Quantitative extraction of bedrock exposed rate based on unmanned aerial vehicle data and TM image in Karst Environment

hongyan wang, qiangzi li, xin du, and longcai zhao

Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, beijing, China (wanghy@radi.ac.cn)

Abstract: In the karst regions of Southwest China, rocky desertification is one of the most serious problems of land degradation. The bedrock exposed rate is one of the important indexes to assess the degree of rocky desertification in the karst regions. Because of the inherent merits of macro scale, frequency, efficiency and synthesis, remote sensing is the promising method to monitor and assess karst rocky desertification on large scale. However, the actual measurement of bedrock exposed rate is difficult and existing remote sensing methods cannot directly be exploited to extract the bedrock exposed rate owing to the high complexity and heterogeneity of karst environments. Therefore, based on the UAV and TM data, the paper selected Xingren County as the research area, and the quantitative extraction of the bedrock exposed rate based on the multi scale remote sensing data was developed. Firstly, we used the object oriented method to carry out the accurate classification of UAV image and based on the results of rock extraction, the bedrock exposed rate was calculated in the 30m grid scale. Parts of the calculated samples were as training data and another samples were as the model validation data. Secondly, in each grid the band reflectivity of TM data was extracted and we also calculated a variety of rock index and vegetation index (NDVI, SAVI etc.). Finally, the network model was established to extract the bedrock exposed rate, the correlation coefficient (R) of the network model was 0.855 and the correlation coefficient (R) of the validation model was 0.677, the root mean square error (RMSE) was 0.073. Based on the quantitative inversion model, the distribution map of the bedrock exposed rate in Xingren County was obtained.

Keywords: Bedrock exposed rate, quantitative extraction, UAV and TM data, Karst rocky desertification.