

Herstmonceux station current status and future plans

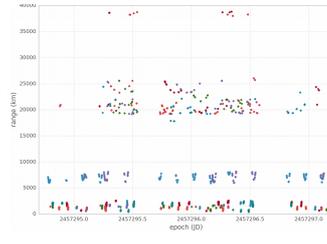
We present a summary of recent activity at the Space Geodesy Facility, Herstmonceux, including kHz laser status, telescope drive repair, new calibration target installation and current tracking best practise and experiences. In addition the latest laser ranging and gravimetry results and site stability survey data will be given.



kHz satellite laser ranging The SGF operates a 1kHz laser, firing 10ps, 1mJ pulses. It uses a SPAD detector and an event timer, HxET, made from Thales modules. An A033-ET Riga event timer has also been recently installed for simultaneous data collection and comparison. The upgrade to the kHz laser in the autumn of 2014 resulted in increased pulse energy and much improved reliability.

Replaced daytime filter The narrowband filter used for daytime SLR consists of an oven controlled $\pm 0.15\text{ns}$ filter and a blocking filter. The blocking filter was found to be ageing and defective and replaced. This improved the filter transmission by a factor of 4.

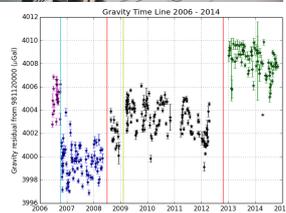
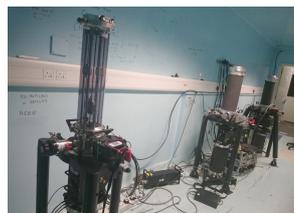
Improved SLR and interleaving These recent upgrades have improved the kHz SLR capability of the SGF. At night the SGF can observe the IRNSS satellites at ranges beyond 38 000km and during the day observers can expect to successfully find GNSS and Etalon SLR targets with more consistency than previously.



The time required to produce a good normal point is significantly reduced with kHz, allowing for frequent switching between satellite targets. An example plot showing the different SLR targets tracked over two days is plotted above right.

Down for telescope drive repair SLR at the SGF was halted for the month of July 2016 due to failure of a telescope drive system amplifier. Once the ordered replacement arrived, SLR commenced the same day.

Absolute Gravimetry Absolute Gravimetry data has been collected at Herstmonceux since 2006. A Micro-G FG5-X gravimeter is permanently installed in the SGF basement, alongside two legacy FG5 models. A gravity measurement consists of hourly drop sets over a 24 hour period and the SGF time-series of project days is plotted to the right. The SGF has recently started campaign deployments, including to Eskdalemuir in Scotland and to Port-of-Spain, Trinidad.

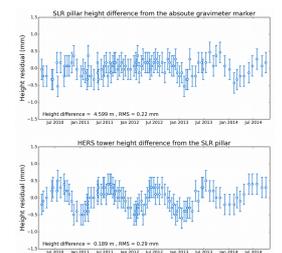


Hydrogen Maser An active hydrogen maser was installed in 2010 and provides the station time and frequency reference. This enables us to take part in time transfer type experiments, this year we have undergone an ELT calibration visit and are currently involved in a T2L2 campaign to compare clocks at intercontinental distances.

Levelling campaign In order to monitor potential instability in the immediate local site surrounding the SGF, a campaign of digital levelling began in 2010 to measure at intervals of a few weeks the relative heights of a series of monuments.

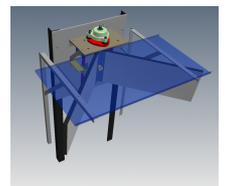


The levelling run uses a Leica DNA03, with instrumental accuracy of 0.3mm. It begins in the site basement on an absolute gravimetry pier and in steps of a few metres to several 10s of metres it then includes the SLR pillar (which is estimated to reach more than 10 metres deep in to the ground), several points on the HERS monument, and points on the HERO and HERT GNSS sites. In total 22 site heights are measured within approximately two hours.



The results indicate good site stability and no long term height changes between the monuments measured.

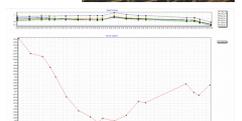
Calibration target A new calibration target, designed and built in-house, has been installed alongside the primary SLR target. This target is designed to have a well defined and easily surveyed reference point and will become the primary SLR target following a full site survey.



Sun Photometer A Sun Photometer measures the thickness of aerosols in the atmosphere. Aerosols are microscopic particles in the lower atmosphere that reflect the Sun's radiation back into space.



Plotted to the right is a Sun Photometer measurement taken 2016 Sep 14, showing variation in aerosol optical thickness.



Aircraft In-sky safety The SGF operates a radar aircraft detector that inhibits the firing of the SLR laser. An ADS-B receiver was installed in 2013 and provides the SLR observer with a visual display of nearby aircraft and an audible warning if an aircraft is approaching the beam.