Hillslope Response to Knickpoint Migration in the Southern Appalachians: Implications for the Evolution of Post-Orogenic Landscapes

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ABSTRACT:
The southern Appalachians represent a landscape characterized by locally high topographic relief, steep slopes, and frequent stream-channel failures. The evolution of such landscapes is a result of fundamental processes responsible for such activity in a post-orogenic landscapes remain enigmatic. The well-documented Cullasaja River basin of southwestern North Carolina, with uniform lithology, frequent debris flows, and high-relief rivers, is an ideal natural setting to study landscape evolution in a post-orogenic landscape through the use of aerial-channel photography. We used a digital elevation model (DEM) and aerial photographs to analyze the spatial and temporal changes of knickpoints in the Cullasaja River basin. We used a digital elevation model (DEM) and aerial photographs to analyze the spatial and temporal changes of knickpoints in the Cullasaja River basin. We investigated the relationship of knickpoints with the cumulative areas in the Cullasaja River basin. We also captured the transient effect of landslide frequency exhibit significant downstream increases below the mouth of Lake Watauga showing the existence of a transient spatial relationship between knickpoints and the Cullasaja basin as a whole to characterize surface processes and basin evolution through time. Our results highlight the existence of a transient spatial relationship between knickpoints and the Cullasaja basin as a whole to characterize surface processes and basin evolution through time. Our results highlight the existence of a transient spatial relationship between knickpoints and the Cullasaja basin as a whole to characterize surface processes and basin evolution through time. Our results highlight the existence of a transient spatial relationship between knickpoints and the Cullasaja basin as a whole to characterize surface processes and basin evolution through time. Our results highlight the existence of a transient spatial relationship between knickpoints and the Cullasaja basin as a whole to characterize surface processes and basin evolution through time. Our results highlight the existence of a transient spatial relationship between knickpoints and the Cullasaja basin as a whole to characterize surface processes and basin evolution through time. Our results highlight the existence of a transient spatial relationship between knickpoints and the Cullasaja basin as a whole to characterize surface processes and basin evolution through time.