**Evaluation Method for Geometric Correction Accuracy of
Geostationary Environment Monitoring Spectrometer Images**

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***ABSTRACT***

Geostationary environment monitoring spectrometer(GEMS) on the GK-2B satellite is the world's first geostationary hyperspectral satellite. With a field of regard of 5,000 km x 5,000 km, spatial resolution of 7 km x 8 km, and 1,033 bands, GEMS is crucial for global climate and atmospheric monitoring. To ensure accurate observations, geometric correction is performed to eliminate position errors. However, traditional methods of geometric accuracy check, such as using ground control points, are not applicable to GEMS due to its very low resolution and band characteristics. This study aims to establish an efficient method for evaluating geometric accuracy of GEMS images. We compare GEMS images with AMI images, which are geostationary meteorological images acquired during similar time. The comparison is carried out three scales: global, regional and local scale. To make input data spatiotemporally and spectrally identical, collocation process was conducted. From a global scale, entire GEMS image was shifted and compared with the AMI image to calculate the root mean square error(RMSE) of the radiance between all pixels and analyze the trend. The experiment results showed that when the entire image was shifted by less than 2 pixels, the RMSE was minimized. However, while total error for the entire image could be identified, analyzing the bias of errors across different regions was challenging. From regional and local scale perspectives, the entire image and divided detailed regions were analyzed for error magnitude and direction using normalized cross correlation-based matching. The experiment results showed that the RMSE between matched pixel positions was, on average, less than 2 pixels, and it was possible to identify the degree of bias errors present in different parts within the image. Through these results, we confirmed that for future improvements of position errors based on geometric correction accuracy, regional geometric correction performance evaluation method is more suitable.

**Keywords:** GEMS, Geometric correction, Image matching, Satellite image