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INVESTIGATION OF SEMI-MAJOR AXIS INCREASING FOR A DAILY REPEAT ORBIT

**Abstract**

FORMOSAT-2 satellite was launched on May 20, 2004, and is currently on a Sun-synchronous orbit of 14 rev/day. It is currently the only one satellite with daily revisit and global coverage, since it possesses features of daily repeat, high altitude, and large field of regard. During its five-year mission, the satellite could take the first-time images and continuously monitoring for most events, especially for the southern Asia tsunami in 2004, the Hurricane Katrina in 2005, Wilkins Ice Shelf Disintegration and Sichuan Earthquake in 2008.

Since FORMOSAT-2 satellite launched, it has exemplified a strange feature of orbital altitude evolution for its semi-major axis (SMA) increased when the groundtrack passed through a range of longitudes. It has been conducted three orbit maintenances during its five-year mission life, among which there are two to lower the altitude. In this paper, the SMA evolution is examined through Hilbert-Huang transform techniques, and the instantaneous frequencies of SMA are correlated to the spherical harmonics of geopotential. The sensitivity of the SMA of the repeat orbit to the coefficients of the high-order sectorial harmonics is investigated.