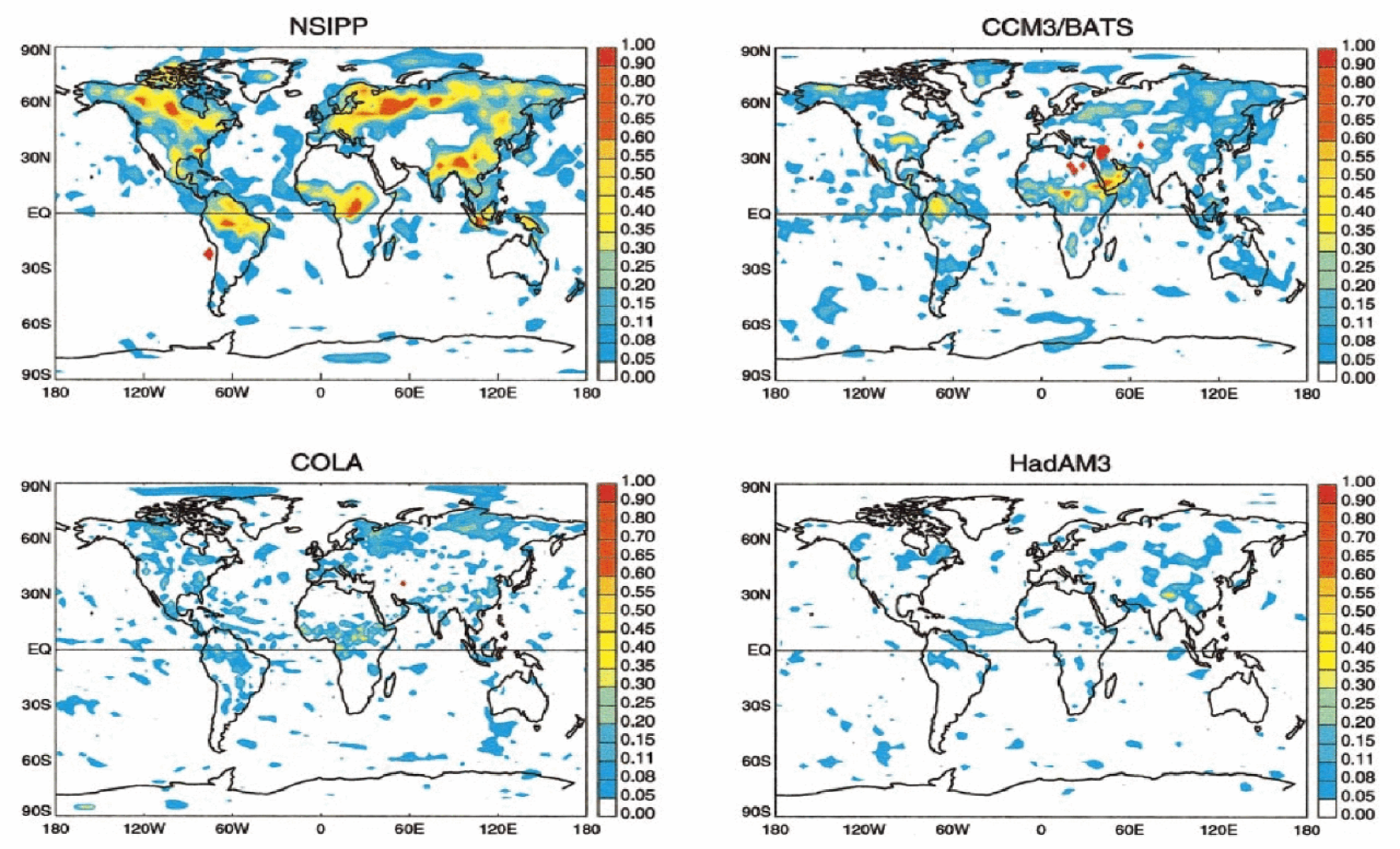
Global impact of seasonal to inter-annual LAI: fluxes of moisture and heat.

Richard Ellis[1],

Christopher Taylor[1], Sietse Los[2].

Land-surface atmosphere coupling strength.



Koster et al 2002

Forcing data.

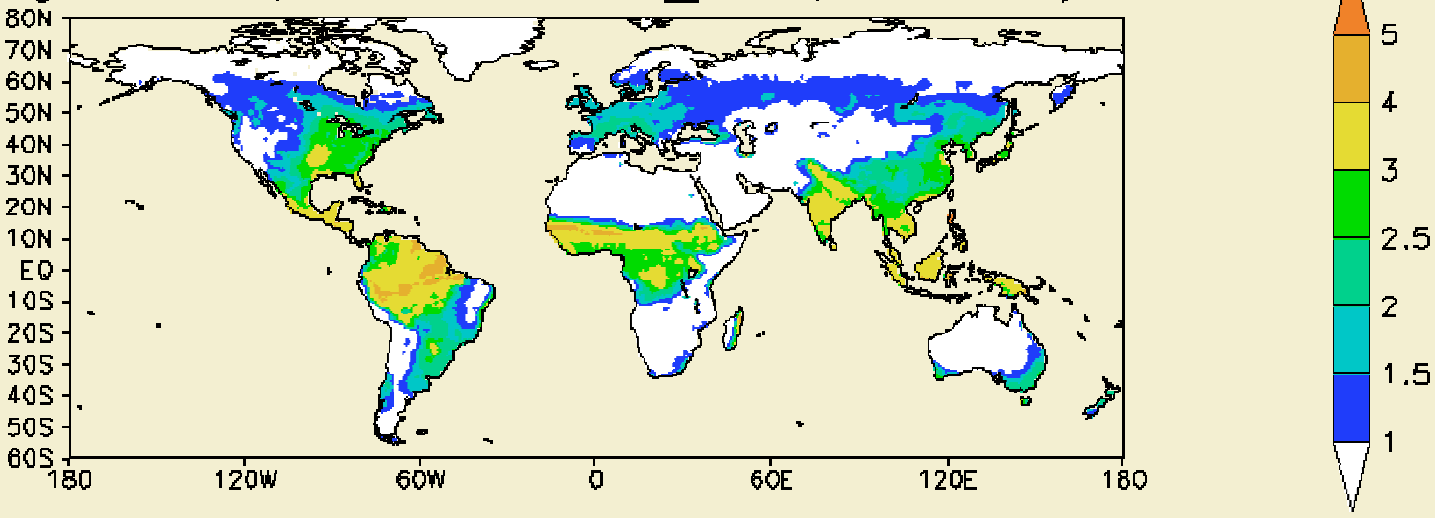
1. GSWP2

- 1 degree global coverage. Time step of 3 hours.
- Covers the years 1986-1995.
- Short wave radiation, long wave radiation, liquid precipitation, solid precipitation, surface temperature and surface pressure. http://www.iges.org/gswp2/

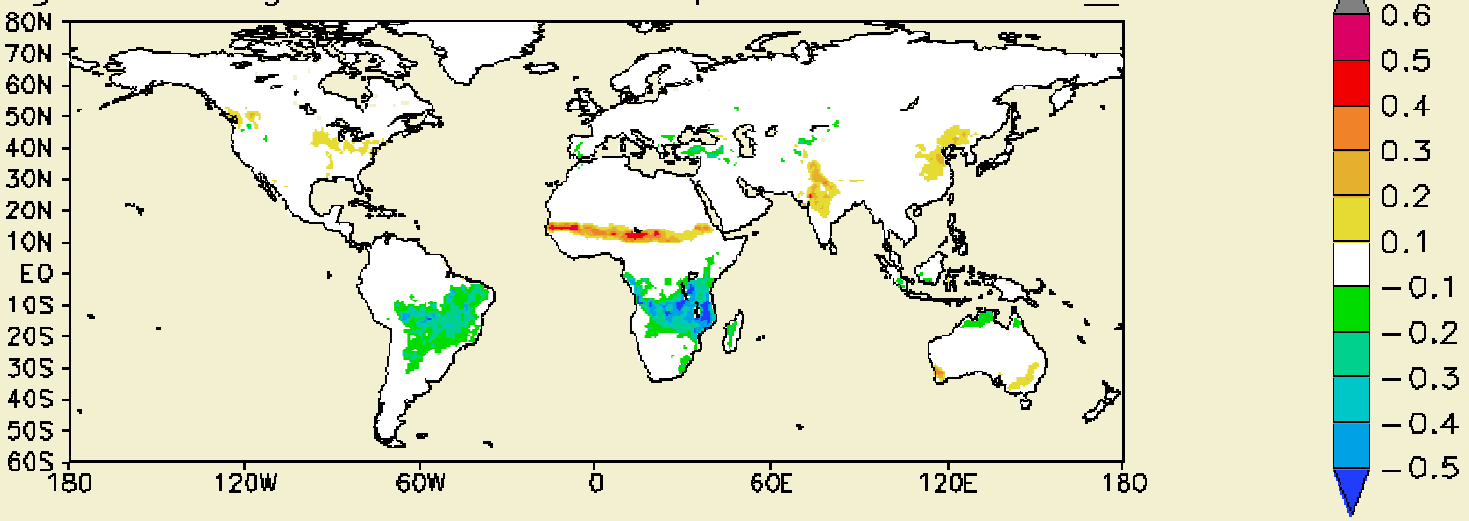
2. fAPAR

- 1degree/8km global coverage. Time step of 10 days.
- Covers the years 1982-1999. (http://www.neodc.rl.ac.uk/)

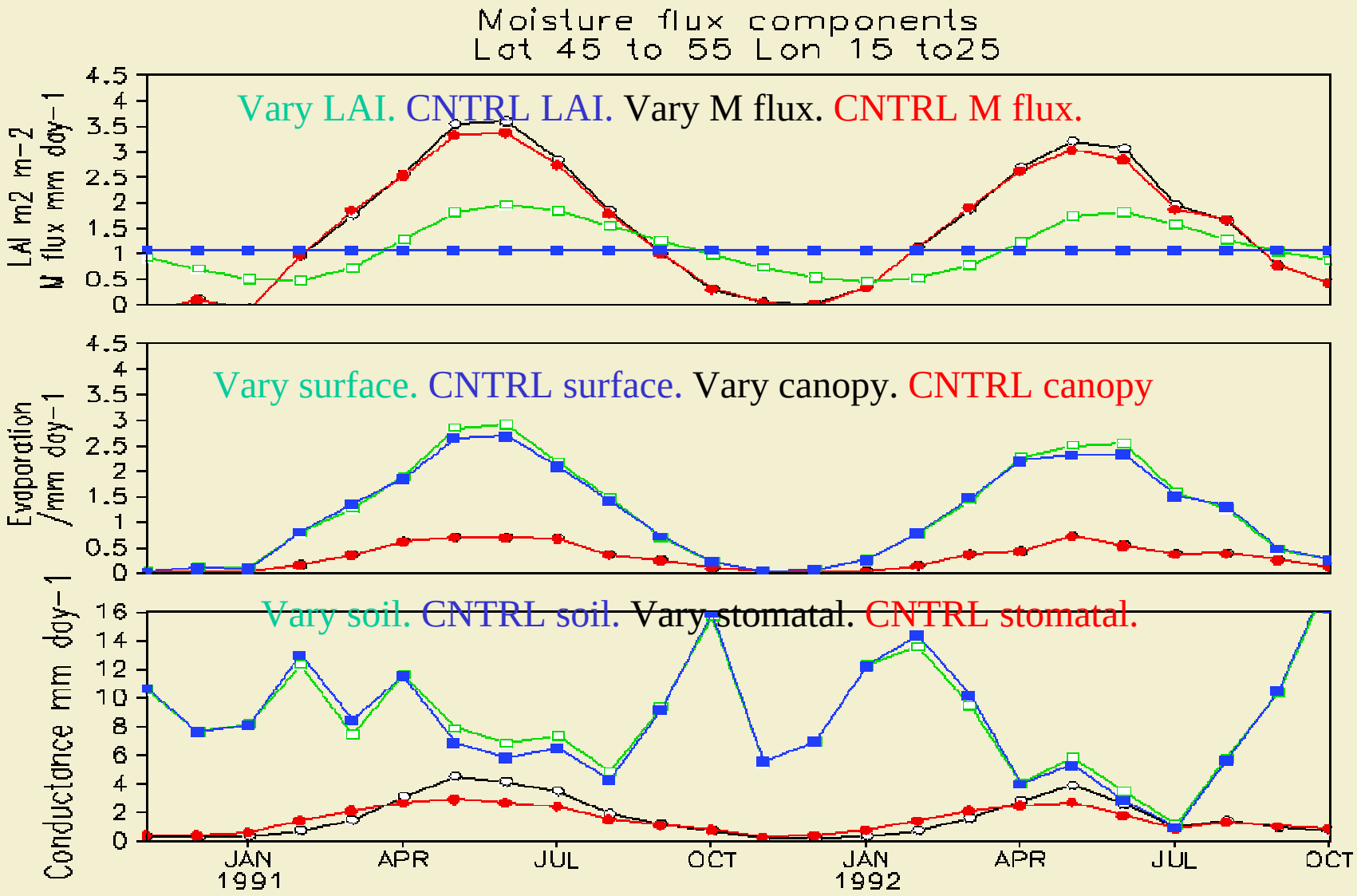
August evaporation VARY_LAI /mm day−1



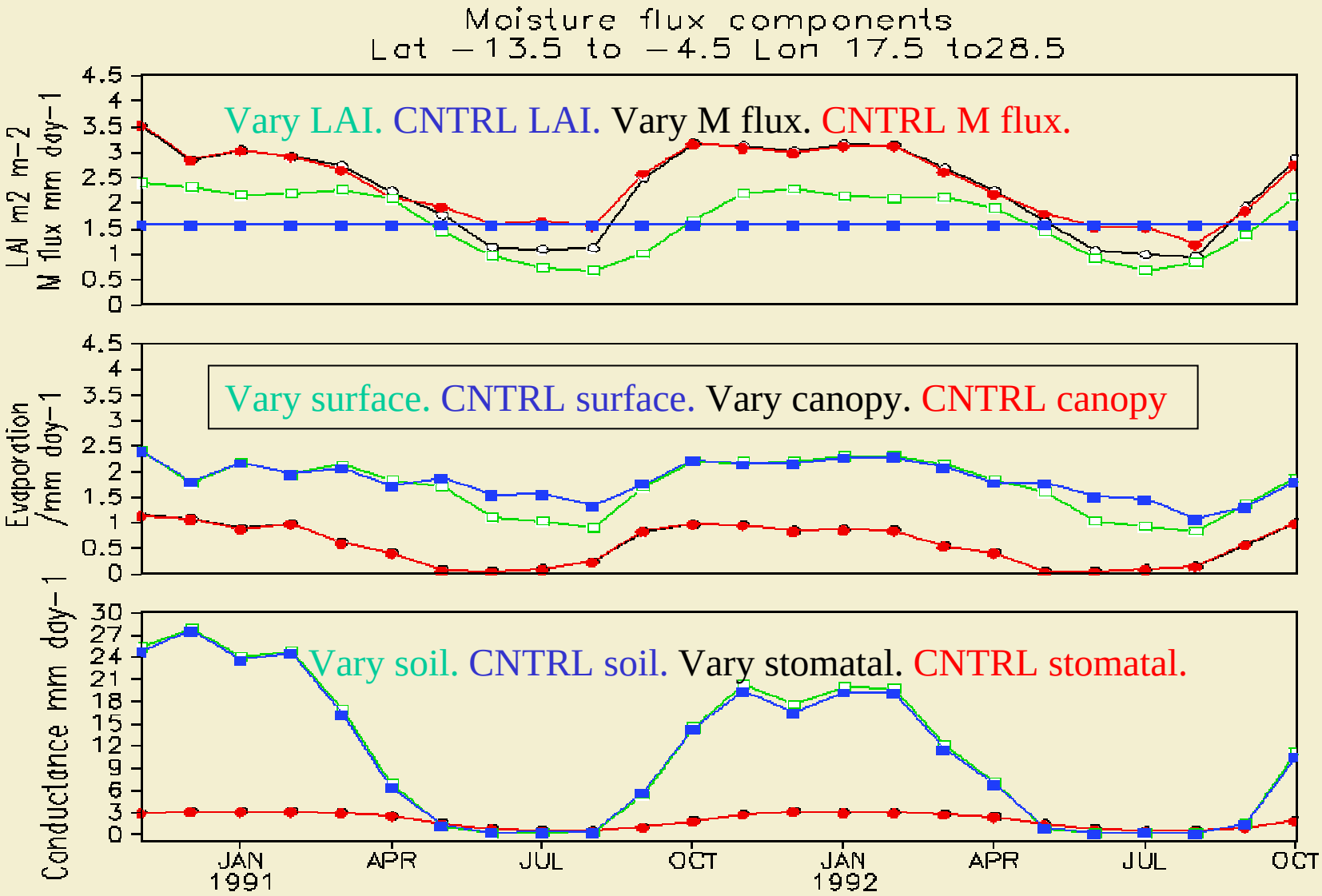
Percentage change AUGUST evaporation VARY_LAI−CNTRL

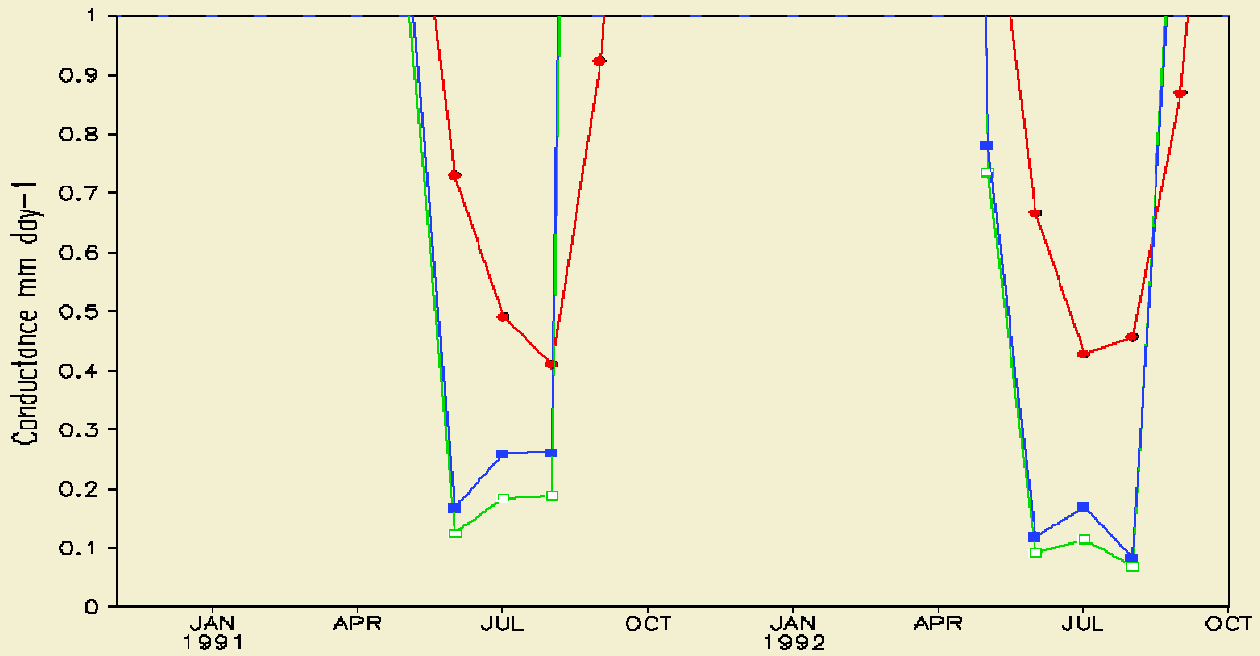


European case



African case





$$R_{soil} = 100/g_{soil}$$

So a change in g_{soil} from 0.25 to 0.2, results in an increase in resistance 100ms^{-1} (400 to 500).

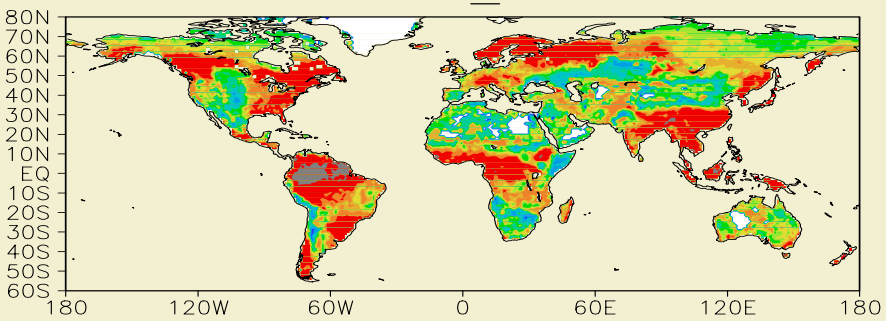
Influences of moisture fluxes in the model.

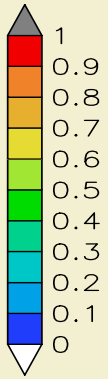
With no atmospheric interaction i.e. with one way meteorological forcing, the factors that influence the moisture flux are:

- Radiation interception,
- Soil moisture,
- LAI.

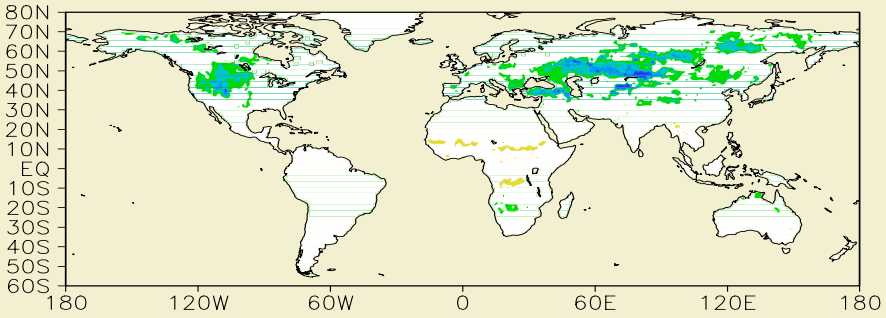
So LAI will only have an impact if the radiation and soil moisture are not dominant.

August soil moisture stress
VARY_LAI

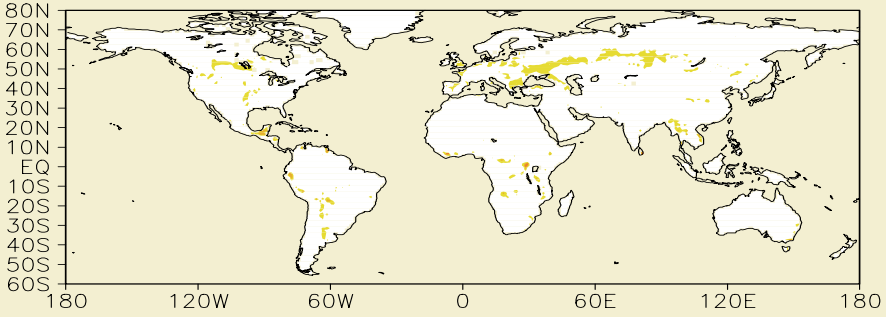


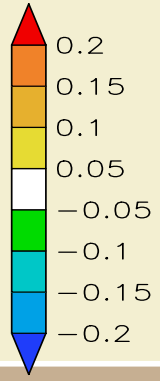


Change August soil moisture stress
VARY_LAI−CNTRL



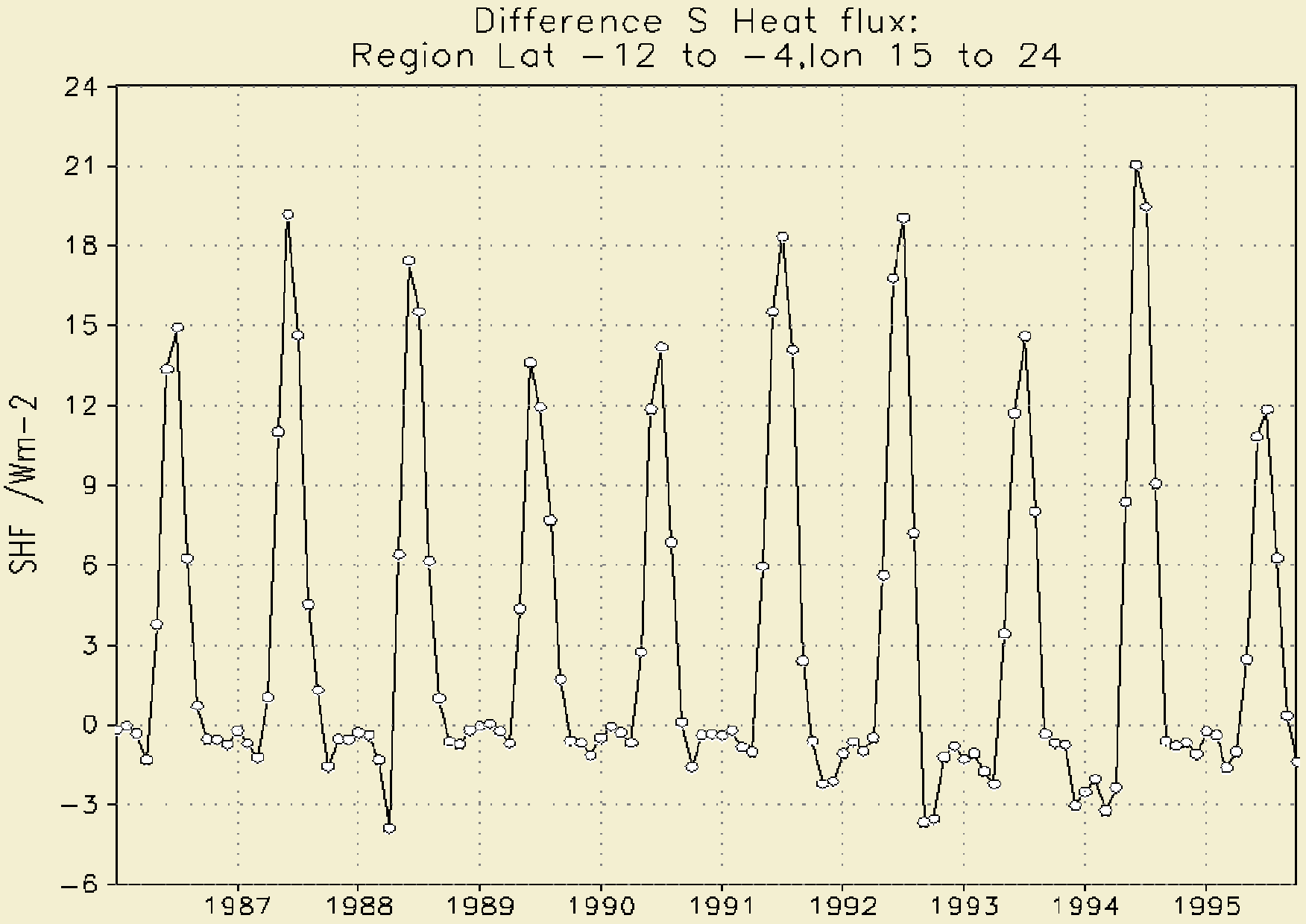
Change August soil moisture stress
L_MOD−CNTRL

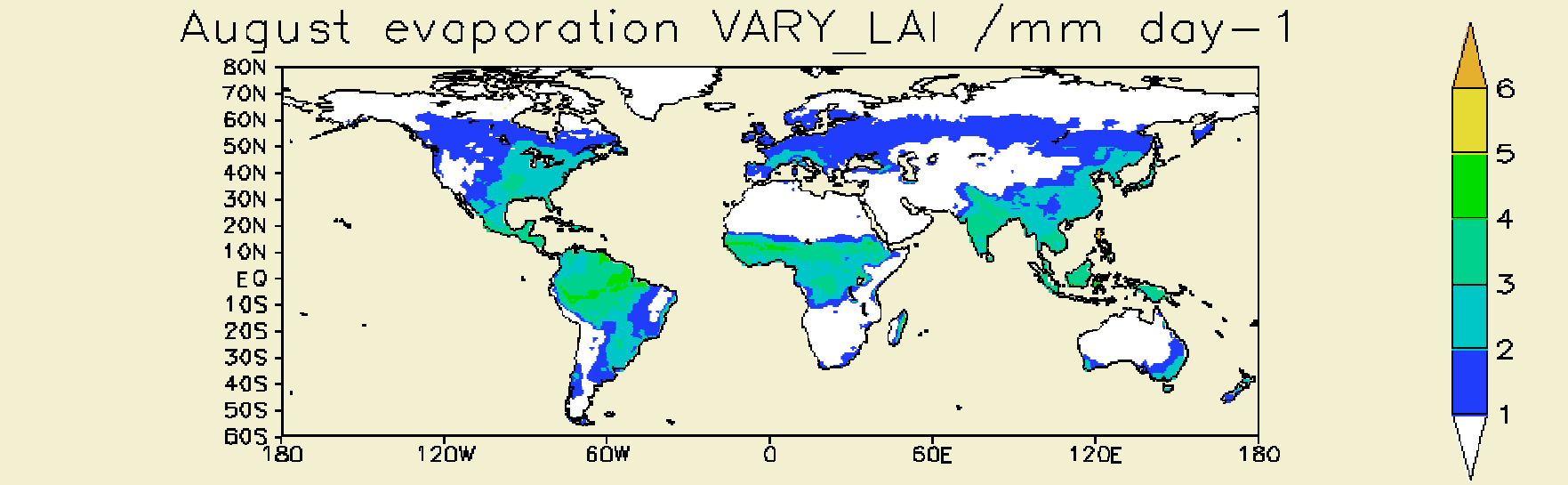


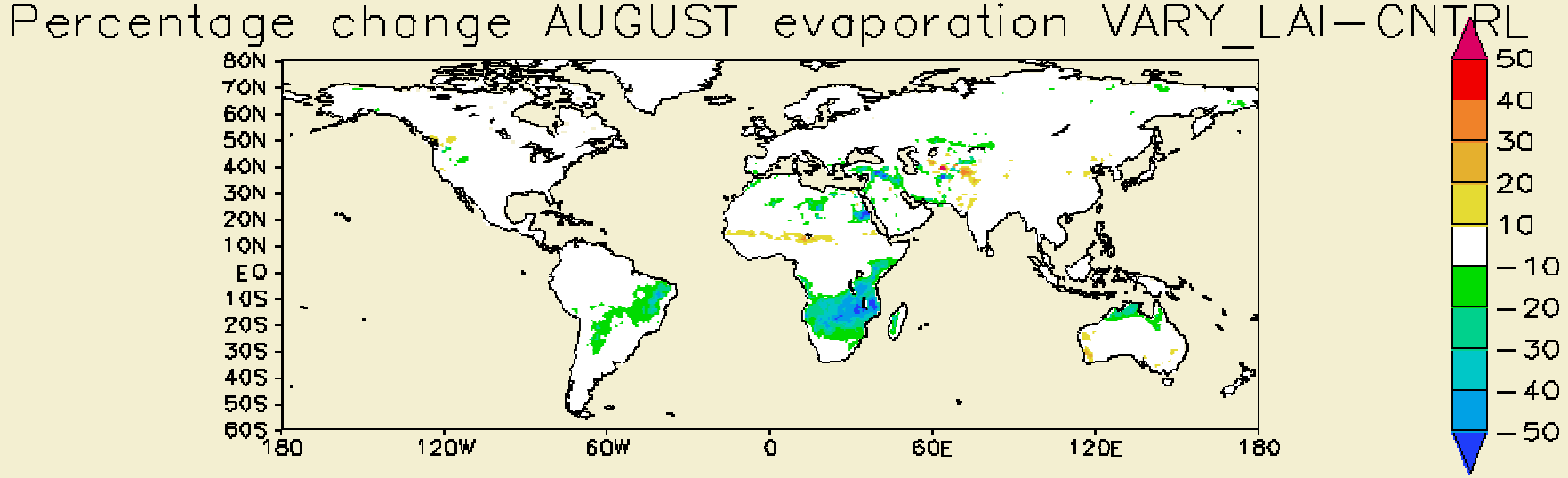


Improving land surface representation in the GCM.

- Use satellite data to identify regions of soil stress.
- Does the model show stress in these regions?
- If not why not?
-


Difference S Heat flux:
Region Lat −12 to −4,lon 15 to 24
SHF /Wm-2
24
21
18
15
12
9
6
3
0
−3
−6
1987
1988
1989
1990
1991
1992
1993
1994
1995


August evaporation VARY_LAI /mm day-1
80N
70N
60N
50N
40N
30N
20N
10N
EQ
10S
20S
30S
40S
50S
60S
180
120W
60W
0
60E
120E
180
6
5
4
3
2
1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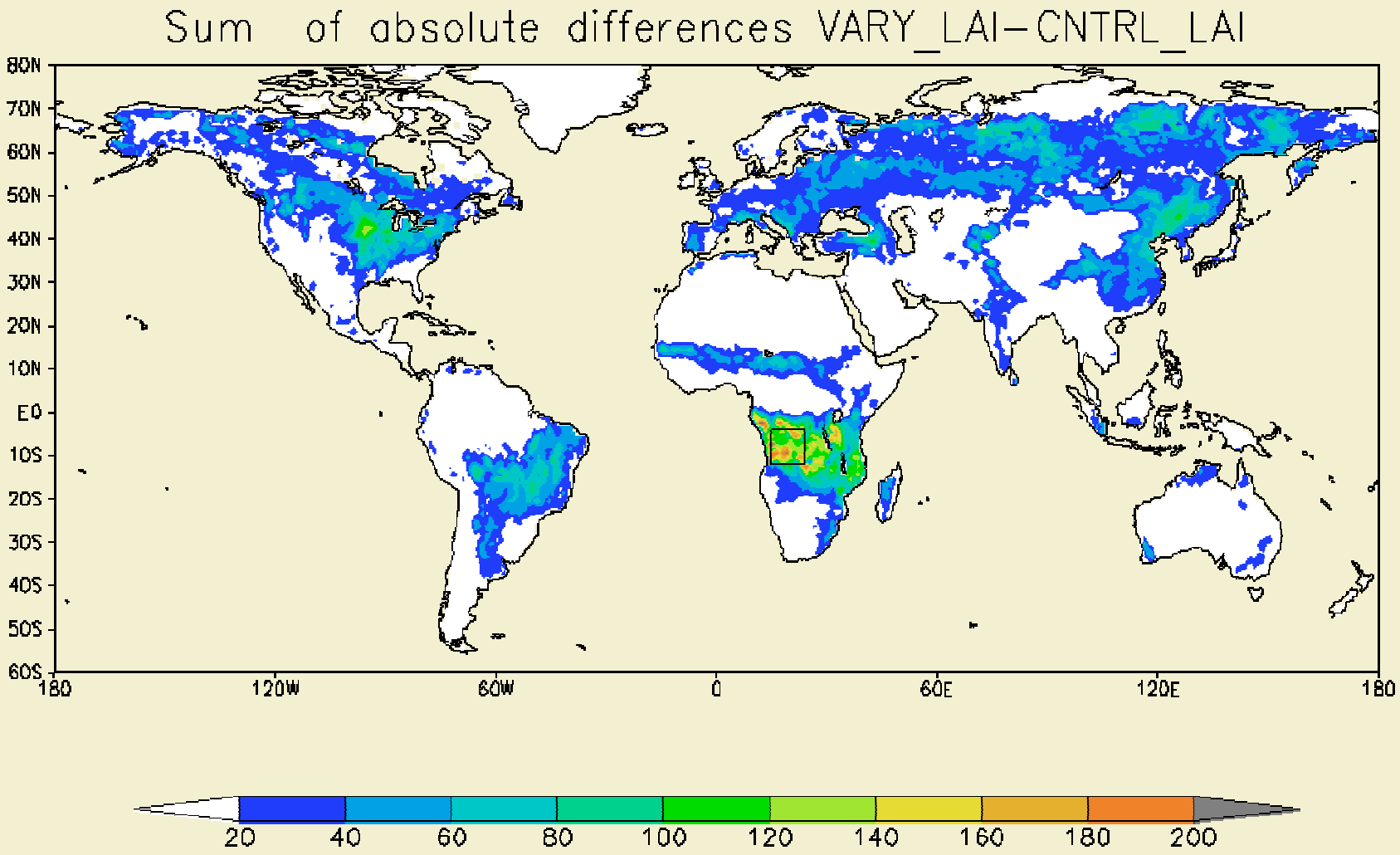
60E
120E
180
50
40
30
20
10
-10
-20
-30
-40
-50



$$\Sigma\ ABS(SHF_{VARY_LAI}-SHF_{CNTRL})$$