SLR Station Riga 1884, Status Report

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Hardware and Software Upgrades since 2018.

Substantial Upgrades during 2021-2022.

•A new SLR detector unit was installed, including a second channel with a PicoQuant HPD photodetector. The unit is termostated, with electronic interference protection and is operated remotely.

•The telescope drive and control has been replaced with COTS components.

•New computer-controlled optical channel switching system, laser beam divergence control and receiver FOV control

•Upgraded dual-use visual guiding channel, with the Andor iXon Ultra 888 EMCCD camera, Optomask and a computer-controlled filter wheel for photometry. We have started photometric observation, currently up to 10 Hz, sampling rate can be increased up to ~100Hz with sensor masking technique and binning.

•A new upgraded local ties network determination, replacing the 1996 solution (published paper QR link below). Redetermination of the 2016 SLR system delay using the new local ties monuments as external targets (original 2016 system delay poster QR link below).

•New prediction, Event Timer Control and Filtering software, covering both ILRS and space debris targets. The telescope pointing software has been upgraded.

•A new time and frequency distribution unit Pendelum FDA-301.

•The Time Selector/Amplitude to Time Interval Converter (TS/ATIC) is in operation from September 2019.

•The local Vaisala WTX501 & PTU300 barometric sensors are calibrated against the GFZ-Potsdam GE DPI Druck141 reference barometer.

•In development:

•Testing the new event timer, under development at the Institute of Electronics and Computer Science, with parameter stabilization and additional capabilities

•Back calibration of the Paulin VMB 2 station barometer (used 1987-2007) against the calibrated Vaisala local meteorological Stations.

•Improved telescope/receiver unit thermal protection for daylight tracking.

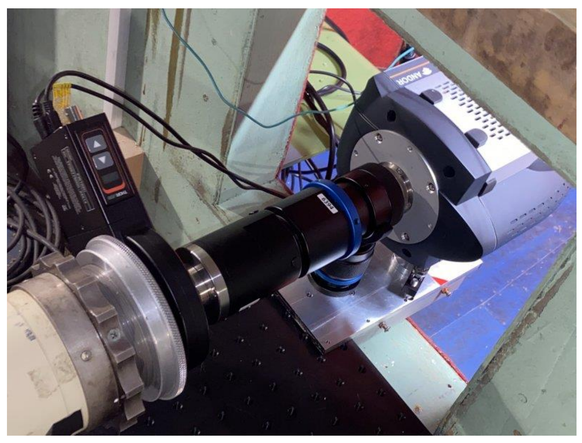
•Notable Points, 2018-2022

•Station operation affected during 2020-2021 due to COVID restrictions and telescope drive failure (2021-2022)

•New single night passes observation record: 54 (2020/01/02-2020/01/03).

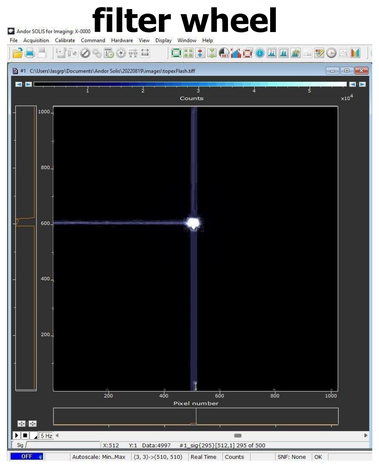
•Permanent hourly clarity monitoring since January 1st 2018.

•Space Debris photometric observations (since spring 2022).

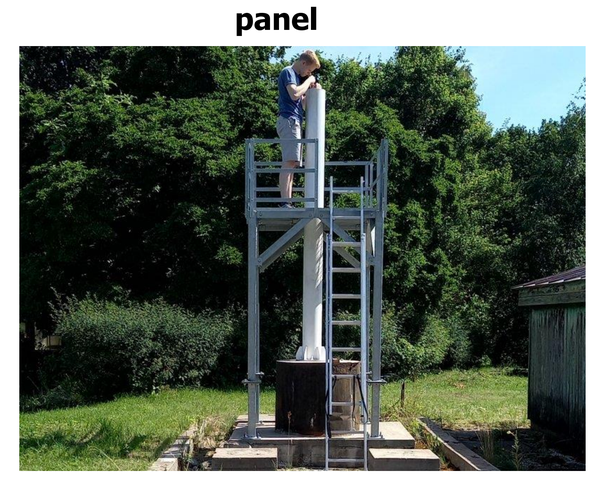


Andor iXon camera, Optomask and filter wheel

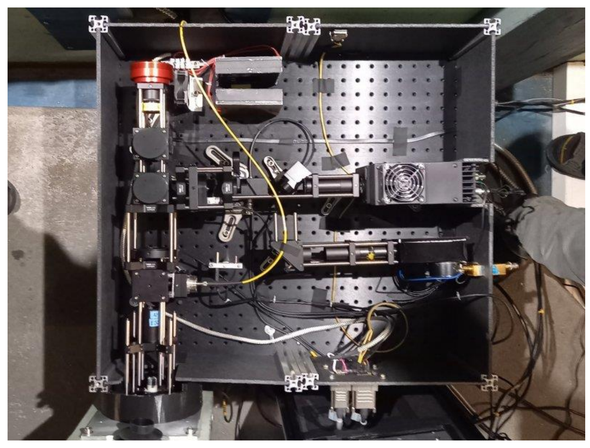
Receiver unit control panel



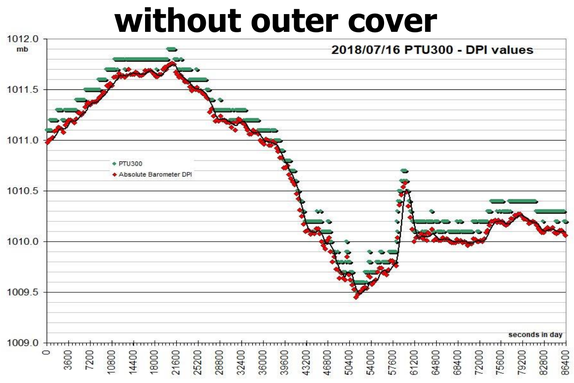
Topex photometric frame at 10 Hz (enhanced flash image)



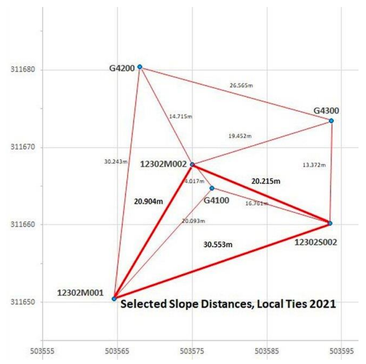
Receiver unit - external view without outer cover



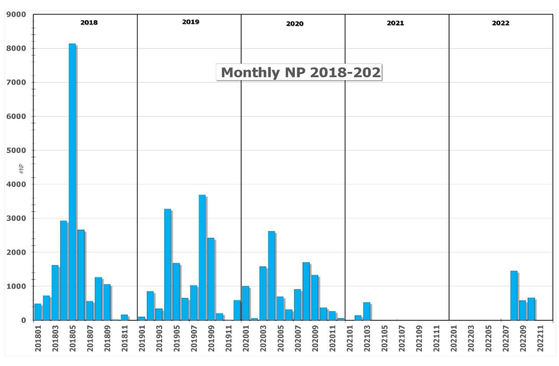
Receiver unit - open view



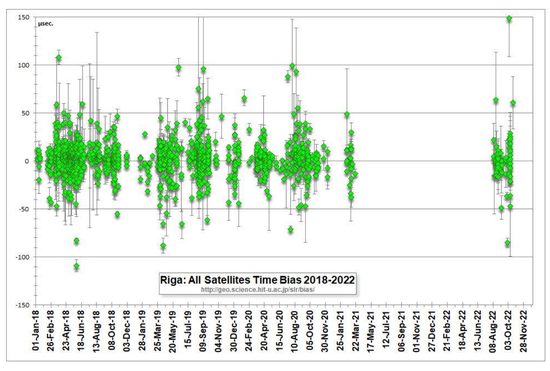
PTU300 barometer calibration



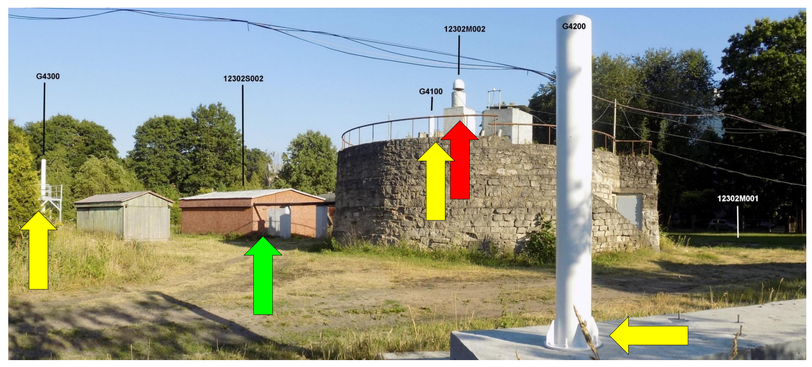
Riga local ties scheme 2021



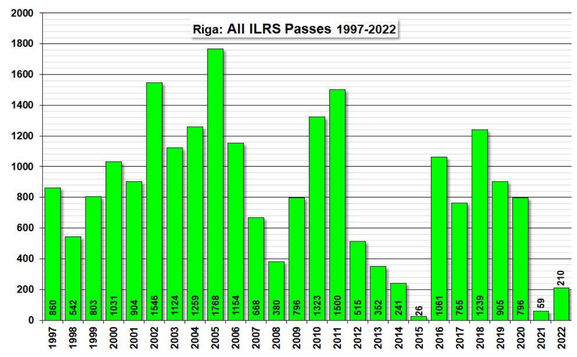
Normal points 2018 – 2022

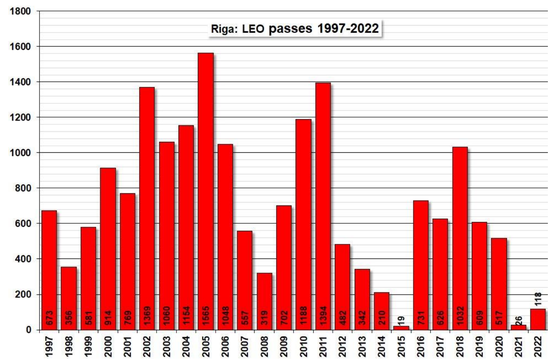


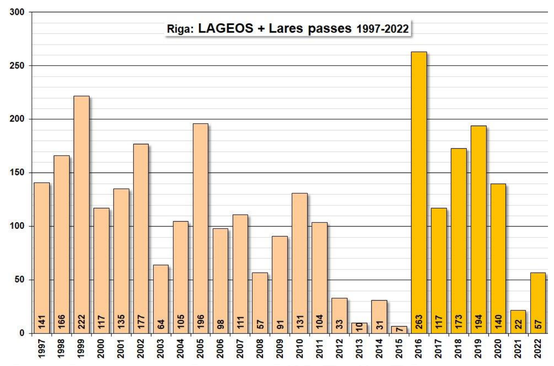
Time Bias 2018 – 2022

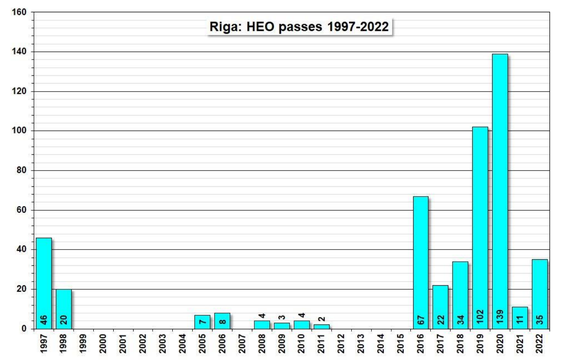


New local network ties points (yellow), GNSS (red) SLR (green)









Riga passes 1997 – 2022 (2022/10/25) – space debris observations (SLR & Photometry) not included

Acknowledgements:

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Link to the Local Ties paper

Link to 2016 system delay poster

Link to the main author e-mail:

22th International Laser Ranging Workshop "Reconnecting the ILRS community"

7-11 November 2022 Yebes, Spain