ITRF2014P Evaluation by the IDS CC

Guilhem Moreaux
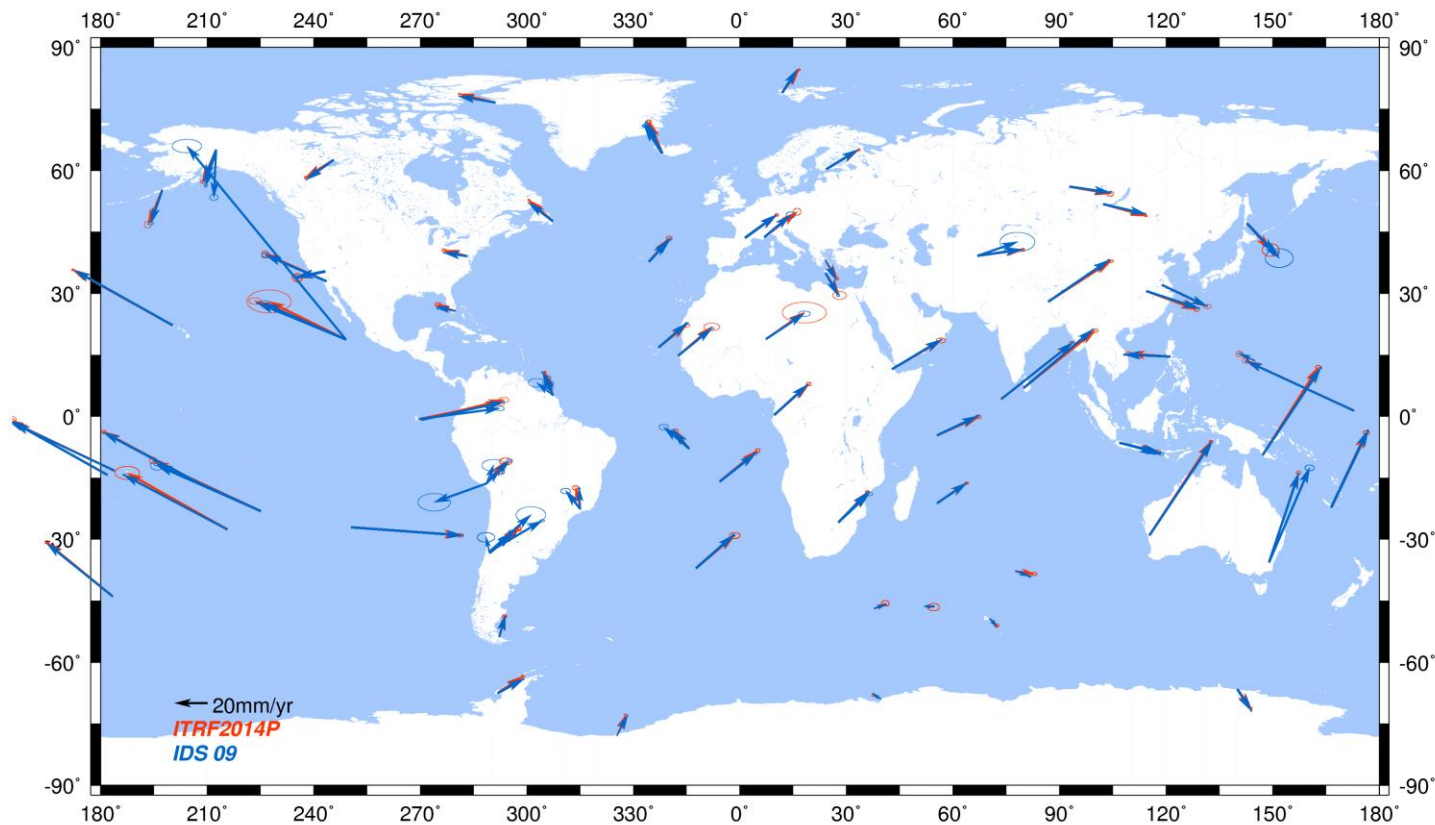
- **Discontinuities**
  - **62 at 32 sites.**
  - **23 from seismic origin.**
  - **10 from beacon origin.**
  - **35 discontinuities are in the IDS 09 cumulative solution.**
  - **24 discontinuities were already in ITRF2008**.

- **Post-Seismic Deformations (PSD)**
  - **12 beacons at 7 sites (Arequipa, Fairbanks, Goldstone, Reykjavik, Santiago, Terre Adélie, Yuzhno-Sakhalinsk).**
  - **One site is out of order: Yuzhno-Sakhalinsk.**
  - **Not used in the estimations of station position residuals.**

Horizontal Velocities ITRF2014P vs IDS 09

http://ids-doris.org

❑ **Selection of velocities with uncertainties smaller than 5 mm/yr.**
❑ **Solutions similar even if differences in the discontinuities.**

Downward Velocities ITRF2014P vs IDS 09
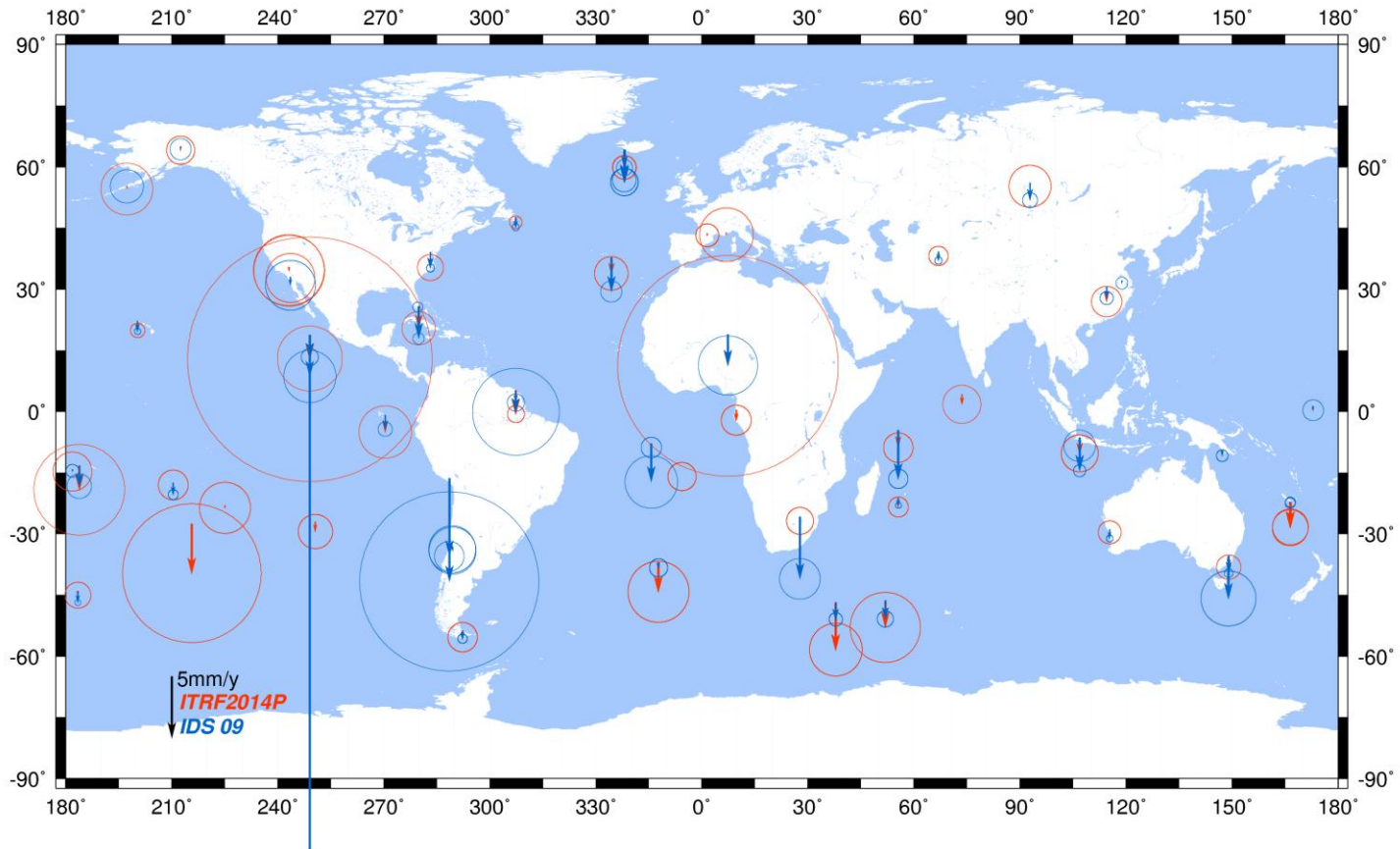
❑ **Selection of velocities with uncertainties smaller than 5 mm/yr.**
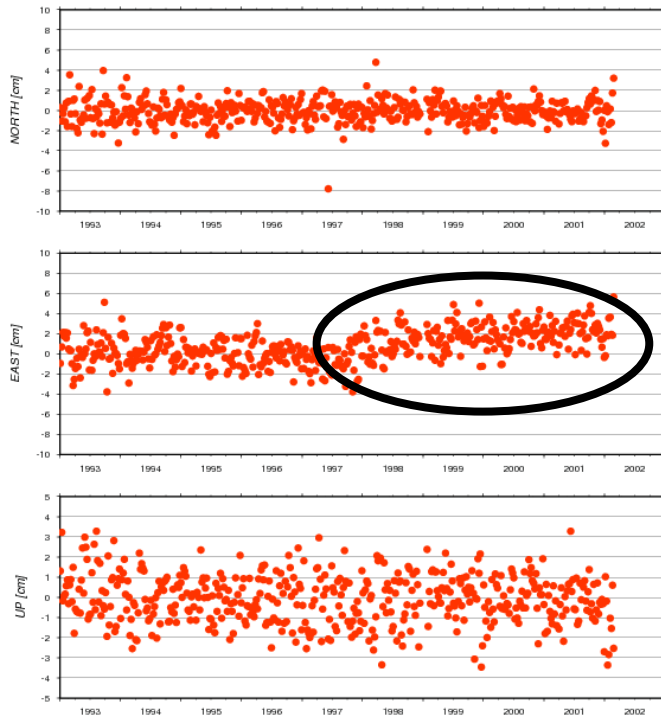❑ **Major differences in Socorro and Arequipa (seismic activities).**
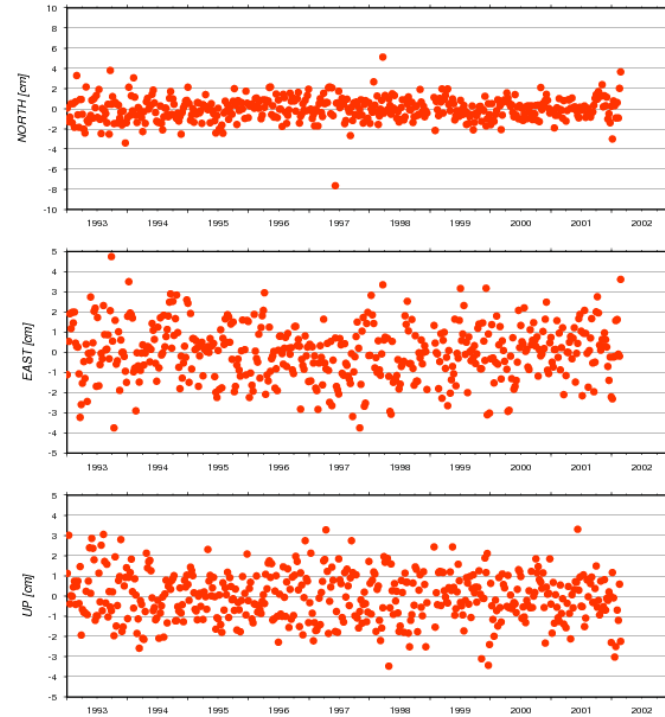
Upward Velocities ITRF2014P vs IDS 09
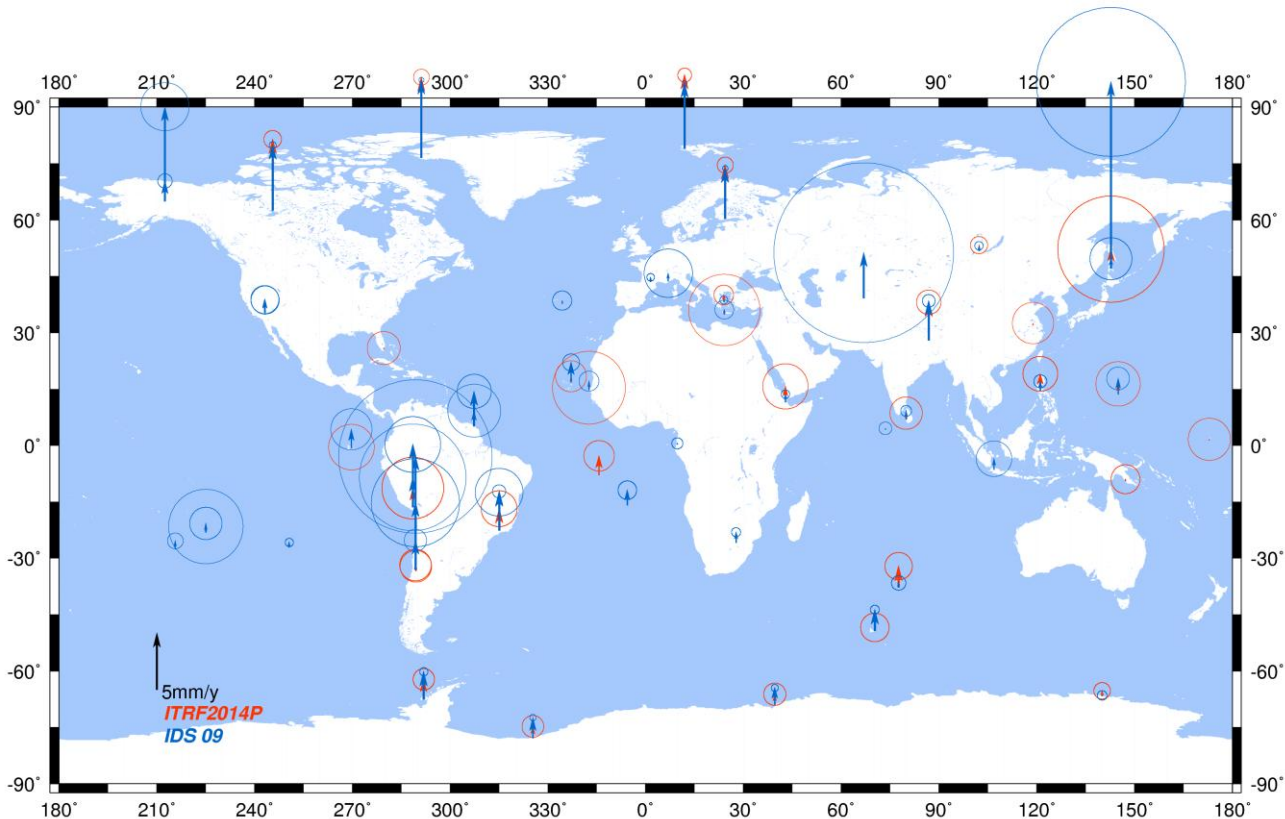
❑ **Selection of velocities with uncertainties smaller than 5 mm/yr.**
❑ **Major differences in Arequipa, Santiago and Yuzhno-Sakhalinsk (sites with PSD corrections).**

http://ids-doris.org

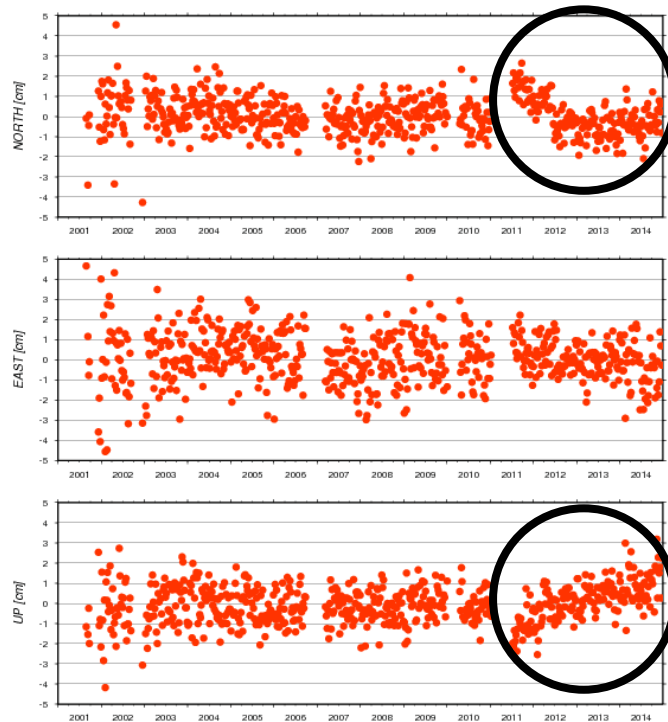# Station Position Residuals – Terre Adélie

http://ids-doris.org

IDS 09 wrt ITRF2014P

IDS 09 wrt IDS-TRF2014

❑ Residuals wrt ITRF2014P are impacted by un-use of post-seismic deformation model.

Station Position Residuals – Easter Island
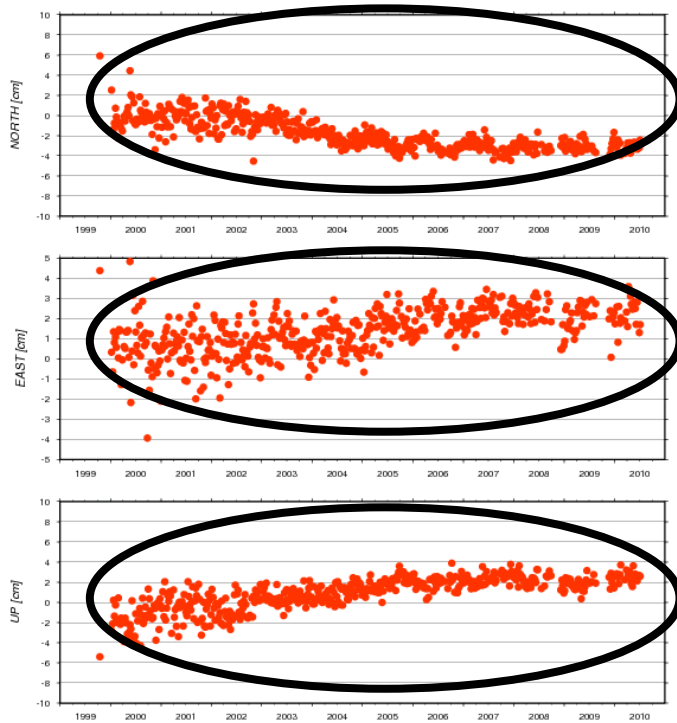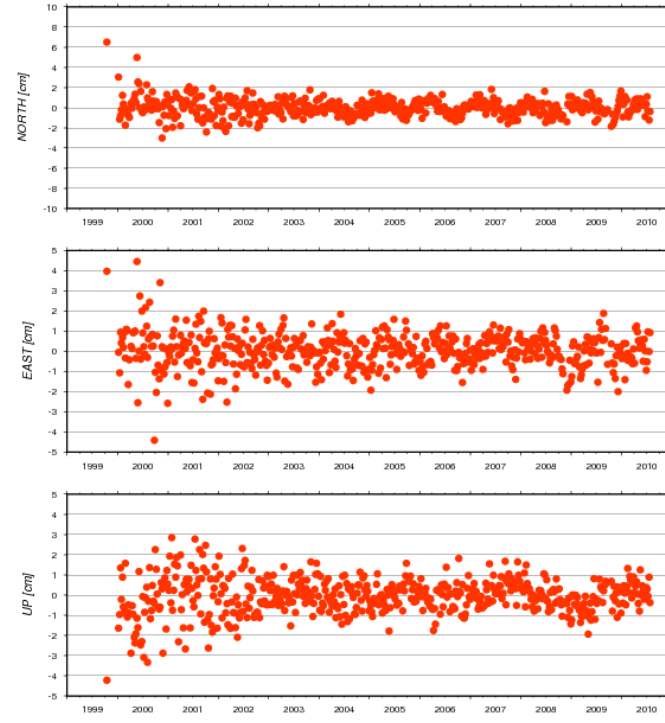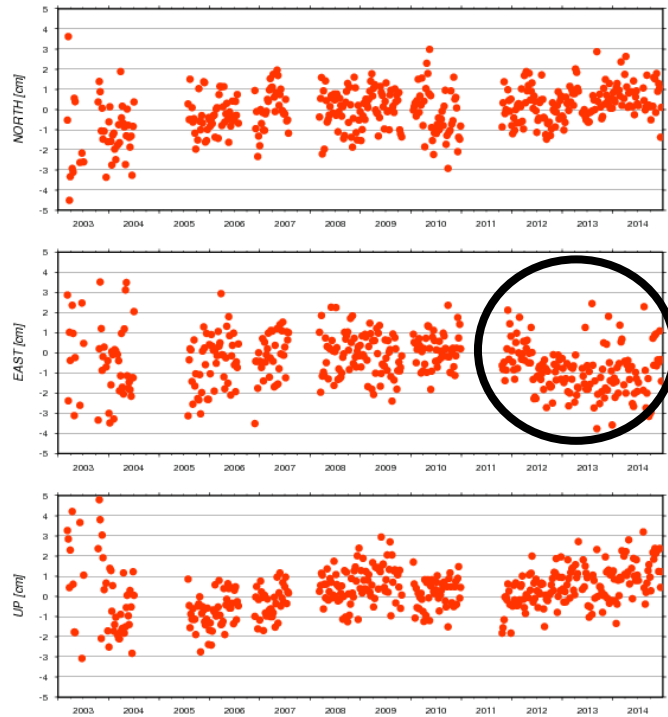
IDS 09 wrt ITRF2014P　　　　　　　**IDS 09 wrt IDS-TRF2014**
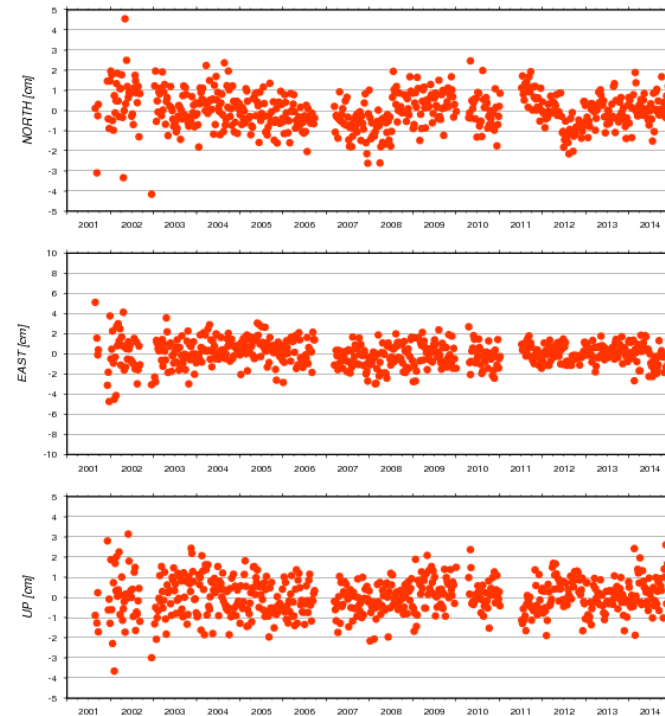
☐ Both IDS 09 and ITRF2014P include discontinuity in 2011 doy 86 (2011/06/30) while the beacon is changed.

☐ Meanwhile IDS 09 does not constrain the velocity to the same value over the 2 epochs.

Station Position Residuals – Fairbanks

http://ids-doris.org

IDS 09 wrt ITRF2014P

IDS 09 wrt IDS-TRF2014

❑ Residuals wrt ITRF2014P are impacted by un-use of post-seismic deformation model.

Station Position Residuals – Manila (MANB)

http://ids-doris.org

IDS 09 wrt ITRF2014P

IDS 09 wrt IDS-TRF2014
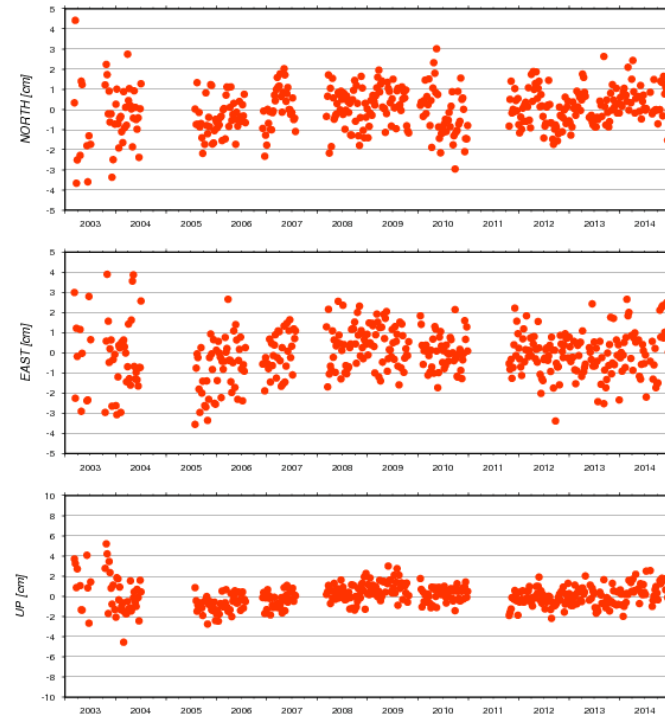
❑ Velocity constrain in ITRF2014P while Earthquake in 2012/06/16 ?

Preliminary Conclusions (1/2)

- **IDS CC suggests to reconsider velocity constraints in Easter Island and Manila.**

- **ADGB has wrong DOMES number (91501S001) in ITRF2014P-psd-doris.dat.**

- **ARFB: soln 1 ends in 07:231 and soln 2 starts in 07:230.**
- **REYB has no solution numbers 1 and 3, not 2.**
- **REZB: soln 1 ends in 05:079 and soln 2 starts in 05:078.**
- **SANB: soln 1 ends in 06:008 and soln 2 starts in 06:007.**

➔ **Check epochs of sites with PSD corrections.**

http://ids-doris.org

- **What is the ellipsoid which has been used to estimate NEU corrections ? A= 6378137m E2 = 0.00669438003 ?**

- **Unused of PSD corrections ➔ centimetric differences even several years after the Earthquake.**

- **Logarithmic term for Fairbanks, Terre Adélie, Reykjavik and Santiago.**

- **Logarithmic and exponential development of PSD corrections**

  i) In case of logarithmic term, corrections goes to infinity while time goes to infinity.

  ➔ PSD corrections must be used for sites with logarithmic terms.

  ii) In case of no logarithmic term, corrections goes to a constant while time goes to infinity.

  ➔ for sites with no logarithmic terms, after a while, PSD correction can be assumed to be constant.

PSD corrections

- **Due to the centimetric impact of un-use of PSD corrections, IDS CC has implemented these corrections in the IDS CC software.**

- **PSD corrections are based on correction file and subroutine made available by Zuheir in the frame of ITRF2014.**

- **PSD correction implementation has been validated from the single estimation given by ZA (ARFB in 2005/01/01).**

- **Afterwards, there are biases between Zuheir and IDS CC estimations due to use of different reference coordinates.**
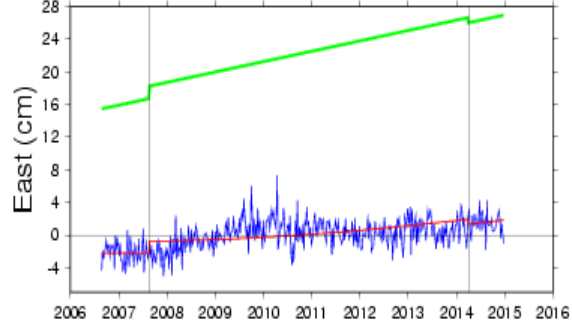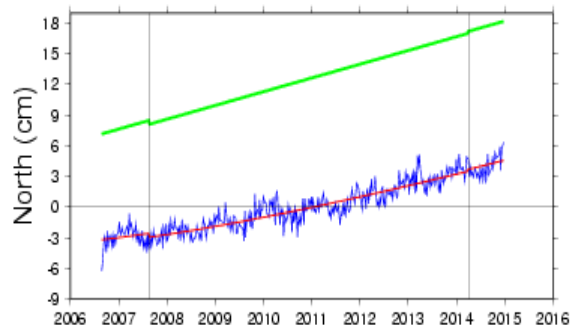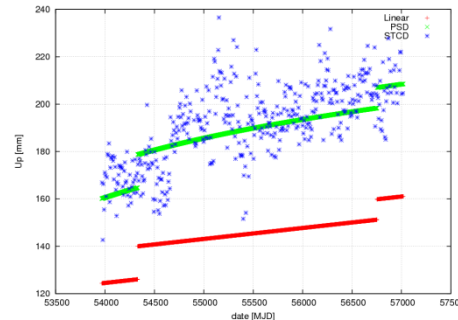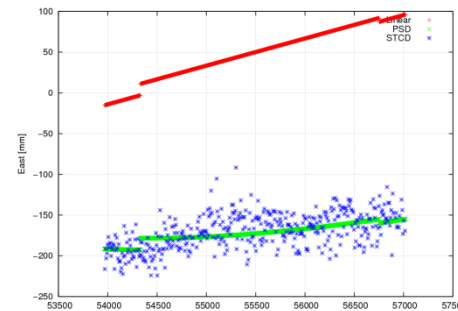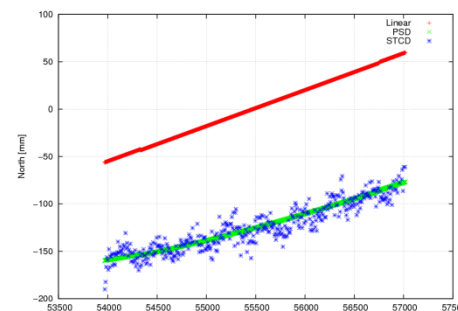
PSD corrections - Arequipa

From Zuheir Altamimi

IDS CC - AREB

Trajectory: Blue: Raw, Green: Linear, Red: PSD model
Vertical gray lines represent discontinuities

Trajectory: Blue: Raw, Green: Linear, Red: PSD model
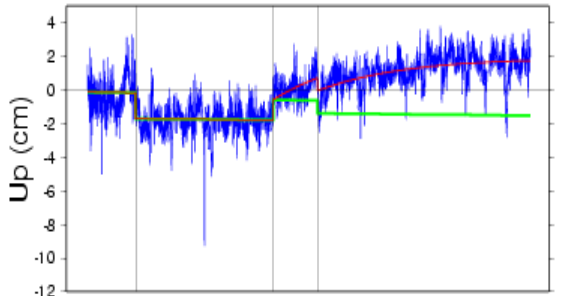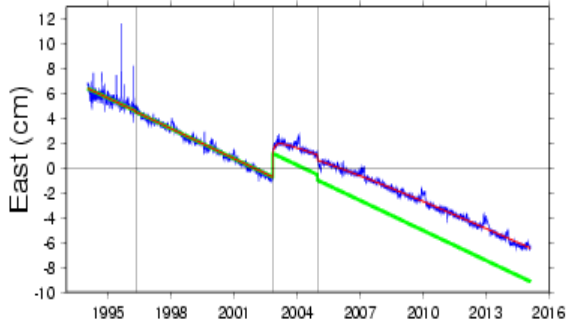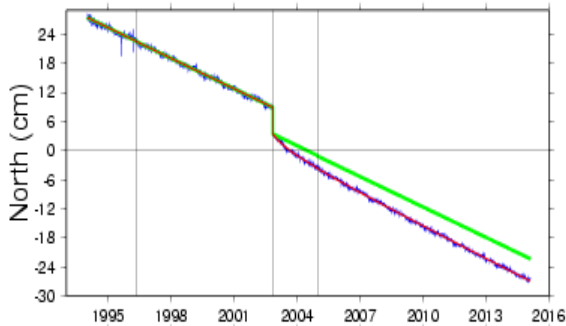Vertical gray lines represent discontinuities

(ITRF2014: Etat d'avancement et résultats préliminaires - CCT PDS – Toulouse, September 30th, 2015)

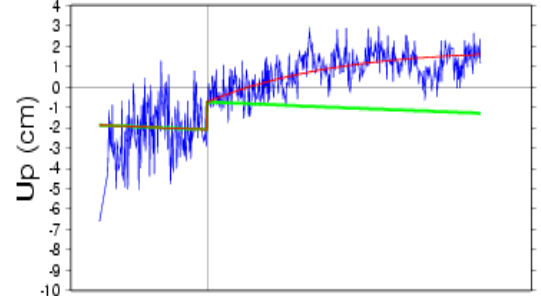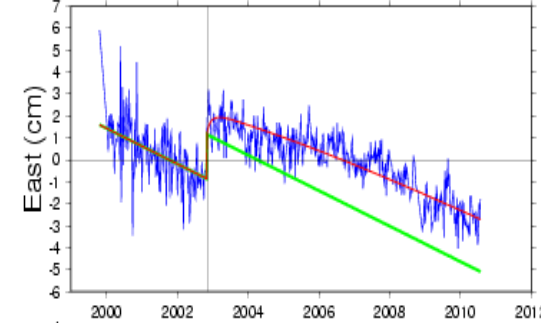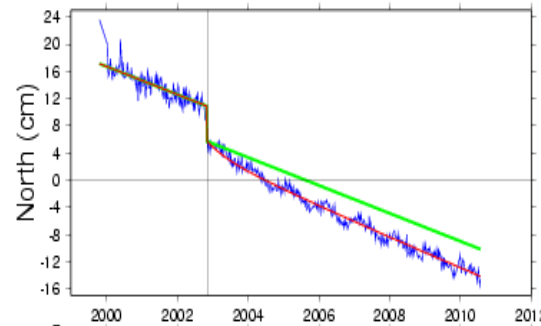# PSD corrections - Arequipa

From Zuheir Altamimi
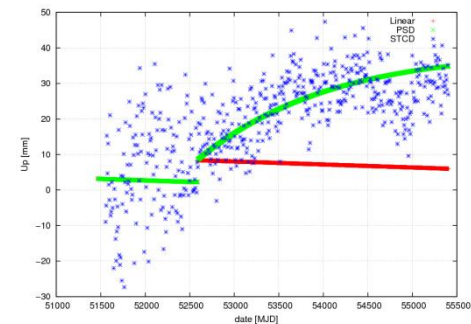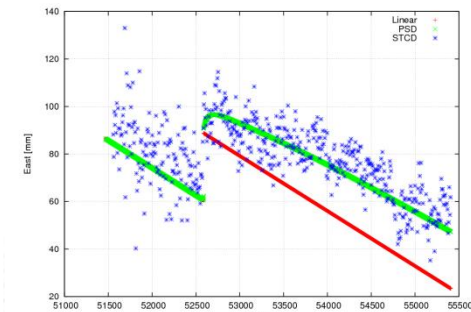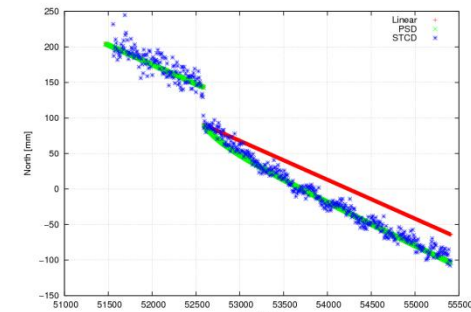
IDS CC - ARFB

AREQ_42202M005 trajectory
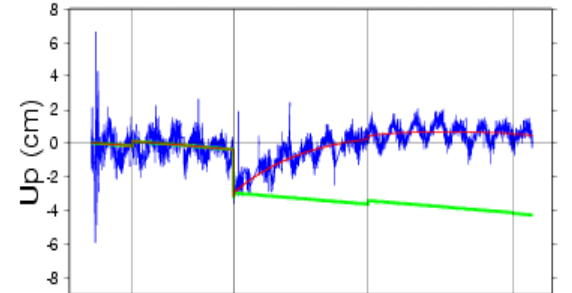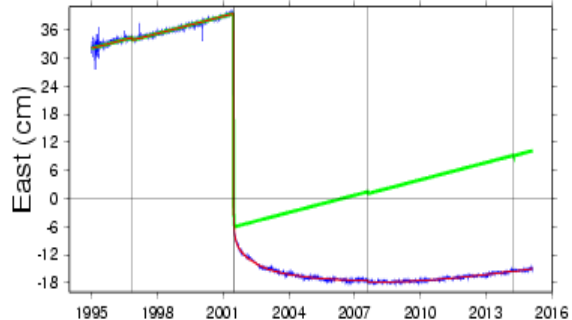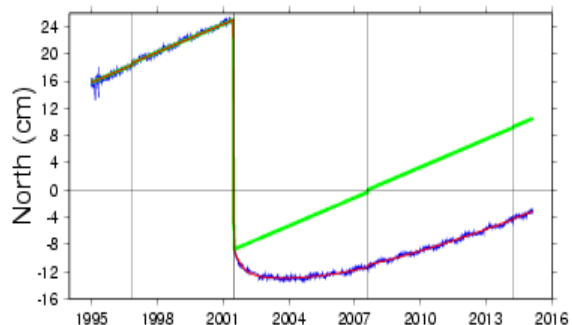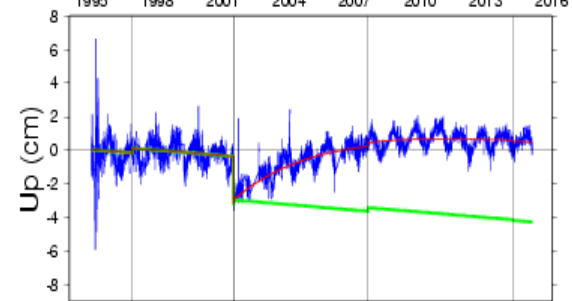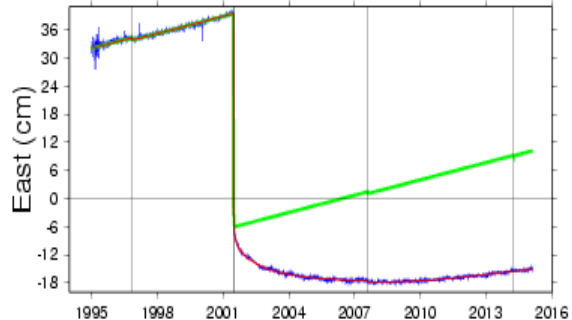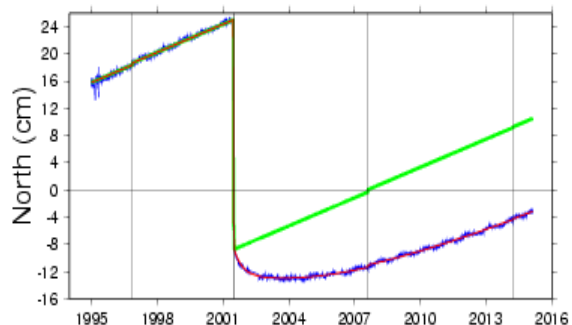
ARFB_42202S007 trajectory

Trajectory: Blue: Raw, Green: Linear, Red: PSD model
Vertical gray lines represent discontinuities

Trajectory: Blue: Raw, Green: Linear, Red: PSD model
Vertical gray lines represent discontinuities

(ITRF2014: Etat d'avancement et résultats préliminaires - CCT PDS – Toulouse, September 30th, 2015)

IDS AWG – Washington – October 16th 2015

PSD corrections - Fairbanks

From Zuheir Altamimi

IDS CC - FAIB

Trajectory: Blue: Raw, Green: Linear, Red: PSD model
Vertical gray lines represent discontinuities

(ITRF2014: Etat d'avancement et résultats préliminaires - CCT PDS – Toulouse, September 30th, 2015)
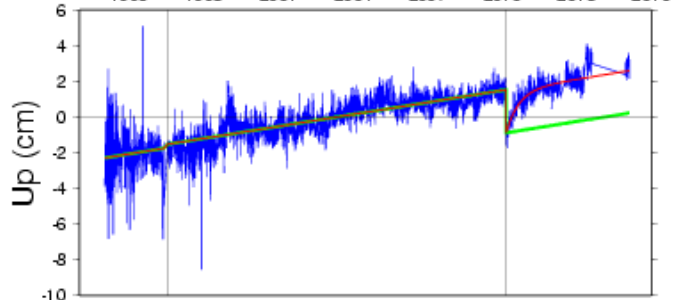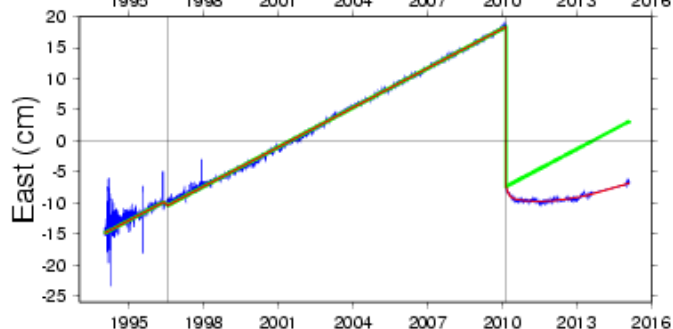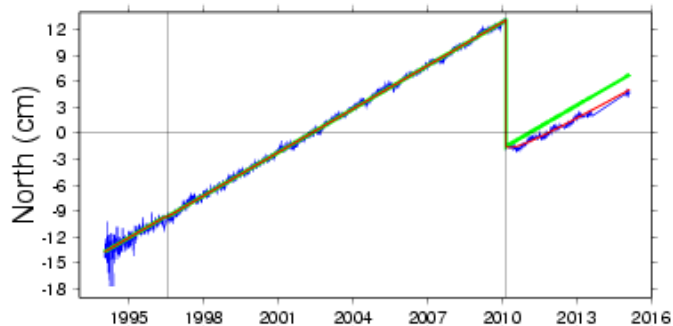
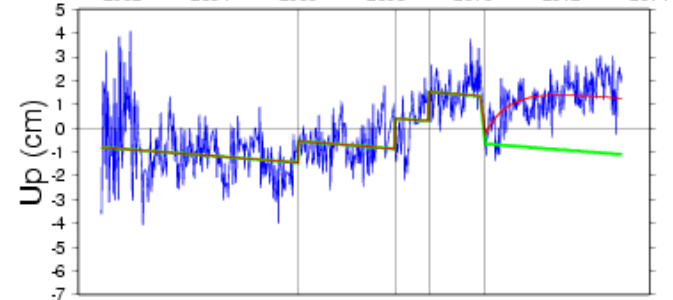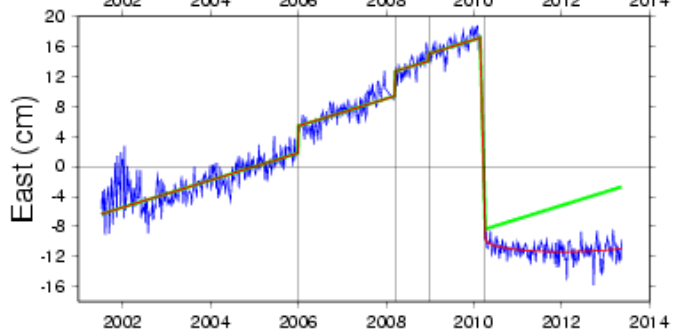IDS AWG – Washington – October 16th 2015

PSD corrections - Santiago

From Zuheir Altamimi

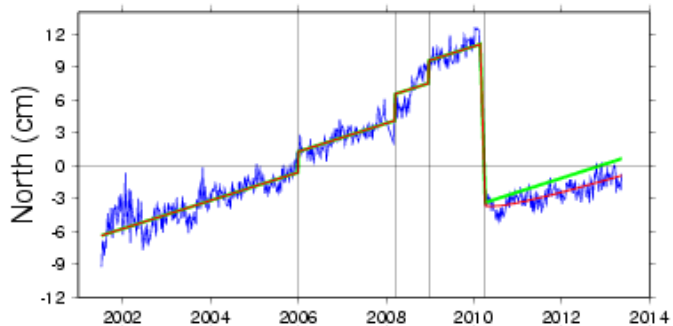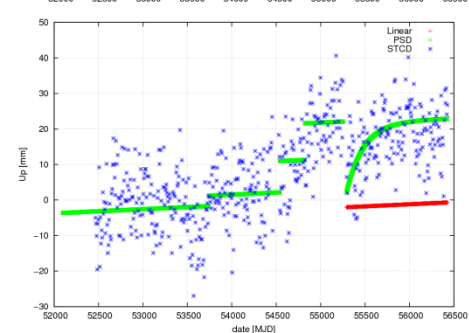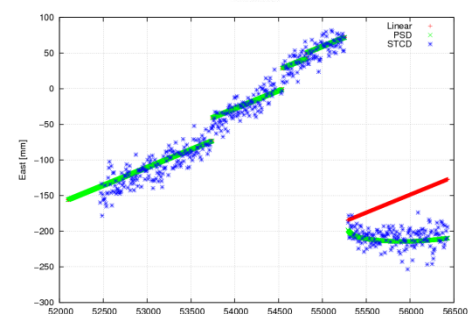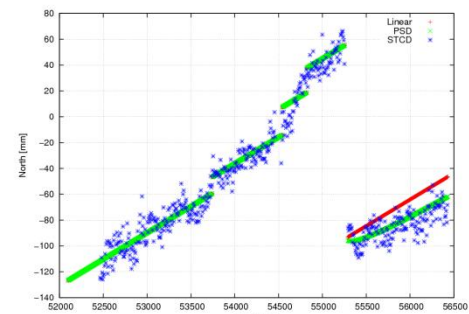IDS CC - SANB

Trajectory: Blue: Raw, Green: Linear, Red: PSD model
Vertical gray lines represent discontinuities

Trajectory: Blue: Raw, Green: Linear, Red: PSD model
Vertical gray lines represent discontinuities

(ITRF2014: Etat d'avancement et résultats préliminaires - CCT PDS – Toulouse, September 30th, 2015)

What's next ?

- **Plots with PSD corrections, IDS 09 time series and IDS 09 velocities.**

- **IDS CC propose to made available to the IDS ACs XYZ and NEU corrections in Ascii file. One file per station and one line per week until 2020.0.**