

Multi-Temporal Cloud Detection and Removal in Satellite Imagery for Land Resources Investigation

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Abstract : Clouds are inevitable contaminants in optical satellite imagery, and prevent the satellite imaging systems from acquiring clear view of the earth surface. The presence of clouds in satellite imagery bring negative influences for remote sensing land resources investigation. As a consequence, detecting the locations of clouds in satellite imagery is an essential preprocessing step, and further remove the existing clouds is crucial for the application of imagery. In this paper, a multi-temporal based satellite imagery cloud detection and removal method is proposed, which will be used for large-scale land resource investigation. The proposed method is mainly composed of four steps. First, cloud masks are generated for cloud contaminated images by single temporal cloud detection based on multiple spectral features. Then, a cloud-free reference image of target areas is synthesized by weighted averaging time-series images in which cloud pixels are ignored. Thirdly, the refined cloud detection results are acquired by multi-temporal analysis based on the reference image. Finally, detected clouds are removed via multi-temporal linear regression. The results of a case application in Hubei province indicate that the proposed multi-temporal cloud detection and removal method is effective and promising for large-scale land resource investigation.

Keywords : cloud detection, cloud remove, multi-temporal imagery, land resources investigation

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