COLLOCATION-AIDED ADJUSTMENT OF HETEROGENEOUS MODELS FOR SATELLITE IMAGES

W. Chang[*a] L. Chen[a] T. Teo[b]

[a] National Central University, Center for Space and Remote Sensing Research, Center for Space and Remote Sensing Research National Central University No.300, Jhongda Rd., Jhongli, Taoyuan, Taiwan, 32001, Jhongli, Taiwan

[b] National Chiao Tung University, Civil Engineering, 1001 University Road, Hsinchu, Taiwan, 300, Hsinchu, Taiwan

Technical Commission VII Symposium 2010

KEY WORDS: Satellite, Modelling, Adjustment, Correction, Georeferencing

ABSTRACT:

The geometric correction for satellite images is an important task in remote sensor applications. The geometric correction methods for satellite images include rigorous sensor model (RSM) and rational function model (RFM). RSM describes the relationship between object points and image coordinates through exterior orientation parameters (EOPs). RFM uses the Rational Polynomial Coefficients (RPCs) to transform object coordinates into image space. Thus, treated parameters in the block adjustment for those two models are heterogeneous. In fact, the availability of those parameters is satellite dependent. Thus, the heterogeneous models between RSM and RFM should be combined in the block adjustment when those two types of images are integrated. Considering the global geometry, the block adjustment for all images is to keep the geometrical registration consistent. There might still remain local systematic errors. Thus, this paper proposes a collocation-aided block adjustment for multi-sensor images. The Direct Georeferencing, which is one of RSM, and the RFM are combined a mathematical model for block adjustment. Then the least squares collocation is included to compensate the systematic errors for those heterogeneous models. Besides, to adapt for the weakly convergent geometry, which happens frequently, a digital elevation model is employed as the elevation control in the block adjustment. The test data set includes GeoEye, QuickBird, WorldView-1, Kompsat-2, and Formosat-2 satellite images. The validation includes the checks for absolute accuracy and relative discrepancy among those images. Experimental results indicate that the proposed block adjustment significantly improved both the absolute accuracy and relative discrepancy.

TOPIC: Geometric modeling
ALTERNATIVE TOPIC: Data fusion and data assimilation