

Satellite anomalies and satellite alert system

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Solar activity has a cycle of about 11 years. In this cycle, sunspot activity was decreasing from its maximum April 2000 peak to its 2007 minimum when the Oct. 2003 storm occurred. A huge solar flare also occurred in a previous diminishing period. Although there had been no major flare since Jun. 15, 2003, a large flare occurred on Oct. 19. On Oct. 23, the first large flare (X-ray magnitude class X5.4) was observed in the sunspot region 486, where the subsequent ultra-large flare occurred (X17 on Oct. 28, X10 on Oct. 29, and X28e on Nov. 04). The NASA Goddard Space Flight Center Space Science Mission Operation Team indicates that approximately 59% of the Earth and Space Science missions (both deep-space and near-Earth missions) experienced effects from the October-November activity.

We assessed the effects of solar activity on two Japanese spacecraft anomalies in JAXA during an Oct. 2003 radiation storm.

(1) The GEO-orbiting Data Relay Test Satellite (DRTS), also known as Kodama in Japanese, entered the safety mode (slow-spin mode), essentially shutting down all non-critical functions, on 28 Oct. at 1842 (UT). Three-axis attitude control of Kodama was then recovered on 7 Nov. at 1219 (UT). In this paper, we report what occurred on the satellite and on a high-energy electron enhancement (or Electro Static Discharge (ESD)) alert system and solar flare alert system using space weather.

(2) The Advanced Earth Observing Satellite II (ADEOS-II), also called Midori-II in Japanese, a low-altitude polar sun-synchronous satellite with an altitude of 800 km, suffered a catastrophic failure during an October storm. Solar cell power output dropped from 6 kW to 1 kW in three minutes (1613 to 1616 (UT)) on October 24. We will report what occurred on the satellite and related space environment effects, and on polar orbit satellite alert system using space weather.