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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 leading the development of the Arab Satellite 813 (Sat813), an Earth observation mission initiated by His Highness Sheikh Mohammed Bin Rashid Al Maktoum and funded by the UAE Space Agency (UAESA). This strategic initiative serves as a science and technology pathfinder for the Middle East and North Africa (MENA) region, advancing regional capabilities in space science while fostering collaboration among the Arab Space Cooperation Group (ASCG). The mission is designed to generate hyperspectral imaging data to support environmental and climate studies, empowering researchers and government entities in addressing critical challenges such as vegetation health monitoring, soil and mineral mapping, methane detection, and water pollution analysis. Sat813, a small satellite equipped with three primary payloads—Hyperspectral Imager (HIS), Panchromatic (PAN), and Atmospheric Polarimeter (AP)—operates in the VNIR to SWIR-1 spectral range. It features advanced attitude control and onboard data processing, utilizing X-band and S-band communication for seamless operations. Positioned in a Sun-synchronous Low Earth Orbit (SSO) at an altitude of 550 km, the satellite is designed for a minimum operational lifespan of three years, with launch planned for the third quarter of 2025. A key aspect of Sat813 is its integration with the Arab Space Pioneers Program (ASPP), an initiative launched to cultivate regional expertise in space science and engineering. ASPP provides scholarships and hands-on research opportunities to emerging Arab scientists and engineers who are actively engaged in various aspects of the Sat813 mission, conducting research in payload development, satellite bus architecture, data analysis, and mission operations. This synergy between education and real-world space applications exemplifies the UAE's commitment to fostering the next generation of Arab space professionals. By blending scientific ambition with human capital development, Sat813 not only advances Earth observation capabilities in the MENA region but also serves as a beacon of Arab collaboration in space exploration. The paper provides a comprehensive overview of the Sat813 mission, detailing its objectives, payloads, satellite subsystems, and operational concept, while highlighting the crucial role of regional talent development through the Arab Space Pioneers Program.