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Author: Mr. Jens Freymuth
Technische Universität Berlin, Germany

Mr. Alexander Burnicki
Technische Universität Berlin, Germany
Mr. Philipp Wüstenberg
TU Berlin, Germany
Prof. Enrico Stoll
TU Berlin, Germany
Dr. Siegfried Voigt
German Aerospace Center (DLR), Germany
Dr. Sebastian Grau
Technische Universität Berlin, Germany

SALSAT: FOUR YEARS IN ORBIT - MISSION RESULTS AND RELEASE OF THE FREE-TO-ACCESS RF SPECTRUM DATABASE

Abstract

The SALSAT nanosatellite mission, conducted by Technische Universität Berlin, plays a critical role in enhancing how the radio frequency (RF) spectrum is analysed and managed in space. As the number of satellites increases, the need for effective spectrum management becomes increasingly important. SALSAT is designed to address this challenge by monitoring the global usage of key frequencies in the VHF, UHF, and S-band, which are essential for a wide range of communication and research activities. This mission sets itself apart by focusing on advancing the understanding of spectrum utilization on a global scale. It includes the SALSA spectrum analyzer, which utilizes software-defined radio technology to provide detailed observations of the RF environment from orbit, combining technical sophistication with practical insight into spectrum management. SALSAT is operated since September 2020 and is about to complete its fourth year of operations, surpassing the design lifetime by three times.

The mission's focus in the past months was the collection of extensive UHF spectrum data samples across different RF parameters, illustrating the utilization of these bands worldwide. These data samples underscore the importance of real-time spectrum monitoring in identifying congestion and potential interference scenarios. During the operational phase of the mission a free-to-access heatmap has been developed. The interactive tool visualizes the global spectrum usage in the UHF band (mainly 430-440 MHz) and provides waterfall plots for the recordings. This tool shall serve as a resource for researchers and policymakers and promote transparency in spectrum management. The results discussed in this session underscore the effectiveness of SALSAT's mission in providing insights into spectrum utilization. These findings can be relevant for designing more robust communication systems and in the strategic planning of satellite constellations to minimize interference.

As the SALSAT mission concludes its four-year journey, the focus shifts to the future. The mission's success has laid the groundwork for subsequent experiments and missions, notably the anticipated follow-up mission, RACCOON. This next venture aims to further the objectives of SALSAT by expanding the scope of spectrum analysis by designing an intelligent and resilient transceiver for various applications

including interference-free small satellite communications. In summary, SALSAT helped to advance our understanding of the RF spectrum utilization in Low Earth Orbit. The release of its RF Spectrum Database offers invaluable data for the global community. The mission's success paves the way for future endeavors, promising to further enhance the capabilities in space communication and research.