LIAISE: Land surface Interactions with the Atmosphere over the Iberian Semi-arid Environment

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Talk Outline

1. Motivation
2. Observations
3. Community Experiments
1. Motivation

Surface fluxes

Land Surface Temperature (LST)

Carbon fluxes

Land / atmosphere coupling

Rivers

Wildfires
PLUMBER:
Common statistics

Mean Bias Error
Normalised Mean Error
Standard Deviation
Correlation Coefficient
Model dry-down issues

Espirra (Ev broad)

Amphero (C₃ grass)

Blodgett (Ev needle)
Precipitation response to soil moisture in models

Most models depict positive feedback in many regions

Taylor et al., Nature 2012

Courtesy of Chris Taylor, CEH.
DICE: Diurnal land/atmosphere Coupling Experiment

LSM and SCM stand-alone performance against observations

Stage 1

Observations

1a

LSM

Stage 2

1b

SCM

Stage 3

SCM

SCM

SCM

SCM

LSM

LSM

LSM

LSM

What is the impact of coupling?

How sensitive are different LSM and SCM to variations in forcing?
Profiles of Relative Humidity

Differences in relative humidity
Differences in cloud
Differences in precipitation
Potential for different coupling strengths
UM Global LST biases

GA6.1 LST biases compared to IASI (MetOpB) 1DVAR retrievals for 2015 at 0900L. (Obs – Model)
EURO4 LST biases vs. SEVIRI

- LST biases develop at dawn and grow through the morning. They are more pronounced later in the summer – note apparent contrast with IASI / global model.
- Biases are not seen in verification of T1.5m
- Not tied to specific locations

 Courtesy of John Edwards
Changing semi-arid climate sensitivity

- +6% expansion of vegetation, shrubs and grasses, across Australia since 1982
  - Invasive species and grazing by domestic animals (Asner et al 2004)
  - Fire suppression (Andela et al 2013)
  - Increased water-use efficiency (Donohue et al 2013)
  - Climate trends (Donohue et al 2009)


Courtesy of Stephen Sitch, Exeter Uni
2. Observations

Aircraft

Surface sites

Satellites

MSG – SEVIRIA (evaluation site)
(EUMETSAT)

TERRA – MODIS, ASTER (NASA)
3. Community Experiments
GLASS Framework

- land-atmosphere coupling
- model data fusion

metrics

benchmarking