Quantifying Diwata-1 and Diwata-2 Image Degradation through Spatial Resolution using Edge Detection Method

Olivar, Fritz Rhaem (1), Vergel, Kaye Kristine (1), Magallon, Benjamin (1)

[1] University of the Philippines - Diliman, Diliman, Quezon City, Philippines
Email: fmolivar@up.edu.ph; kookaye@gmail.com;
bpmagallon@gmail.com

Abstract: The Philippines has launched two earth-observation microsatellites to space, Diwata-1 and Diwata-2. Both microsatellites have a High Precision Telescope (HPT), equipped with four CCDs in blue, green, red and near-infrared region. Since Diwata-1 has a lower altitude, its HPT has a resolution of 3 m while that of Diwata-2 has a resolution of 5 m. Both cameras are used for disaster monitoring and damage assessment. As remote sensing satellites, the quality of the images they produced is of the utmost importance. However, these satellites are in low earth orbit. They are exposed in harsh space environment and their orbit decays at a faster rate affecting the cameras and the images. Thus, the quality of the images should be assessed and checked regularly so that camera settings can be adjusted to produce higher quality images. In this paper, we evaluated the image quality and sensor degradation of Diwata-1 and Diwata-2's HPT by measuring the spatial resolution of the images using the edge detection method. This method computes the spatial resolution by deriving the sensors line spread function. We calculated the spatial resolution of Diwata-1's and Diwata-2's HPT images captured at different times and at varying pointing angles. Analysis of the results together with measurements of the sun position relative to the microsatellite, and its pointing angle during image acquisition were carried-out.

Keywords: DIWATA-1, DIWATA-2, edge detection, linear spread function, image degradation