Background

SpOrT runs the NASA Land Information System (LIS) in real-time to support local modeling and diagnosis at NOAA/National Weather Service (NWS) weather forecast offices (WFOs).

Current Applications of SpOrT-LIS

- Initializing LSM fields in local modeling applications (i.e., WRF model)
- Supported option in the WSO Science Training and Resource Center’s Environmental Modeling System (EMS, http://d3r.jpl.nasa.gov/EMS/systems/)
- LIS-GDR output files uploaded to ftp server in real-time
- EMS users over see U.S. can initialize with LIS LSM fields in place of coarser-resolution, large-scale model fields

Situational Awareness

- Drought Monitoring
- Assessing flood potential
- LIS data ingested and displayed in AWIPS II at NWS Huntsville, AL
- Refer to training examples below

Vegetation Stress during Growing Season

- University of Alabama – Huntsville acquires SpOrT-LIS and MODIS vegetation products
- Manages in-house crop-stress model over U.S.
- Distributes reports to end-users

Comparison Between SE U.S. and CONUS SpOrT-LIS Configurations

Table 1. Summary of configuration details for the real-time SpOrT-LIS runs over the Southeastern U.S. domain and CONUS domain.

<table>
<thead>
<tr>
<th>Configuration detail</th>
<th>Southeastern U.S. domain</th>
<th>CONUS domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSM surface model</td>
<td>Noah-MP</td>
<td>Noah-15M</td>
</tr>
<tr>
<td>Grid dimensions</td>
<td>100 x 100</td>
<td>200 x 104</td>
</tr>
<tr>
<td>Atmospheric forcing</td>
<td>FSU-2, GFDL, GFS, GISS-E2, JRA, CPRS, MERRA-2, 2.5 km grids, 91x10-km wind</td>
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</tr>
<tr>
<td>Stage IV hourly Precipitation</td>
<td>LIS Multi-Radar Radar-Sensor (MRRS) hourly gauge-averaged radar QPE</td>
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</tr>
<tr>
<td>Soil database</td>
<td>SWATG</td>
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<tr>
<td>Static land use dataset</td>
<td>MODIS/LPDM</td>
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<tr>
<td>Green vegetation fraction</td>
<td>Daily Shrub MODIS</td>
<td>Daily Shrub MODIS</td>
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<tr>
<td>Historical record</td>
<td>3-Year</td>
<td>3-Year</td>
</tr>
<tr>
<td>History record interval</td>
<td>6 hours</td>
<td>6 Years</td>
</tr>
</tbody>
</table>

Issues Documented with MRMS Precipitation Dataset

- Beam blockage due to terrain / physical impediments
- Not just concerns in Rocky Mountains
- Columbus, MS radar: Rapidly growing trees have blocked beams over time at certain azimuths
- Indicates problem in integrated soil moisture fields
- LIS is a good tool to identify problems in QPE down through long time integrations

Development of LIS Training Module for Situational Awareness Applications

- Example from 17 September 2013 over southwestern U.S.
  - Heavy rainfall and flooding occurred in New Mexico during early September
  - Dynamic modeling of integrated soil moisture, soil-weather interactions in drought classification

Sample Results / Comparison between SE U.S. LIS and CONUS LIS

- Summer 2013 had distinct spatial pattern in total column soil moisture change: SE U.S. moistening; Midwest drying (above)
- Better soil moisture classifications over LIS (below)

Future Direction

- Upgrade to LISv7 and utilize LIS Validation Toolkit
- Validate LIS against soil moisture observations and field campaign data
- Assemble satellite-based soil moisture from SMOS and SNAP
- Incorporate NEXIS global real-time IRS-VHR green vegetation fraction (Vargas et al., 2013; Future Opr. En. Sat. Conf.)