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

Major differences in Socorro and Arequipa (seismic activities).
- Selection of velocities with uncertainties smaller than 5 mm/yr.
- Major differences in Arequipa, Santiago and Yuzhno-Sakhalinsk (sites with PSD corrections).
Residuals wrt ITRF2014P are impacted by un-use of post-seismic deformation model.
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.
- Residuals wrt ITRF2014P are impacted by un-use of post-seismic deformation model.
Station Position Residuals – Manila (MANB)

IDS 09 wrt ITRF2014P

IDS 09 wrt IDS-TRF2014

- Velocity constrain in ITRF2014P while Earthquake in 2012/06/16?
• 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.
• What is the ellipsoid which has been used to estimate NEU corrections?
  A = 6378137 m 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.
From Zuheir Altamimi

**PSD corrections - Arequipa**

(AREQ_42202M005 trajectory)

(AREB_42202S006 trajectory)

(IDS CC - AREB)

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

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From Zuheir Altamimi

SANT_41705M003 trajectory

SANB_41705S009 trajectory

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

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.