

Data Harmonization Methodology Based On Simultaneous Nadir Overpasses

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Abstract

With the launch of ESA's Sentinel-2B, the mission capacity of the Sentinel-2 mission has doubled, creating new opportunities in the cross-calibration and harmonization of data from different Earth Observation sensors.

The improved revisit time of the Sentinel-2 constellation, now five days globally, increases the opportunities of observing the same area with different sensors, both nadir looking, and only a few minutes apart. This creates a unique scenario in which the images are acquired with similar ground, atmospheric, illumination and viewing conditions. These favorable conditions create a proper environment for the development of enhanced methodologies for calibration, validation and harmonization of multi-sensor data that can be turned into more accurate products for the benefit of applications ranging from agriculture to emergency management.

The multi-sensor harmonization is a necessary condition to address the increased global demand of Earth Observation data and products in both public and private sectors. The use of Simultaneous Nadir Observations (SNOs) allows the harmonization of sensors of different relative spectral responses, spatial and temporal resolutions. We have identified Deimos-1 archived images acquired under SNO conditions with Landsat-8 and Sentinel-2 A&B. Additionally, we have also tasked Deimos-1 to acquire new imagery under the aforementioned conditions. The set of images were then compared by using spatially homogeneous areas in order to diminish the influence of the different GSDs and MTFs. By doing so we reduced the number of variables influencing the measurements to a minimum, being the RSRs the most prominent. That enabled us to conduct an assessment on the dependency of the different RSRs with a set of ground types. The results of the assessment directly lead to the possibility of creating harmonized products over the given set of ground types.

In this presentation we will show how the SNOs were identified and the homogeneous areas were chosen. Then the RSR vs. ground type assessment will be described along with its results. Finally, the harmonized product creation procedure will be described together with its performance and limitations.

Keywords - Calibration methodology and techniques