DUBAISAT-1: MISSION OVERVIEW, DEVELOPMENT STATUS AND FUTURE APPLICATIONS

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1. ABSTRACT

DubaiSat satellite system will be the first spatial program in the Middle East that is fully dedicated to environmental observation and monitoring. The launch of the first platform (DubaiSat-1) is scheduled for the first quarter of 2009. DubaiSat-1 will observe the Earth from a sun-synchronous orbit providing new and unique opportunity for continuous monitoring of the local and regional environment. The new DubaiSat-1 data, combined with existing polar orbiting and geostationary missions, will provide potentially significant enhancements to the predictive capabilities of the existing environmental models as well as improved capabilities for monitoring and predicting natural hazards such as sandstorms, land degradation, desertification and droughts.

DubaiSat-1 is designed to be compatible with low earth orbit with altitude ranging from 500 km to 800 km. DubaiSat-1 with its stowed solar panels is compatible with most of small satellite launchers as a secondary payload or as a primary payload such as Falcon. The spacecraft bus provides a typical pointing performance of 0.2 deg. DubaiSat-1 weighs less than 200 kg including 50 kg payload mass. The average power consumption is less than 150 Watts. The two figures below depict DubaiSat-1 platform in both launch configuration and in exploded view. The origin of the satellite coordinates is located at the geometric centre of the launch adaptor bottom plane as shown in Figure 1-1. The +Z-axis is toward the payload optical axis. +X-axis is defined along the scanning direction of DMAC, which is normal to the detector lines. The DMAC payload consists of a Telescope, Focal Plane Assembly (FPA), Signal Processing Module (SPM), two Mass storage & Control Modules (MCMs), and Thermal & Power Module (TPM). DMAC also has a direct link to ITU.

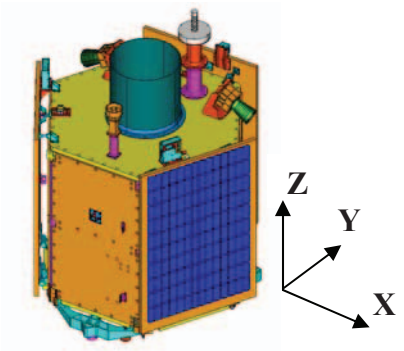

Figure 1-1: DubaiSat-1 in Launch Configuration

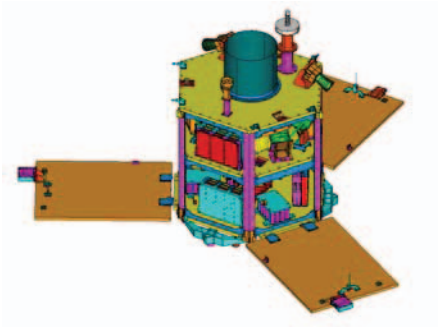

Figure 1-2: DubaiSat-1 in Exploded View

The table below shows a comparison between the characteristics and properties of Dubaisat-1 and SPOT-5. SPOT-5 is a optical polar-orbiting platform currently in orbit with spectral and spatial resolutions similar to DubaiSat-1.

Satellite	DubaiSta-1	SPOT 5
Dimensions	1.2 m in diameter, 1.35 m high	2.65 x 1.42 x 0.96 m
Altitude [km]	680	832
Weight [kg]	200	3000
Inclination [degrees]	98.13	98.7
Expected life-time [years]	5	5-7
Sensor	DMAC (Dubai Medium Aperture Camera)	2 x HRG (High Resolution Geometric)
Sensor Arrangement[2]	Linear array	Linear array
Intensity range [bits]	8	8
Panchromatic GSD [m]	2.5	5 m single image 3.5 m dual image 2.5 super-mode (on ground)
Multispectral GSD [m]	5	MS = 10 SWIR= 20
Spectral Bands [µm]	Pan: 0. 42-0.72 4 multi-spectral channels: Blue:0.42 to 510 FWHM Red: 0.51 to 0.58 FWHM Green: 0.6 to 0.72 FWHM Near-IR: 760 to 890 nm FWHM	Pan: 0.48 – 0.71 B1: 0.50 to 0.59 B2: 0.61 to 0.68 B3: 0.78 to 0.89 short-wave infrared (SWIR): 1.58 to 1.75
Swath Width [km]	20	60
Off-nadir Range	+/- 45°	+/- 27°
Field Of View (FOV)	1.685°	4.13°
Typical Applications	Infrastructure Development, Civil Development and Construction, Geospatial Technology, Natural Resources Management, Environment and Disaster Management	Vegetation, DEM generation

The design steps of the major instruments and their basic performance parameters will be presented as well as the potential applications and end-user products.