JCET’s Daily-updated State-of-the-art SLR-only TRF

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Introduction

• The ITRF is updated on a nominal timescale of 3-4 years

• The ILRS network is currently upgraded and new sites and systems require accurate coordinates much more often than the ITRF can accommodate

• GGOS’ stringent requirements must be met at all times
  – SLR is currently off target by a factor of ~10-20

• Monitoring the network’s quality requires high fidelity coordinates to provide robust estimate of any systematic errors in the hardware
  – The QC service of the ILRS requires sufficiently accurate coordinates to maintain the fidelity of their daily reports
ILRS QC Resources

• The ILRS has dedicated Analysis Centers that monitor the quality of the data collected at all sites

• Most QC ACs deliver these reports on a weekly basis, some provide daily reports

• The information provided in these reports is compiled into a “report card” (originally quarterly, now monthly!) that is available online
  
  — For each site one can find short-term and long-term performance based on their statistics over the past 3-months and 1-year periods respectively
### SLR Global Performance Report Card


<table>
<thead>
<tr>
<th>Site Information</th>
<th>DGFI Orbital Analysis</th>
<th>Hitotsubashi Univ. Orbital Analysis</th>
<th>JCET Orbital Analysis</th>
<th>MCC Orbital Analysis</th>
<th>SHAO Orbital Analysis</th>
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<td></td>
<td>LAG NP RMS (mm)</td>
<td>short term (mm)</td>
<td>long term (mm)</td>
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<td>LAG NP RMS (mm)</td>
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Japan and Australia Region

SHORT-TERM RMS (AVERAGE)

LONG-TERM RMS (AVERAGE)
Eastern Asia Region

SHORT-TERM RMS (AVERAGE)

LONG-TERM RMS (AVERAGE)
SLR Data Processing Phases

- CDDIS/EDC DC
- JCET AC
- LAGEOS 1
- LAGEOS 2
- LARES
- ETALON 1
- ETALON 2

COMBINATION
LAGEOS, LARES & ETALON NEQs
Relative weighting

ACCUMULATED NEQs OF LAGEOS, LARES AND ETALON FROM PREVIOUS WEEKLY REDUCTIONS

- STATION COORDINATES
- STATION VELOCITIES
- EOP SERIES (DAILY SINCE 1993)
- WEEKLY 1st deg. HARMONICS
- WEEKLY 2nd deg. HARMONICS
- Higher HARMONICS
- ORBITAL PARAMETERS, ...
Weekly Coordinate Variations - Koganei

7308 Koganei

\[ \Delta X, \Delta Y, \Delta Z \text{ [mm]} \]

\[ \text{DATE} \]

10/1/12  12/1/12  2/1/13  4/1/13  6/1/13  8/1/13  10/1/13

\[ \bullet \Delta X[\text{mm}] \]
\[ \square \Delta Y[\text{mm}] \]
\[ \triangle \Delta Z[\text{mm}] \]
Weekly Coordinate Variations - Simosato

7838 Simosato

\[ \Delta X, \Delta Y, \Delta Z \text{ [mm]} \]

\[ \bullet \Delta X \text{ [mm]} \]
\[ \square \Delta Y \text{ [mm]} \]
\[ \triangle \Delta Z \text{ [mm]} \]

DATE

10/1/12 12/1/12 2/1/13 4/1/13 6/1/13 8/1/13 10/1/13
Weekly Coordinate Variations - Tanegashima

7358 Tanegashima

ΔX, ΔY, ΔZ [mm]

DATE

10/1/12 12/1/12 2/1/13 4/1/13 6/1/13 8/1/13 10/1/13

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

- ΔX[mm] - ΔY[mm] - ΔZ[mm]
Weekly Coordinate Variations - Yarragadee

7090 Yarragadee

$\Delta X, \Delta Y, \Delta Z \text{ [mm]}$

DATE

10/1/12  12/1/12  2/1/13  4/1/13  6/1/13  8/1/13  10/1/13

-3.0  -2.0  -1.0  0.0  1.0  2.0  3.0

-\text{\bullet $\Delta X$ [mm]}
-\text{\square $\Delta Y$ [mm]}
-\text{\triangle $\Delta Z$ [mm]}
Weekly Coordinate Variations - MLRS

7080 McDonald Obs.

DATE
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ΔX, ΔY, ΔZ [mm]

• ΔX[mm]
• ΔY[mm]
• ΔZ[mm]
Monitoring of ILRS Analysis WG Products

- Weekly Station Positions & Daily EOP Series
- Evaluation of Weekly AWG Products
- Monitoring Systematic Errors at ILRS Stations
- Normal Point Data Monitoring (CDDIS)
Summary

• A frequent update of the TRF used by the ILRS ACs is possible with little extra effort

• Updated quality coordinates can vastly improve the fidelity of the QC process for the network and ensure the quality of the ILRS products

• Addition of new SLR targets will enhance the quality of the monitoring of our products and provide the stations with better view of their systems performance (at various altitudes)