IAF SPACE EXPLORATION SYMPOSIUM (A3)
Interactive Presentations - IAF SPACE EXPLORATION SYMPOSIUM (IP)

Author: Ms. Shahad Badri
UAE Space Agency, United Arab Emirates

SUN AVOIDANCE STRATEGIES FOR THE EMIRATES MISSION TO THE ASTEROID BELT

Abstract

The Emirates Mission to the Asteroid Belt (EMA) is a pioneering Emirati interplanetary mission under the UAE's Projects of the 50 initiative, developed in partnership with the Laboratory for Atmospheric and Space Physics (LASP) at the University of Colorado, Boulder. Launching in 2028, the mission will explore the inner solar system, investigating seven main-belt asteroids. This paper examines the sun avoidance measures implemented to protect the spacecraft's payloads from damage and degradation. These payloads include Emirates Mission to the Asteroid Belt Infrared Spectrometer (EMBIRS), MWIR Imaging Spectrometer for Target Asteroids (MIST-A), Emirates Mission to the Asteroid Belt Camera Systems (EMACS), and Medium Angle Camera (MAC). Prolonged sun exposure can lead to irreversible damage to both scientific instruments and engineering optical components, compromising instrument performance and preventing compliance with the mission's Level 1 Science and Resources Requirements—particularly during the Venus transit at 0.71 AU and Solar Electric Propulsion (SEP) thrusting at 1.3 AU, where elevated temperatures pose risks. Degradation from stray light can also impair science data quality, posing a significant risk to instrument observations. This paper evaluates the need for autonomous capabilities to prevent solar impingement on the instrument panel, the design of fault protection responses, solar array positioning to prevent stray light, SEP keep-out zones, and spacecraft-level sun avoidance implementations, including the utilization of a limited sky coverage approach and a sun search algorithm.