

Centimeter-level precise orbit determination for the HY-2A satellite using DORIS and SLR tracking data

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Abstract

HY-2A satellite is the first ocean dynamic environment monitoring satellite of China. Centimeter-level radial accuracy is a fundamental requirement for its scientific research and applications. To achieve this goal, we designed the strategies of precise orbit determination (POD) in detail. To achieve the relative optimal orbit for HY-2A, we carried out POD using DORIS-only, SLR-only, and DORIS+SLR tracking data, respectively. POD tests demonstrated that the consistency level of DORIS-only and SLR-only orbits with respect to the CNES orbits were about

1.81 cm and 3.34 cm in radial direction in the dynamic sense, respectively. We designed 6 cases of different weight combinations for DORIS and SLR data, and found that the optimal relative weight group was 0.2 mm/s for DORIS and 15.0 cm for SLR, and RMS of orbit differences with respect to the CNES orbits in radial direction and three-dimensional (3D) were 1.37 cm and 5.87 cm, respectively. These tests indicated that the relative radial and 3D accuracies computed using DORIS+SLR data with the optimal relative weight set were obviously higher than those computed using DORIS-only and SLR-only data, and satisfied the requirement of designed precision. The POD for HY-2A will provide the invaluable experience for the following HY-2B, HY-2C, and HY-2D satellites.

Key words: HY-2A satellite, precise orbit determination, DORIS, SLR, weight.

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