SPACE SYSTEMS SYMPOSIUM (D1)
Lessons Learned in Space Systems (5)

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FIVE YEARS DEVELOPMENT AND FIVE YEARS OPERATIONS OF FORMOSAT-2 SATELLITE

Abstract

FORMOSAT-2 satellite began its mission definition in 1999, and was launched in 2004. Now it has been operated beyond its mission lifetime of five years. Originally its orbit is designed as a Sun-synchronous orbit with 14 revolutions per day to daily revisit Taiwan. However, the feature of one revolution passing Taiwan every day also applies to the coverage areas worldwide of the other thirteen revolutions. Therefore, the international marketing come after its launch. FORMOSAT-2 is currently the unique high-resolution imaging satellite to completely and daily cover the worldwide areas.

To meet the mission requirements, the satellite carries the remote sensing instrument (RSI) to take images during daytime, and possesses high agility of reaction wheels for attitude rotation and large amount of propellant for orbit transfer and maintenance. It also carries a scientific payload of the imager of sprites and upper atmospheric lightening (ISUAL) to observe transient luminous events. Due to the complicated operations, it often occurred automatic reconfiguration orders (ARO) in cyclic overload, gyro, and reaction wheels. These anomalies were recovered through adjustment of system parameters or change of flight software through analysis of the trending data.

The indigenous development of the image processing system enabled the quick responses for urgent requests from users. The planning and scheduling software can be modified according to the mission need of each event, so that the satellite can image the same target at same position, same attitude, and same time. The satellite can also image the dynamic objects, large areas, and even the geographic poles. The quick change detection from FORMOSAT-2 images marked its feature after GoogleEarth released in 2005. For the recent large disasters in the world, like southern asia tsunami, Sichuan earthquake, typhoon Morakot over Taiwan, and Chile earthquake, FORMOSAT-2 took the first images almost every time, and provided the intensive monitoring images to domestic and international organizations for aftermath relief.