

## LIS Soil Moisture Quick Guide by NASA/SPoRT

### What is the Land Information System (LIS) Soil Moisture and why is it important?

The LIS soil moisture product is a long-term run of the Noah land surface model (LSM) that began on 1 June 2010 and is updated every 6 hours in real-time. The SPoRT-LIS provides unique, real-time soil moisture information at relatively high resolution (~3 km) compared to other operational sources. SPoRT-LIS is driven by input atmospheric analyses from the NCEP/EMC North American Land Data Assimilation System–phase 2 (NLDAS-2) and Stage IV precipitation, and incorporates real-time MODIS-derived vegetation.

### Impacts to Operations

- **Drought:** The SPoRT-LIS enables a more complete depiction of sub-county drought conditions in space and time compared to coarse soil observation networks (point sources). Since soil moisture and resulting vegetation/crop health are important factors for drought designations, the LIS 3-km analysis provides added value through the integration of 2-dimensional near real-time QPE (Stage IV) and remotely-sensed MODIS vegetation “greenness”.
- **Flood (long-term):** Assessments of soil moisture preceding heavy, long rainfall events are traditionally difficult due to the lack of observations and real-time, operational products. The use of SPoRT-LIS allows forecasters to develop soil moisture thresholds for their local area that correspond to a higher risk for areal or river/stream flooding of drainage basins. Data should be used in conjunction with QPF and other flood forecast products from the WPC.

### How is the soil moisture derived?

LIS-Noah solves equations of the soil-vegetation-snowpack state based on time-varying input atmospheric analyses (i.e., incoming radiation, wind, temperature, precip) and soil / vegetation properties.

### Volumetric vs. Relative Soil Moisture

Volumetric soil moisture is the volume of water content per total soil volume, and is expressed as a unitless percentage (%), or  $m^3 m^{-3}$ . Relative soil moisture is a ratio of the volumetric soil moisture between the wilting and saturation points for a given soil type, and is also expressed as a percentage. Values of volumetric soil moisture are better suited for comparison with in-situ networks, whereas relative soil moisture offers information about the soil saturation state.

### Weekly Change in Column Relative Soil Moisture

The Column Relative Soil Moisture Weekly Change product is especially useful for weekly drought evaluations, since it enables an effective assessment of soil moisture changes over the short-term.

### When and where is the product available?

SPoRT-LIS variables are available in AWIPS II (Volume and Product Browsers) at 3-hourly resolution, and are updated every 6 hours. Select LIS output is also found at: <http://weather.msfc.nasa.gov/sport/modeling/>

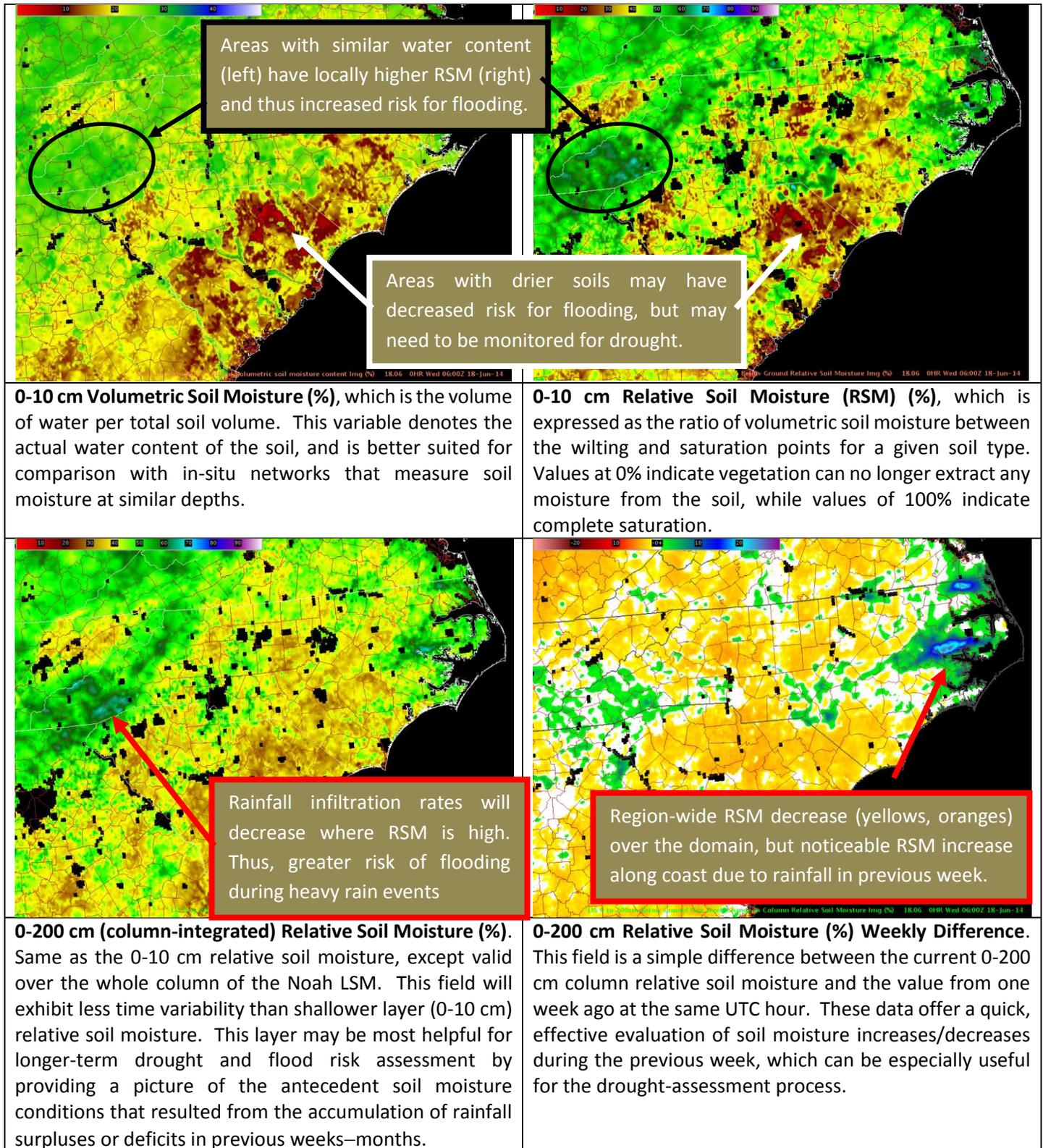
### What are the strengths of LIS soil moisture?

- Uses real-time, daily MODIS Green Vegetation Fraction (GVF) data in place of the default monthly climatological vegetation.

### What are the things to watch out for?

- Urban and river/lake pixels are masked in relative soil moisture data, while only rivers/lakes are masked in volumetric soil moisture data.
- Soil moisture fields can occasionally be corrupted in the short-term when incomplete or poor-quality input Stage IV precipitation occurs. This problem usually corrects itself in subsequent LIS 6-hourly cycles.

## Example of LIS Soil Moisture in AWIPS II



### Resources:

<http://weather.msfc.nasa.gov/sport/modeling/lis.html>