Fluvial Wood Presence and Dynamics over a Thirty Year Interval in Forested Watersheds
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It has long been known that the presence of wood in rivers plays a vital biological and functional role and that a reciprocal relationship exists between woody material and the geomorphology of rivers. Fluvial wood studies, however, are rarely ongoing through time in order to ascertain long-term wood patterns within complete drainage networks. This dissertation addresses the temporal lag in fluvial wood patterns throughout four watersheds in the Oregon Coast Range by recreating a field dataset first collected in 1979 and then again in 1998. Statistical and spatial analysis of stream morphometric data at designated transects throughout the watersheds in addition to analysis of log step and log jam inventories provide insight into significant changes that have occurred over a thirty year interval at a multi-basin scale. These watersheds are located in areas that have been impacted by years of timber harvesting in the mid-twentieth century, however, clearcutting has been on the decline since the early 1980s. This research investigates the impacts that the legacy of clearcutting and subsequent afforestation has had on the abundance and volume of fluvial wood in the stream networks of these four watersheds. I digitized historical aerial imagery to determine the amounts of clearcutting in the basins over time. I integrated this variable with channel morphometric variables to assess predictors of wood abundance and volume through multiple regression analysis. Results show that the stream that has been the most affected by clearcutting has lower volumes of wood than measured in 1979 or 1998. Residence times of wood are short in these watersheds and wood abundance and volume was highly impacted by the debris flows that occurred during the Storm of 1996, prior to the 1998 data collection. There are statistically significant changes that have occurred in the stream morphology among the four watersheds. This dissertation also tests a method of detecting fluvial wood through airborne lidar analysis. This method provides an alternative to field surveys in areas of even the most extreme tree canopy cover.