Association of Southeastern Biologists Annual Meeting, 14-17 April 2004, Memphis, TN.
Poster abstracts (http://www.people.memphis.edu/~biology/asb/posterorderedabstracts.pdf)

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Simulating multifactor climate change in an old-field grass community: Design, setup, and first year monitoring of the Old-Field Community Climate and Atmosphere Manipulation Project (OCCAM)

Current rates of increasing carbon dioxide (CO_2) concentration, if continued, will result in changes to key climatic variables such as tropospheric temperature and regional precipitation regimes. Changes to any one of these conditions would have a profound effect on the structure and function of ecosystems, but multiple, and often confounded, environmental variables ultimately will dictate the responses of ecosystems. We are studying whole ecosystem response to multifactor environmental change in an old-field (i.e., abandoned agricultural land) system. Its stature is conducive to whole-system analysis and it contains a mixture of plant functional types, which allows us to investigate species-specific responses, competitive interactions, and the role of biological diversity. In the fall of 2002 experimental old-field communities were constructed within open-top chambers used to manipulate the target climatic and atmospheric variables on the Oak Ridge National Environmental Research Park. In the spring of 2003 we began treatments of ambient and elevated CO_2 (ambient + 300 ppm), ambient and elevated air temperature (ambient + 3 ˚C), and dry and wet soil moisture conditions (varied amounts of overhead irrigation). Average volumetric water content of surface soil (0-15 cm) was approximately 5% lower under elevated CO_2 than ambient and approximately 5% lower under elevated temperatures than ambient.