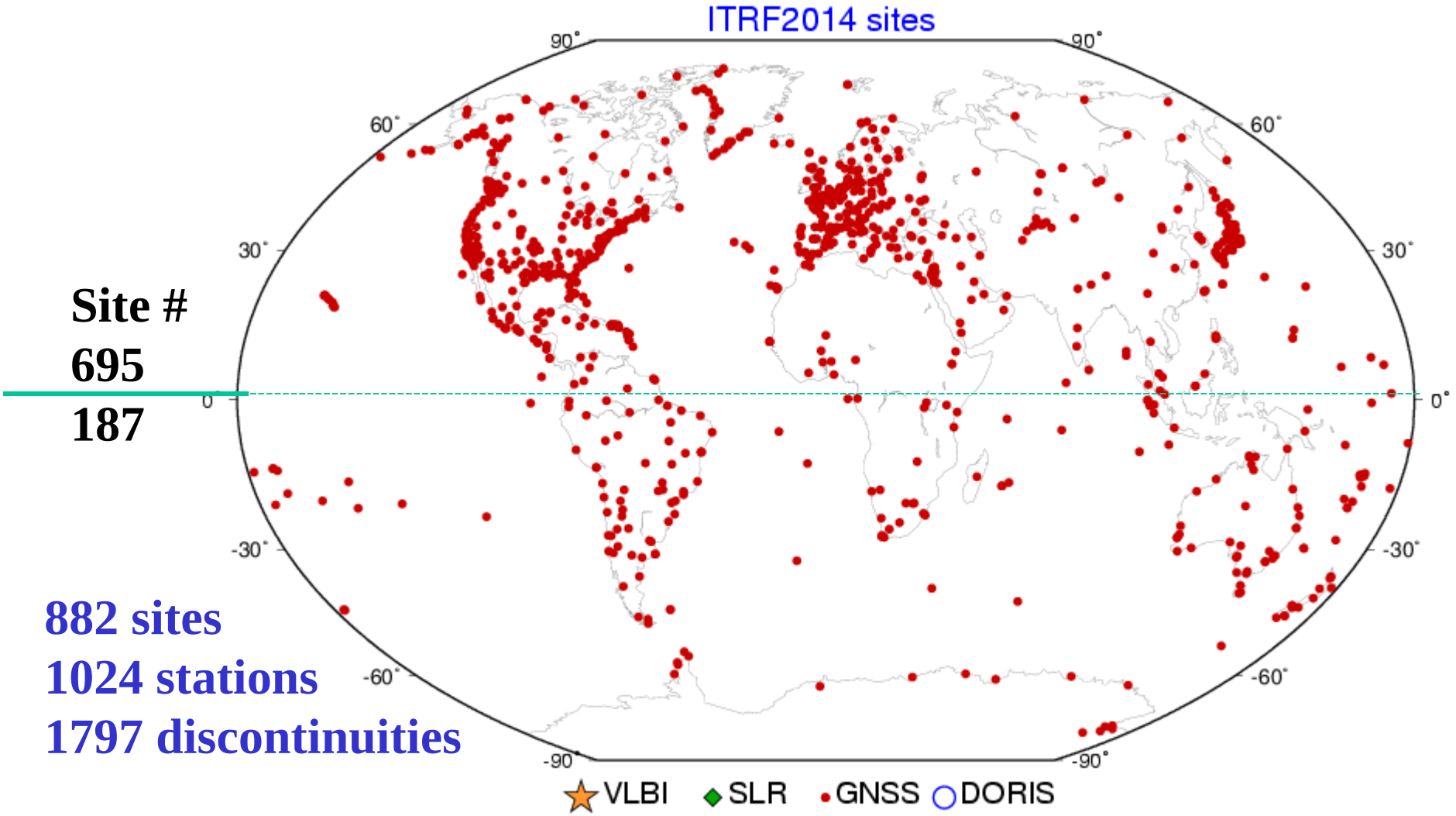
ITRF2014 : SLR



ITRF2014: VLBI



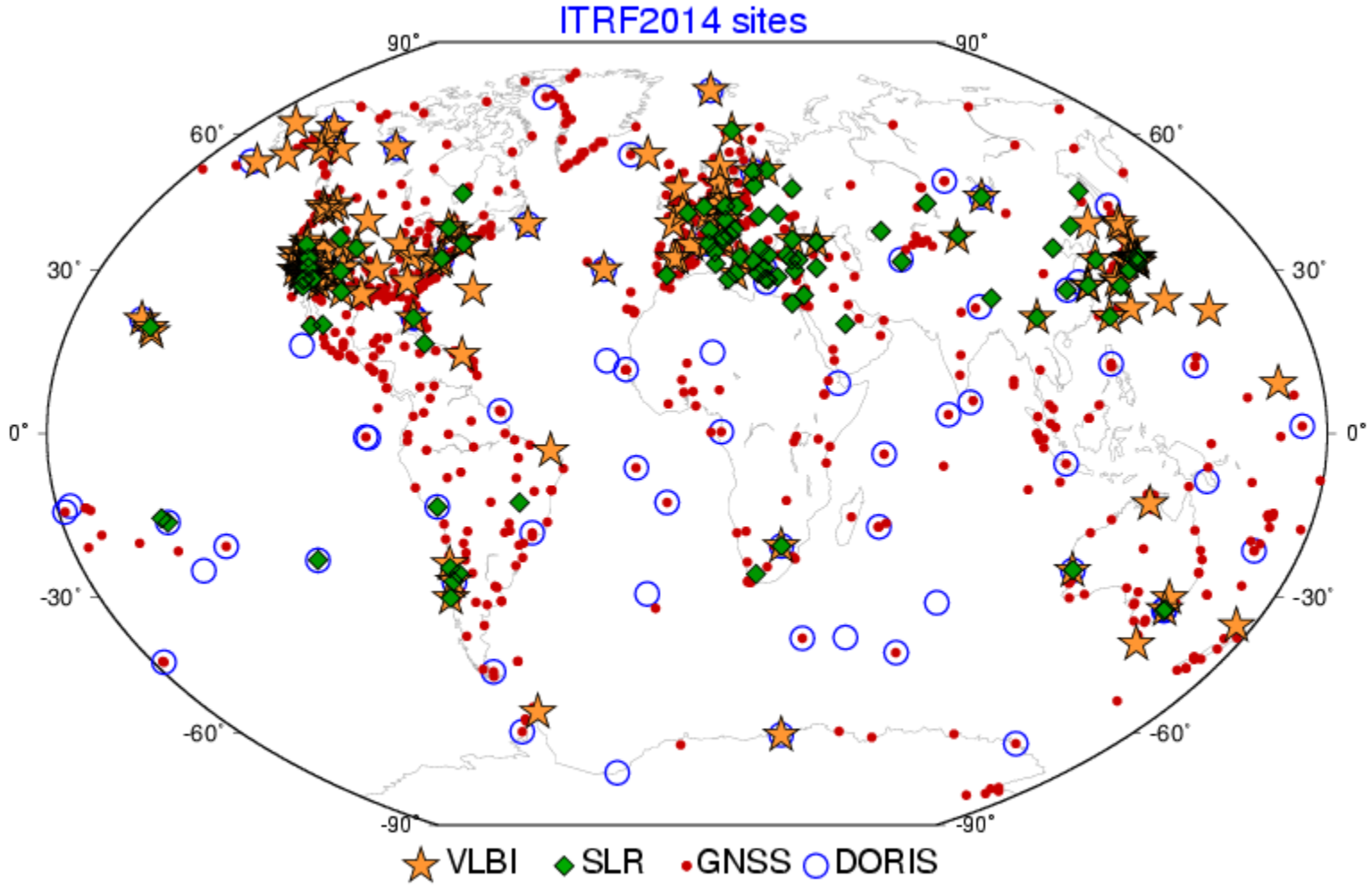
ITRF2014: GNSS



Site #
695
187

882 sites
1024 stations
1797 discontinuities

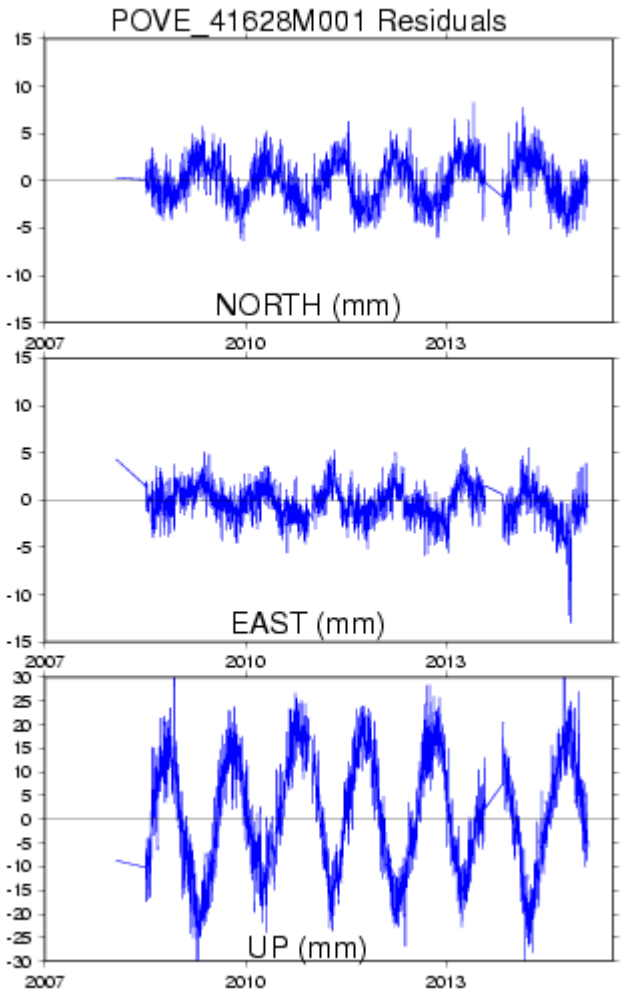
ITRF2014



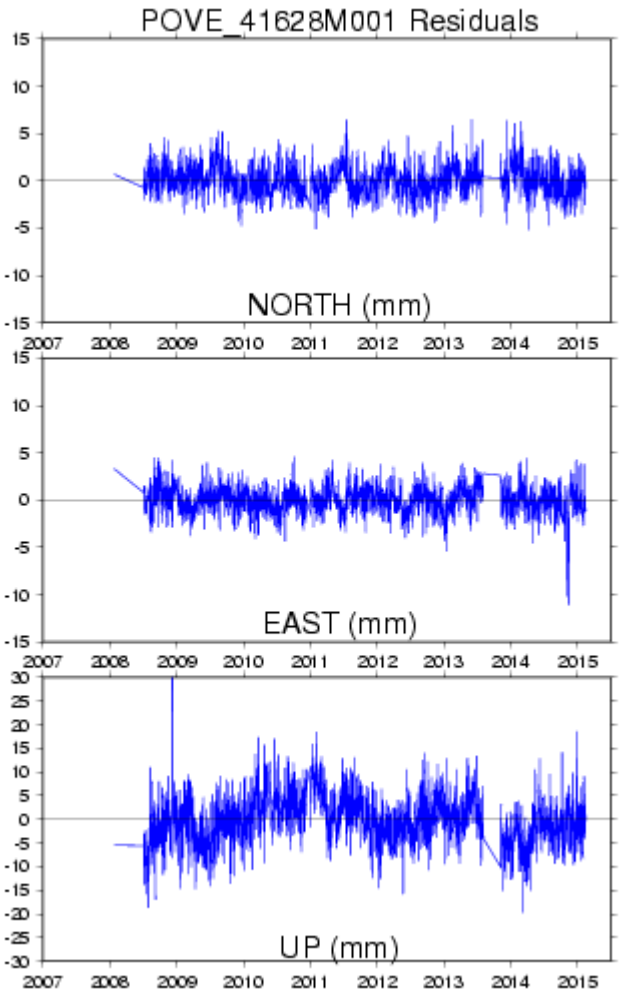
Periodic signals

POVE/ Brazil GNSS site

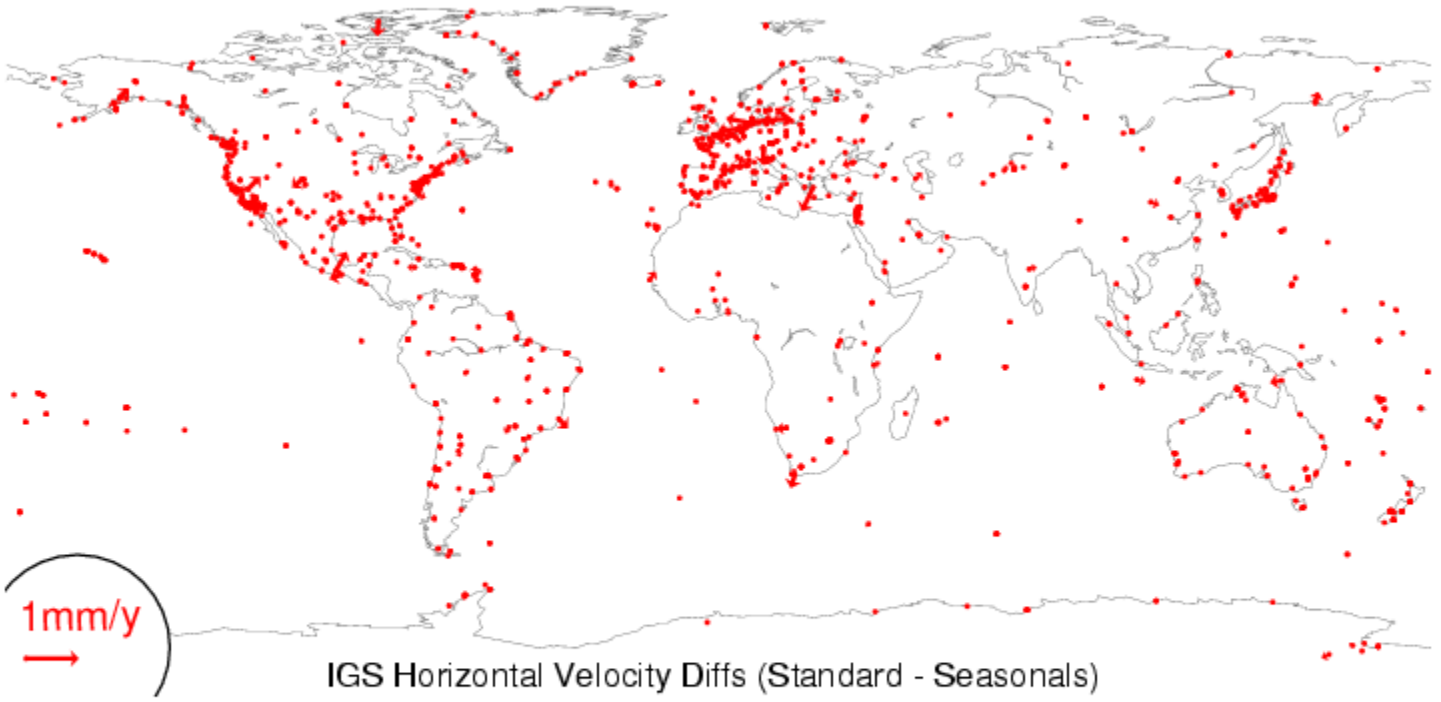
Standard residuals



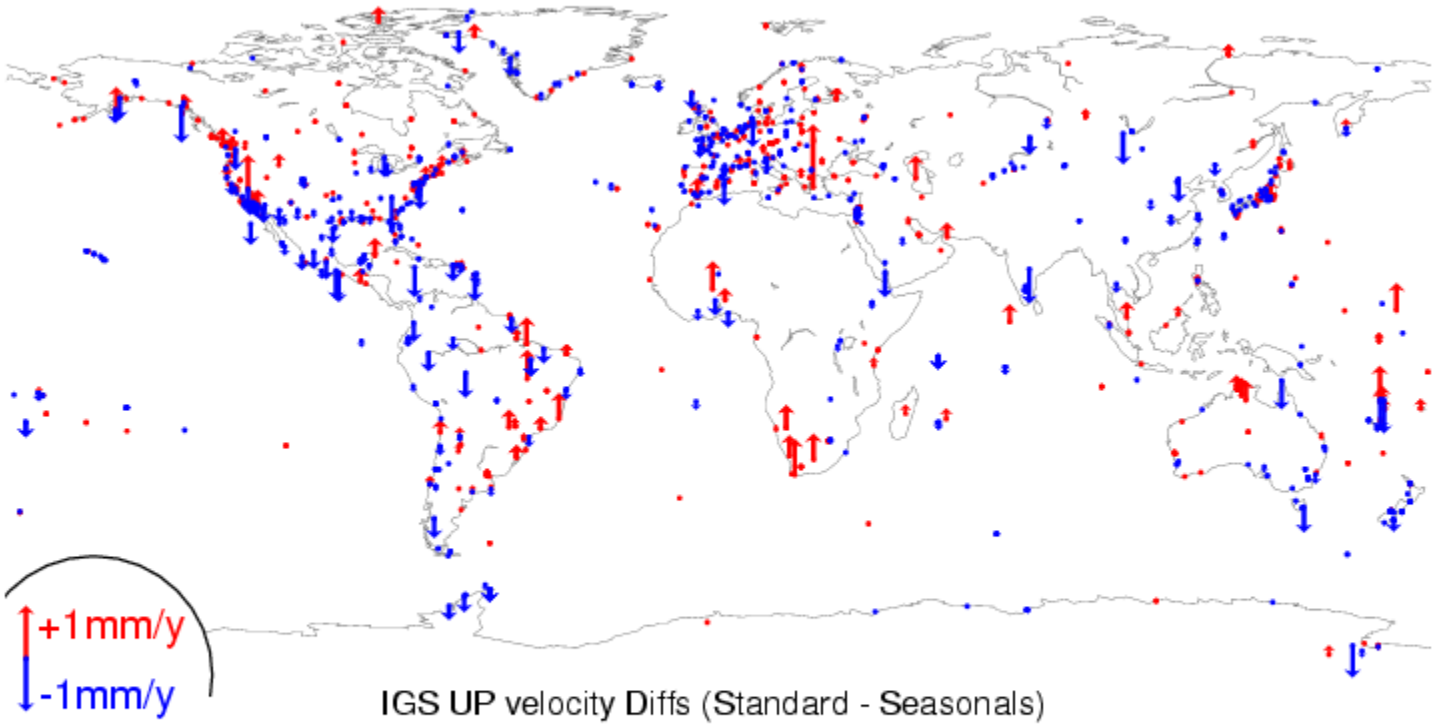
Annual & semi-annual estimated



IGS Horizontal Velocity Differences (Standard – Annual+Semi-Annual)

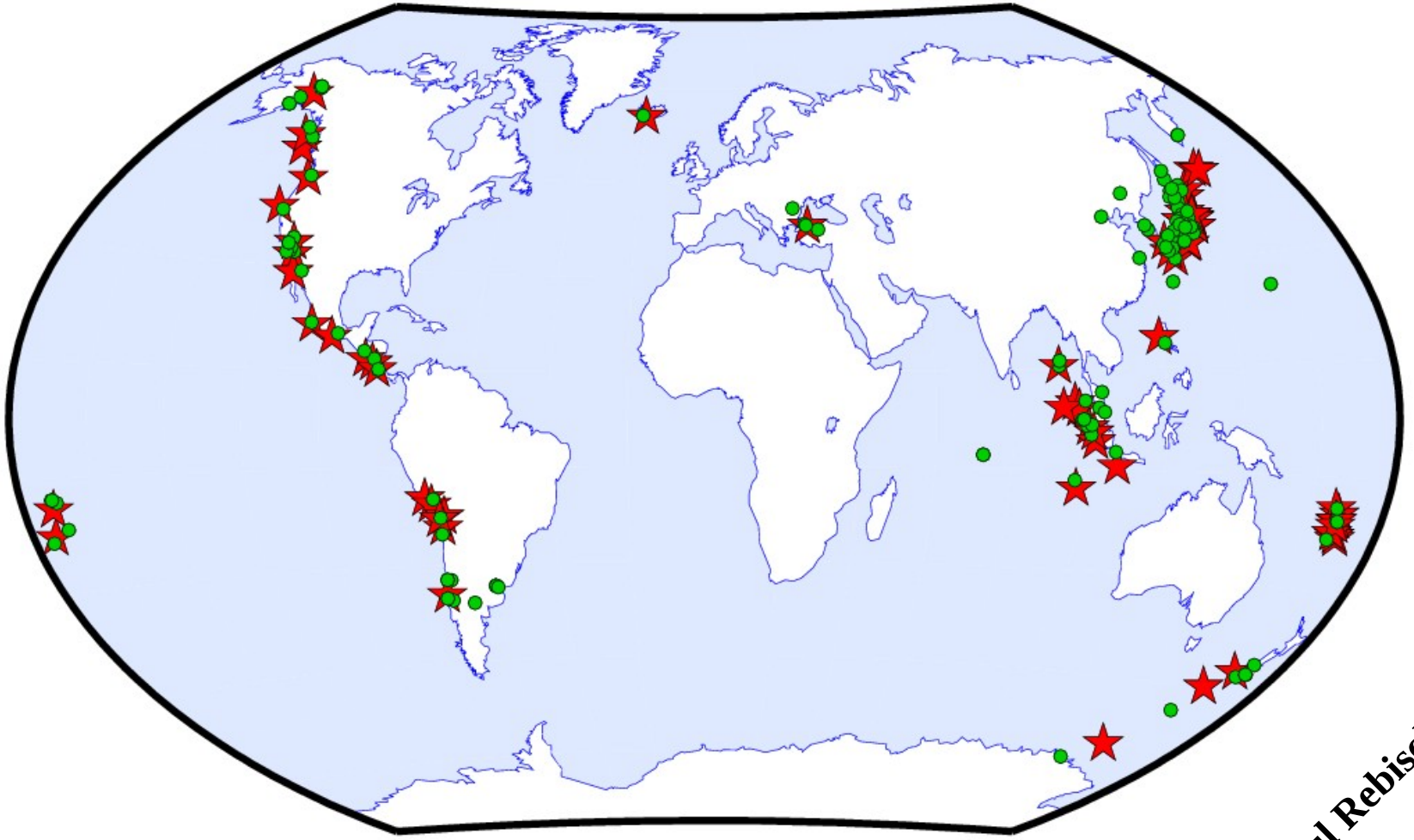


IGS Vertical Velocity Differences (Standard – Annual+Semi-Annual)



Post-Seismic Deformations

ITRF2014 Site affected by PSD



Red Stars: EQ Epicenters

Green circles: ITRF2014 sites

Artist: Paul Rebischung

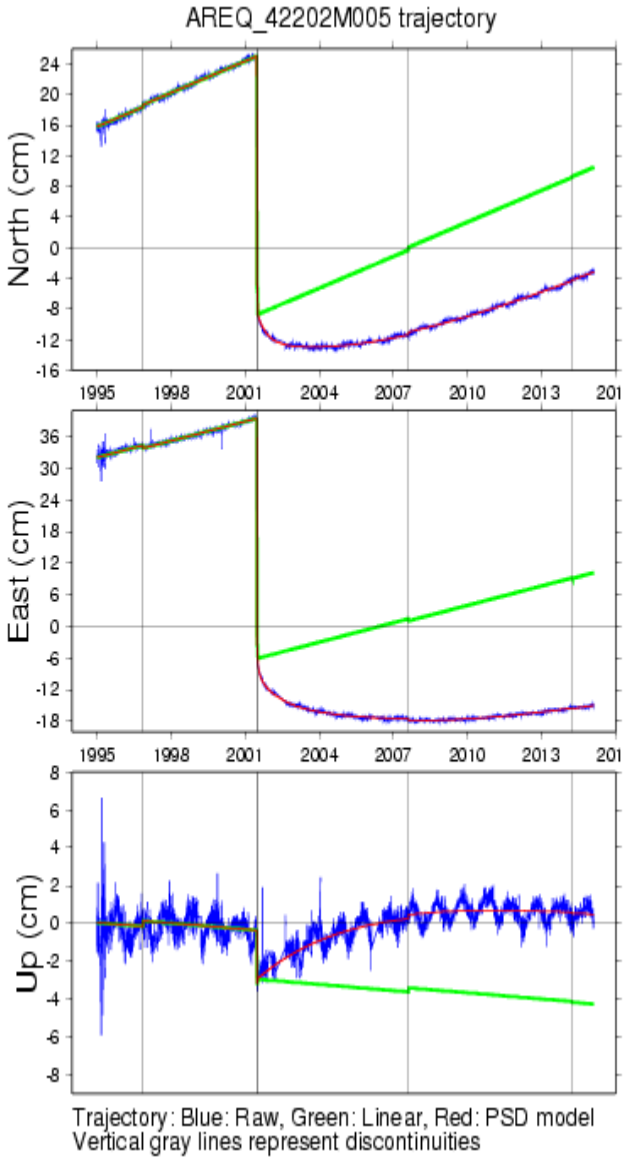
Post seismic parametric models

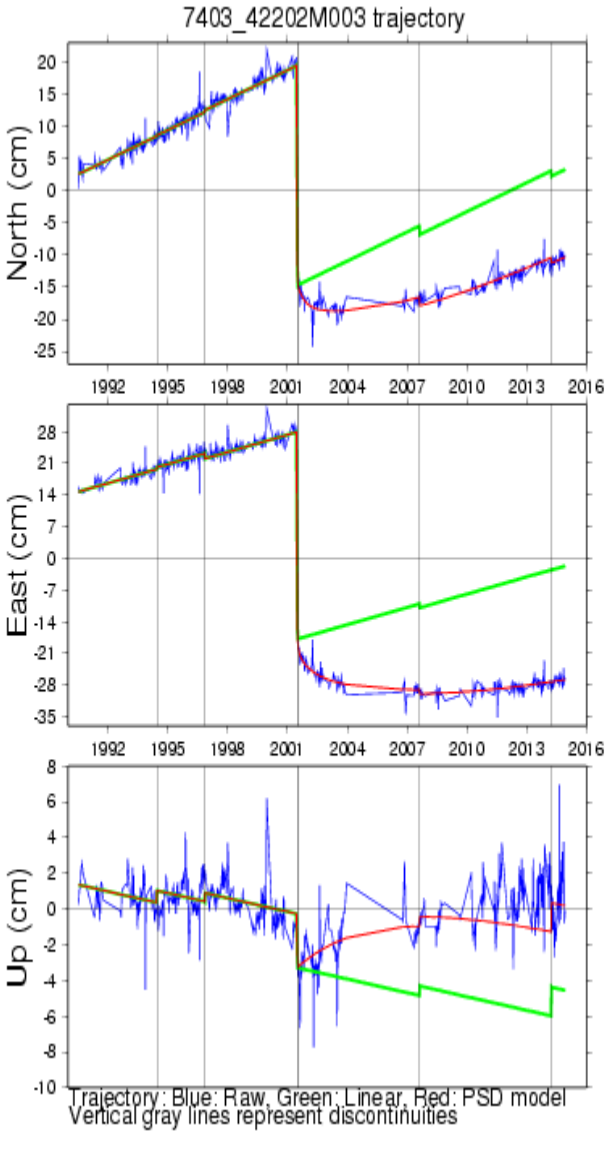
$$X(t) = X(t_0) + \dot{X}(t - t_0) + \delta X_{psd}(t)$$

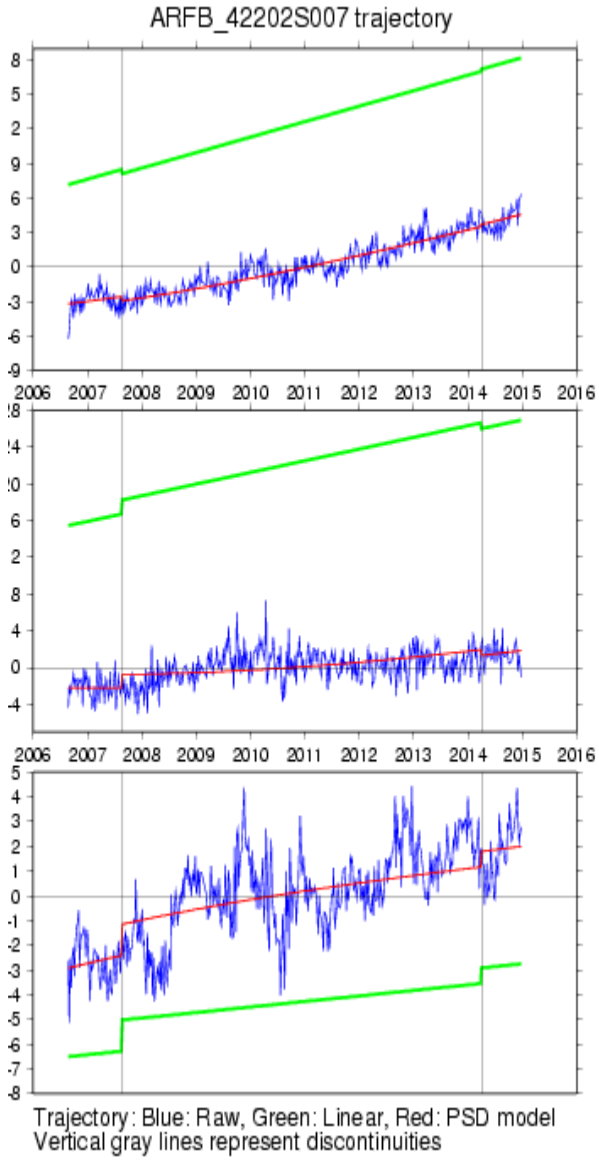
$$\delta L(t) = \sum_{i=1}^{n^l} A_i^l \log(1 + \frac{t - t_i^l}{\tau_i^l}) \oplus \sum_{i=1}^{n^e} A_i^e (1 - \mathrm{e}^{-\frac{t - t_i^e}{\tau_i^e}})$$

- **Piece-Wise Linear (PWL) function**
- **Parametric models:**
  - **Logarithmic**
  - **Exponential**
  - **Log + Exp**
  - **Two Exp**

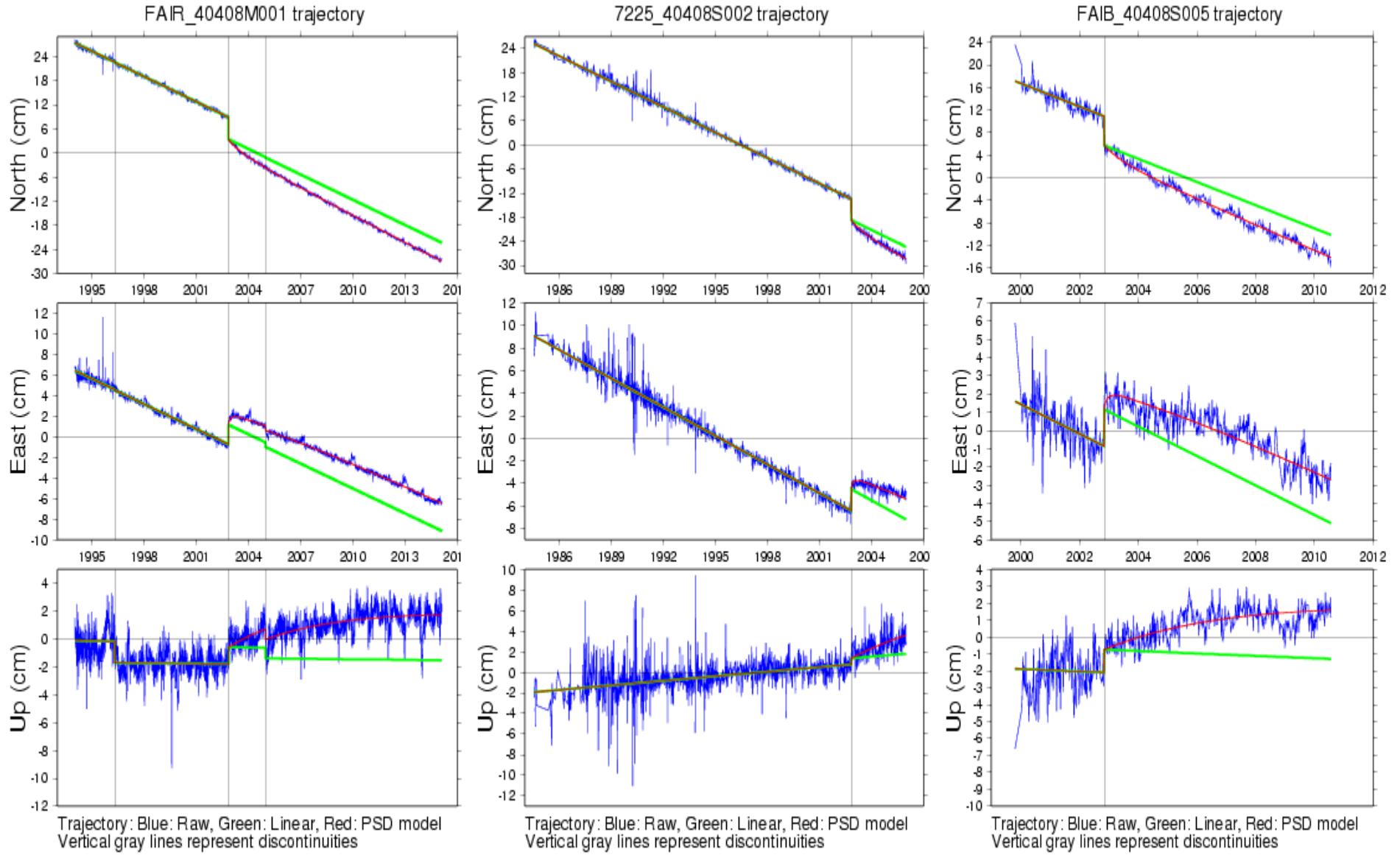
Arequipa-GPS, SLR & DORIS





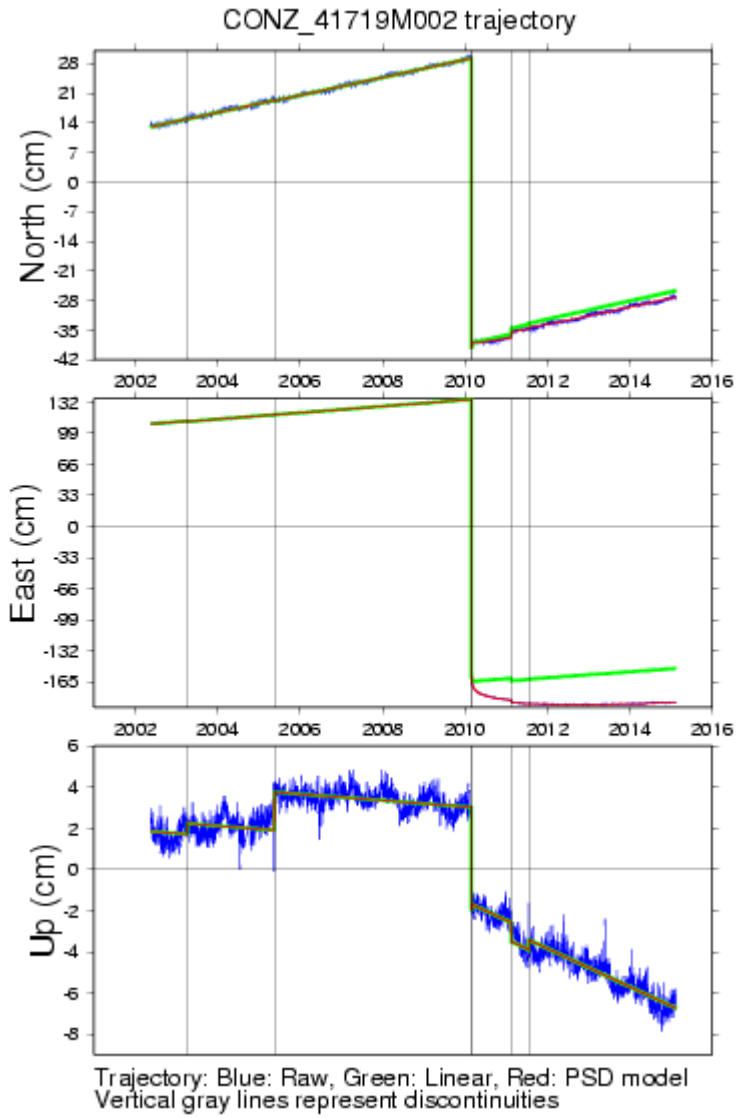


Fairbanks: GPS, VLBI & DORIS

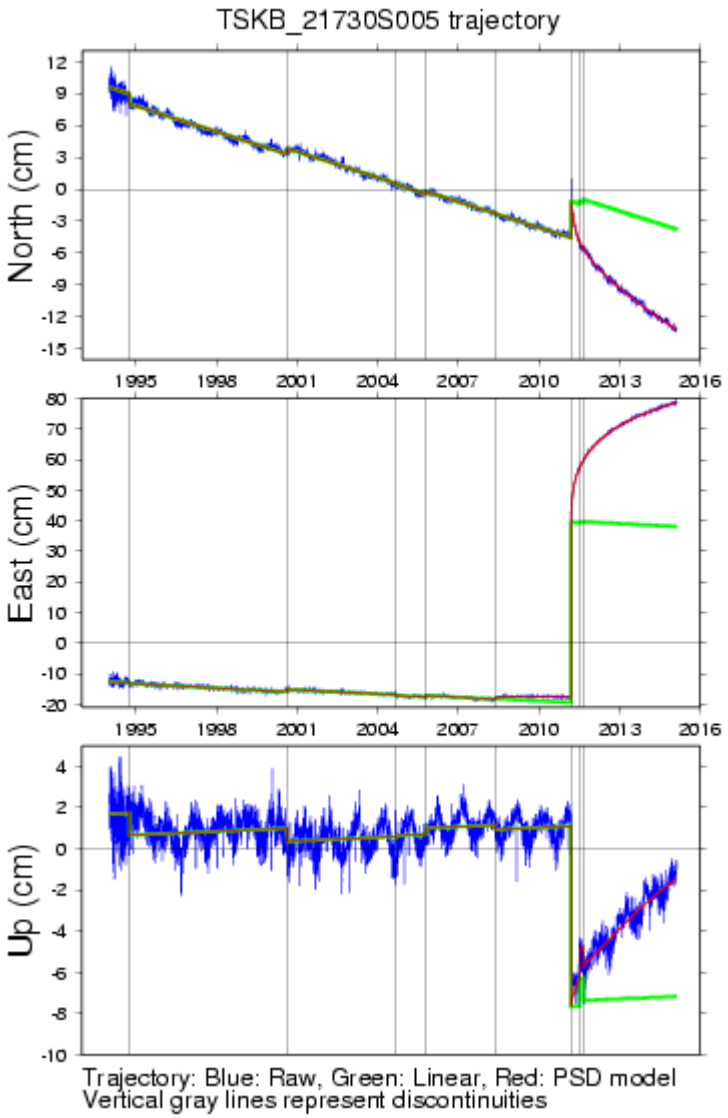


CONZ & TSKB

CONZ Trajectory

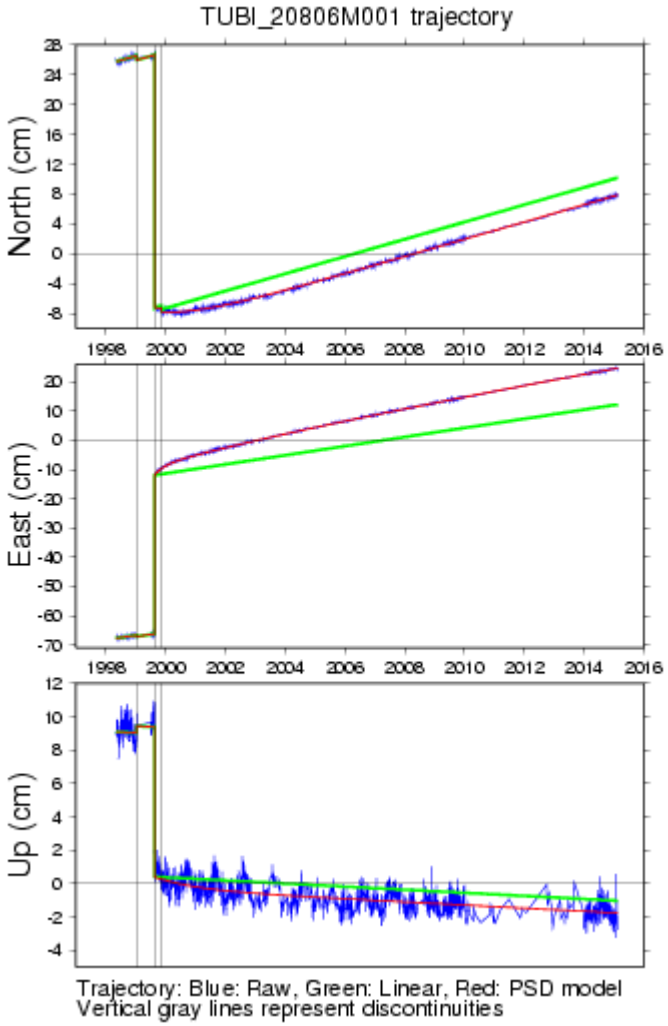


TSKB Trajectory

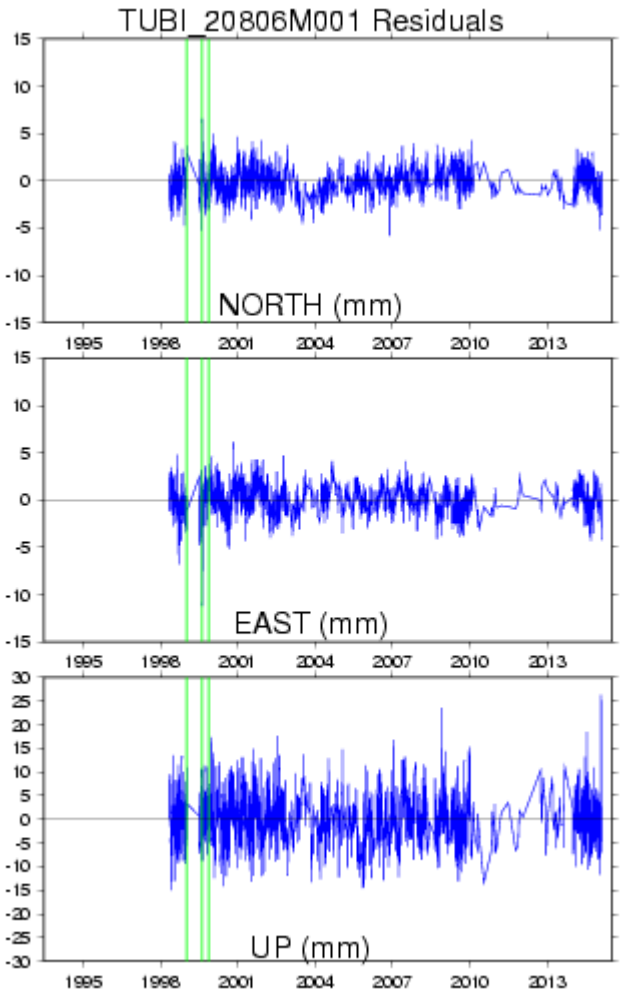


EPN station TUBI

Trajectory

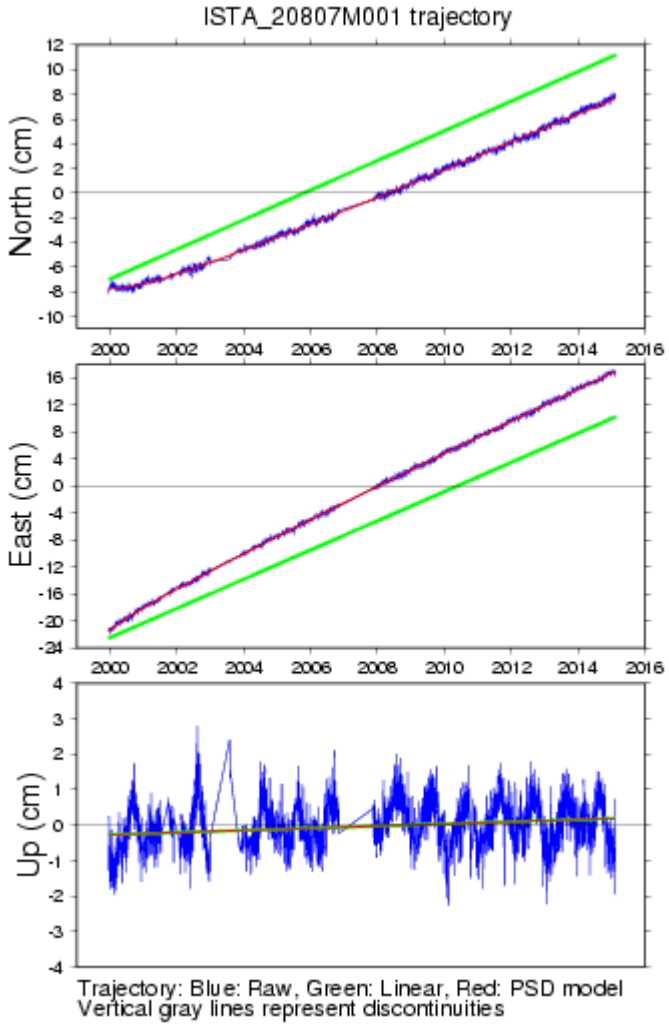


Residuals

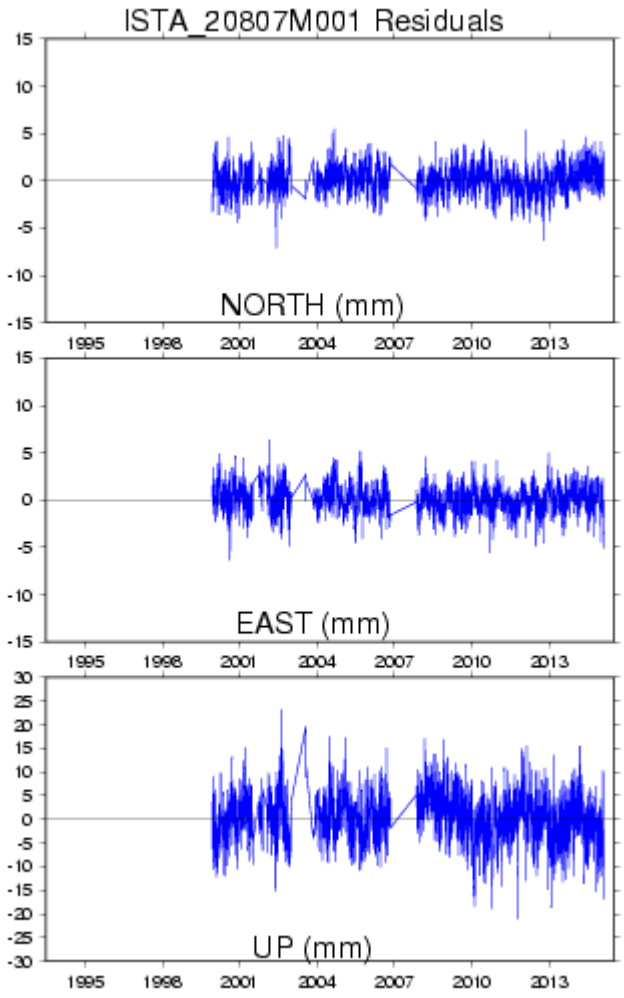


EPN station ISTA

Trajectory

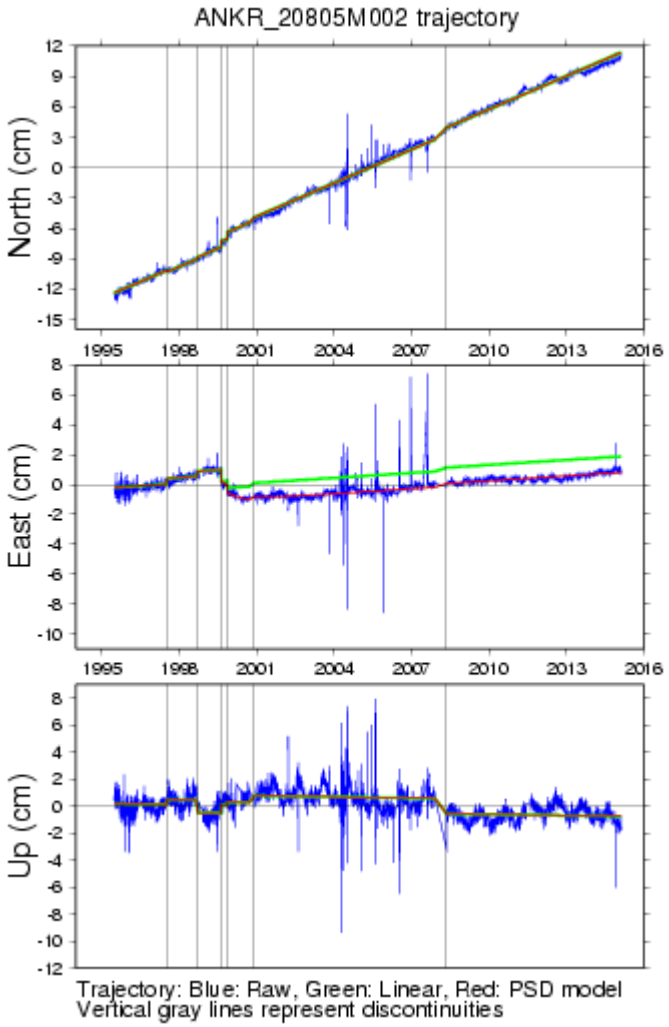


Residuals

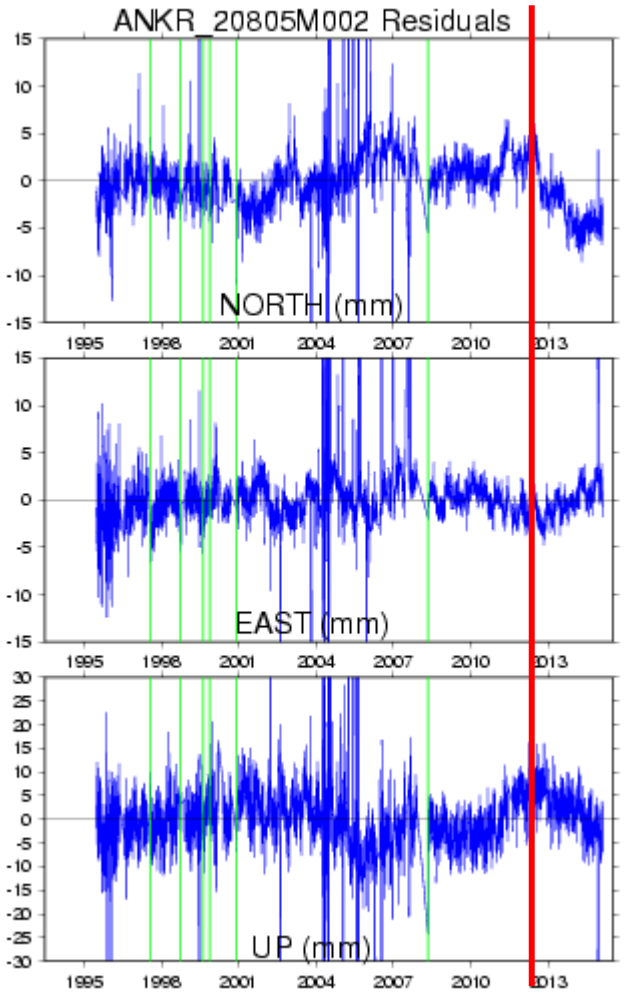


EPN station ANKR

Trajectory

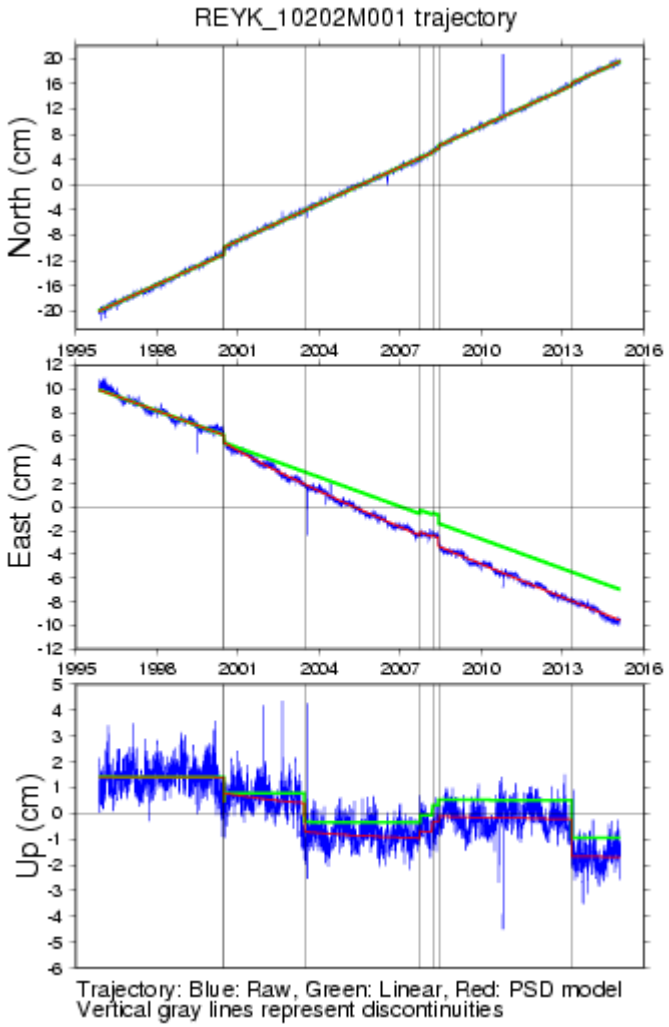


Residuals

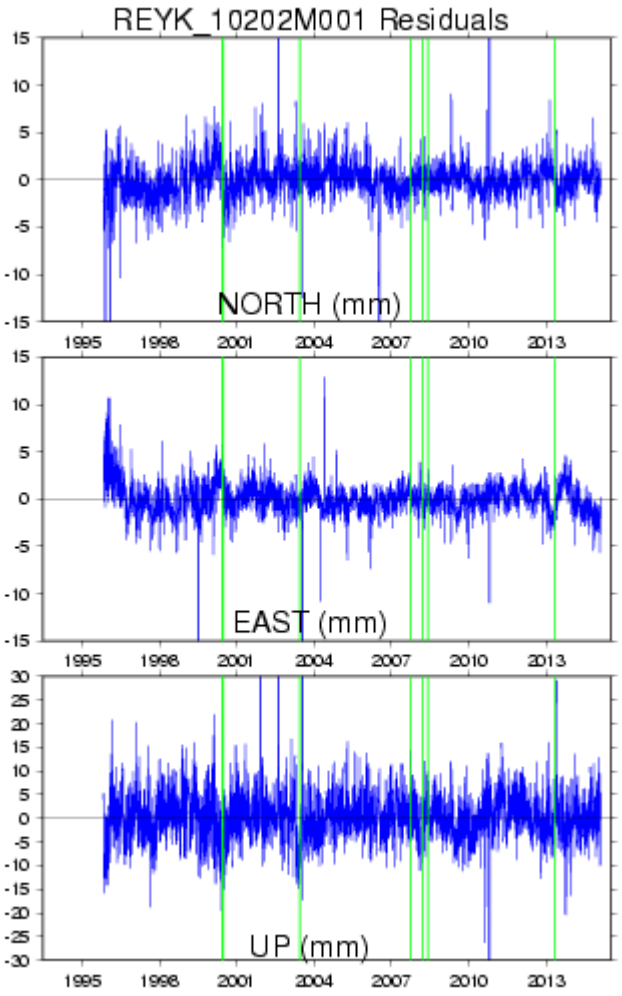


EPN station REYK

Trajectory

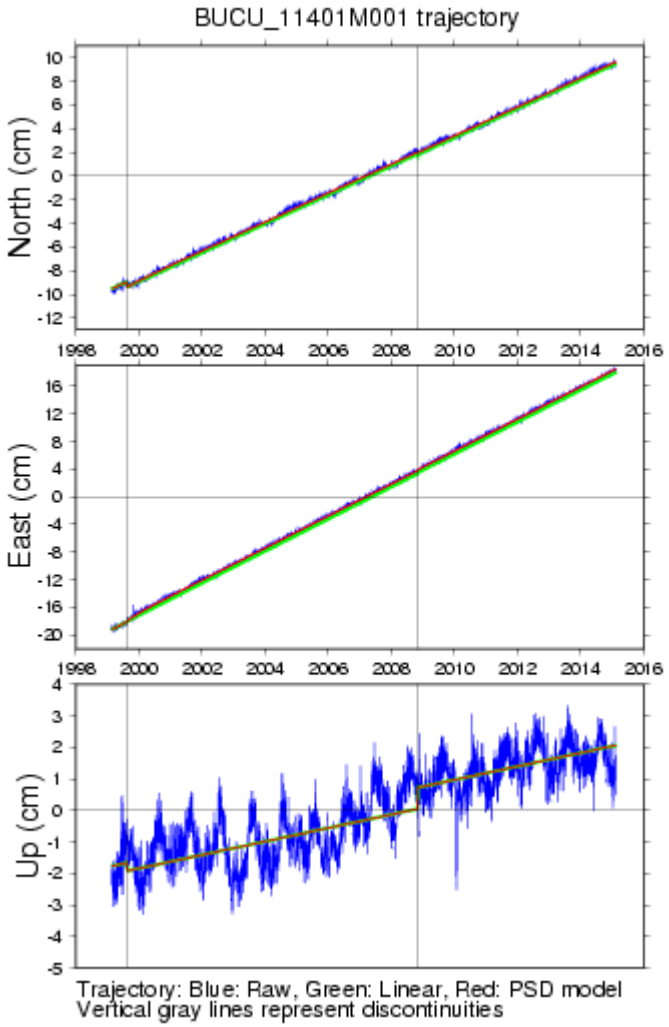


Residuals

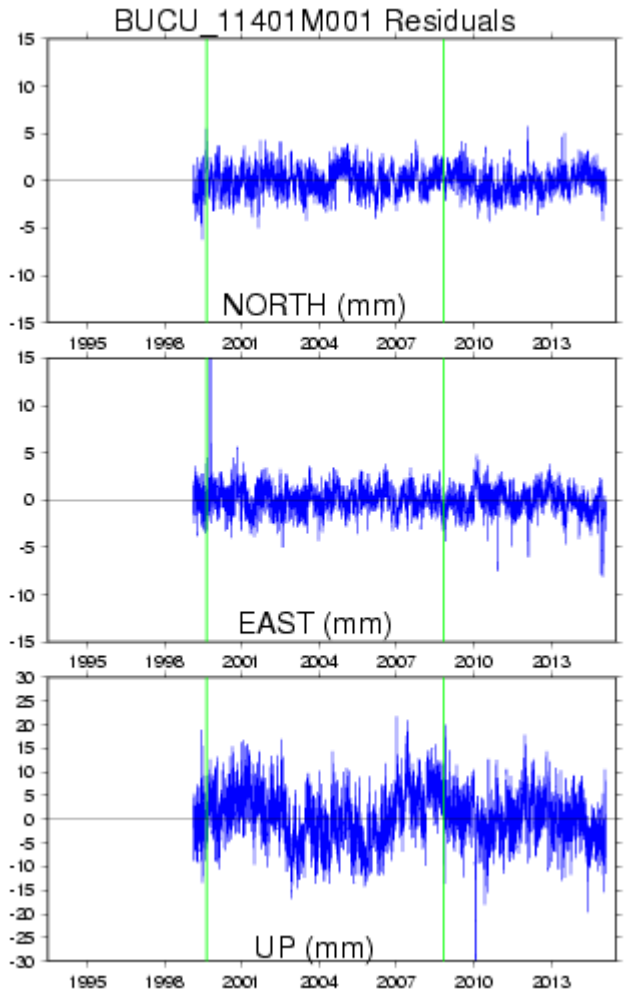


EPN station BUCU

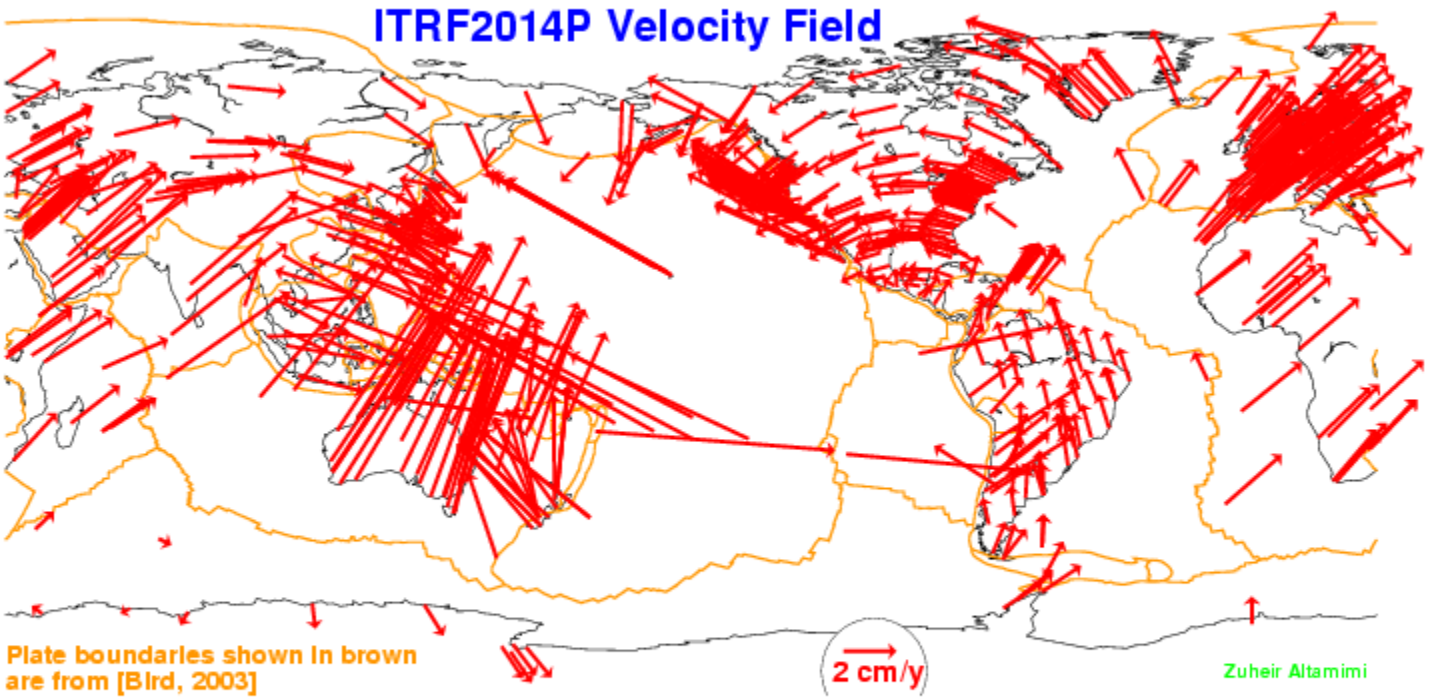
Trajectory



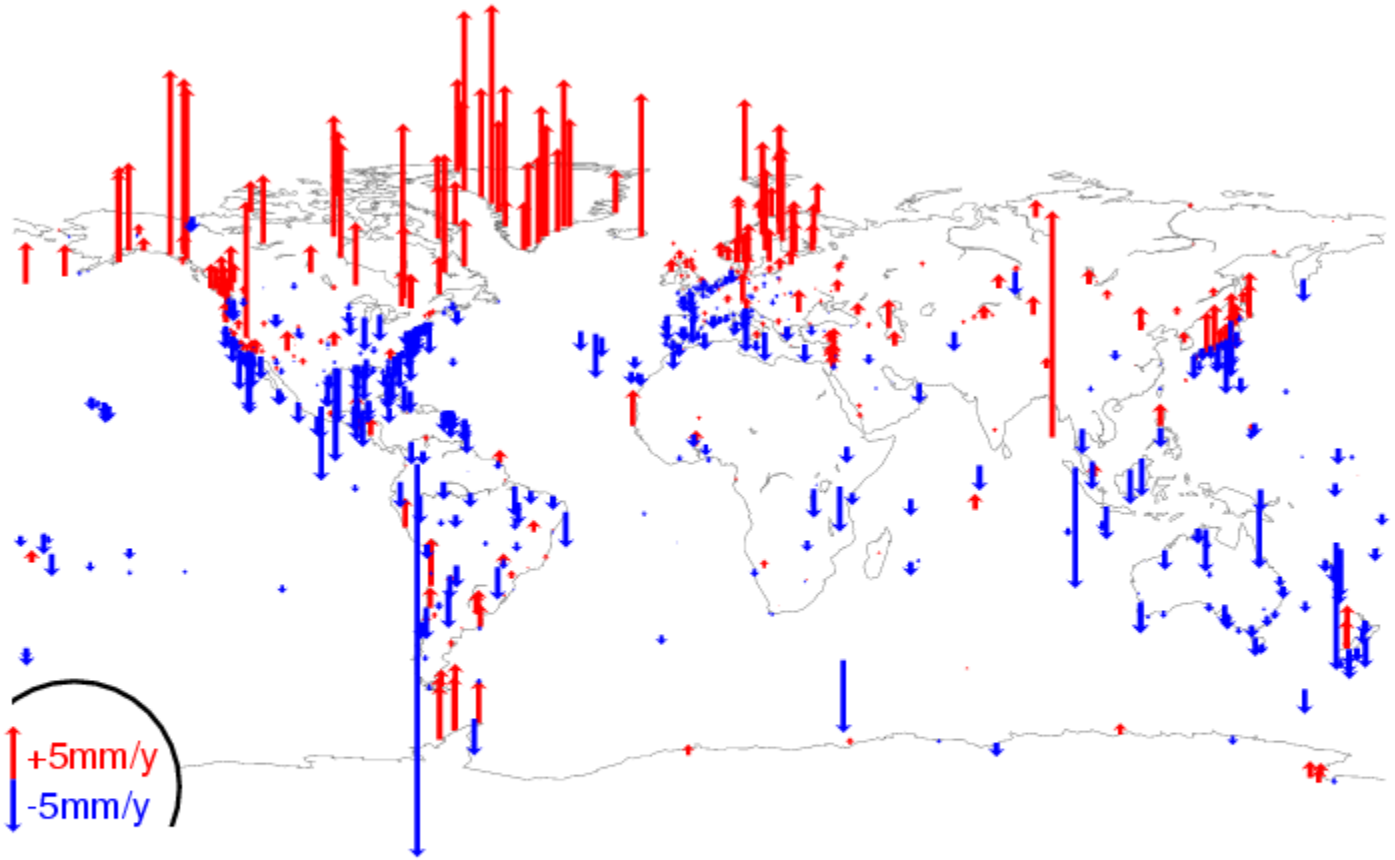
Residuals



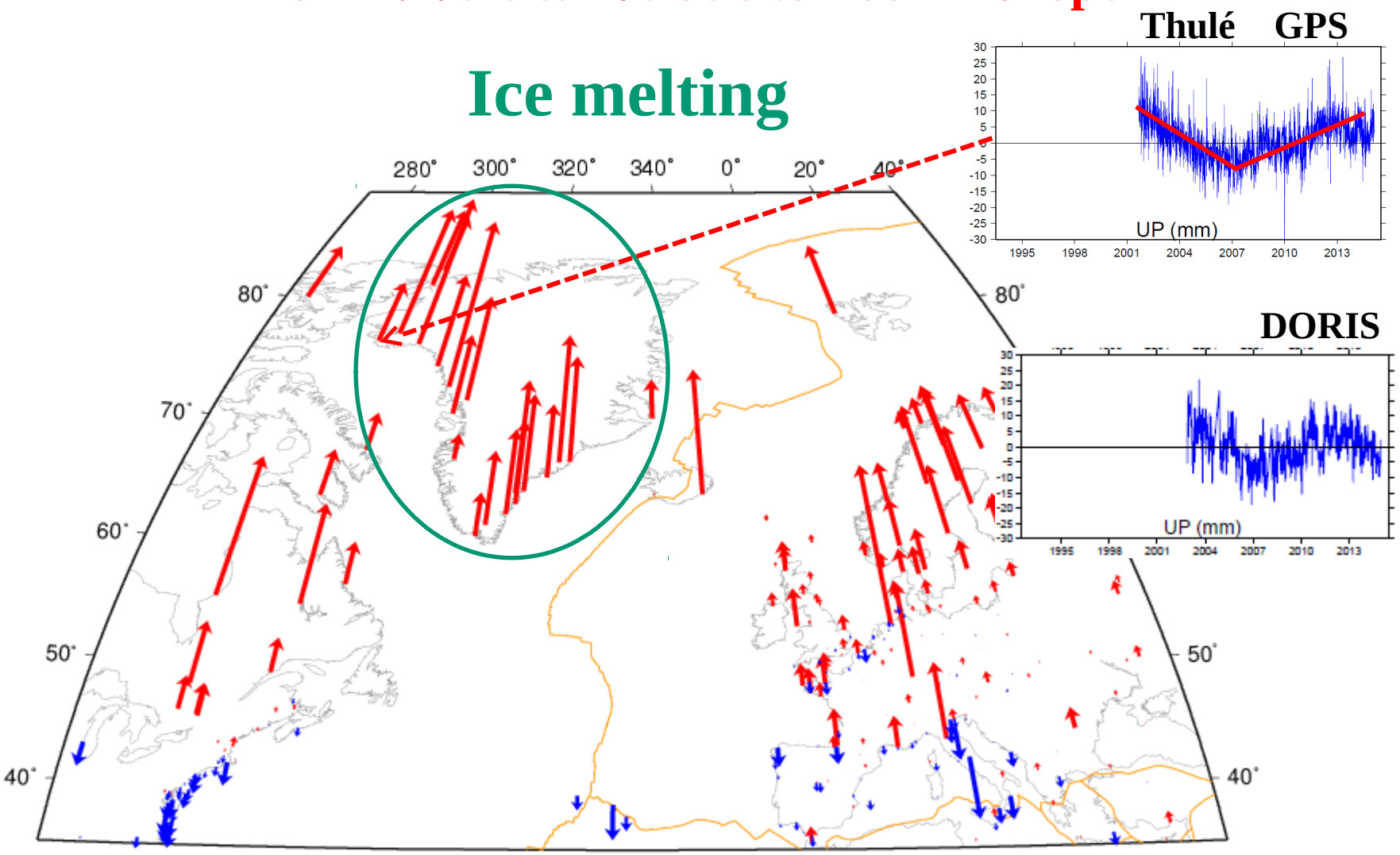
ITRF2014P: Horizontal Velocities



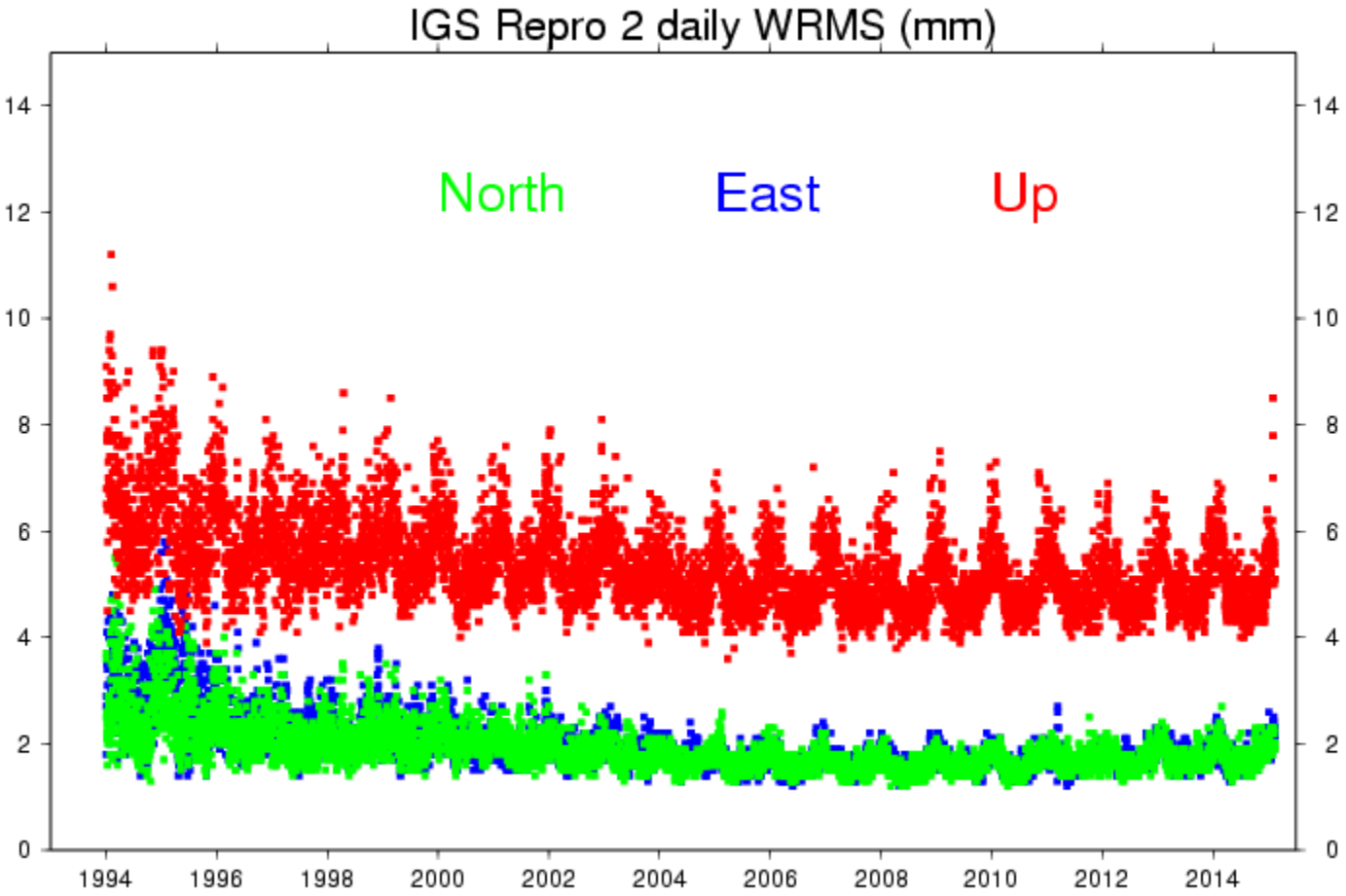
ITRF2014P: Vertical Velocities



ITRF2014P: Vertical Velocities Zoom Europe



Performance (WRMS)



Conclusion

- **Modeling of non-linear motions**

- **ITRF2014: What is new?**
- **==> Modelling the non-linear motions**
  - **Estimation of the seasonal terms**
  - **Application of parametric models for post-seismic deformation**

- **ITRF2014: When ?**
  - **By end of October, early November, 2015**

Backup slides

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