

Public Abstract

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Title:CLIMATE AND REGENERATION AT UPPER TREELINE EAST AND WEST OF THE CONTINENTAL DIVIDE IN THE NORTHERN AND SOUTHERN ROCKY MOUNTAINS: DO LANDSCAPE- AND LOCAL-SCALE MOISTURE GRADIENTS IMPACT THE BIOGEOGRAPHIC EXPRESSION OF CLIMATE CHANGE?

In the 21st century, global-scale controls of treeline are thought to be well understood. While this may be true, the treeline ecotone is modulated by fine-scale microclimates and feedbacks. This creates a need for understanding how geographic location, topography, and slope aspect contribute to treeline position. In this study, dendroecological techniques were used to reconstruct rates of tree establishment at 7 climatic treeline sites in the northern and southern Rocky Mountains. Research sites were further stratified by their east/west orientation in regards to the Continental Divide. Via this scheme, we are able to examine the interplay between temperature-moisture interactions and tree establishment at both the landscape- (east-west of Continental Divide) and local-scale (north-south slopes). Regime shift analysis is used to identify the role of abiotic and biotic thresholds in driving patterns displayed by establishment data. Results from the northern Rocky Mountains show that rates of treeline advance appear to be greatest on north-facing slopes. In addition, cool season precipitation correlates significantly at sites both east and west of the Divide, yet subsequent temperature-precipitation interactions differ during the growing season. Throughout the year, improved cool season conditions appear to be of overriding importance and tree regeneration on north-facing slopes appears to be more susceptible to climate variability. However, different relationships between climate and vegetation are seen in the Southern Rocky Mountains. Taken together, current data analyses suggests that spatial and temporal alignment of precipitation regimes—as well as microsite conditions—are of utmost importance in determining climate-vegetation interactions within the treeline environment.