Automated Calibration and Data Quality control

S. Mackin[1], J.Warner, J.J. Settle

1) s.mackin@eosense.co.uk, EOSense Ltd

Abstract

The techniques described relate to the use of the imagery alone to determine certain radiometric characteristics and data quality control of optical imagery, primarily from pushbroom sensors. The ideas originated with commercial small satellite systems, but are equally applicable to larger flagship missions such as Sentinel-2 MSI, Sentinel-3 OLCI and Sentinel-3 SLSTR.

In this presentation we will present the results of studies on both small satellite systems and larger ESA flagship missions, demonstrating the capability to assess radiometric calibration drift, estimation of the signal to noise ratio of the sensors, determination of the relative gain of a sensor and non-linearity within the systems. All estimations use normal images as input, not specific calibration images. The accuracy of the techniques approaches that of using specific calibration images or on-board calibration devices and in fact points to some issues of basing the calibration and data quality entirely on on-board calibration systems.
One of the biggest advantages of this approach, apart from the lack of on-board equipment, is the high temporal sampling, as we can determine relative gain variations, changes in non-linearity and changes in SNR at a daily sampling interval if required, compared to every two weeks on Sentinel-3 OLCI or every month based on Sentinel-2 MSI.

Finally, given we are using normal images in a normal processing chain, the whole process lends itself to automation, so that once set up, there is little or no interaction by the user apart from the analysis of the results. Validation of the results is against pre-launch or other data sources, differences in results between the methods and validation data will be indicated and discussed.

Keywords - Calibration methodology and techniques