

# HJ-1A/B MULTISPECTRAL IMAGERS RADIOMETRIC STABILITY IN THE FIRST YEAR

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## ABSTRACT

On September 6th, 2008, HJ-1A/B, which is a Micro-satellite Constellation for Environment and Disaster Monitoring, was successfully launched in China. HJ-1A/B is composed by two small satellites named as Satellite-A (HJ-1A) and Satellite-B (HJ-1B). The payloads of HJ-1A include a multispectral imager and an interferometric imaging spectrometer; the payloads of HJ-1B include an infrared scanner and the same multispectral imager as that of the HJ-1A. Both the multispectral imagers are of the same design. Their spectrum ranges from 430 nm to 900 nm with 4 spectral bands which are similar as Landsat TM1, 2, 3, 4. The ground sample distance (GSD) of the multispectral imagers is 30m, and the image swath is up to 700km. Under the cooperation of the two satellites and the large imaging swath, HJ-1A/B multispectral imagers can revisit the same location no more than one day. The multispectral imagers of HJ-1A/B are the main sensors of the small constellation.

To evaluate the radiometric stability of the HJ-1A/B multispectral imagers during their first year, an image data set of Dunhuang Site (40° 05' 25" N, 94° 23' 35"), which is the nation radiometric calibration site of China, are acquired from September 17<sup>th</sup>, 2008 to October 2009. The image data set are composed by the series of the HJ-1A/B multispectral images and the series of the Terra/Modis images which are acquired almost synchronously with the HJ-1A/B. The image acquired by HJ-1A/B multispectral imagers and the image acquired by Terra/Modis on the same day are called the pairs-images. There are more than fifty pairs-images acquired by HJ-1A/B multispectral imagers and Terra/Modis. Given the well-calibrated result and the good radiometric performance of Terra/Modis, it is possible to use image data from Terra/Modis to calibrate HJ-1A/B multispectral imagers. The cross-calibration method is used in this paper to calibrate HJ-1A/B multispectral imagers. A series of the cross-calibration results of HJ-1A/B multispectral imagers are calculated and are used to evaluate the radiometric stability of HJ-1A/B multispectral imagers.

In this paper, more than fifty cross-calibration results of HJ-1A/B multispectral imagers are calculated. The variation of the calibration results is calculated and the reasons that cause the variation are also analyzed.

Based on these results, the radiometric stability of HJ-1A/B multispectral imagers is evaluated. There are two times obvious change of the cross-calibration parameters. The first obvious change was raised in mid-October 2008, just after HJ-1A/B's launching 30-40 days. The second obvious change was taken placed in mid-April 2009. It is the 7<sup>th</sup> month after HJ-1A/B's launching. Taking into account this change occurred in the first year after the launch of HJ-1A/B, this change can be received.

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