

Report from NESC meeting on Thursday 2nd February 2023

The NESC held a meeting on Thursday 2nd February on Microsoft Teams with **30** participants.

The Riga ITRF2014 Solution Problem

Kalvis Salmins & Jorge del Pino described a systematic bias in the Riga station data as seen in the station coordinates from ITRF2014 and in time bias and range bias reports. Finding the cause of this problem was not straight forward. The Riga team inherited in 2013 a degraded system and very little documentation. A new timing unit and frequency distribution network was installed, but this did not remove the LAGEOS time biases. The station velocities for SLR and GNSS in ITRF2014 do not agree. Only now with the new ITRF2020 solution can the problem be seen to be resolved. The SLR data from Riga before the timing upgrade in 2014 is unfortunately of lower quality.

Galileo for Science Tracking Campaign

David Lucchesi talked to the NESC about the scientific motivations for a new ILRS tracking campaign on the Galileo satellite constellation. This is to support the G4S_2.0 Project, which will be looking at all Galileo satellites, but in particular those in eccentric orbits (Galileo 201 and 202). This work will investigate gravitational redshift, relativistic precessions, dark matter and new models and technology. The requested tracking campaign includes an increase in Galileo tracking, a significant increase for the eccentric orbit satellites (at least two weeks per month) and additional focus on the times when the beta angle is maximum, minimum and close to zero for a period of 2 years. A discussion followed around how much previous Galileo campaigns could cover the needs of this project. It was said that feedback to stations via a website is useful during a campaign.

Space Debris Laser Ranging with range-gate-free Superconducting Nanowire Single-Photon Detector

Xiaoyu Pi gave a presentation on behalf of Haitao Zhang about the advantages of the superconducting nanowire single photon detector in operation at the Yunnan Observatory in Kunming, China. The detector can automatically recover its working state and can even respond multiple times for a single laser pulse. It can therefore be operated in 'range-gate' free' mode. This has useful applications in searching for targets with large range gates, such as poorly predicted debris objects. The SLR returns from debris passes shown were taken in night conditions and future plans include daylight ranging with some range gating.

DLR Experiments with Transmitting / Receiving-Stations 333km Apart

Xiaoyu Pi reported on activities in multi-static laser ranging to space debris objects. The Kunming station ranged to debris targets and received returns, in addition laser returns were recorded at Lijiang station 333km away. Both stations used superconducting nanowire detectors.

The presentations will be available at https://ilrs.gsfc.nasa.gov/network/newg/newg_activities.html

The date for the next NESC meeting was set as **Thursday 6th April at 1300 UTC**

If you missed the meeting and would like to catch up, please send me an email (matwi@nerc.ac.uk) and I can provide the recording.