Soil Moisture Scaling Function Development for the Little River Experimental Watershed

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Primary calibration and validation approach is utilization of dense in situ soil moisture measurements (multiple soil moisture measurement within the 3-km to 36-km SMAP footprint).

Supplemental approach will utilize large-scale sparse networks (one measurement within footprint), and global remote sensing and model-based soil moisture data products.
**Climate class:** Temperate (Cfa)

**Landcover:** Cropland/natural mosaic

**Soil texture:**
- **S-%:** 80
- **C-%:** 7
- **BD:** 1.47

**Algorithm Performance Metrics:***

<table>
<thead>
<tr>
<th>Alg.</th>
<th>ubRMSE</th>
<th>Bias</th>
<th>RMSE</th>
<th>R</th>
<th>Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCA-H</td>
<td>0.045</td>
<td>0.068</td>
<td>0.082</td>
<td>0.758</td>
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</tbody>
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*In Situ*
protocols for soil moisture measurement and monitoring

Scaling Function

- Arithmetic
- Voronoi
- Physical Sampling
- Model Matchup
- Temp Network
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Wet Forest - 25%
Forest - 20%
Agriculture et al. - 55%
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protocols for soil moisture measurement and monitoring

Temp Network in early summer of 2017
Interrupted at harvest 2017
Many reinstalled for the winter of 2017-18
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protocols for soil moisture measurement and monitoring

\[ y = 1.284x + 0.018 \]

\[ R^2 = 0.5909 \]
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protocols for soil moisture measurement and monitoring

Scaling Function

Voronoi

Temporary Network

Weighted Average Soil Moisture (WASM)

New SM = f(WASM)

New_WASM = 0.25*0.1864*ln(WASM)+0.7387 + 0.2*(1.2566*WASM+0.0186) + 0.2*(0.747*WASM+0.0441) + 0.35*(0.715*WASM - 0.0044)

New_WASM = Wetland Forest + Dry Forest + Irrigated Crop + Non-irrigated Crop
Climate class: Temperate (Cfa)
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Alg.  ubRMSE  Bias  RMSE  R  Slope
SCA-H  0.045  0.068  0.082  0.758  1.301  
SCA-V  0.036  0.115  0.121  0.782  1.144  
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In Situ

Black: Use recommended [Retrieval Quality Flag bit(0)=0]
Climate class: Temperate (Cfa)
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Black: Use recommended [Retrieval Quality Flag bit(0)=0]
Gray: Retrieval attempted and succeeded but use not recommended [bit(0)=1, bit(1)=0, bit(2)=0]
Green: Retrieval attempted but failed [bit(0)=1, bit(1)=0, bit(2)=1]
Cyan: Retrieval not attempted [bit(0)=1, bit(1)=1]