ILRS Network and Station Assessment Software: Use and Initial Results

Crustal Dynamics Data Information System
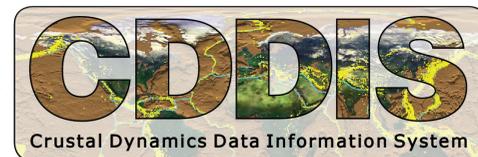
With the continued growth of the Satellite Laser Ranging (SLR) network, an understanding of the overall performance and health of the network is necessary. This is needed to recognize the achievements and realization of goals set by the International Laser Ranging Service (ILRS) including contributions to the International Terrestrial Reference Frame (ITRF). To ensure this information is communicated, a station assessment software has been developed. The software analyzes how well the system performance standards are being met and where there is room for adjustment and improvement in both the standards and on the station side. In addition to the system performance standards, tracking capabilities, interleaving, normal points per pass, and priority list adherence are also analyzed for applicable stations. As a continuation of the station assessment software presentation, this poster provides more detailed information on the initial results and the changes that have resulted from them.

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Purpose and Goals

1) Determine network capabilities for altimetry, geodetic, and GNSS satellites.
2) Assess station performance and steps for improvement to support network goals.

- Provides visualizations of parameters from the 2015 ILRS Pass Performance Standards and from parameters discussed at the 2017 ILRS Technical Workshop in Riga, Latvia
- Allows for assessment of existing objectives such as defining an operational GNSS tracking strategy for the ILRS
  - Most of the stations are not meeting the minimum number of GNSS passes required yearly.
- Next Steps: The standards forming the backbone of the software needs to be reviewed by the ILRS

Parameters

General
- Total Pass: 3500
- Average NPT/Pass: 3

Interleaving
- Percent Passes that Interleave Out of Total Tracked: 5%
- Percent LAGEOS Passes that Interleave Out of Total Tracked: 1%
- Percent GNSS Passes that Interleave Out of Total Tracked: 1%

Priority List Adherence
- % Passes from Top 10 Satellites: 1%
- % Passes from Top 20 Satellites: 15%
- % of Satellites Tracked not on the Priority List: 35% (Max)
- % Distinct Satellites on Priority List Tracked: 25%

Altimetry
- Total Pass: 2300
- Average NPT/Pass: 8

Geodetic
- Tracked all LAGEOS and LARES
- Total Pass: 600
- Even Spread of Passes: 200 for LAGEOS1, LAGEOS2, LARES
- NPT/Pass: 6-9

Etalon
- Track All Etalon
- Total Pass: 50
- Average NPT/Pass: 3

**GNSS**
- Track Primary GNSS Constellations: 1 Compass, 1 Galileo, 1 GLONASS
- Total Pass: 3000
- NPT/Pass: 3

How to Use

To zoom in and out of the map, either use the scrollbar on your mouse. Or the + and – buttons on the top-right of the image (appears when you hover over the image).

The visibility of keys can also be turned on and off by selecting the key name in the legend.

To learn more about a specific station, hover over the station dot for more information. The comprehensive score provides a report on the station's performance in all the parameters while the parameter specific image provides the total counts for the station over the expected.

Initial Results: Geodetic Review

10) Tracked All LAGEOS and LARES
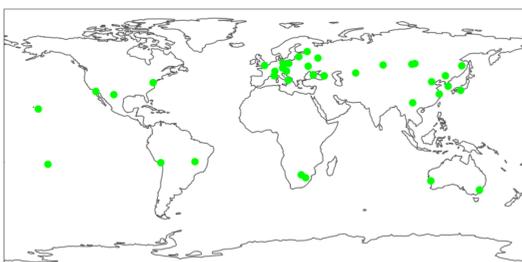
- All the stations are capable of tracking all the LAGEOS and LARES satellites

11) Total Number of LAGEOS Passes: 600 Minimum
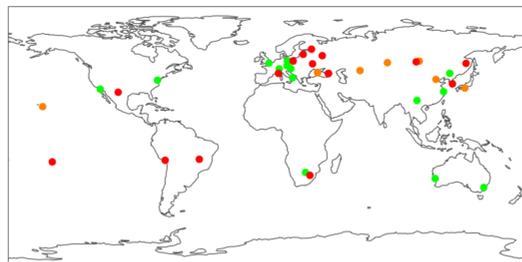
11.1) Total Number of LAGEOS Passes - Coverage
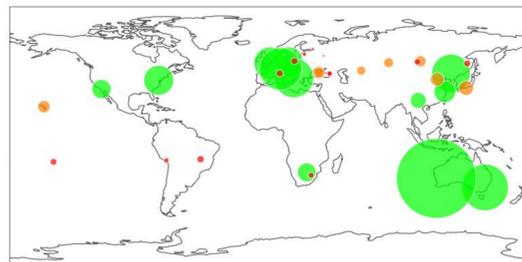
- Not enough tracking from a majority of stations
- Stations may meet the minimum for one geodetic satellite but they need to meet the minimum for all the geodetic satellites.

12) Total Number of LAGEOS-1 Passes: 200 Passes Minimum
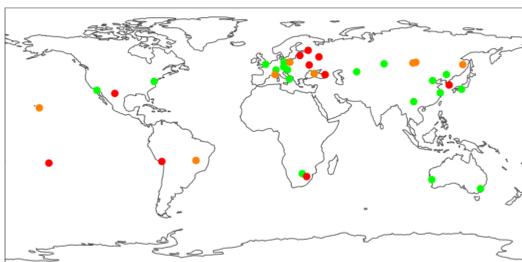
13) Total Number of LAGEOS-2 Passes: 200 Passes Minimum
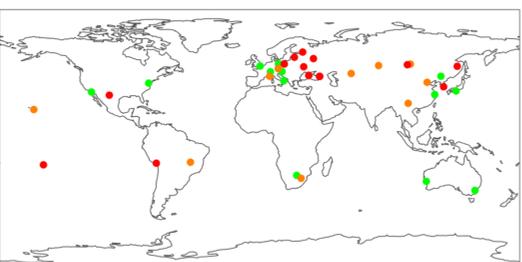
14) Total Number of LARES Passes: 200 Passes Minimum
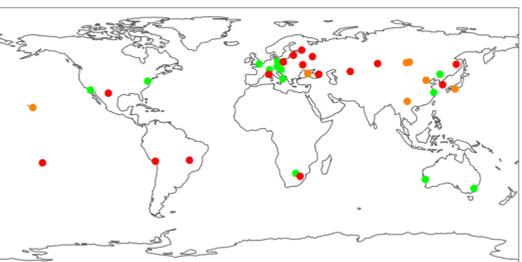
Initial Results: GNSS Review

19) Tracked All Primary GNSS Constellations: Compass, Galileo, GLONASS
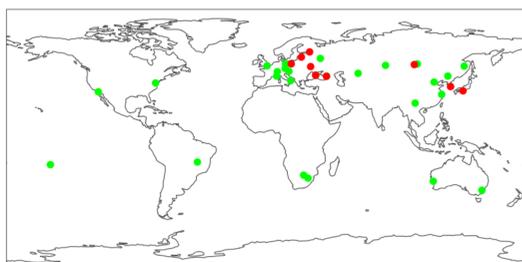
20) Total Number of GNSS Passes: 3000 Minimum
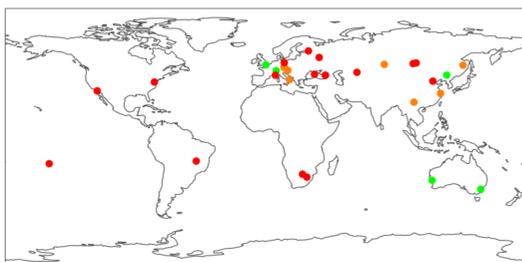
20.1) Total Number of GNSS Passes - Coverage
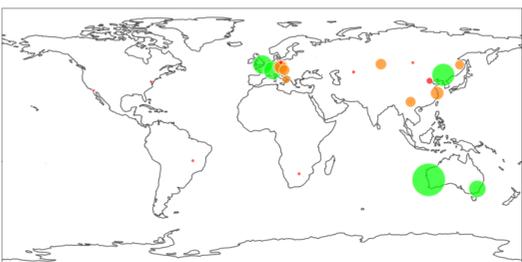
LARGE Campaigns
- Started in 2014 to expand GNSS data coverage of the ILRS network
- Objectives: 1) Define an operational GNSS tracking strategy for the ILRS

22) Percentage of Passes that Interleave Out of Total Tracked: 5% Minimum
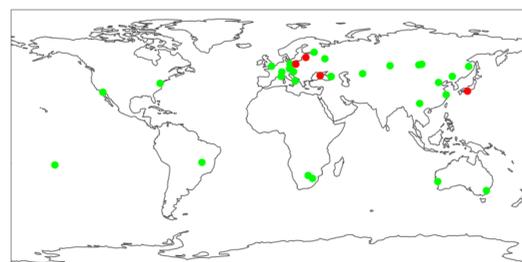
22.1) Percentage of Passes that Interleave Out of Total Tracked
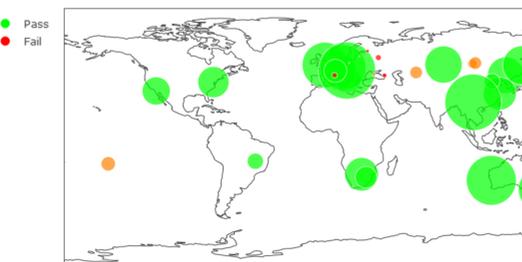
- Not all stations are tracking all three primary constellations
- Most of the stations are not meeting the minimum number of GNSS passes required yearly. This needs to be reviewed by those setting the standards.
- Stations have been asked to interleave but the technique is already being used by a majority of stations with most stations utilizing it over 25% of the time they are tracking

*Similar information is available for all the categories under parameters