Using satellite estimate of land surface temperature to assess the performance of the soil physics in JULES

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JULES moisture/energy fluxes

- Θcrit controls
  - Bare soil evaporation
  - Plant transpiration
Soil texture to hydraulic parameters

- Sand, silt, clay
  - Van Genuchten,
  - Cosby et al
  - Brooks Corey

<table>
<thead>
<tr>
<th>Data set</th>
<th>$\theta_{\text{crit}}$</th>
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</thead>
<tbody>
<tr>
<td>6 Type IM2</td>
<td>0.244</td>
</tr>
<tr>
<td>BADC IGBP</td>
<td>0.333</td>
</tr>
<tr>
<td>ISLCP (continuous)</td>
<td>0.307</td>
</tr>
<tr>
<td>3 Type IM1</td>
<td>0.367</td>
</tr>
</tbody>
</table>

http://en.wikipedia.org/wiki/Water_retention_curve
Seasonal temperature cycle
Model and MODIS seasonal range

Seasonal temperature range (August – May)

• Princeton driving data: 1° resolution, 3 hourly
• Monthly means over the 2000-2008 period
• Cosby et al transfer functions on ISLSCP continuous soil texture data
FSMC and seasonality
Improved seasonality

**MODIS**

**Model**

**MODIS**

**New Model**

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NERC National Centre for Earth Observation

Centre for Ecology & Hydrology
Evaporation in Iberia

EF = (B - A) / (C - A)

ET = Energy * EF
JULES with new parameters
Periodicity of West African land-surface temperature
Influence of land cover
Model and MODIS
Taking this forward

- Sensitivity JULES other parameters
- Orography
- Mapping pfts
- Crops in JULES
- Changing water cycles
  – SWELTER
Beyond FSMC