The ILRS ASC Pilot Project on systematic error estimation

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ITW2017, Riga, 1-6 October, 2017
ILRS Pilot Project on systematic errors

- Weekly estimation of coordinates, EOP and range biases
- Time frame: 2005-2008
- Data: L1 and L2
- Time series with separate range biases
- New convention to report the site wavelength of the biases SINEX file
- Available time series from 5/8 ACs: ASI, BKG, DGFI, GFZ, JCET
# Internal ILRS convention

<table>
<thead>
<tr>
<th>System</th>
<th>CDP ID#</th>
<th>SOLN Flag</th>
<th>Wavelength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concepcion</td>
<td>7405</td>
<td>400</td>
<td>423</td>
</tr>
<tr>
<td>Concepcion</td>
<td>7405</td>
<td>800</td>
<td>846</td>
</tr>
<tr>
<td>Zimmerwald</td>
<td>7810</td>
<td>400</td>
<td>423</td>
</tr>
<tr>
<td>Zimmerwald</td>
<td>7810</td>
<td>500</td>
<td>532</td>
</tr>
<tr>
<td>Zimmerwald</td>
<td>7810</td>
<td>800</td>
<td>846</td>
</tr>
<tr>
<td>SOS Wettzell</td>
<td>7827</td>
<td>400</td>
<td>425</td>
</tr>
<tr>
<td>SOS Wettzell</td>
<td>7827</td>
<td>800</td>
<td>850</td>
</tr>
<tr>
<td>Matera</td>
<td>7941</td>
<td>300</td>
<td>355</td>
</tr>
<tr>
<td>Matera</td>
<td>7941</td>
<td>500</td>
<td>532</td>
</tr>
</tbody>
</table>

Use the hundreds of the wavelength instead of 1,2,3, etc.

```plaintext
+SOLUTION/ESTIMATE
*INDEX _TYPE_ CODE PT SOLN _REF_EPOCH_ UNIT S 'ESTIMATED VALUE' STD_DEV
1 RBIAS 1864 L1 501 06:144:43200 m 2 -.483950051050630E-01 .552626E-01
2 RBIAS 1864 L2 501 06:144:43200 m 2 -.328793856394894E-01 .598145E-01
3 RBIAS 1884 L2 501 06:144:43200 m 2 .550701015634650E-01 .120007E+00
4 RBIAS 7405 L1 801 06:144:43200 m 2 .333156587892270E-02 .600274E-02
5 RBIAS 7405 L2 801 06:144:43200 m 2 .695240939794482E-02 .671321E-02
```
ILRS product combination

The combined biases are produced following the standard process of the routine ILRS products (station coordinates, daily EOP, orbits) and adding the range bias estimation. The solutions are produced following the ILRS/ASC guidelines.
The Y-axis limits are different!
LAGEOS-2 Range Biases

The Y-axis limits are different!
Combined ILRSA Range Biases

GRAZ +7 mm
MLRO -7 mm

Number of weekly estimates
Combined range biases
Combined range biases

Station: 7839501; Satellite: 7603901;

GRAZ LAGEOS1

wmean = 0.0070

Station: 7941501; Satellite: 7603901;

MLRO LAGEOS1

wmean = -0.0073
wmean = -0.0038
wmean = -0.0240
wmean = -0.0117
wmean = -0.0014
Impact on the site coordinates

3D coordinate residual WRMS

Estimating the biases for all the sites together with the coordinates /EOP weakens the official ILRS products
Impact on RF origin

TX w.r.t. SLRF2014
Impact on RF origin

TY w.r.t. SLRF2014

Standard
Estimated bias

mm

Impact on RF origin

TZ w.r.t. SLRF2008

Standard
Estimated bias
Impact on the scale

The impact on the scale is motivating the ASC to move from the Pilot Project to an operational phase.
Future of the PP

Next activities:
• compute the weekly time series since 1983 (both Acs and CCs)
• make a table of biases using the time series of combined range biases from 1983 up to now
• apply the bias values in the table for the official ILRS products
• report the applied RB (& TB) in the SINEX file for next contribution to ITRF as recommended by the UAW
• start the service to keep the table updated

Timeline:
• AC will submit their time series by the end on 2017
• The RB table will be ready by the end of February 2018
• The operational service is expected to come online by April. 2018