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Characteristics of Vegetation Cover Changes in Qingliu River Catchment and its Correlation with Hydrometeorologic Factors on Different Scales

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Vegetation is an important indication for global and regional ecology. Correlation analysis among vegetation cover, climate change and hydrologic process has been an essential topic in the domain of earth science research. In this paper, Enhanced Vegetation Index (EVI) is selected as the vegetation index representing for vegetation cover. The averaged EVI values of forest and farmland is acquired from all available landsate images from 1989 to 2010 for the Qingliu River catchment. The temporal and spatial variation characteristics of EVI and its correlations with major climate factors (temperature, precipitation, evaporation) and hydrologic factor (runoff) on different scales (monthly, seasonal, annual) are analyzed. The findings show that the annual average EVI ranging from 0.2031-0.3103 has increased significantly from 1989 to 2010. The multiple-year average EVI exhibits seasonal distribution that high EVI appears in summer and low EVI appears in winter, which is consistent with vegetation growth characteristics. EVI and hydrometeorologic factors present high correlation on both monthly and seasonal scales while weak correlation (except for temperature) on annual scale. Specifically, the highest correlation (r=0.876) between EVI and temperature is found on monthly scale. In contrast, the highest correlations among EVI and other factors are noticed on seasonal scale. Annual EVI has negative correlation with precipitation and surface evaporation, while positive with runoff and temperature. Dynamic correlation among EVI and hydrometeorologic factors is also investigated by using sliding window techniques. On annual scale, the dynamic correlation coefficients of EVI-precipitation and EVI-runoff are relatively low and fluctuate particularly in 1993, 1997 and 2001. On seasonal scale, their dynamic correlations fluctuate, with highest correlations appearing in autumn. The contributions of this study lie in (1) analyzing EVI variation on a higher spatial resolution compared with most previous study; (2) analyzing correlation among EVI and hydrometeorologic factors in a dynamic manner. The findings will provide scientific support for ecological restoration, regional water resources management and climate change adaption.