

GEOMETRIC ANALYSIS OF WORLDVIEW-2 MULTI-ANGULAR IMAGERY

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Abstract:

WorldView-2 (WV2) is the first commercial satellite to carry a very high spatial resolution sensor with one panchromatic and eight multispectral bands. In addition, the high satellite agility enables Worldview-2 to acquire the multi-angular imagery over the same target area within a relatively short period of time. Compare to a single image, the multi-angular imagery has several advantages including the extraction of more precise three-dimensional surface information, improvement of land use/land cover classification, the compensate of missing information in occluded areas, the retrieval of atmospheric parameters, and the investigation of the bidirectional reflectance distribution (BRDF), etc. This study will focus on the geometric analysis and correction of multi-angular imagery in comparison with single and stereo imagery.

In general, the high-precision geometric correction of single or stereo imagery can be performed using the rigorous model with dynamic collinear equation. However, the ground control points (GCPs) should be distributed evenly covering the whole image to give best estimation of the geometric transformation coefficients. This will be a problem for multi-angular images which occupy a small subset of the original single image, and might not be in the best part of the geometric restraint regions. Nevertheless, the robust geometric conditions from multi-angular imagery should improve the geometric positions within the overlapping area.

In this study, the rigorous geometric correction are performed in the single, stereo and multi-angular imagery separately, and the positioning accuracy assessment is estimated to illustrate the effectiveness of multi-angular imagery. In addition, the framed-based geometric correction is implemented on the small subset covered by all the multi-angular images that the dynamic variances of exterior parameters are

ignored. By doing so, we hope to get the conclusion of enable to calculate the satellite multi-angular images by only using its overlapping areas.

KEY WORDS: WorldView-2, multi-angular imagery, rigorous method, geometric correction