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SALSAT: FIRST MISSION RESULTS OF THE GLOBAL RF SPECTRUM ANALYSIS IN THE VHF,  
UHF AND SPACE RESEARCH BANDS MEASURED BY THE SPECTRUM ANALYSIS SATELLITE**Abstract**

On September 28th, 2020 at 11:20 UTC the Technische Universität Berlin (TU Berlin) successfully launched the nanosatellite mission SALSAT (Spectrum AnaLysis SATellite). The satellite is operating in a sun-synchronous orbit at 575 km. Since the successful LEOP and Commissioning Phase the mission is collecting RF spectrum data in bands which are often used for small satellite communications. To accomplish this, SALSAT is equipped with the spectrum analyzer SALSA as its primary payload. SALSA is based on a SDR that is fully reconfigurable in-flight. Due to its highly inclined, sun-synchronous orbit the mission will achieve global coverage. The collected mission data shall be used for further studies and concepts to improve the utilization of the available communication spectrum. The spectrum data can either be processed via an FFT by the on-board FPGA for further evaluation on the ground or it can be evaluated, converted, and compressed by the Linux system aboard SALSAT before being transmitted to the ground station. Consequently, SALSAT is an advanced in-orbit testbed to collect and analyze the spectrum usage and perform in-situ measurements.

In 2021 SALSAT successfully completed the Commissioning of all subsystem as well as many software optimizations and operational improvements to ease the operations. After a initial spectrum analysis over the European continent in 2021 to optimize the payloads RF parameters and calibration the mission is currently collecting spectrum samples on a global scale. The mission collects samples in the VHF and UHF amateur radio bands as well as in the S band utilized for space research. The announced SALSAT spectrum database is currently set up. It will allow researchers around the world to access and analyze the RF spectrum measurements of the SALSAT mission.

This paper will introduce the current flight results of the mission with respect to the RF spectrum measurements in the aforementioned frequency bands. All data samples collected throughout the mission

duration will be made freely available to the public through a web application, which is introduced within this paper. Additionally an outlook on the future mission operations of SALSAT and development of intelligent RF transceivers for future space applications based on the SALSAT mission results will be presented.