SPACE SYSTEMS SYMPOSIUM (D1)
Training, Achievements, and Lessons Learned in Space Systems (5)

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LESSONS LEARNED FROM FORMOSAT-2 TEN-YEAR OPERATIONS

Abstract

FORMOSAT-2 satellite was launched in 2004 on a Sun-synchronous orbit of 14 rev/day. It has taken the first images and continuously monitoring after large disasters over the world to support the aftermath relief and precaution of secondary disasters. The daily repeat of FORMOSAT-2 simplifies operations, scheduling, and processing, and the users are easy to request images for urgent needs. With the higher altitude of 888 km and larger field of regard of 45 deg, the satellite can even take images up to the geographic poles. This demonstrates that FORMOSAT-2 is the only one high-resolution imaging satellite which can daily cover the worldwide areas. Also due to the higher altitude, it has been conducted only 6 orbit maintenances during its mission time. Good agility is to guarantee the large-area imaging or multiple tasking.

During the 10-year satellite operations, one of the gyros was found noisy in 2006, and then the other three gyros were used as the attitude sensors. Satellite was operated as before, but has never redundancy in the gyro set. To overcome this problem, a numerical inertial attitude estimator is developed to compute angular rate from star tracker data to replace the original from gyros. One of the reaction wheels was failed in 2012. The satellite attitude maneuver was then performed with the other three reaction wheels. The agility of the satellite is reduced with 50 percent longer than that of 4 reaction wheels. The main impact on the tasking is the mosaic imaging of multiple strips. The original 3 strips imaging for a large area is reduced to 2 strips. Two-reaction-wheel control algorithm is implemented to prevent the mission failure and to extend the mission life.