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COMPARATIVE ANALYSIS OF GROUND AND IN ORBIT THERMAL PERFORMANCE OF THE
PRETTY CUBESAT SDR PLATFORM

Abstract

The main mission goal of the PRETTY spacecraft is dedicated to climate research, in particular monitoring and analysing ice thickness in polar regions and sea currents by using signals emitted by GNSS satellites and their reflections on the Earth's surface. The signals are received with a custom in-house developed software defined radio (SDR) platform acting as the key scientific payload on the PRETTY spacecraft. This paper conducts a comprehensive comparison of the thermal behavior of the SDR platform - following subsystem-level vacuum chamber testing on ground and subsequent deployment in orbit. The SDR, integral to the spacecraft's mission, underwent rigorous pre-flight evaluations to characterise its temperature dynamics in a controlled environment, simulating the space environment. Upon launch, continuous thermal monitoring was implemented to observe the payload's response and performance implications to the harsh conditions in space. The paper details the comparative analysis of the thermal data gathered in a vacuum chamber against the data collected in orbit, aiming to assess the thermal stability and effectiveness of the design under real mission parameters. This comparison elucidates the operational thermal characteristics of the SDR in space, indicating the robustness and suitability of pre-launch testing methods and contributing valuable insights for future CubeSat payload designs and their thermal management in space missions.