Day- and night-time SLR at MHz repetition rate in Graz

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Ultra-high repetition (≥100 kHz) rate is one of the most promising strategies for future satellite laser ranging (SLR), and a few stations have already started such attempts. Heretofore, all of them had efficiently proved the concept and the benefits of the ultra-high repetition rate SLR during night-time. Since the year of 2019 a demo then a purchased laser version (>45 Watt @ 1064nm, ≤10 Mhz, ≤10 ps pulse width) are installed in Graz. After some integrations and developments some successful passes up to inclined geosynchronous orbit (IGSO, slant range > 380,000 km) satellites during station were tracked successfully during night time, presenting max. return ratio ≈ 53.0 % for Swarm-B, equivalent 265 k returns per second; max. 800 returns per second for Beidou IGSO5. In addition during daytime with the application of propagated MHz range gate some low and middle earth orbit satellites were also achieved. In this talk the system setup and several involved key methods or techniques will be presented, for example the timing issue of the burst mode, the propagated range gate generator, and the fast real time displaying and storing of PC software, etc. The approach of this work will significantly prompt stations who are will to go to MHz direction in the interest of superior data precision, shorter normal point acquirement time, more advanced strategy regarding target signature and attitude identification.