DEIMOS-1 Cross-calibration with Landsat and Sentinel-2

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Abstract

The DEIMOS-1 satellite, owned and operated by UrtheCast through its subsidiary Deimos Imaging, is an Earth observation system designed to expand Landsat's capabilities and applications. DEIMOS-1 has provided the USDA with the bulk of the imagery used to monitor the crop season in the Lower 48 since 2011.

DEIMOS-1 measurements have a tight correlation with Landsat missions. This correlation is achieved thanks both to design and cross-calibration. The DEIMOS-1 sensor, SLIM6-22, has three bands whose spectral response is very close to Landsat-7 ETM+ 4, 3, 2 and Landsat 8 OLI 3 and 4 bands. Moreover, the spatial resolution is very similar on these bands (22m GSD for DEIMOS-1 and 30m GSD for Landsat at nadir).

These DEIMOS-1 features, combined with a swath >600km and the capability of acquiring up to 5,000,000 km 2 per day, increases the availability and usability of Landsat-class imagery.

ESA's Sentinel-2 mission, together with Landsat, is currently leveraging earth observation applications, creating a proper environment for synergistic opportunities, which anyway need a continuous effort in the harmonization of both data sources. Deimos Imaging is permanently conducting cross-calibration procedures to maintain the DEIMOS-1 data harmonized with Landsat's. In accordance with the aforementioned harmonization effort, we have developed a cross-calibration procedure with Sentinel-2 after the first satellite of the constellation (Sentinel-2A) became operational in late 2015. This work starts by providing a summary of the current health and orbit status of DEIMOS-1, which is now in its tenth year in space. We will then provide an update of the status of the cross-calibration of DEIMOS-1 with Landsat-7 and Landsat-8, together with the description of the DEIMOS-1/Sentinel-2 cross-calibration procedure and its results.

Keywords - Cross Calibration / Validation