

IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advance Higher Throughput Communications for GEO and LEO satellites (3)

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ENHANCING SATELLITE OPERATIONS THROUGH DATASAT: A STUDY ON NOISE
MITIGATION SYSTEMS WITHIN THE ADA FRAMEWORK

Abstract

In the current era marked by a proliferation of satellites in orbit, the imperative for efficient satellite operation systems has become crucial. This has prompted the development of DATASAT, a groundbreaking Brazilian Ground Stations Network designed to revolutionize satellite operation, tracking, and command (TTC). At its core, DATASAT employs Automatic Directional Antennas (ADA) equipped with automatic steering capabilities, controlled by ADASERVER software. A distinctive feature of DATASAT lies in its commitment to open-source hardware and software. This approach not only addresses the escalating demand for efficient satellite operation systems but also caters to educational and research requirements, fostering accessibility and innovation in the field. This study explores satellite operations within the ADA framework, specifically focusing on the impact of noise elimination systems. The systems being examined for noise elimination include: Surface Acoustic Wave (SAW), helical, and cavity filters. A comprehensive comparative analysis is conducted, evaluating the signal-to-noise ratio both with and without these filters. The results of this analysis provide practical insights into the optimization of ADA performance through effective noise reduction strategies. By elucidating the benefits derived from employing filters within the ADA framework, this research contributes to the ongoing discourse on satellite technology. Furthermore, the study emphasizes the implications of these results, not only for DATASAT but also for the satellite operations community. In short, the integration of noise elimination systems emerges as a critical factor in enhancing the reliability and performance of satellite operations in an environment characterized by an escalating number of orbiting satellites.