**P162 Expansion of the Real-Time SPORT-Land Information System for NOAA/National Weather Service Situational Awareness and Local Modeling Applications**

Jonathan L. Case; ENSCO, Inc./NASA Short-term Prediction Research and Transition (SPoRT) Center; Huntsville, AL, and
Knmastero D. White; NOAA/NWS Huntsville Weather Forecast Office, Huntsville, AL

American Meteorological Society 94th annual meeting; Atlanta, GA, 20th Conf. on Weather Analysis and Forecasting / 22nd Conf. on Numerical Weather Prediction

**Poster Session 2; 4 February 2014**

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**Background**

SPoRT runs the NASA Land Information System (LIS) in real-time to support modelers and decision-makers at NOAA/National Weather Service (NWS) weather forecast offices (WFOs).

- Current domain covers the Southeastern half of the Continental U.S. (CONUS) due to limitations in the Stage IV precipitation grids driving the Noah land surface model (LSM) integration in LIS.
- This past year, SPoRT added a new real-time run over a full CONUS domain.
- Enables expansion of US applications to NOAA/NWS partners outside Southern Region.
- Sets stage for future soil moisture data assimilation activities.

**Posture objectives**

- Provide summary of real-time activities at SPoRT.
- Compare/contrast real-time LIS over SE U.S. with full CONUS-LIS.
- Map out future direction of LIS applications.

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**Modeling System and Capabilities**

**NASA Land Information System (LIS)**

- High-performance land surface modeling & data assimilation framework.
- Can run a variety of LSMs (Noah, SIEM, Catchment, etc.).
- Supports several static databases for land use and soil classification.
- Able to run up to global domains at 1-km grid spacing.
- Land surface data assimilation:
  - Ensemble Kalman Filter (EnKF) or Direct Insertion (DI).
  - Soil moisture, soil temperature, snow fraction/Snow/FVSN.
- Optimization and Uncertainty Estimation (Srozavetz et al. 2013, J. Hydromet).

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**Development of LIS Training Module for Situational Awareness Applications**

**SPoRT-US for Drought Monitoring**

- Example from 17 September 2013 over southwestern U.S.: heavy rainfall and flooding occurred in New Mexico during mid-September.
- Dense monitoring of integrated soil moisture, soil-water variation in drought classification.

**SPoRT-US for Assessing Flood Potential**

- Contracting extensive soil moisture conditions likely played a strong role in the different outcomes.
- Dense monitoring of integrated soil moisture, soil-water variation in drought classification.

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**Current Applications of SPoRT-LIS**

- Initializing LSM fields in local modeling applications (i.e., WRF model):
- Supported option in the WSO/UCD Resource Center’s Environmental Modeling System (EMS; http://wso.umd.edu/software/vertisens).
- LIS GRIB output files uploaded to ftp server in real-time.
- EMS users over SE U.S. can initialize with LIS LSM fields in place of coarser-resolution, large-scale model fields.

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**Situational Awareness**

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

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**Vegetation Stress during Growing Season**

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

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**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 new CONUS domain.**

<table>
<thead>
<tr>
<th>Configuration detail</th>
<th>SE U.S. Domain</th>
<th>CONUS Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land surface model</td>
<td>Noah</td>
<td>LISv7</td>
</tr>
<tr>
<td>Grid resolution</td>
<td>100-km resolution</td>
<td>2-km resolution</td>
</tr>
<tr>
<td>Grid dimensions</td>
<td>100-km resolution</td>
<td>2-km resolution</td>
</tr>
<tr>
<td>Soil moisture database</td>
<td>STICS</td>
<td>MODIS3</td>
</tr>
<tr>
<td>Green vegetation</td>
<td>Daily MODIS</td>
<td>Daily MODIS</td>
</tr>
<tr>
<td>History report interval</td>
<td>6 Years</td>
<td>6 Years</td>
</tr>
</tbody>
</table>

**Current CONUS domain with Stage IV**

| New full CONUS domain with MRMS |

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

<table>
<thead>
<tr>
<th>CONUS LIS (MRMS)</th>
<th>SEUS LIS (StageIV)</th>
<th>DHR (CONUS – SEUS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 Sep 2013</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Issues Documented with MRMS Precipitation Dataset**

- Similar patterns in soil moisture to radar coverage gaps in Western U.S.
- Most soils within radar coverage: dry soils in radar coverage gaps.
- MRMS product very dependent on available soil moisture data.

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**Beam blockage due to terrain / physical impediments**

- Not just concerns in Rocky Mountains.
- Columbus, MS radar: Rapidly growing trees have blocked beam over time or certain azimuths.
- Pattern particularly discernable in integrated soil moisture fields.
- LIS is a good tool to identify problems in QPF down through long time integrations.

**Edge of radar networks and non-overlapping radars**

- Especially a problem in Central N. Mexico.
- Recommend that end-users do not utilize CONUS-LIS output in these problem regions.
- Better blending of precipitation forcing and/or soil data assimilation needed to improve spatial continuity.

**Periodic drop-outs of regional tiles (fixed Oct 2013)**

- Numerous drop-outs in late Summer / Autumn 2013.
- Instead of precip assigned as missing, entire regional tile was filled with "0" values.
- Lead to artificial problems in soil moisture in portions of domain where active precipitation occurs at the boundary.
- Points with no input data assigned "0" (fixed Feb 2013).

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**Poster References**


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**Future Direction**

- Upgrade to LISv7 and utilize LIS Validation Toolkit.
- Validate LIS against soil moisture observations and field campaign data.
- Assimilate satellite-based soil moisture from SMODS and SNAP.

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**Table of contents**

- Expansion of the Real-Time SPORT-Land Information System for NOAA/NWS
- Situational Awareness and Local Modeling Applications
- Background
  - SPoRT runs the NASA Land Information System (LIS) in real-time to support modelers and decision-makers at NOAA/National Weather Service (NWS) weather forecast offices (WFOs).
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      - Example from 17 September 2013 over southwestern U.S.: heavy rainfall and flooding occurred in New Mexico during mid-September.
      - Dense monitoring of integrated soil moisture, soil-water variation in drought classification.
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    - Drought Monitoring:
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  - 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 new CONUS domain.
  - Current SE U.S. CONUS domain with Stage IV
  - New full CONUS domain with MRMS
  - Sample Results / Comparison between SE U.S. LIS and CONUS LIS
  - Issues Documented with MRMS Precipitation Dataset
    - Beam blockage due to terrain / physical impediments
    - Edge of radar networks and non-overlapping radars
    - Periodic drop-outs of regional tiles (fixed Oct 2013)
  - Poster References
  - Future Direction
- Conclusion
  - Expansion of the Real-Time SPORT-Land Information System for NOAA/National Weather Service Situational Awareness and Local Modeling Applications
  - Background
  - Current Applications of SPoRT-LIS
  - Situational Awareness
  - Vegetation Stress during Growing Season
  - Comparison Between SE U.S. and CONUS SPoRT-LIS Configurations
  - Sample Results / Comparison between SE U.S. LIS and CONUS LIS
  - Issues Documented with MRMS Precipitation Dataset
  - Future Direction