



A Multi-platform Package for the Visualization of the ILRS QC Reports

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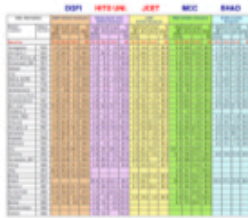
Abstract

We developed a software package based on MATLAB that allows users to query a data base with ILRS-associated QC reports and visualize the reported information as a function of the tracking site, tracked satellite target and reporting/Analysis Center, over the selected period of interest. The user can perform simple statistics on the available data set. The "QC Viewer" software works on multiple platforms (e.g. Windows, Linux and Mac OS), and does not require ownership or local availability of MATLAB. The software will be distributed for the ILRS along with a data base of all the available QC reports up to the release date and form of ACs. The users will be responsible for updating the data base by including the reports released beyond the date of release of the package. We will present the capabilities offered by this package and describe for each application. An link to the software is on forms or contact changes. In the distributed QC reports the software requires file extensions. We plan to maintain the QC Viewer as requests and time permits and submit it to include any future additions or modifications to the current suite of distributed 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" (initially quarterly, now monthly) that is available online.
- For each site one can find short term and long term performance based on their station over the past 3 months and 3 year periods respectively.

ILRS MONTHLY GLOBAL REPORT CARD



Global Report Card access:

http://ilrs.gsfc.nasa.gov/track/analysis/analysis/analysis_report_card/analysis_report_card.html

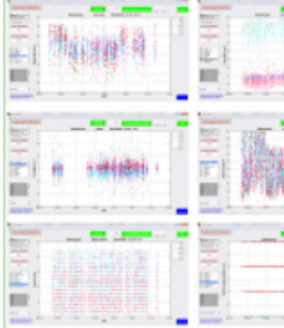
Access Reports directly from:

- http://ilrs.gsfc.nasa.gov/track/analysis/analysis/analysis_report_card/analysis_report_card.html
- http://ilrs.gsfc.nasa.gov/track/analysis/analysis/analysis_report_card/analysis_report_card.html
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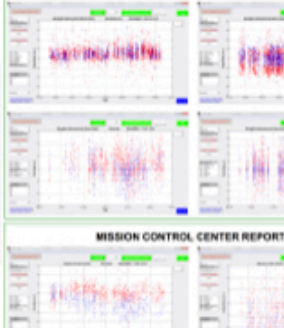
JCET QC Viewer

- The QC reports from each of the contributing ACs are in general formatted in a very standard manner, containing different information, in different order, units, etc.
- The information in these reports should be able compared with the available statistics available in the QC reports, for those to be used in the future managing the optical stations.
- In the past the software had allowed a QC report delivery package that was delivered with each of the QC reports, but was not available at the time.
- JCET's MATLAB based QC viewer works with ALL reports from DECEMBER, NOVEMBER, OCTOBER and SEPTEMBER.
- The package will run on Windows, Linux and Mac OS and will be able to read and write reports, a format of QC report data base for a complete station and complete user interface.

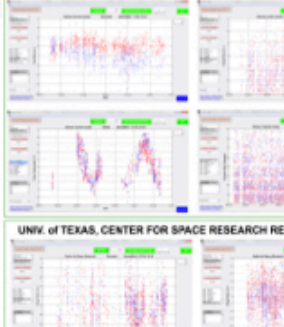
HITOSUBASHI UNIVERSITY REPORTS



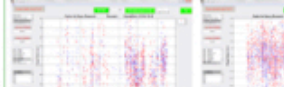
SHANGHAI ASTRONOMICAL OBSERVATORY REPORTS



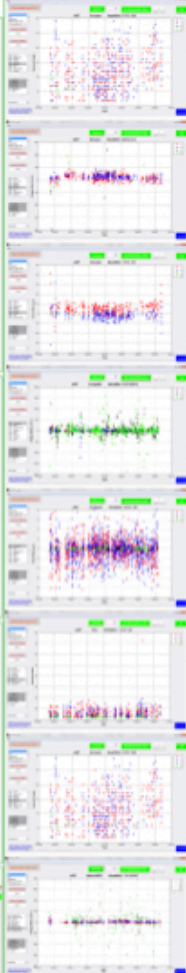
MISSION CONTROL CENTER REPORTS



UNIV. OF TEXAS, CENTER FOR SPACE RESEARCH REPORTS (LEGACY)



UNIVERSITY OF MARYLAND JCET REPORTS



We gratefully acknowledge the support of the ILRS and their network for making their ILRS tracking data available to us for this study and NASA's Financial Support through Grant NNX11-014-0-0000.



To obtain an executable and installation instructions from JCET, contact: Ericos C. Pavlis: epavlis@umbc.edu



Accuracy and Stability Assessment of the ILRS Stations Over Two Decades

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Abstract

The development of the ITRF depends on the quality of the contributions from the four geomatics techniques. With the GNSS requirements for ITRF accuracy and stability becoming increasingly stringent, ITRF requests that each technique generate and deliver an assessment of the performance of each system over time, covering as much of the period spanned by their contribution as possible. Since the ITRF relies on the combination of the techniques at the constituent sites, this information can be used to sort out cases where a discrepancy is observed between the techniques and the cost survey information, creating the most likely culprit and taking appropriate steps to avoid obscuring the final result. In response to an ITRF request we have developed a national qualification index based on the long term and short-term performance information available to ILRS, a consistently derived set of systematic error estimates from the analysis of LAGEOS 1 and LAGEOS 2 SLR data and all the engineering information reported to ILRS by the stations. We propose to establish and maintain this index to serve as input to ITRF for the ITRF2015 development as well as for the future realizations.

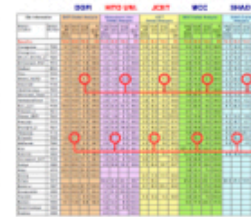
OUR APPROACH FOR SYSTEM PERFORMANCE CHARACTERIZATION

The ILRS AWG has long adopted a policy in estimating systematic measurement errors for the tracking sites, separating the network in "Core" and "Non-core" sites, and in general avoiding estimation for the core sites, unless a real problem is detected through the daily QC process or reported directly by the station owner.

The QC process qualifies the data and the system performance on the basis of the currently available best set of station positions and velocities (usually the ITRF2008 model), which however do suffer from errors themselves, thus "leaving" out results to some extent. Major deficiencies will further be considered, however. These would affect all stations at a similar level, although errors for some might be due to a geographically correlated feature. It is a fact that the "long-term performance" index as it is represented by the quarterly or monthly Global Report Cards, should be taken with more than a grain of salt, and it should be accompanied by some line series of estimated systematic errors (e.g. measurement or timing biases, etc.) and good understanding of the quality of the underlying (fixed) position of each site.

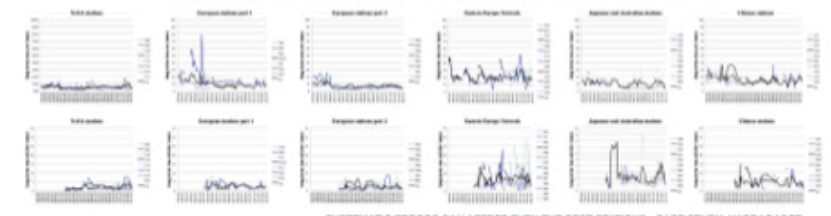
JCET has developed a data base of weekly resolution measurement error estimates for all sites in the ILRS network and for all four main target satellites used in the ILRS operational products, LAGEOS 1 & 2, and ETAN, LOR 1 & 2. The estimates are based on the ITRF2008 reference frame, which dates from significant deficiencies when it comes to new sites (especially after the end of 2008) or even for some sites with a very early start.

ILRS MONTHLY GLOBAL REPORT CARD

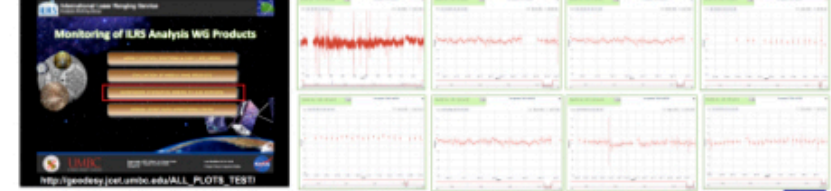


Long-term RMS AC and combined AC and computed QC data over the year.

LONG-TERM RMS AVERAGE VALUES (TOP CHARTS) AND THEIR STANDARD DEVIATIONS (BOTTOM CHARTS) BY REGION



SYSTEMATIC ERRORS CAN AFFECT EVEN THE BEST STATIONS - CASE STUDY: YARRAGADEE



We gratefully acknowledge the support of the ILRS and their network for making their ILRS tracking data available to us for this study and NASA's Financial Support through Grant NNX11-014-0-0000.



Averaging over long periods of time can easily mask short-term deviations which sometimes occur in the local area control solution. Note the large and significant error from Oct-2010 to March-2011: 10.4 ± 1.7 mm.

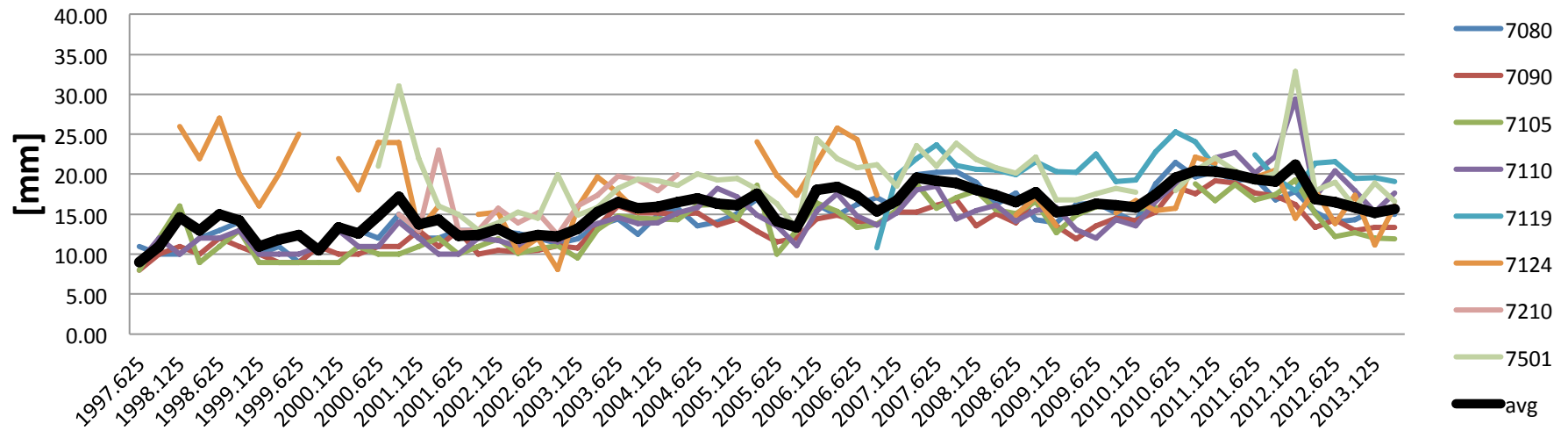




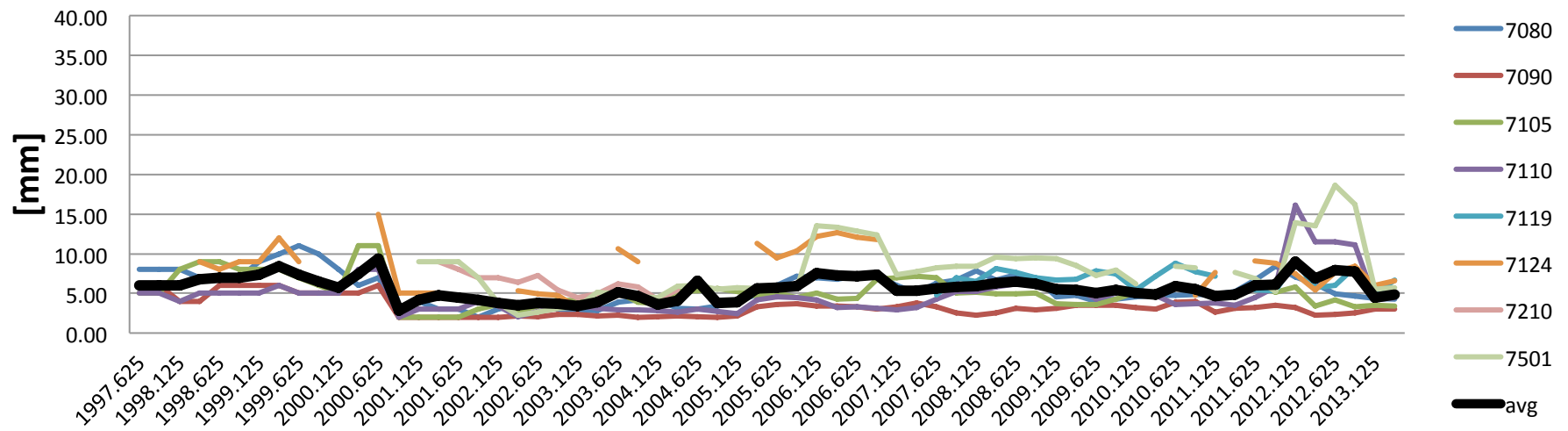
NASA Network



SHORT-TERM RMS (AVERAGE)



LONG-TERM RMS (AVERAGE)

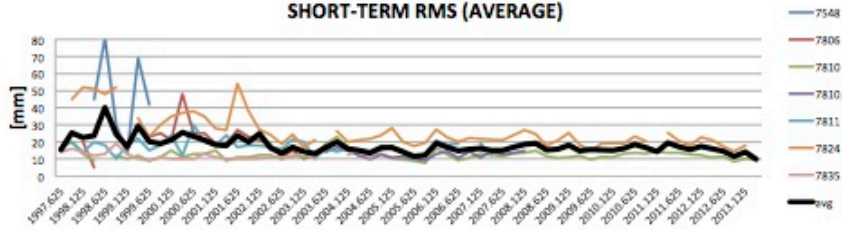




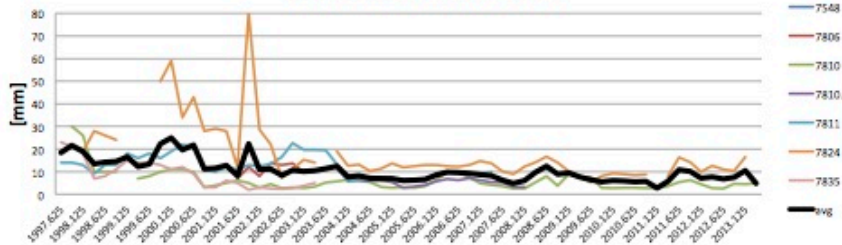
European Network - I



SHORT-TERM RMS (AVERAGE)



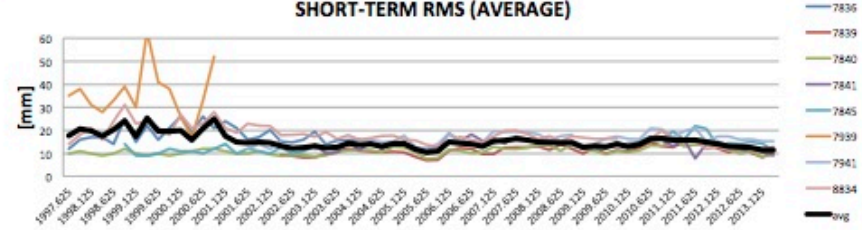
LONG-TERM RMS (AVERAGE)



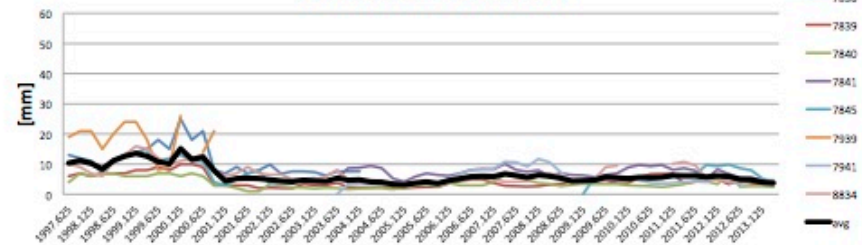
European Network - II



SHORT-TERM RMS (AVERAGE)



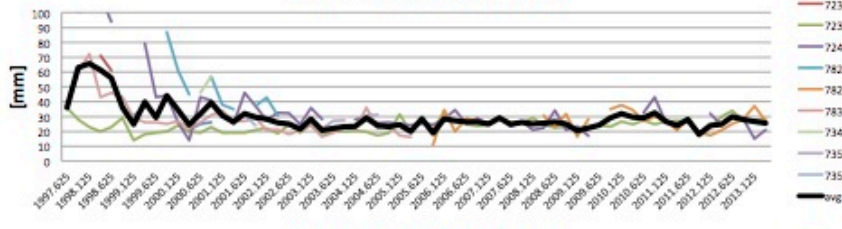
LONG-TERM RMS (AVERAGE)



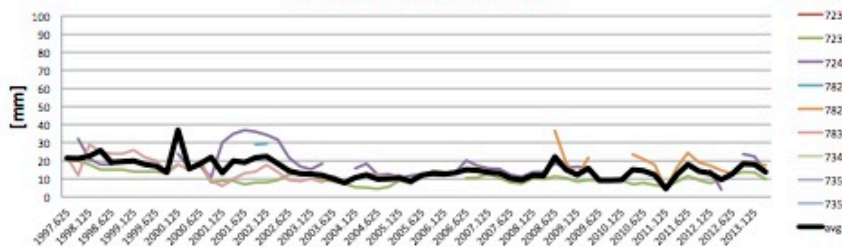
Chinese Network



SHORT-TERM RMS (AVERAGE)



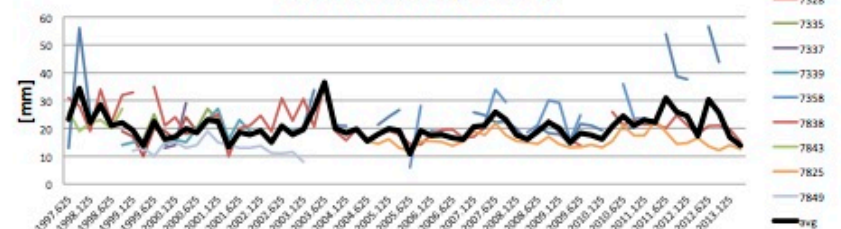
LONG-TERM RMS (AVERAGE)



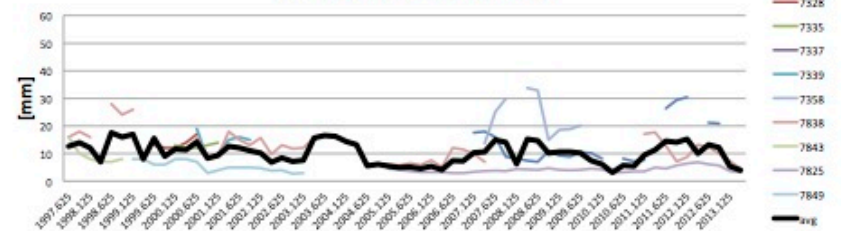
Japan and Australia Region



SHORT-TERM RMS (AVERAGE)



LONG-TERM RMS (AVERAGE)



ILRS REPORT CARD

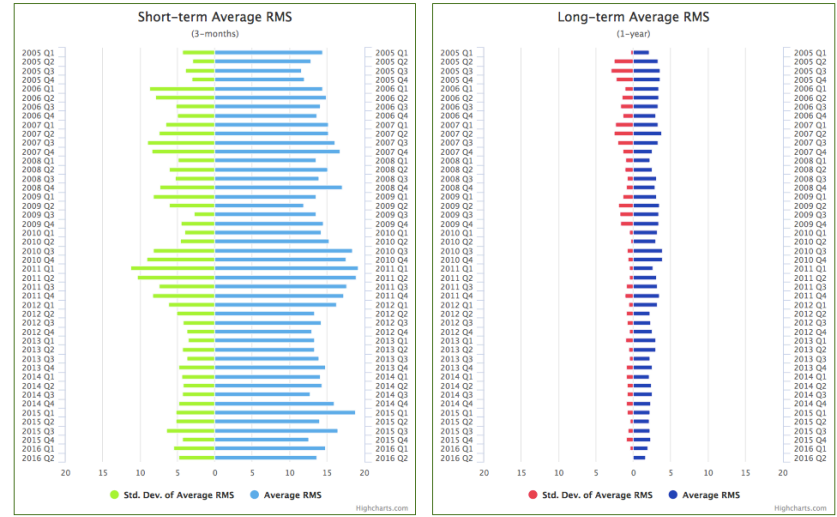
Start (MM-DD-YYYY):

End (MM-DD-YYYY):

Station:

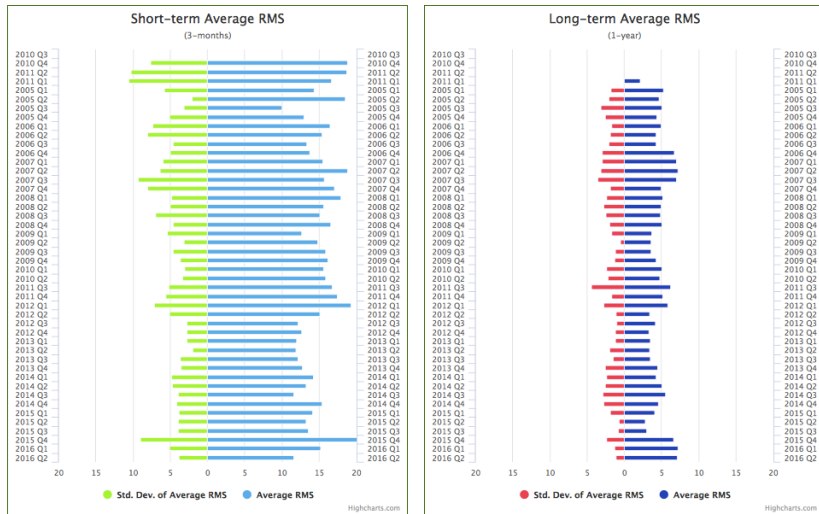
http://geodesy.jcet.umbc.edu/ILRS_REPORT_CARD

Yarragadee 7090



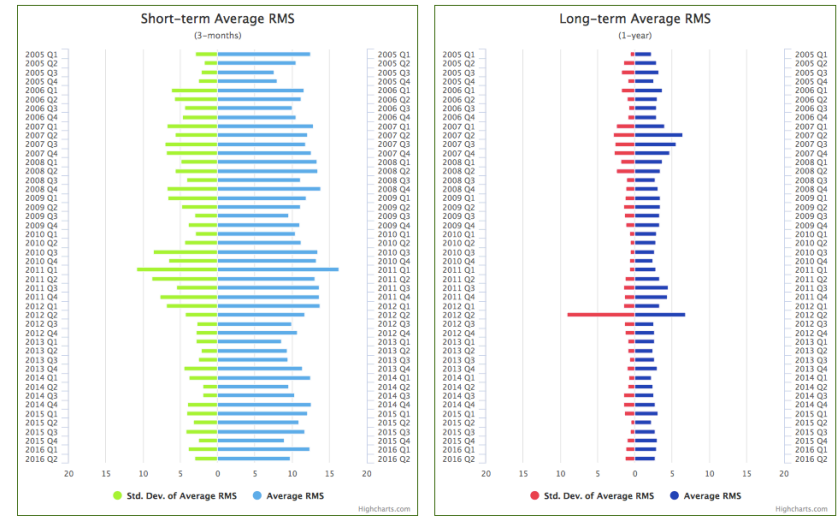
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Greenbelt 7105

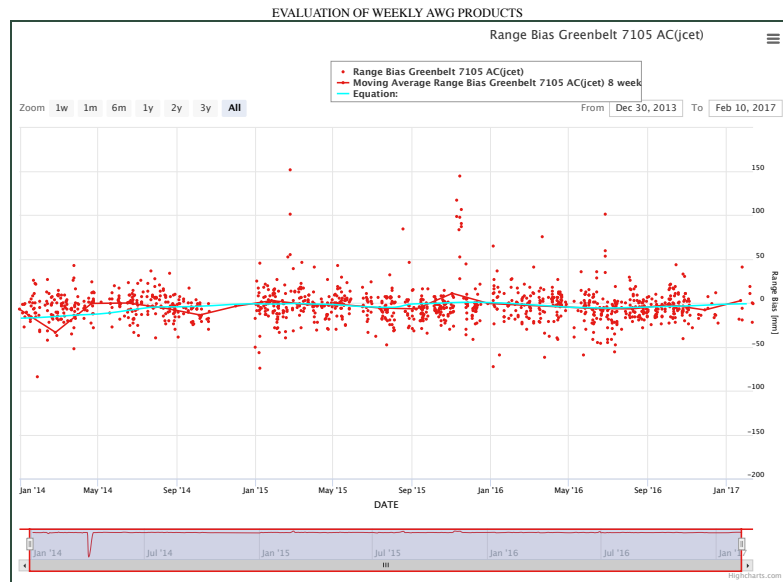


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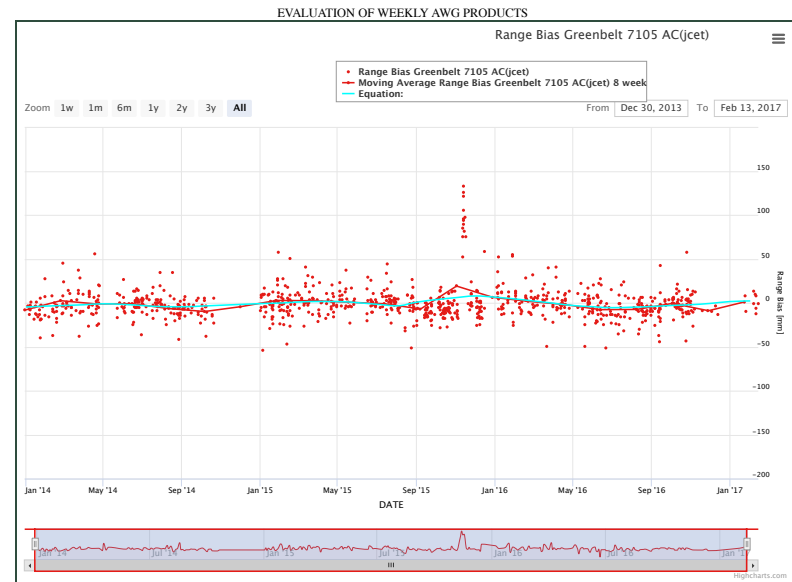
Herstmonceux 7840



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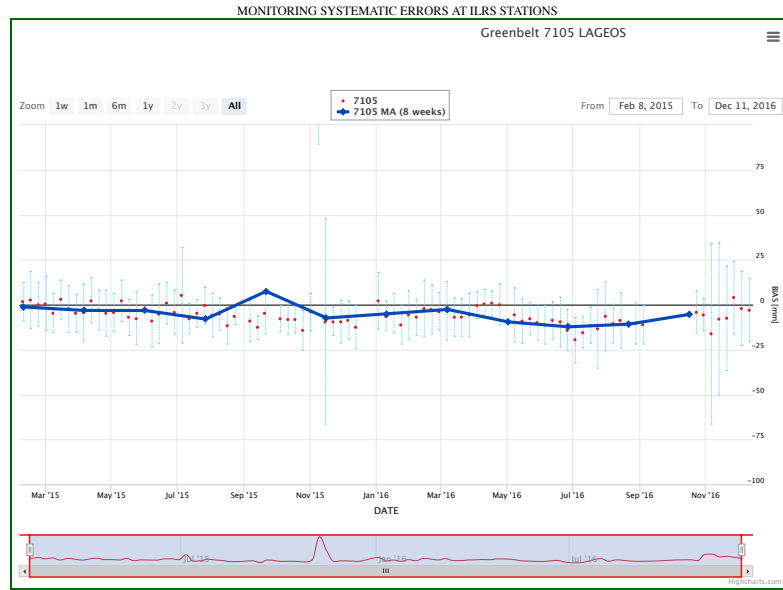


7105 Range Bias Greenbelt 7105 AC(jcet)
 Mean/Std. Dev.: -4.6116 ± 56.98 Count: 1,206

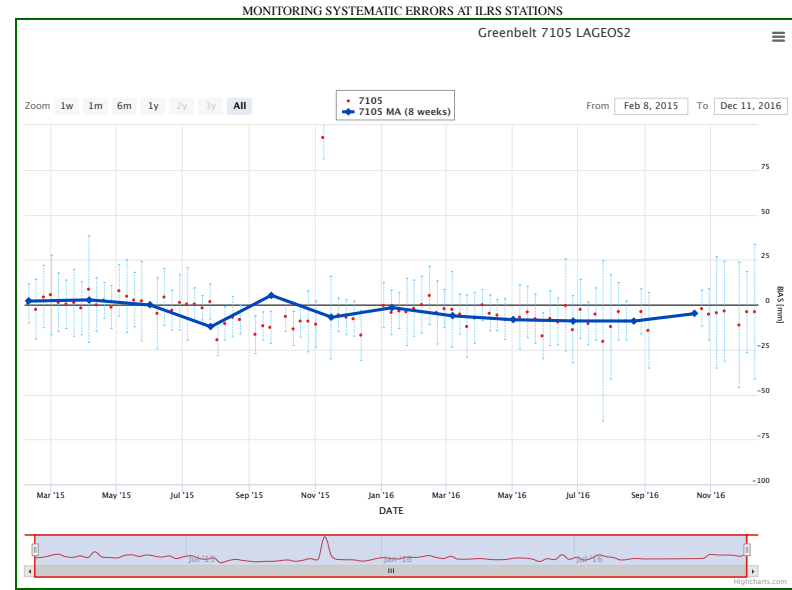


7105 Range Bias Greenbelt 7105 AC(jcet)
 Mean/Std. Dev.: -0.7594 ± 18.35 Count: 917

<http://geodesy.jcet.umbc.edu/QC/>



BIAS [mm] Greenbelt 7105 LAGEOS
Mean/Std. Dev.: -5.27 ± 10.81 Count: 138



BIAS [mm] Greenbelt 7105 LAGEOS2
Mean/Std. Dev.: -4.19 ± 10.14 Count: 128

http://geodesy.jcet.umbc.edu/ILRS_AWG_MONITORING/

MONITORING SYSTEMATIC ERRORS AT ILRS STATIONS