A COMPARATIVE ANALYSIS OF MONITORING SNOW COVER BASED ON DIFFERENT SPATIAL RESOLUTION REMOTE SENSING IAMGERIES*

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Abstract

Snow-cover, as an important water supply resource, and estimating its depth have much significance for agricultural irrigation in the region of arid and semiarid. The application of Remote Sensing has made easy to monitor snow-cover in regional or global scale. In this paper, a comparative analysis of monitoring snow-cover has done using the imageries of the B-moonlet of environment and disasters monitoring moonlet (HJ1B) of China and the imageries of the NASA Earth Observing System (EOS) Moderate Resolution Imaging Spectroradiometer (MODIS). At the same time, the region of Tianshan in Xingjiang of China as study area is selected. The objects of the paper is focusing on analyzing the accuracy of monitoring snow-cover based on different spatial resolution imageries and verifying the quality of monitoring snow-cover using HJ1B moonlet imagery.

In this paper, the information of snow cover has been completed by virtue of Normal Difference Snow Index (NDSI) [1]. A lot of researches had proved that the combination the green band of the near infrared band can successfully distinguish between snow and other objects under the condition of cloudless. While the short wave infrared band can detach snow from the cloud if imagery is cloud covered [2]. Therefore the method of Normal Difference Snow Index (NDSI) has been used to identify snow versus other features in a scene. And we adopt the appropriate threshold value via ground spectral measure to retrieve snow cover information of the Tianshan region and validate the results by the support of ground experiments.

Multi-sources data including HJ1B 30m, IRS 150m and MODIS L1b 500m products are available on October 16th, 2008. The procedure is as follows.

(1)Mapping different spatial resolution snow cover is generated by spatial or spectral resize between

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HJ1B with 150m and MODIS with 500m imageries.

(2) Four maps are divided into three groups and comparative analysis has been conducted. Meanwhile, quality validation of HJ1B is analyzed. The snow area change difference and the influence of spatial resize on snow cover are explored further more.

(3) The difference of snow cover imageries (DSC) is obtained using the Calculus of differences between the HJ1B and MODIS snow cover images. On this basis, we provide the conception of passive detail pixels (PDP) and negative detail pixels (NDP) in order to explore the special detail differences of different spatial resolution remote sensing images.

Our results show that: (1) there are the uniform profiles on snow cover maps from both HJ1B and MODIS imageries. The estimating snow rate from MODIS data is much 5.8% than the result from HJ1B data. This may be caused by the fact that the high spatial resolution remote sensing image has better clustering details than the lower special resolution image.

(2) The process of image spatial resize has few or even no influence on the snow cover rate. The change of the snow cover rate is only 0.0026% in the process of resizing spatial resolution from 150 meters to 500 meters of HJ1B moonlet images and as to MODIS, it's only 0.0276% from 500 meters to 150 meters.

(3) The DSC image and the PDP or NDP not only have the capability to indicate the differences of snow cover from different special resolution images, but have the capability to make it clear the difference of resizing data on different resolution imageries from the spatial detail aspect.

Keywords: snow cover NDSI different special resolution

References

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