Paper ID: 34869
oral

23rd IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Small Earth Observation Missions (4)

Author: Prof. Jan du Plessis
Private, South Africa

Mr. Hano Steyn
Denel Spaceteq, South Africa

PAST PRESENT AND FUTURE SOUTH AFRICAN EARTH OBSERVATION MISSIONS. PROF JAN DU PLESSIS (UNIVERSITY OF STELLENBOSCH)

Abstract

South Africa has an active history of earth observation systems, conceptualized, designed and build completely in South Africa. In fact, South Africa is the only country in Africa that managed to completely build satellites within its own country borders. This resulted in three successful operational earth observation systems (SunSat, O1 and Sumbandila). They are the forerunners of the present 450Kg EO-Sat1 satellite being developed at present, as part of the ARMC (African Resources Management Constellation). The present EO-Sat1 satellite is designed to provide a sub set of the Sentinel-2 bands, excluding the water vapor and SWIR bands of Sentinel-2, but including the yellow band of World View 3. The purpose is vegetation health state observation on a routinely two weekly basis for any specific tasked area. The EO-Sat1 satellite narrow swath imager has 2 correlated bands (red and yellow) at 2.5m-GSD as well as an 8 subset of the Sentinel bands at 10m-GSD, all implemented by means of TDI sensors. The wide swath imager has the same 10 bands, but with two bands at 15m-GSD and the other 8 bands at 60m-GSD. The satellite has high enough slew rate to do a 60 degree forward looking observation of the target area, followed by nadir imaging and followed by a 60 degree backward observation of the same area, to characterize aerosols above and the anisotropy of the vegetation surface being observed. A possible follow up enhanced satellite's conceptual design is presented in this paper, which use the present EO-Sat1 satellite buss with a drastically enhanced earth observation payload, increasing the total satellite mass to approximately 600Kg. It will have double the swath width to decrease latency time of critical observation areas. The design change the operational orbit away from the present high debris density, high collision risk orbit height of 700Km to a lower orbit where end of life will be shorter than 25 years natural orbit decay, allowing the satellite to be designed without an active failure prone de-orbiting mechanism. A number of additional spectral bands are also added namely the XAN band between blue and green to increase the bathymetry capabilities of the satellite, as well as adding a 900nm vapor band, and the SWIR bands that are needed for cloudy imagery improvements.