Analysis of Summertime Convective Initiation in Central Alabama Using the Land Information System

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During the summer months in the southeastern United States, convective initiation presents a frequent challenge to operational forecasters. Thunderstorm development has traditionally been referred to as "random" due to their disorganized, sporadic appearance and lack of atmospheric forcing. Horizontal variations in land surface characteristics such as soil moisture, soil type, land and vegetation cover could possibly be a focus mechanism for afternoon convection during the summer months. The NASA Land Information System (LIS) provides a stand-alone land surface modeling framework that incorporates these varying soil and vegetation properties, antecedent precipitation, and atmospheric forcing to represent the soil state at high resolution. The use of LIS as a diagnostic tool may help forecasters to identify boundaries in land surface characteristics that could correlate to favored regions of convection initiation. The NASA Short-term Prediction Research and Transition (SPoRT) team has been collaborating with the National Weather Service Office in Birmingham, AL to help incorporate LIS products into their operational forecasting methods.

This paper highlights selected convective case dates from summer 2009 when synoptic forcing was weak, and identifies any boundaries in land surface characteristics that may have contributed to convective initiation. The LIS output depicts the effects of increased sensible heat flux from urban areas on the development of convection, as well as convection along gradients in land surface characteristics and surface sensible and latent heat fluxes. These features may promote mesoscale circulations and/or feedback processes that can either enhance or inhibit convection. With this output previously unavailable to operational forecasters, LIS provides a new tool to forecasters in order to help eliminate the "randomness" of summertime convective initiation.

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