One of the most important centers of forest diversity in North America is the Southern Appalachian region. The Southern Appalachians have supported continuous forest communities longer than any other area on the continent, host many rare endemic species, and harbor many disjunct species populations (NCNHP, 1999). They also provide ecosystem services such as carbon storage, watershed and water quality protection, and serve as a timber source (Zipper *et al.*, 2011). In order to protect these valuable resources, it is crucial that we thoroughly understand the past climate of this area and how it has influenced the many ecosystems within the region. A sound understanding of the past relationship between climate and the many ecosystems will enable scientists and landowners to better manage the natural resources in the future.

The continued increases in greenhouse-gas emissions are predicted to cause an increase in average global surface temperatures of 1.0-3.5º by the end of this century (Kattenberg et al., 1996). However the influence of global warming on precipitation regimes is not as well understood, particularly in the southeastern United States. Approximately one-third of the 24 models used in the IPCC AR4 process predict a decrease or no change in drought frequency (Seager et al., 2009). This uncertainty makes it difficult to predict water and power usage. The ability to do so is crucial because the southeastern United States has experienced substantial increases in population and energy consumption, over the last decade (Seager et al., 2009; Sobolowski and Pavelsky, 2012). It is important that the public and planners in the Southeast have access to information regarding climate change projection and mitigation. Through the use of tree-ring based climate reconstructions scientists may better understand past precipitation regimes in order to better predict future precipitation patterns in a changing climate.

In order to develop more accurate climate models and extend meteorological records tree cores are commonly used as a proxy for climate over a given area. Most commonly the tree cores used for this purpose are collected in an area where drought is the limiting growth factor. For example there are extensive climate reconstructions for the southwestern U.S.(). However, scientists have also successfully used tree cores to develop climate reconstructions in the eastern US (LeBlanc, 1993; Stahle and Cleveland, 1993; Cook *et al.*, 1999;). Traditionally it has been understood that trees in a closed-canopy forest are not limited by climate to the same extent as trees growing on the forest border. Within a dense forest, stand dynamics play an important role in shaping the forest structure through their influence on radial tree growth. As these interactions between indivuals increase in strength, it becomes difficult to interpret the climatic influence on tree growth time series. Fritts presented a classic schematic diagram which show the generally understood relationship between correlation, sensitivity, and moisture limiting days [[1](#Xfritts1976tree)]. As can be seen in this simplified rendition of the classic plot (see Fig. [1](#x1-90061)), dense or closed-canopy forests typically have low correlation among trees and with climate and low mean sensitivity. However, Speer *et al.*, found significant correlations between temperature, precipitation, and oak chronologies from closed canopy forest in the Southern Appalachian Mountains (2009).

In this study, we developed and analyzed the climate response found in a chestnut oak tree-ring chronology from interior forest trees located in an oak-pine forest on Brush Mountain, Virginia, US. The objectives of this study were to: (1) Determine the presence of a significant relationship between the chestnut oak growth series and climate. (2) Assess the viability of a climate reconstruction based on the chestnut oak growth series as proxy data. (3) Evaluate the reliability of the reconstruction by comparing it to other verified regional reconstructions.

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