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THE DMSAT-1 MISSION: PRIMARY INSTRUMENT POLARIMETER CHARACTERISTICS AND
ITS EARTH OBSERVATION APPLICATIONS

Abstract

DMSAT-1 (Dubai Municipality Satellite) is the United Arab Emirates (UAE) first microsatellite manufactured by the Space Flight Laboratory (SFL) for Mohammed Bin Rashid Space Center (MBRSC). The satellite is designed to perform multi-spectral observations in the visible and near-infrared bands by a Polarimeter imager, in addition to two shortwave infrared spectrometers. This atmospheric environmental satellite aims to monitor aerosols and greenhouse gases over the atmosphere of UAE.

The primary instrument (Polarimeter imager) is a multi-spectral, dual polarization imager that is designed to collect observations of polarized and directional (0° and 90° linear) solar radiation in three visible spectral bands (Blue, Red and Near-Infrared) by Earth's atmosphere over the UAE. The main objective of this instrument is to detect and map aerosol (PM_{2.5} and PM₁₀) content in the atmosphere by detecting the Aerosol Optical Depth (AOD) and Aerosol Effective Radius (AER).

This paper will introduce DMSAT-1 primary instrument's main characteristics and its potential Earth observation applications such as mapping aerosols PM_{2.5} and PM₁₀ over land, assess cloud properties such as cloud reflection, optical thickness, phase and scattering. Moreover, the instrument allows to study land surface properties and vegetation cover. In meeting these objectives, DMSAT-1 will play an important role in advancing the measurements and research objectives for its main end-user, the Municipality of Dubai, and for other potential end-users and educational institutes