ANALYSIS OF RPC CORRECTION ACCURACY OF KOMPSAT-3A IMAGERY ACCORDING TO COMBINATION OF MATCHING POINTS EXTRACTED BY VARIOUS AREA-BASED MATCHING METHODS

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Most satellite images provide sensor model information in the form of rational polynomial coefficients (RPC) data to perform a transformation between ground coordinates and image coordinates. However, since initial RPC information has errors due to geometric distortion included in the satellite sensor itself, it is common to perform RPC correction using ground control points (GCP). A GCP chip is a small image patch extracted from an orthorectified image together with a height information, which can thus be directly used for geometric correction. There are many studies performing matching between satellite images and GCP chips based on area-based matching methods. However, even if the same GCP chips are used, the distribution or accuracy of extracted matching points can be different according to each algorithm. Therefore, in this study, comparison analysis of RPC corrections according to a combination of matching points extracted by different matching methods is conducted. To this end, here we employed mutual information (MI), normalized cross-correlation (NCC), and relative edge cross-correlation (RECC) methods among representative area-based matching methods. Specifically, GCP chips produced by an aerial orthoimage were projected onto KOMPSAT satellite imagery by obtaining the corresponding height information from digital surface model (DSM). Afterward, matching was performed to extract the center point of the image coordinates with the highest correlation between the satellite image and the GCP chip for each algorithm. Then, the RPC correction coefficient and root mean square error (RMSE) are derived through the difference between the projected image coordinates and the matched image coordinates. As a result, we confirmed that fusing the matching points extracted by the various matching methods can obtain a better RPC correction performance.

Keywords: GCP chip, Area-based matching methods, RPC correction