Fraction of vegetation cover estimation and their relations with permafrost degradation in Sule River Basin

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Over the last few decades, the grassland ecosystems of Qinghai-Xizang Plateau have experienced noticeable degradation. Degradation of grassland affects the environmental processes, e.g. runoff and the exchange of energy and water between land surface and atmosphere. The reduction of fraction of vegetation cover (FVC) of grassland is one of the most obvious characteristics of grassland degradation. It is vital to study the change of FVC, and its relations with other environmental factors. However, at the plot scale, FVC is usually estimated by human visual estimation, which has been considered as too objective. In this study, we applied Agriculture Digital Camera (ADC, multispectral) and a common digital camera in estimating FVC in the upstream region of Sule River Basin, which locates in the northeast margin of Qinghai-Xizang Plateau. Altogether, we collected more than 300 pairs of valid pictures. We calculated the Normalized Difference Vegetation Index (NDVI) from ADC pictures, and estimated FVC using a threshold of 0.4 of NDVI; We also visually estimated FVC from common pictures with three different people. We found that there are large differences among the estimation of FVC from different people; and that the estimation of FVC from ADC pictures are accurate and effective. At the same time, we performed measurements of ground frost state with a ground penetration radar. It was found there is a good correlation between FVC reduction and permafrost degradation.