Status of ITRF2013 Preparation

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Next ITRF solution (ITRF2013)

• To be ready by summer 2014

• All techniques to submit solutions by Jan-Feb, 2014, but some (hopefully small) delays are expected from the techniques

• Solutions with no load corrections

• Evaluation of NT-ATML (+) will be repeated with ITRF2013 input data
Preparation for ITRF2013

• Expected Improvements & Developments:
  – Reprocessed solutions from the 4 techniques;
  – Revisiting the weighting of Local Ties and Space Geodesy solutions included in the ITRF combination;
  – Improving the process of detection of discontinuities in the time series;
  – Modeling the non-linear station motions
    • Seasonal signals
    • Co- & Post-seismic deformation
New ties since ITRF2008

- Brewster: VLBA & GNSS
- Greenbelt (4 techniques)
- McDonald/Fort Davis (VLBI, SLR & GNSS)
- Warkworth (New Zealand): VLBI & GNSS
- 4 Australian Co-location sites (Hobart, Katherine, Mt. Stromlo, Yarragadee)
- Medicina: (VLBI & GNSS)
- Noto: (VLBI & GNSS)
- Riyadh: (SLR & GNSS)
- (GNSS & DORIS): (Rikitea, Papeete, Rothera, Kourou, Dionysos)

Reports Available at the ITRF WEBSITE
Schematic of velocity discrepancy at a co-location site

Time

VLBI, DORIS or SLR

GPS

Tie
Schematic of velocity discrepancy at a co-location site

Time

VLBI, DORIS or SLR

GPS

Tie
Schematic of velocity discrepancy at a co-location site

Time

VLBI, DORIS or SLR

GPS

Tie
Schematic of velocity discrepancy at a co-location site

- GPS
- VLBI, DORIS or SLR

Time
Schematic of velocity discrepancy at a co-location site

Time

GPS

VLBI, DORIS or SLR

Tie
Schematic of velocity discrepancy at a co-location site

Time

VLBI, DORIS or SLR

GPS

Tie
Data used for this presentation in preparation for ITRF2013

- **Space Geodesy:**
  
  **SLR:** ILRS contribution to ITRF2008, extended up to 2013.96 by ILRS operational weekly SNX solutions
  
  **VLBI:** GSFC 2011b session-wise solutions: 1983-2013.9
  
  **GNSS:** IGS operational weekly solutions: 1994-2013.9
  
  **DORIS:** Not used here

- **Local ties:**
  
  - ITRF2008 local ties
  
  - New ties…
GNSS & VLBI Tie Discrepancies

GPS-VLBI Tie Residuals

North

East

Up

GNSS & SLR Tie Discrepancies

GPS-VLBI Tie Residuals

North

East

Up

GPS & Tie Discrepancies

IGS station position Up residuals: stacked periodogram

- Standard solution
- Annual + SemiA
- (+1st +2nd dracs)
- (+1st +2nd +4th dracs)
- (+3rd +6th dracs)
- Annual + SemiA + 7 dracs
IGS Horizontal velocity differences
(Standard – Annual+Semi-Annual)
IGS Horizontal velocity differences
(Standard – Annual+Semi-A+7 dracs)
IGS Vertical velocity differences
(Standard – Annual+Semi-Annual)
IGS Vertical velocity differences
(Standard – Annual+Semi-A+ 7 dracs)
Parametric post seismic models

Parametric models for postseismic displacements:
\[
\forall i \in \{E, N, U\}, X_i(t) =
\begin{cases}
X_1(t_0) + V_1 \times (t - t_0), & t < t_{eq} \\
X_2(t_{eq}) + V_2 \times (t - t_{eq}) + D(t - t_{eq}), & t > t_{eq}
\end{cases}
\]

Parametric postseismic models use logarithmic or exponential functions:
\[
D(t - t_{eq}) \text{ with }
D(t - t_{eq}) = A \log(1 + \frac{t - t_{eq}}{\tau}) \quad (1)
\]
or
\[
D(t - t_{eq}) = A \left(1 - e^{-\frac{t - t_{eq}}{\tau}}\right) \quad (2)
\]

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

or
\[
D(t - t_{eq}) = A_1 \log(1 + \frac{t - t_{eq}}{\tau_1}) + A_2 \left(1 - e^{-\frac{t - t_{eq}}{\tau_2}}\right) \quad (3)
\]
or
\[
D(t - t_{eq}) = A_1 \left(1 - e^{-\frac{t - t_{eq}}{\tau_1}}\right) + A_2 \left(1 - e^{-\frac{t - t_{eq}}{\tau_2}}\right) \quad (4)
\]
Linear Function  Arequipa  Parametric Model

HRES_42202M005 Residuals

NORTH (mm)

EAST (mm)

UP (mm)
## ITRF2013: Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>Feb 10, 2014</td>
<td>Deadline for solution submissions by Technique.</td>
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<tr>
<td>End of April</td>
<td>First results and discussions at the EGU2014</td>
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<tr>
<td>End of May</td>
<td>Inter comparisons of the ITRF CCs solutions</td>
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| June               | Preliminary ITRF2013 solutions available for evaluation by the Technique/Analysis Centers  
(One ITRF2013P solution provided by the ITRS Center) |
| July-Aug, 2014     | Final ITRF2013 solution released by the ITRS Center.                 |
Status of submissions

• No official solution was submitted so far

• IDS: ???

• IGS:
  – Some ACs are ready: ESA, GFZ, CODE
  – Others need about one month ==> Mid April

• ILRS: Promised to deliver a first solution by end of March

• IVS: by end of March