

EARTH OBSERVATION SYMPOSIUM (B1)
Future Earth Observation Systems (2)

Author: Mr. Marappa Krishnaswamy
Indian Space Research Organization (ISRO), India

CARTOSAT-2 -A DEDICATED SATELLITE FOR CARTOGRAPHIC APPLICATIONS

Abstract

The Cartosat-2 is an advanced Cartographic application satellite with single panchromatic camera providing scene specific imageries of around 1m spatial resolution and around 10 km swath. The spacecraft is a 3-axis stabilized and planned to provide spot imageries of the desired location with a quick turn around time. The satellite has the capability to provide stereo imageries by making use of the along and across track steering capability of the spacecraft. The spacecraft is built around the camera to provide low mass and moment of inertia and has the high agility capability to meet the multiple spot scenes in a pass. The spacecraft mainframe functions like Telemetry, Telecommand, Attitude and Orbit Control (AOCS) system, Thermal Management, Sensor signal processing and the battery management functions are integrated in a single system called Bus Management Unit. High accuracy star sensors and DTG based inertial reference system and high torque reaction wheels are used as Attitude sensors and actuators. Advanced triple junction solar cells, bonded on stiffened solar array substrate are used for power generation.

The payload system consists of modified RC type two mirror telescope, three lens field correcting optics and a band-pass filter placed close to the CCD. The camera operates in the spectral band of 0.5 – 0.8 μ m using 12000 element CCD array. Two CCDs are located within the focal plane and two independent camera electronics provides redundancy for the entire payload chain. The video data from CCD is quantized to 10 bits and the total data rate from the camera is 336 mbps. This data is compressed in two chains and formatted and transmitted through a single X-band carrier. The video data is also suitably encrypted and additionally stored in the onboard Solid State Recorder (SSR) for later playback and transmission. The payload data after QPSK modulation in x-band is transmitted either through an electronically steerable Phased Array Antenna (PAA) or through a dual gymballed patch antenna to the ground receiving station.

The Cartosat-2 spacecraft was realized during 2004 – 2006 and was successfully launched into 630 km polar sun-synchronous orbit by the PSLV-C7 launch vehicle from Sriharikota Launch Complex, India on 10th January 2007.

After successful in-orbit initial phase operations, the spacecraft has entered into the normal phase of operations. All the calibration operations required for the mainframe elements like star sensors and the gyroscopes have been carried out by suitable on-board calibration maneuvers. Payload calibration for geometric and radiometric parameters have been carried by Stellar Imaging and imaging the accurate Ground Control Points (GCP). After all the calibration operations, the Cartosat-2 spacecraft was declared operational during October 2007 and radio-metrically and geometrically corrected imageries and image products are being delivered to many national and international users.