

A Study of ZY3 Satellite Digital Elevation Model Verification and Refinement with Shuttle Radar Topography Mission

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Abstract : As the first high-resolution civil optical satellite, ZY-3 satellite is able to obtain high-resolution multi-view images with three linear array sensors. The images can be used to generate Digital Elevation Models (DEM) through dense matching of stereo images. However, due to the clouds, forest, water and buildings covered on the images, there are some problems in the dense matching results such as outliers and areas failed to be matched (matching holes). This paper introduced an algorithm to verify the accuracy of DEM that generated by ZY-3 satellite with Shuttle Radar Topography Mission (SRTM). Since the accuracy of SRTM (Internal accuracy: 5 m; External accuracy: 15 m) is relatively uniform in the worldwide, it may be used to improve the accuracy of ZY-3 DEM. Based on the analysis of mass DEM and SRTM data, the processing can be divided into two aspects. The registration of ZY-3 DEM and SRTM can be firstly performed using the conjugate line features and area features matched between these two datasets. Then the ZY-3 DEM can be refined by eliminating the matching outliers and filling the matching holes. The matching outliers can be eliminated based on the statistics on Local Vector Binning (LVB). The matching holes can be filled by the elevation interpolated from SRTM. Some works are also conducted for the accuracy statistics of the ZY-3 DEM.

Keywords : ZY-3 satellite imagery, DEM, SRTM, refinement

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