SYNOPTIC CIRCULATION AND TEMPERATURE PATTERN DURING SEVERE WILDLAND FIRES

Warren E. Heilman[1]

Large-scale changes in the atmosphere associated with a globally changed climate and changes in climatic variability may have important regional impacts on the frequency and severity of wildland fires in the future. Identifying the relationships of large-scale middle and lower atmospheric processes to regional-scale fire-weather systems is critical for understanding how a changing climate or climate variability can potentially influence wildland fire activity. Three very important middle and lower atmospheric variables that influence the development of regional fire-weather systems are wind, temperature and moisture.

In this study, empirical-orthogonal-function (EOF) analyses were performed on the middle and lower atmospheric circulation and temperature fields at the onset of past severe wildland fire episodes. These EOF analyses were used to identify the synoptic circulation and temperature patterns at the 500 mb and 850 mb levels in the atmosphere, respectively, that are prominent at the onset of severe fires in six different regions (NW, NC, NE, SW, SC, and SE) of the U.S. Lower atmospheric relative humidity patterns corresponding to the EOF-derived circulation and temperature patterns during severe fires were also identified. The analyses suggest that there are two or three distinct synoptic circulation, temperature, and moisture patterns that tend to be associated with severe fires in each region. Additional studies are examining how these large-scale patterns influence the mesoscale dynamics of fire-weather systems.

[1]USDA Forest Service, North Cenral Forest Experiment Station, 1407 S. Harrison Rd., room 220, East Lansing, MI 48823-5290.