JULES integrated impacts configuration

Annual JULES Meeting – Met Office – 26th June 2017
Integrated impacts concept

Climate (driving data) → land surface

land surface ↔ crop ↔ irrigation ↔ river flow ↔ glaciers
Preliminary setup

- Version 4.7
- 0.5 degree, global
- 1980 to 2010, 3-hourly (WFDEI)
- Tile fractions from UM
- Crop fractions from Monfreda: Wheat, maize, rice, soy.
- Prescribed sowing dates (Sacks)
- l_triffid = F, l_phenol = F
- Soil ancillary from CAP, l vg_soil = F
- Vegetation parameters from TRENDY
- Irrigation fractions
- TRIP rivers
- Spin-up: 10 x 10 yr
Plans for this configuration

1. Validate for present day (1980 – 2010) with observations as driving data (WFDEI)

2. Drive with HELIX HadGEM3 control run (N216 AMIP run with ERA-Interim SSTs 1980 - 2010)

3. Run with HELIX HadGEM3 future runs at specific warming levels (1.5, 2, 4 deg C...) : bias-corrected daily, so using disaggregator.
Validation datasets

- ET: Jung et al
- Runoff: Fekete
- NPP: MODIS
- GPP: MODIS?
- river flow: Dai
- irrigation: FAOstat
- crop yield: FAO?

- Validation metrics: as ISIMIP protocol?
Early model-obs comparisons (using ‘dummy’ thermal time ancillary)

NPP $kgm^{-2}yr^{-1}$

ET $mm/yr$
1. Thermal time ancillary for crops

\[ TT_{\text{veg}} = \text{thermal time between emergence and flowering} \]
\[ TT_{\text{rep}} = \text{thermal time between flowering and harvest} \]

"\[ x = (TT_{\text{veg}} + TT_{\text{rep}}) \]
\[ = 0.5, 0.45, 0.6, 0.6 \text{ for soybean, maize, wheat, and rice, respectively} \]"

Osborne et al. (2015)
2. Disaggregation

3. l vg soil in the HG3 runs

Williams & Clark (2014)
Soils in HadGEM3

ET
mm/yr

Surface temp
K

l_vg_soil=F - l_vg_soil=T
Soil moisture
kgm$^{-2}$