

## Testing and benchmarking the NASA SGSLR systems at the 1mm level prior to field deployment

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**Abstract:** NASA SGSLR network, presently in its early stage of development, must meet significantly improved ranging performance than the current NASA SLR network. The goal for SGSLR is to achieve 1mm or better normal point data precision, accuracy, and stability as well as support automation. This places significant emphasis on the need for a robust and comprehensive approach for system verification for performance compliance. The system build phase will include conventional approaches to test the hardware and software performance from the modular level to the subsystem level and subsequently to the system level. Upon completion of the standalone system performance verification, NASA intends to use the collocation technique, where a proximity SLR reference system is used to benchmark the performance via simultaneous ranging through a common atmosphere to geodetic satellites with precisely known center of mass. The ranging performance comparison is then performed on a pass by pass basis using a combination of ge-

ometrical and orbit analysis techniques. This independent comparison is normally performed over a sufficiently long period of time to establish adequate satellite pass geometry and to meet the short term and long term system stability measurement requirements. This mature approach, which has significantly helped NASA to achieve the uniformity and consistency of performance across its global network while minimizing the performance risk across its core sites, will also be used for SGSLR. To further augment the above verification framework, each system or at least the reference system will carry a piggy-backed small aperture auxiliary telescope to simultaneously receive the satellite returns from the other system for cross-correlated range measurements. Details will be discussed.