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EXPERIENCE FEEDBACK ON EFFECTS OF IN-ORBIT FPA TEMPERATURE ON RADIOMETRIC  
PERFORMANCE OF ALSAT-1B OPTICAL IMAGER

**Abstract**

On September 26th 2021 Alsat-1B, the Algerian medium resolution Earth observation satellite, celebrated its fifth year on orbit. Alsat-1B has been built in the framework of a collaborative mission between the Algerian Space Agency (ASAL) and Surrey Satellite Technology Ltd (SSTL). Alsat-1B carries an optical imaging payload based on a push-broom concept and providing 12-meter imagery in Panchromatic (PAN) and 12/24-meter imagery in Multispectral (MS) in four bands (Red, Green, Blue, Near-Infrared (NIR)) along a 140 km wide swath and with 10/12 bits radiometric resolution. Performance stability of optical imaging payload during mission lifetime is an important issue for space optical earth observation missions. CCD detectors in particular are subject during in-orbit lifetime to many damaging effects caused by temperature and radiation. Temperature rise at focal plane array, FPA, during image acquisition is known to induce a time-dependent increase of CCD dark signal due to thermal leakage current. The dark CCD detector elements usually used to estimate detector offset signals for calibration purposes may consequently produce biased results. This affects the accuracy with which the image data can be radiometrically calibrated and hence produces a degradation in radiometric performance of the imager (dynamic range, SNR, etc.). The present work focuses on experience feedback on in-orbit FPA's temperature effects on radiometric performance and calibration of Alsat-1B optical imager by making use of measurements made by the thermal sensors attached to the CCD detectors over five years since Alsat-1B launch.