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OVERVIEW OF THE ARAB SATELLITE 813: A SMALL SATELLITE FOR EARTH OBSERVATION WITH HYPERSPECTRAL IMAGING CAPABILITIES

Abstract

The National Space Science and Technology Center (NSSTC) is developing an Earth Observation Satellite program, which is one of the UAE Space Agency (UAESA) programs, The Arab Satellite 813 (Sat813), is a strategic project initiated by UAE's Vice President and Prime Minister His Highness Sheikh Mohammed Bin Rashid Al Maktoum.

The Program is an important science and technology pathfinder project for the country and the Middle East and North Africa (MENA) region, emphasizing knowledge, and a way to encourage members of the Arab Space Cooperation Group (ASCG) to step into the field of space science and technology. The data products shall be shared with a group of scientists and academia from the region, with support from the Shanghai Engineering Centre for Microsatellites (SECM).

The Sat813 mission entails a hyperspectral earth-observing satellite designed to comprehensively monitor environmental and climatic factors. Sat813 primary scientific objectives include monitoring vegetation health, mapping soil types, mineral distribution, methane detection, and water pollution. This initiative aims to empower the UAE scientific community and government entities in addressing climate change and studying environmental challenges.

Sat813, weighing in the range of the small satellites, accommodates three payloads: Hyperspectral Imager (HIS), Panchromatic (PAN), and Atmospheric Polarimeter (AP), covering a spectral range from VNIR to SWIR-1 bands. Equipped with advanced attitude determination capabilities and a 3-axis control system for precise attitude determination, the satellite utilizes both x-band and S-band communication systems for seamless onboard communication.

Operating within a fixed Low Earth orbit (LEO), Sun-synchronous Orbit (SSO) at 550-650 km altitude, the Sat813 is focused on serving the MENA region while providing global observational coverage. With

an anticipated operational lifespan minimum of 3 years, the satellite is proposed for launch in the second quarter of 2025.

The paper will offer a comprehensive outline of the mission's objectives, payloads, satellite subsystems, and Concept of Operations (ConOps), providing a high-level perspective on the mission.

Keywords—Sat813, Earth Observation, VNIR, SWIR1, HIS, PAN, AP, MENA, LEO, SSO, NSSTC, UAESA, SECM, ConOps, AIT.