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PLEIADES HR IN FLIGHT GEOMETRICAL CALIBRATION : LOCATION AND MAPPING OF THE FOCAL PLANE

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Abstract. The Pleiades system, ORFEO system optical component (Optical and Radar Federated Earth Observation) consists of a constellation of two satellites for very High Resolution panchromatic and multispectral optical observation of the Earth. Its mission is to cover all European civilian needs (mapping, tracking floods and fires) and defence in the category of metric resolution: 0.7m Nadir. The first Pleiades satellite was launched at the end of last year.

One of the key objectives of the Pleiades HR (PHR) project is to achieve a location accuracy that will allow the use of images in GIS (Geographical Information System) without geometrical model improvement by refining on ground control points. The image location without refined model was specified with the precision of the most commonly used tool ie the civil GPS. So the location accuracy has been specified at less than 12m for 90% of the images on a nominal satellite configuration. Very special care has been taken all along the PHR project realization to achieve this very good location accuracy. The final touch is given during the in-orbit commissioning phase which lasts until June 2012.

The geometric quality implies to tune the parameters involved in the geolocation model (geometric calibration): besides attitude and orbit restitution tuning (not considered here), it consists in estimating the biases between the instrument orientation and the AOCS reference frame, and also the sight line of each detector in the focal plane. This is called static geometrical model. The analysis of dynamic perturbations outside of the model are the second most important image quality objective of in-flight commissioning, not described in this paper.

Finally “image quality assessment” consists in evaluating the image quality obtained in the final products. For geolocation model, it is quantified by the absolute geolocation and the pointing accuracies, and it is a main contributor in length alteration and planimetric and altimetric accuracies.

In this paper we will present both the different practices we have adopted (their advantages, limitations and complementarities) and the means we are using for the operational assessment of the location quality of PHR images. We will focus on the innovative methods and mention the improvements in progress. To conclude, we will present the very first accuracy results assessed after PHR1A launch on L1 and Sensor products.

Conference Paper (PDF, 1070 KB)

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