Preliminary Assessment of the Impact of Climate Change and Variability on Biomass and Forest Fires, the Impact of Forest Fires on Ozone and PM Air Quality, and the Regional Climate Response to these changes in the Southern U.S.

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A regional air quality modeling system with integrated meteorology and chemistry is being used to investigate the feedbacks of aerosols to radiations and atmospheric dynamics that in turns affect the distribution of air pollutants. Through coupling several interdisciplinary modeling systems including the forest growth models, the Community Smoke Emission Model for smoke emissions from wild and prescribed fires, and the Sparse Matrix Operator Kernel Emissions modeling system, preliminary fire and biogenic emissions will be generated under a variety of scenarios including wild fire only and national fire management plan for several future years. These emission scenario results will be input into the integrated modeling system and preliminary model results are examined to assess the changes in air quality, and their intra- and inter-annual impacts on key regional climate parameters under the various scenarios. The primary objectives of this study are (1) to investigate the impacts of climate change on vegetative cover and fuel characteristics, the consequences for fire frequency and intensity, and feedbacks to biomass load and biogenic emissions under managed and wildfire scenarios; (2) to examine changes in regional air quality due to the evolution of anthropogenic and biogenic emissions in response to various fire scenarios; and (3) to investigate the feedback of the air quality changes to regional climate variables. The resulting coupled emissions modeling system may result in a significantly improved, and readily accessible modeling system for understanding the complex and cyclical nature of the interactions between fire occurrence, climate change, and air quality.