Clinic Session 5: Web tools and software

The internet makes it very easy to connect with colleagues, share experience and advice, host analysis feedback charts and make software solutions available for download. The ILRS community makes good use of this connectivity with the ILRS website and also through websites from other institutions. The 'Web Tools and Software' clinic session asked if we make the most of the online platform. Could we collaborate further on our common software needs? And what other web/software tools are required by the ILRS community?

Within the session, a number of different tools were presented and discussed with the full group and in smaller groups. Our impression was that there is interest within the community for publicly available tools alongside a willingness to share and distribute.

Attendees were made aware of the ILRS Software web page (Technology -> Software), where existing software can be downloaded. Participants had the chance to actively sign up to the NESC forum. A number of tools were presented on laptops and could be tested by the participants. A short description of each the tools follows below.

NESC Forum
The Networks and Engineering SC forum is a space to post questions, give answers, join a discussion and take advice. It currently has 84 members. It covers a great range of topics and could potentially become a very useful problem solving tool. http://sgf.rgo.ac.uk/forumNESC

CPF Time Bias Prediction
The DiGOS/GFZ "CPF Time Bias Prediction" service estimates satellite time bias offsets from predictions at the present moment in time. This helps stations to acquire their targets more easily. http://slr.gfz-potsdam.de:5000/tb/v1/

OrbitNP.py – Orbit correction and normal point software
OrbitNP.py is written in Python3 to process Satellite Laser Ranging (SLR) observations. It originates from FORTRAN code developed at the Space Geodesy Facility, Herstmonceux, UK. An observation is comprised of an accurate time-stamp epoch in Coordinated Universal Time (UTC) and a highly precise time interval representing the 2-way time-of-flight to a satellite and back. These 2-way range measurements can be converted to flattened observed-computed (O-C) range residuals by solving for along track and range bias corrections to a reference orbit prediction. The flattened residuals are then averaged in bins and time stamped to form precise range observations called normal points.

This will hopefully be useful to the community as an analysis tool and example code for reducing SLR data. It is now available for download on the ILRS Software webpage https://ilrs.cddis.eosdis.nasa.gov/technology/software/index.html.

SAT Tracer:
SAT Tracer is a tool to display satellite visibility and passes for all SLR stations. It simultaneously shows a radar and a world map view. The world map can be switched between different projection

types. The user can define different satellite definition files to select targets to be displayed by NORAD ID and TLEs are updated automatically via spacetrack.org. Paths are displayed with respect to its optical visibility (in sunlight or not). Satellites can be filtered by inclination, eccentricity and revolutions per day. The current terminator phases (great circles on earth, where the sun is just beyond horizon) are also displayed on the world map. In addition to that the user can calculate, display and store the rise and set time all upcoming passes of selected targets.

Linux on windows

Some little-known Windows 10 interoperability functions were demonstrated. The Linux subsystem on Windows 10 allows one of the Linux distributions like Ubuntu, Debian or Suse among others, which are available freely from Microsoft Store, to use transparently within Windows without virtual machine. It allows to run native Linux programs on Windows and easy transfer data between Windows and Linux programs via piping. Linux programs and scripts have a direct access to Windows file system. This feature simplifies data exchange in mixed Windows/Linux environments and allows to run Windows and Linux programs side by side eliminating in many cases the need to use dual boot systems or virtual machines.

Databases in operation at Mt Stromlo

A number of databases developed for Mt Stromlo operations for managing satellite, system configuration and system calibration data were demonstrated. These databases consisted of XML data files supported by specific GUI editors and associated tools, each designed to support laser ranging operations. The use of XML files allows data to be highly portable and allows use of many other tools such as text editors for data maintenance. It is expected that the system configuration database editor will be enhanced to provide a front-end for the generation of ILRS station logs.