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Reducing the satellite contribution to range error

In order to better support mm accuracy ranging, spherical geodetic satellites must provide adequate optical cross-section for their assigned orbital altitude while simultaneously minimizing their impulse response, i.e. the temporal spreading imposed on an ultrashort laser pulse. Furthermore, this must be accomplished from all station aspect angles. While the flat panels of large arrays on GNSS and many remote sensing satellites meet both these requirements quite well for radiation entering normal to the array (satellite at zenith relative to the station), the pulse spreading caused by the array can be as high as 500 psec (7.5 cm) at lower elevation angles. The effective target cross-section is reduced as well, but this is a relatively minor concern. One solution for geodetic satellites might be to use large diameter spheres designed to accommodate more retroreflectors but whose retroreflectors are recessed to limit their effective Field of View (FOV) and thereby minimize the range differentials between retroreflectors that do contribute to the return signal. Segments of similarly large spheres could replace current flat panels on GNSS and remote sensing satellites that have a relatively fixed orientation with respect to the Earth Center of Mass.