

Precision Orbit Determination of BDS satellites using combined SLR and Inter-satellite link measurements

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The BDS satellites are equipped with the inter-satellite link (ISL) equipment, which can observe other satellites and ground monitoring stations with Ka-band measurements. The relative satellite clock and geometric distance can be separated to decouple the satellite orbit and clock difference using the dual one-way ISL ranging measurements of BDS satellites. The geometric distance is taken as the observation and is combined with the ground-based measurements to determine the precision orbit of BDS satellites. SLR has no carrier phase ambiguity and clock difference, not affected by the ionosphere, simple data and data processing, which can be used as a measurement technology independent of GNSS observation technology. This paper focuses on evaluating the precision orbit determination accuracy of 11 BDS satellites (MEO/IGSO/GEO) based on SLR and intersatellite link (ISL) measurements. The results show that the orbit accuracy of BDS satellites are 0.04m for radial components and 0.30m for 3D. The accuracy of 12h and 24h predicted orbit for MEO is about 40cm for the 3D, the accuracy of orbit for IGSO orbit is less than 60cm for 3D and the accuracy for GEO is about 1m for 3D. The results show that the high precision orbit of the navigation satellites can be achieved using combined SLR and ISL measurements.