**Introduction**

- Forecasts have difficulty predicting “random” afternoon thunderstorms during the summer months.
- Differences in soil characteristics could be a contributing factor for storms.
- The NASA Land Information System (LIS) may assist forecasters in predicting summer convection by identifying boundaries in land characteristics.
- This project identified case dates during the summer of 2009 by analyzing synoptic weather maps, radar, and satellite data to look for weak atmospheric forcing and disorganized convective development.
- Boundaries in land characteristics that may have lead to convective initiation in central Alabama were then identified using LIS.

**Background**

- Alabama has a diverse selection of soil and vegetation types.
  - Clays, Sand, Silt, Loam; Forests, Grasslands, Crops
  - Black Belt located in southern Alabama (mostly clay soils)
  - Urban areas (Birmingham, Huntsville, Montgomery, etc.)
- Soil and vegetation aid the transfer of moisture and energy into the atmosphere.
- Increasing latent and sensible heat fluxes
- Affect diurnal heating rates
- Thunderstorms can be initiated due to disparate or favorable heat fluxes from the surface.

**Soil Type**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Organic Matter</th>
<th>Clay</th>
<th>Silty Clay</th>
<th>Sandy Clay</th>
<th>Loam</th>
<th>Sandy/Clay Loam</th>
<th>Silt</th>
<th>Silty Loam</th>
<th>Sandy/Loam</th>
<th>Loamy Sand</th>
<th>Sand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birmingham</td>
<td>Organic Matter</td>
<td>Clay</td>
<td>Silty Clay</td>
<td>Sandy Clay</td>
<td>Loam</td>
<td>Sandy/Clay Loam</td>
<td>Silt</td>
<td>Silty Loam</td>
<td>Sandy/Loam</td>
<td>Loamy Sand</td>
<td>Sand</td>
</tr>
<tr>
<td>Montgomery</td>
<td>Organic Matter</td>
<td>Clay</td>
<td>Silty Clay</td>
<td>Sandy Clay</td>
<td>Loam</td>
<td>Sandy/Clay Loam</td>
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<tr>
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</tr>
</tbody>
</table>

**Vegetation Type**

- Convection forms at 2000 UTC across Birmingham.
- Significant area of drier soil along unknown boundary.
- Differences in heat fluxes may have lead to atmospheric forcing similar to sea-breeze circulations.
- Warm, dry soil acts as land; cool, wet soil acts as water.

**Conclusions and Future Work**

- LIS shows the effect of increased sensible heat flux from “Urban Heat Islands” on downwind convection.
- Convection favored at skin temperatures > 44 °C.
- Convection favored along gradients in land characteristics and surface fluxes as winds become perpendicular to these gradients.
- Flow from lower to higher latent/sensible heat fluxes and skin temperatures.
- Differences in soil and vegetation types.
- Continued study on convective initiation and correlations with land characteristics.
- Transition LIS model into operational forecasting to assist with short-term thunderstorm prediction.

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