JCET Station Performance Assessment Tools for the ILRS Stations

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All of our products are the result of automated processing on a daily and weekly basis.

Human intervention is only necessary in special occasions when there is a breakdown of the network or the processing CPUs.
SLR Data Processing for QC Products

- We collect all SLR data for the entire year from CDDIS daily;
- We analyze on a daily basis all data from LAGEOS 1 & 2, LARES, ETALON 1 & 2, STARLETTE, and AJISAI in separate 7th arcs;
- The LAGEOS 1 & 2, and ETALON 1 & 2 analysis generates our official DAILY products and a weekly average of the systematic errors for all stations;
- Through a subsequent reanalysis we generates the systematic error series adjusting for each station pass-by-pass estimate;
- A report is compiled with a leading section that provides general information, followed by sections, one per station, with one-line entries for each pass, with the estimated statistics (raw RMS, precision estimate, bias and std. dev. of the bias, timing bias and std. dev., etc.);
- The report is emailed to stations upon request and archived at CDDIS
JCET SLR Data QC Products

1. ASC product results archived daily for QC of analysis products (for analysts)
   - Position and EOP offsets from official TRF and IERS EOP series for all AC/CC
   - Statistics of AC performance wrt ITRF and to the combined products
   - Station position and EOP evolution over time from ILRS standards

2. Weekly arc analysis with single set of weekly-averaged systematics (far more stable estimates compared to the pass-by-pass QC product)
   - Systematic measurement errors archived and visualized online

3. Data analysis for LAGEOS 1 & 2, ETALON 1 & 2 daily for rapid QC:
   - QC report for past 7 days with pass-by-pass systematics generated daily
   - Report submitted to CDDIS and upon request emailed to stations
   - Reports archived on CDDIS and JCET data base for visualization
   - QC Viewer s/w package for all QC Reports (soon to be online!!!)

4. Data yield for all active sites in the GLTN

5. Station Systematic Error PP results online (preliminary version)

6. Station History Change Logs online in data base (updated daily)

7. CRD-NP data content archived online, several parameters and flags are in the archive & can be visualized by station over time for all available pass segments
QC Report Header

# @161011
# @Data span 161004-161011
# @contact epavlis@umbc.edu
# @website http://geodesy.jcet.umbc.edu/
# ITRF used: SLRF2008 (http://ilrs.gsfc.nasa.gov/working_groups/awg/SLRF2008.html)
# @version 1.0
#
# each line contains:
#
# STA ID = site name
# YY/MM/DD HH:MM = pass starting time
# SAT = satellite name (L1: LAGEOS1; L2: LAGEOS2; E1: ETAL01; E2:ETAL02; S1: STARLETTE; A1: AJISAI; LR: LARES
# GOD OBS = number of good normal points
# RAW RMS = residual RMS before editing & bias application
# PREC EST = post-fit scattering rms
# RANGE BIAS = estimated range bias
# RANGE BIAS SIGMA = estimated range bias sigma
# TIME BIAS = estimated time bias
# TIME BIAS SIGMA = estimated time bias sigma
# PASS DUR = pass duration
# EDIT OBS = number of bad normal points
# CALIB+ MEAN = mean Applied System Delay (ILRS FR format cols 97-104)
# CALIB SDEV = mean System Calibration Method (ILRS FR format cols 126)
# CALIB SHIFT+ = mean Root Mean Square (ILRS FR format cols 111-114)
# STPASS RMS = mean Pass RMS (ILRS FR format cols 58-64)
# TEMP = mean surface temperature [K]
# HUM = mean relative humidity of surface %
# PRES = mean pressure [hPa]
# WLEN = wavelength [nm]
# SICH = System Change Indicator (ILRS FR format cols 127)
# SCI = System Configuration (ILRS FR format cols 128)
# DRF = Data Release Flag (ILRS FR format cols 130)
# ELEVATION MAX = maximum elevation for pass [degrees]
# ELEVATION MIN = minimum elevation for pass [degrees]
#
### QC Report Body (typical part)

<table>
<thead>
<tr>
<th>STA ID</th>
<th>Y/M/D</th>
<th>H:M:M</th>
<th>SAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>88341000</td>
<td>16/10/04 22:19 L2</td>
<td>5</td>
<td>7.1</td>
</tr>
<tr>
<td>88341000</td>
<td>16/10/04 00:00 L1</td>
<td>5</td>
<td>10.3</td>
</tr>
<tr>
<td>88341000</td>
<td>16/10/04 08:27 L2</td>
<td>4</td>
<td>4.5</td>
</tr>
<tr>
<td>88341000</td>
<td>16/10/10 00:12 L1</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>88341000</td>
<td>16/10/10 01:46 E2</td>
<td>2</td>
<td>674.4</td>
</tr>
</tbody>
</table>
JCET QC Viewer s/w (soon web app!!!)

October 8-14, 2016
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QC Viewer Supported Reports:

All Reports Contributing to the Monthly/Quarterly Report Card are Supported

**DGFI** – Data files for the Deutsches Geodaetisches Forschungsinstitut Analysis Center (AC). The online source for these files is [http://ilrs.dgfi.badw.de/fileadmin/quality/weekly_biases/](http://ilrs.dgfi.badw.de/fileadmin/quality/weekly_biases/) Last updated 8/14/2014

**JCET** – Date files for the Joint Center for Earth Systems Technology Analysis Center. The online source for these files is [ftp://cddis.gsfc.nasa.gov/pub/reports/slrjct/](ftp://cddis.gsfc.nasa.gov/pub/reports/slrjct/) Last updated 8/14/2014

**SLRCSR** – Data files for the Center for Space Research Analysis Center. The online source for these files is [ftp://cddis.gsfc.nasa.gov/pub/reports/slrcsr/](ftp://cddis.gsfc.nasa.gov/pub/reports/slrcsr/) Last updated 8/14/2014 DISCONTINUED

**SLRSAO** – Data files for the Shanghai Astronomical Observatory Analysis Center. The online source for these files is [ftp://cddis.gsfc.nasa.gov/pub/reports/slrsoa/](ftp://cddis.gsfc.nasa.gov/pub/reports/slrsoa/) Last updated 8/14/2014

**SLRMCC** – Data files for the Mission Control Center Analysis Center. The online source for these files is [ftp://cddis.gsfc.nasa.gov/pub/reports/slrmmc/](ftp://cddis.gsfc.nasa.gov/pub/reports/slrmmc/) Last updated 8/14/2014

**SLRHITU** – Data files for the Hitotsubashi Analysis Center. The online source for these files is [ftp://cddis.gsfc.nasa.gov/pub/reports/slrhitsu/](ftp://cddis.gsfc.nasa.gov/pub/reports/slrhitsu/) Last updated 8/14/2014
JCET ASC Products Monitoring Portal

Monitoring of ILRS Analysis SC Products

- Weekly Station Positions & Daily EOP Series
- Evaluation of Weekly ASC Products
- Monitoring Systematic Errors at ILRS Stations
- Network Performance on LAGEOS and LAGEOS2
- Systematic Error Estimation Pilot Project
- Normal Point Data Monitoring (CDDIS)

NEW!!!

http://geodesy.jcet.umbc.edu/ILRS_AWG_MONITORING/
Network Performance: % Efficiency (Day/night)

DATA YIELD PERCENTAGE DURING DAY & NIGHT for: LAGEOS
from 2016-10-03 to 2016-10-10
Minimum elevation [''] 20

BLACK: Nighttime tracking %
BLUE: Daytime tracking %

Normalized data yield [%]
MONITORING SYSTEMATIC ERRORS AT ILRS STATIONS

<table>
<thead>
<tr>
<th>Station</th>
<th>Mean/Std. Dev.</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>GFZ LAGEOS1</td>
<td>9.44±19.66</td>
<td>161</td>
</tr>
<tr>
<td>ILRSB LAGEOS1</td>
<td>5.79±12.8</td>
<td>149</td>
</tr>
<tr>
<td>GFZ LAGEOS2</td>
<td>6.87±21.36</td>
<td>138</td>
</tr>
<tr>
<td>ILRSB LAGEOS2</td>
<td>9.09±14.47</td>
<td>132</td>
</tr>
<tr>
<td>GFZ LAGEOS1+2</td>
<td>6.15±18.44</td>
<td>164</td>
</tr>
<tr>
<td>ILRSB LAGEOS1+2</td>
<td>4.54±13.42</td>
<td>166</td>
</tr>
</tbody>
</table>

DATE

BIAS [mm]

GFZ L1
GFZ L1 (MA)
ILRSB L1
ILRSB L1 (MA)
GFZ L2
GFZ L2 (MA)
ILRSB L2
ILRSB L2 (MA)
GFZ L1+2
GFZ L1+2 (MA)
ILRSB L1+2
ILRSB L1+2 (MA)
Station History Change Logs Query Engine

Query: select distinct * from hst where station_cdp_no='7841' order by date, time

http://geodesy.jcet.umbc.edu/sch_sci_query/
## Query Result

```
[SELECT DISTINCT * FROM HST WHERE STATION_CDP_NO='7841' ORDER BY DATE, TIME]
```

<table>
<thead>
<tr>
<th>DATE</th>
<th>TIME</th>
<th>STATION_CDP_NO</th>
<th>SOD_NO</th>
<th>SCH</th>
<th>SCI</th>
<th>HST</th>
<th>DATA_IMPCT_FLG</th>
<th>SUBSYSTEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-01-01</td>
<td>0</td>
<td>7841</td>
<td>8701</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Start configuration: PMT H 5023 Tennelec TC454 discriminator SR620 time interval counter 50 ps (FWHM) laser (532nm) GPS time receiver HP 58503A Vaisala PT 200 meteo sensors</td>
</tr>
<tr>
<td>2003-01-01</td>
<td>0</td>
<td>7841</td>
<td>8701</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>standard configuration with SR620(PMT H5023 @1.6kV, TC454, SR620,single pe)</td>
</tr>
<tr>
<td>2003-05-30</td>
<td>0</td>
<td>7841</td>
<td>8701</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>04.01</td>
<td>Daylight filter (0.4 nm FWHM) introduced</td>
</tr>
<tr>
<td>2003-05-30</td>
<td>0</td>
<td>7841</td>
<td>8701</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Daylight filter (0.4 nm FWHM) introduced</td>
</tr>
<tr>
<td>2004-02-19</td>
<td>0</td>
<td>7841</td>
<td>8701</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>06.01</td>
<td>A031 Event timer replacing SR620 time interval counter</td>
</tr>
<tr>
<td>2004-02-19</td>
<td>0</td>
<td>7841</td>
<td>8701</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>A031 Event Timer replacing SR620 time interval counter</td>
</tr>
<tr>
<td>2004-02-19</td>
<td>0</td>
<td>7841</td>
<td>8701</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>new standard configuration with Event Timer (PMT H5023 @1.6 kV, TC454, A031ET, Single pe)</td>
</tr>
<tr>
<td>2004-09-06</td>
<td>0</td>
<td>7841</td>
<td>8701</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>configuration for high satellites (AD 230 SPAD, TC454, A031ET, Single pe in SPAD Geiger mode)</td>
</tr>
<tr>
<td>2004-09-06</td>
<td>0</td>
<td>7841</td>
<td>8701</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>secondary configuration for high satellites (AD230 SPAD, TC454, SR620, Single pe in SPAD Geiger mode)</td>
</tr>
<tr>
<td>2008-10-26</td>
<td>0</td>
<td>7841</td>
<td>8701</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>04.01</td>
<td>Daylight filter replaced by same type and FWHM</td>
</tr>
<tr>
<td>2011-05-01</td>
<td>0</td>
<td>7841</td>
<td>8701</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>kHz laser, Event Timer A032-ET, SPAD MPD-ICTC for secondary configuration</td>
</tr>
<tr>
<td>2016-03-23</td>
<td>12</td>
<td>7841</td>
<td>8701</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>05.02</td>
<td>Repaired pump diode for external amplifier and new coupling fibre installed, maximum output power 530 mW</td>
</tr>
<tr>
<td>2016-05-24</td>
<td>14</td>
<td>7841</td>
<td>8701</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>04.01</td>
<td>Optical components of telescopes cleaned (negative achromat Tx, entrance window and coupling mirror Rx)</td>
</tr>
</tbody>
</table>

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