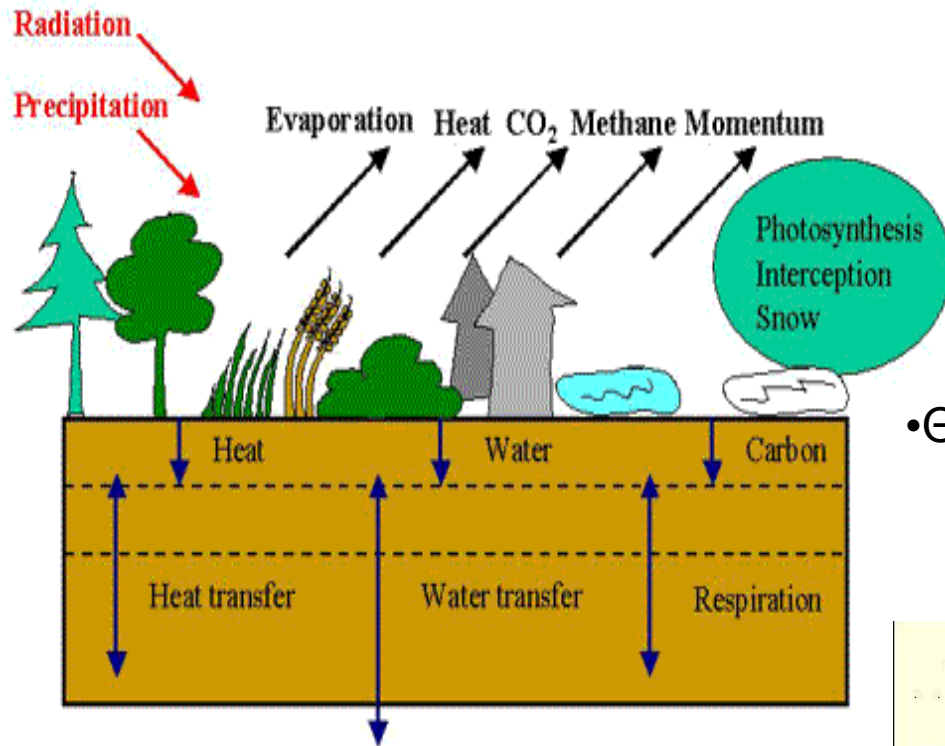


Using satellite estimate of land surface temperature to assess the performance of the soil physics in JULES

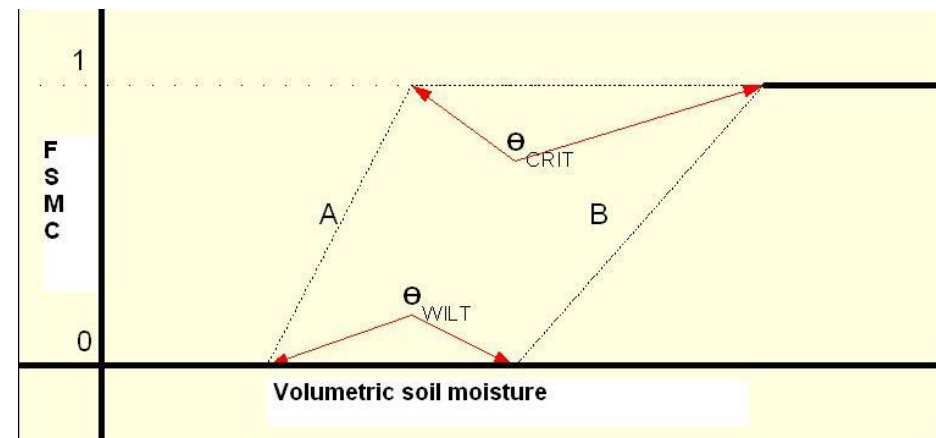
Rich Ellis ⁽¹⁾, Heather Ashton ⁽²⁾, Christopher Taylor ⁽¹⁾,
Maliko Tanguy ⁽³⁾, Martin De Kauwe ⁽⁴⁾

1. Centre for Ecology and Hydrology
2. UK Met Office
3. Universidad de politecnica de Cartagena, Ingeniería de Alimentos y del Equipamiento Agrícola
4. Department of Biological Science, Macquarie University

JULES moisture/energy fluxes



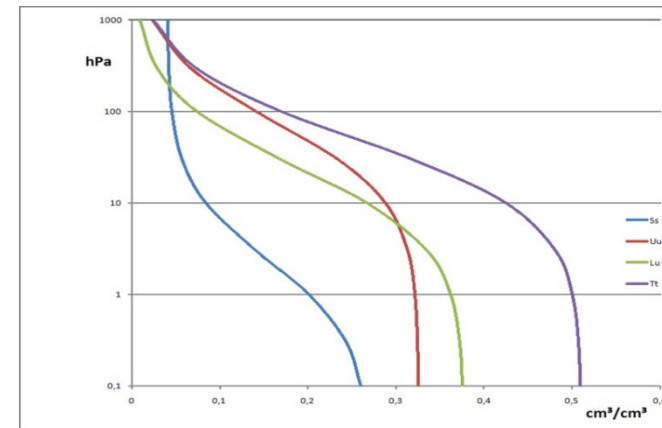
- θ_{crit} controls
 - Bare soil evaporation
 - Plant transpiration



Soil texture to hydraulic parameters

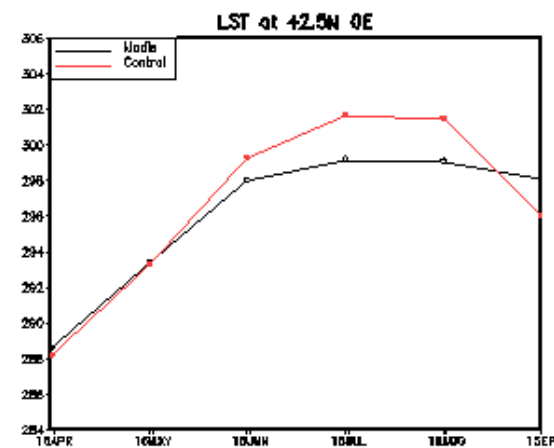
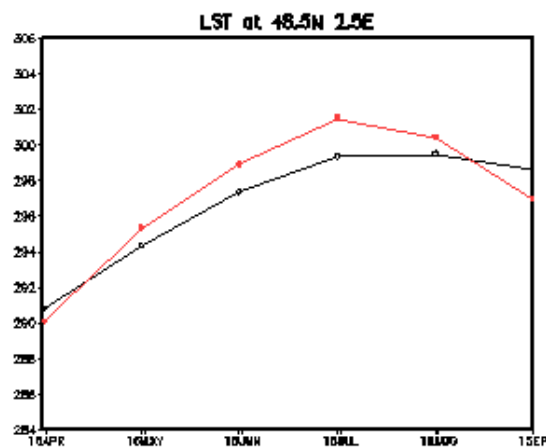
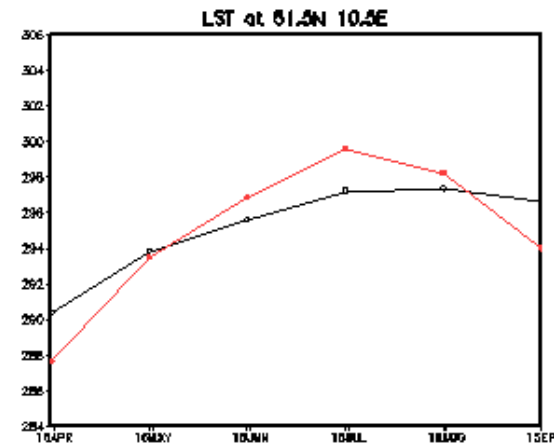
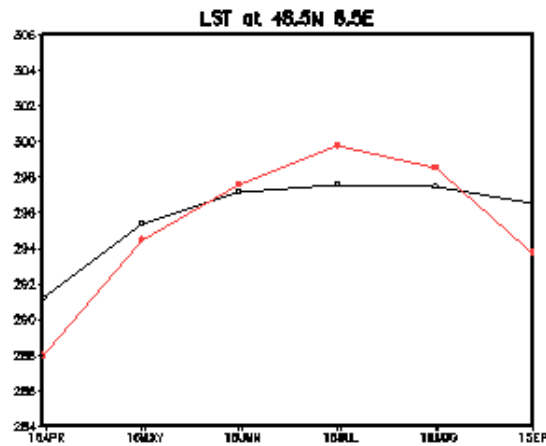
- Sand, silt, clay
 - Van Genuchten,
 - Cosby et al
 - Brooks Corey

Data set	θ_{crit}
6 Type IM2	0.244
BADC IGBP	0.333
ISLCP (continuous)	0.307
3 Type IM1	0.367



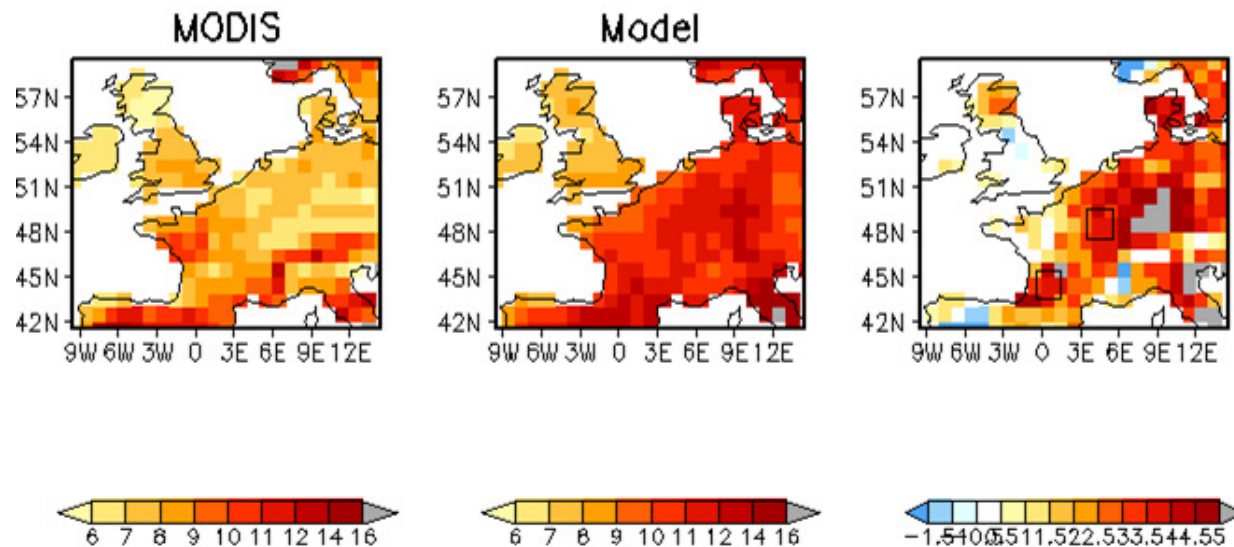
http://en.wikipedia.org/wiki/Water_retention_curve

Seasonal temperature cycle



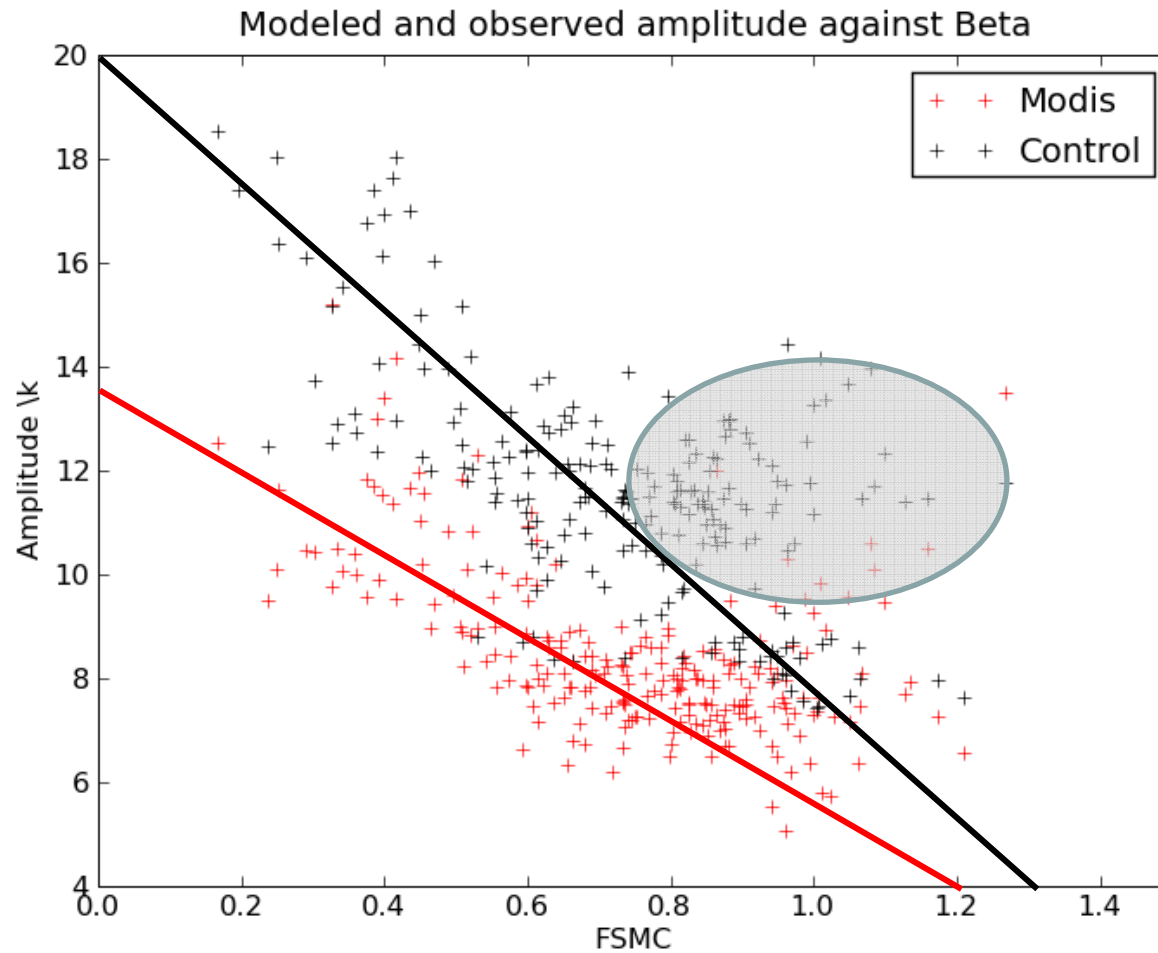
Model and MODIS seasonal range

Seasonal temperature range
(August – May)

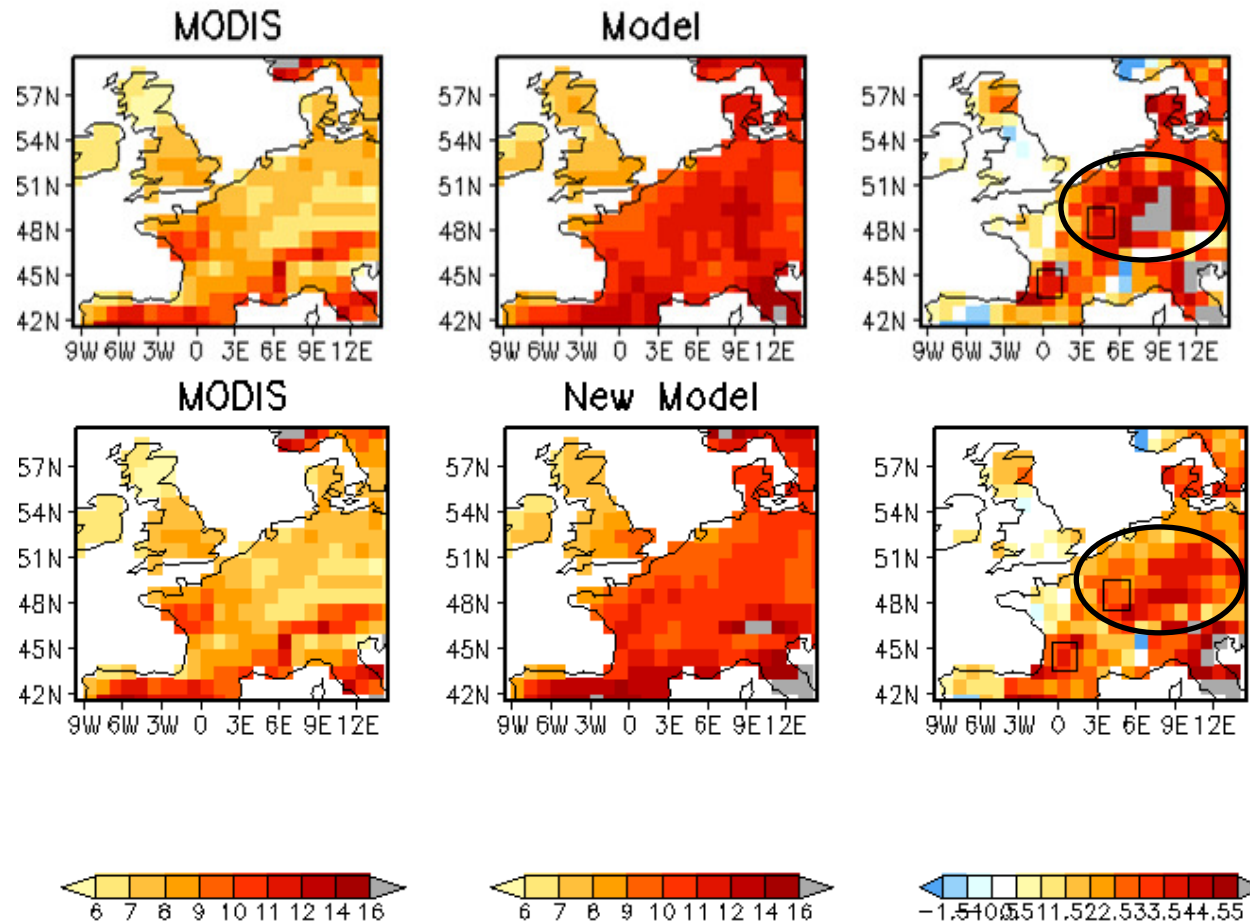


- Princeton driving data: 1° resolution, 3 hourly
- Monthly means over the 2000-2008 period
- Cosby et al transfer functions on ISLSCP continuous soil texture data

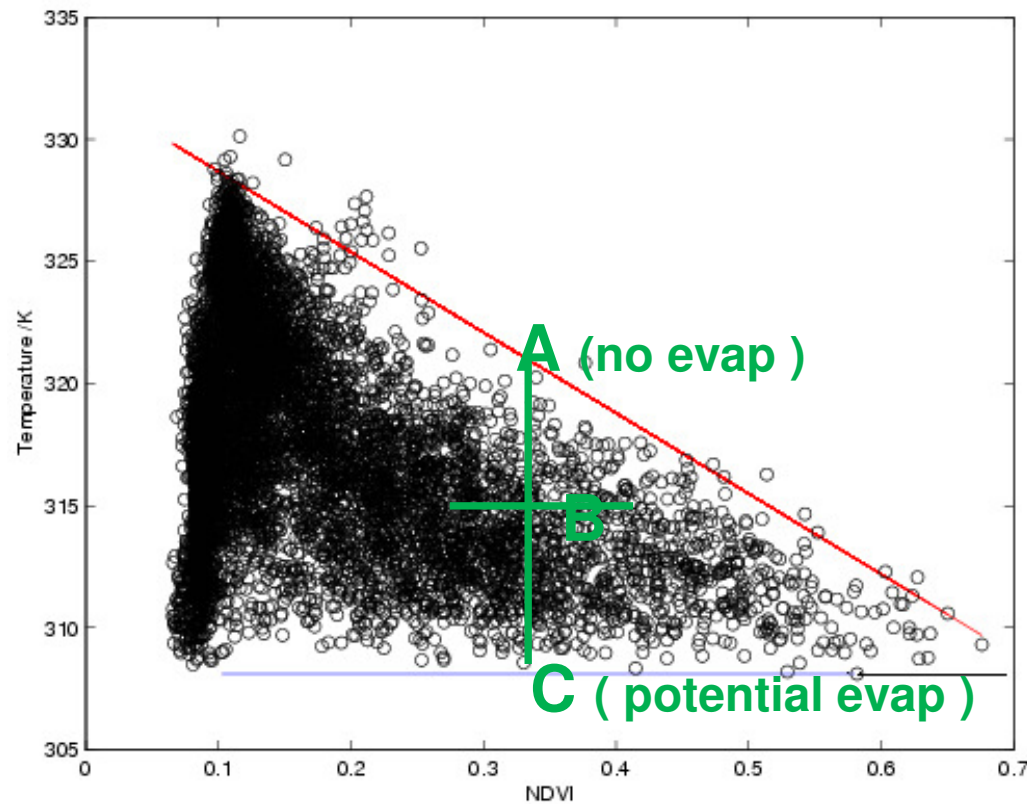
FSMC and seasonality



Improved seasonality

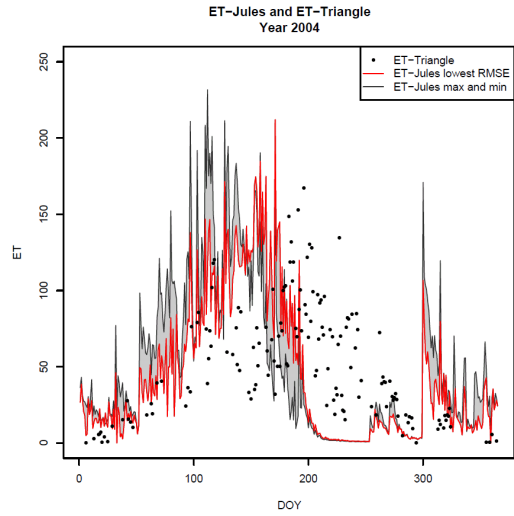


Evaporation in Iberia

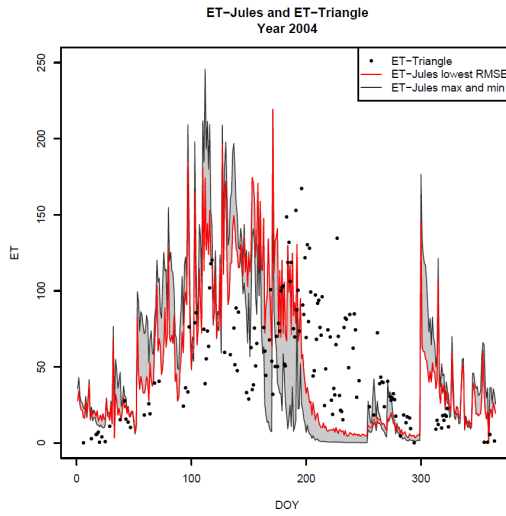


$$EF = (B - A) / (C - A)$$

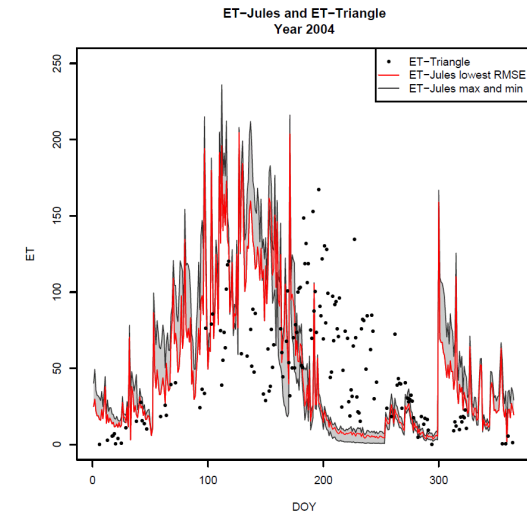
$$ET = \text{Energy} * EF$$



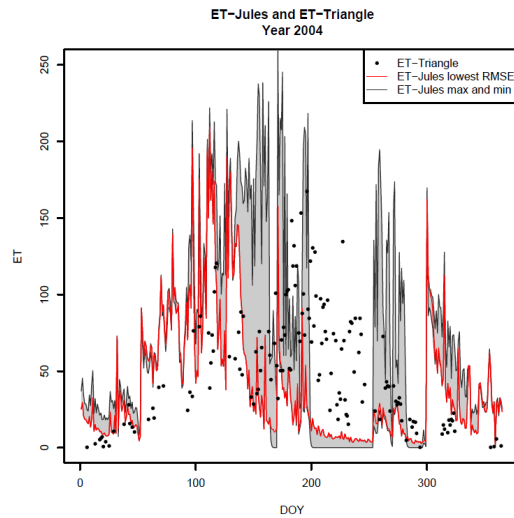
Albedo



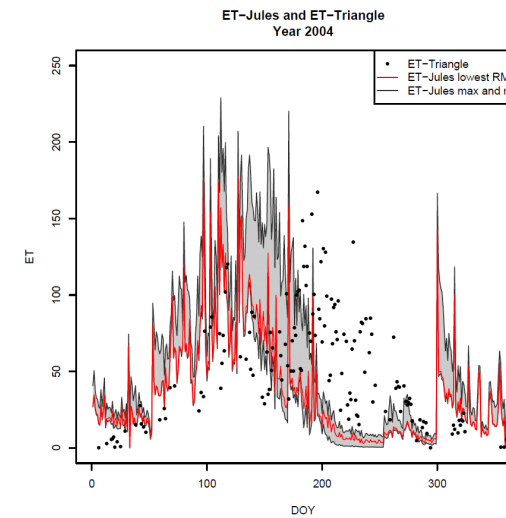
Sm_crit



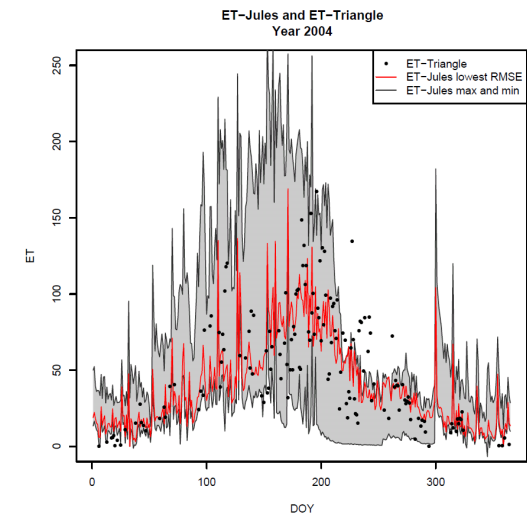
Sm_sat



Sm_wilt

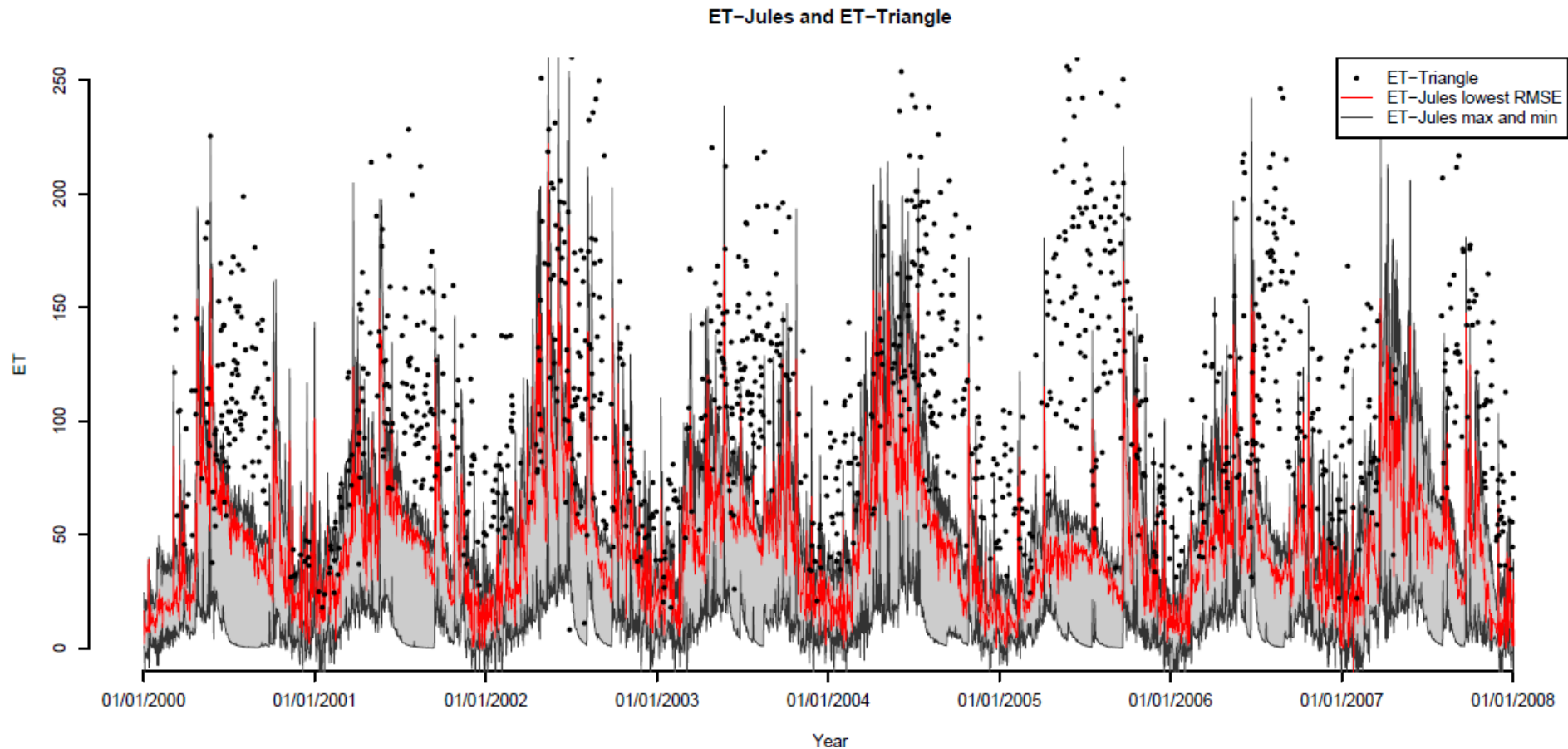


Sm_sat/crit/wilt (jointly)

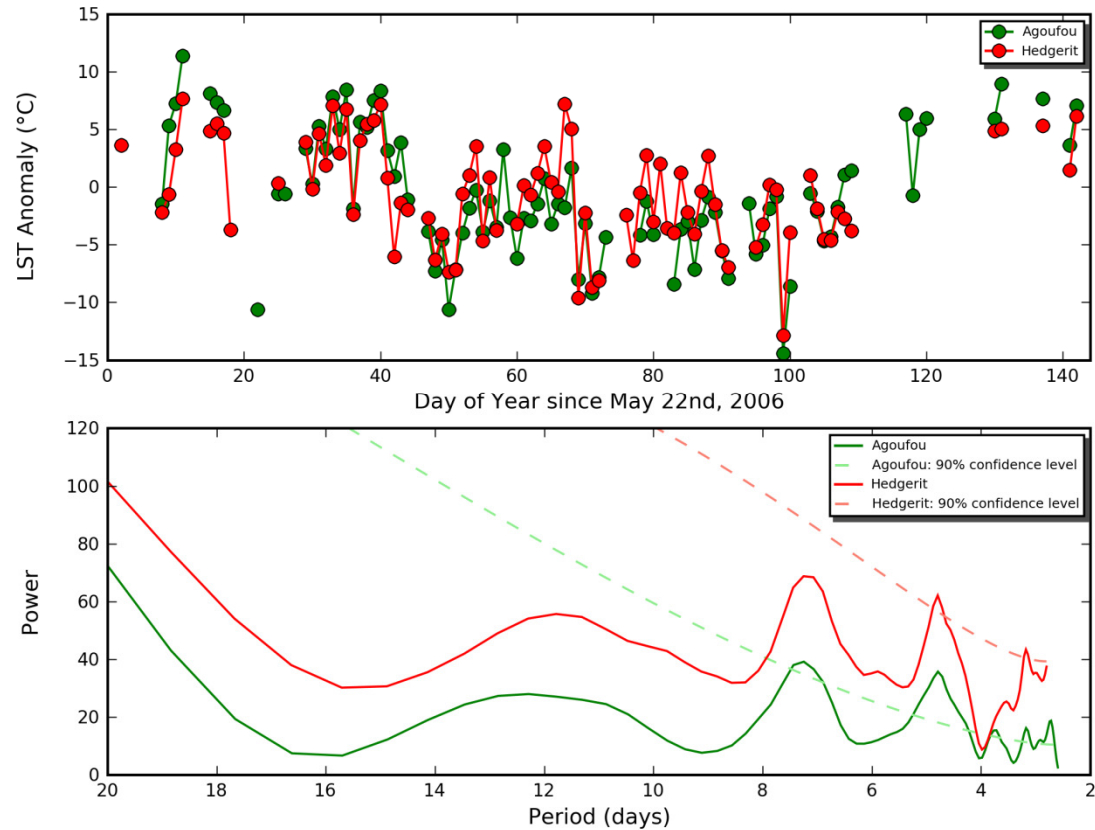


Soil_all_params

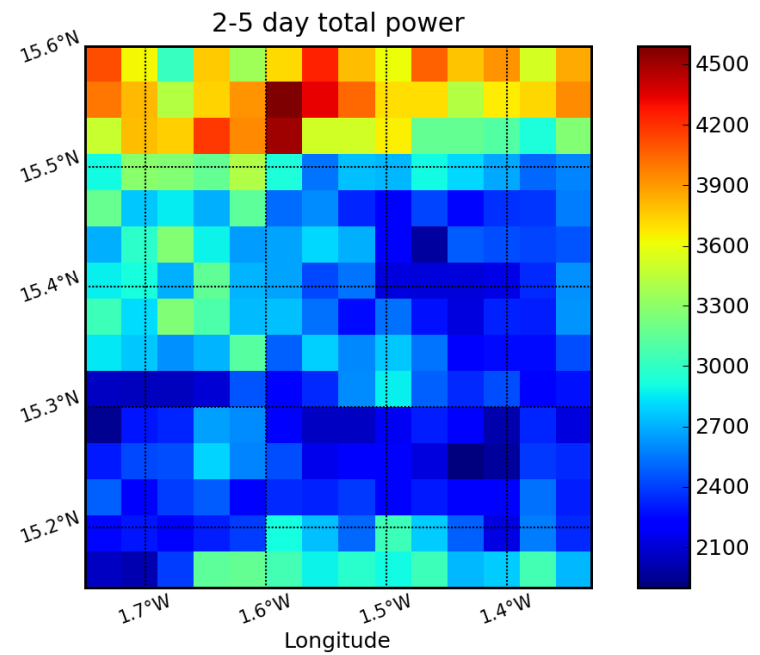
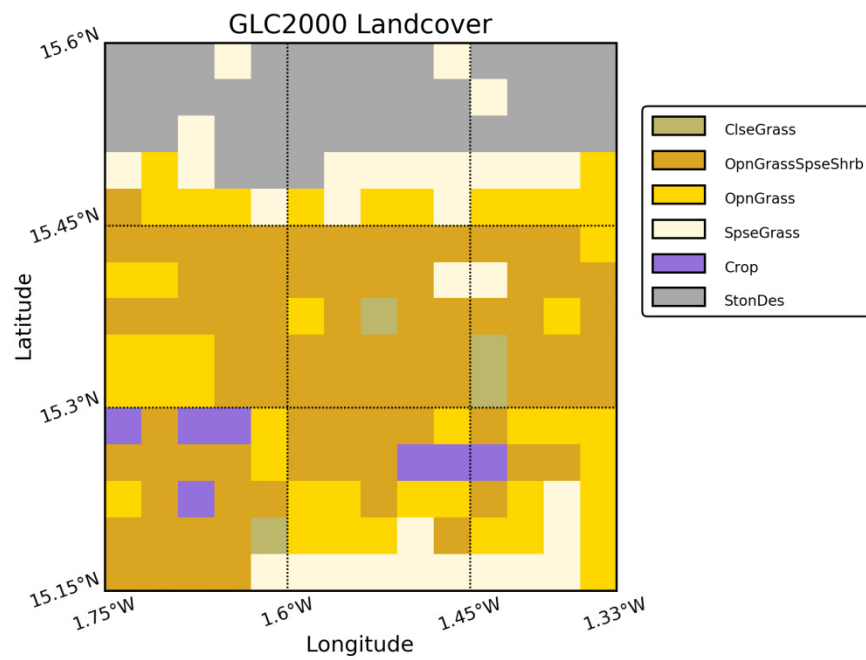
JULES with new parameters



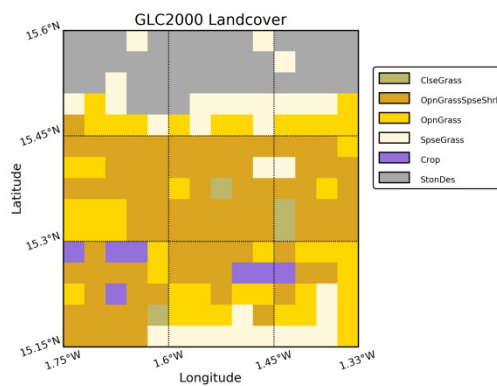
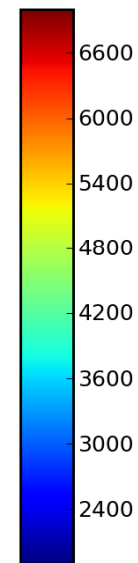
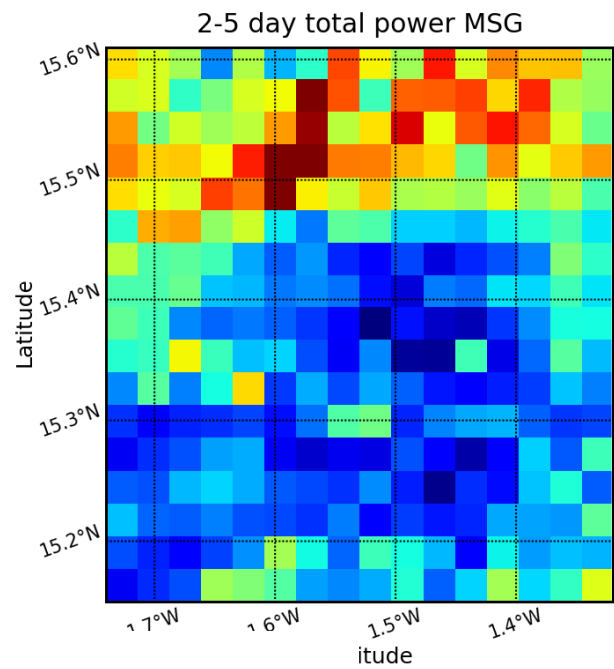
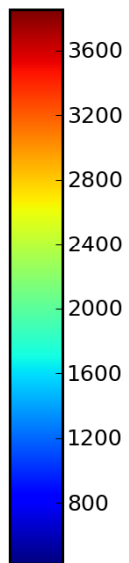
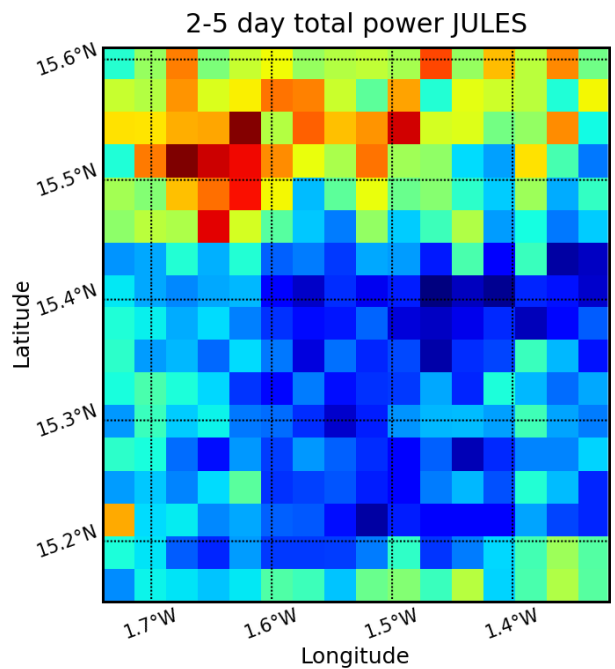
Periodicity of West African land-surface temperature



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

