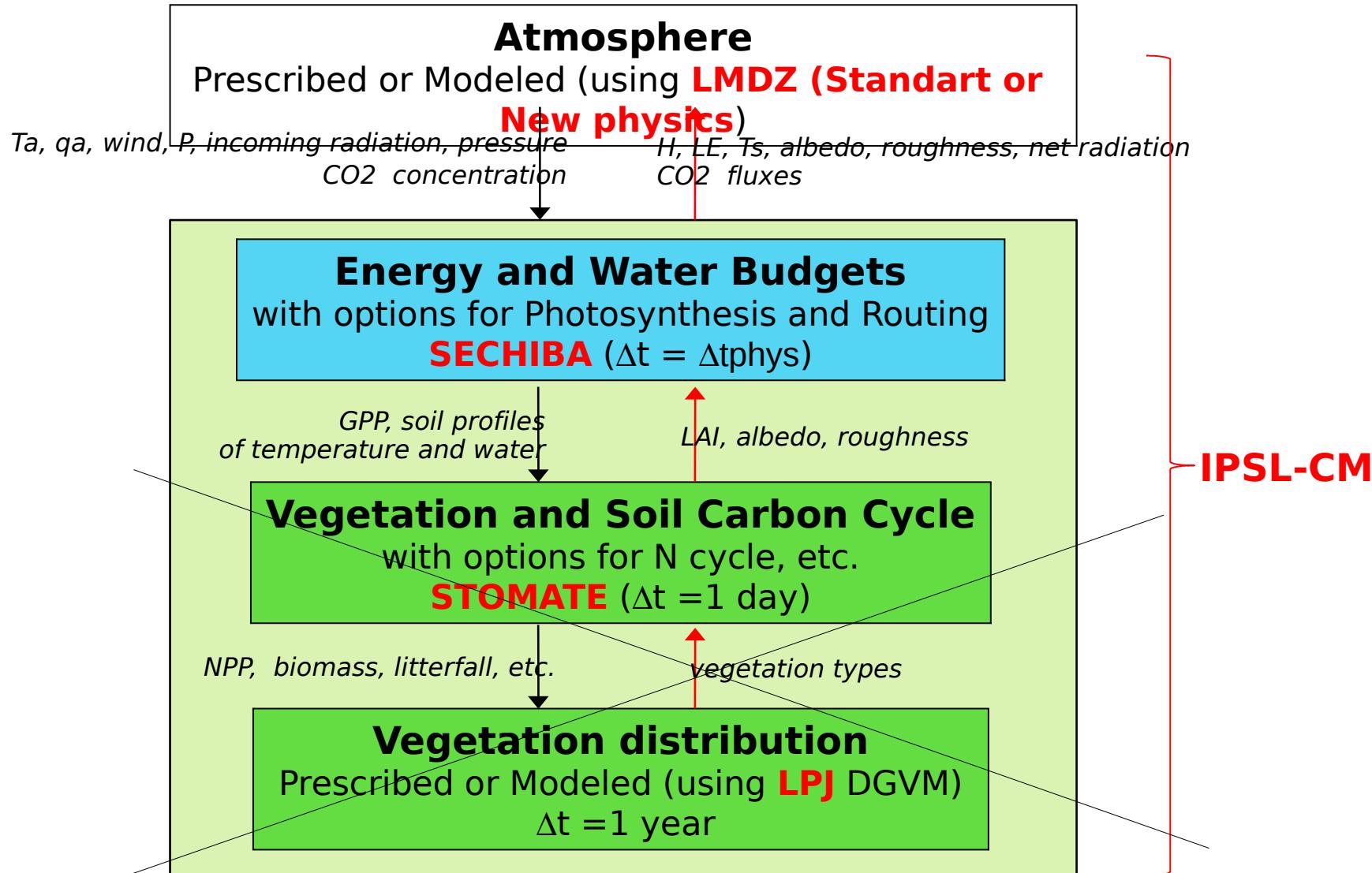


# DICE contribution from LMD - forced LSM and coupled LSM-Atm

S. Ait Mesbah, F. Cheruy, MP. Lefebvre, JY Grandpeix  
LMD/IPSL/CNRS Paris

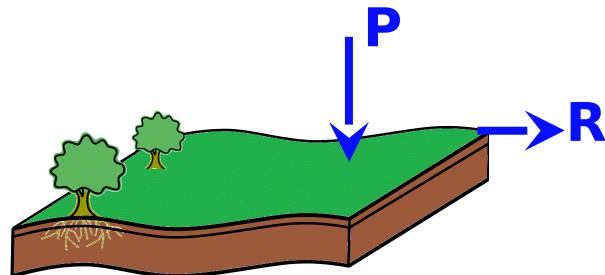
# LMDZ-ORCHIDEE



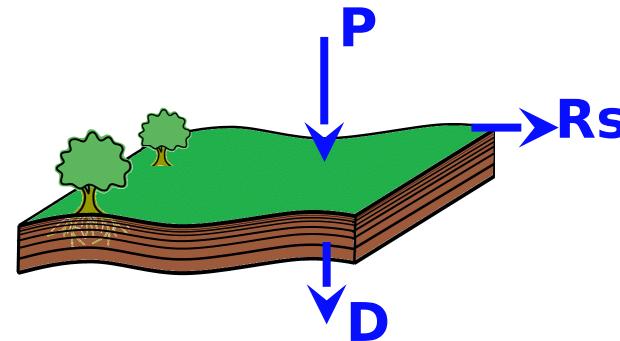
# Two versions of soil hydrology

## Choisnel = ORC2

Ducoudré *et al.*, 1993; *de Rosnay et al.* 1998 *de Rosnay et al.*, 2002; *d'Orgeval et al.*, 2008



## CWRR = ORC11



- **Conceptual description of soil moisture storage**
- **2-m soil and 2-layers**
- Top layer can vanish
- Constant available water holding capacity (between FC and WP)
- Runoff when saturation
- No drainage from the soil  
We just diagnose a drainage as 95% of runoff for the routing scheme

- **Physically-based description of soil water fluxes using Richards equation**
- **2-m soil and 11-layers**
- Formulation of Fokker-Planck
- Hydraulic properties based on van Genuchten-Mualem formulation
- Related parameter based on texture (fine, medium, coarse)
- Surface runoff =  $P - E_{sol} - \text{Infiltration}$
- Free drainage at the bottom

# Stage 1A : Forced LSM

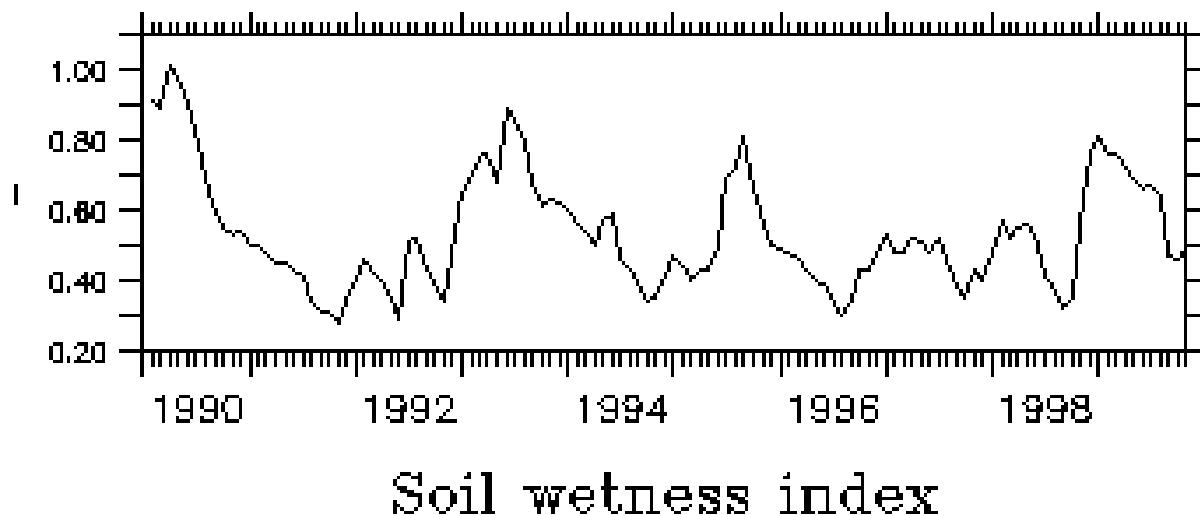
## 1- Implementation of the case :

- *Vegetation Fraction* : 0.8 Of grass, C3,
- *Soil class* : Loam,
- *Leaf Area Index* : 2.2,
- *Emissivity* : 1.0,
- *Albedo* : 0.22,
- *Surface roughness* : 0.03,

# Stage 1A : Forced LSM

## 1- Implementation of the case :

- *Vegetation Fraction* : 0.8 Of grass, C3,
- *Soil class* : Loam,
- *Leaf Area Index* : 2.2,
- *Emissivity* : 1.0,
- *Albedo* : 0.22,
- *Surface roughness* : 0.03,
- 10 years of spinup (beginning with saturated reservoirs).



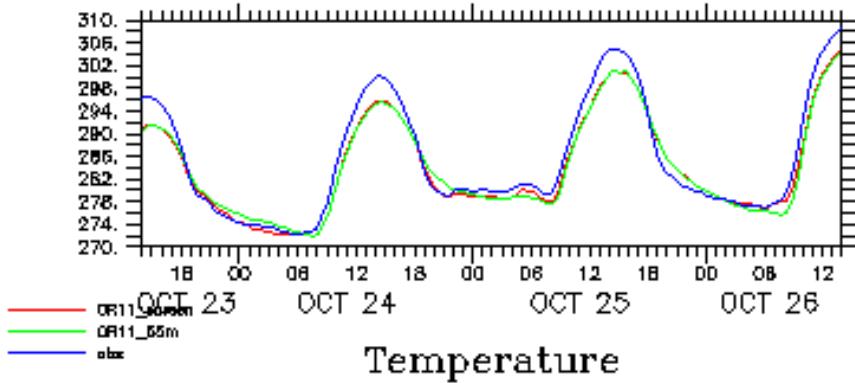
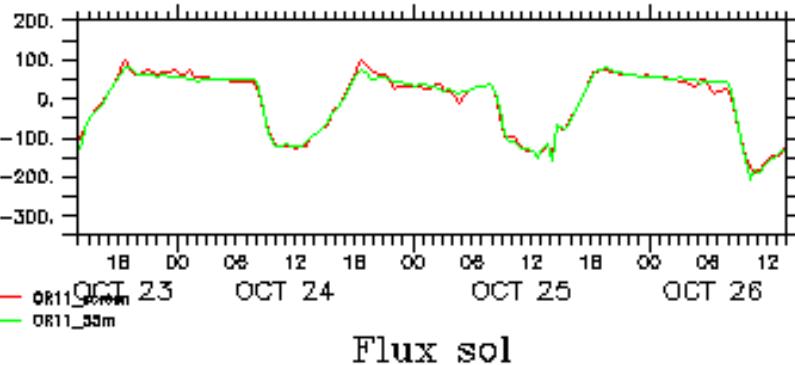
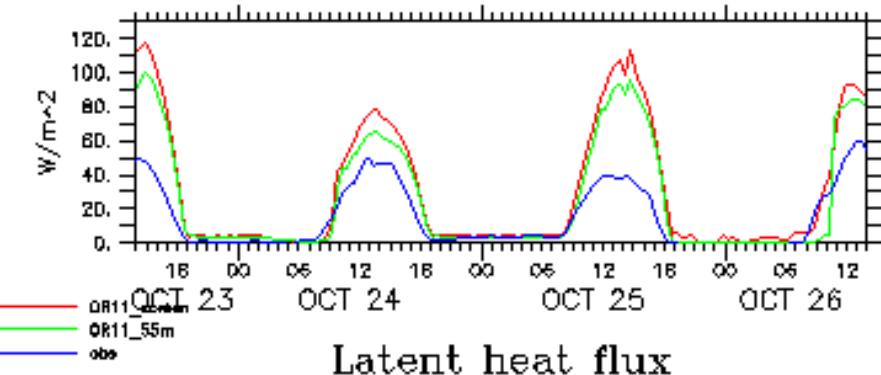
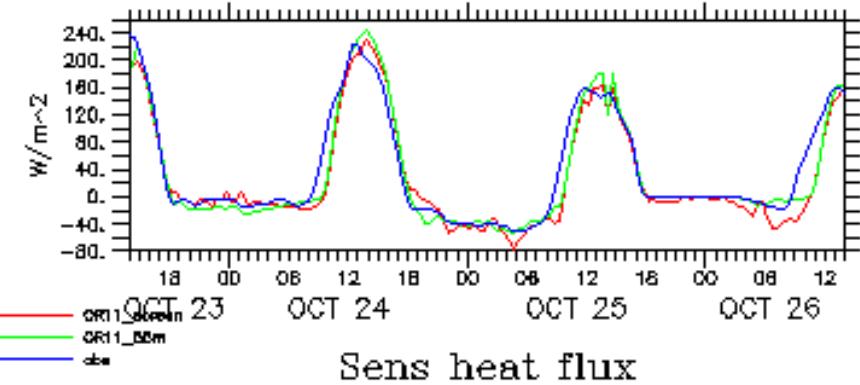
# Stage 1A : Forced LSM

## 2- Run three days (ORCHIDEE)

11)

**Run 1 (screen)** : Reference height for temperature and humidity = 2 m, and for wind = 10m

**Run 2 (55m)** : Reference height for temperature and humidity and wind = 55m



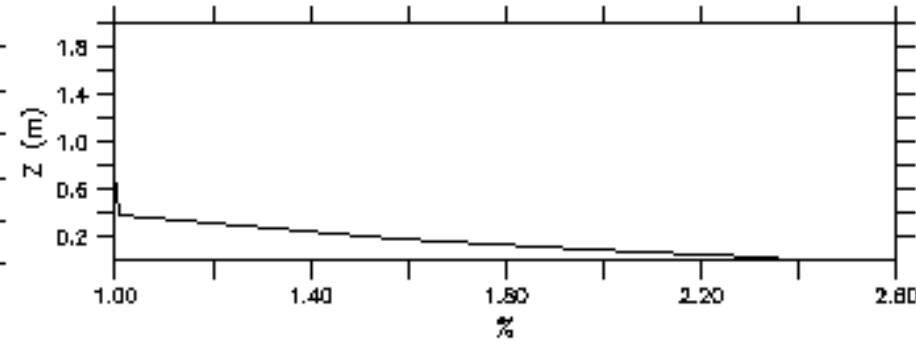
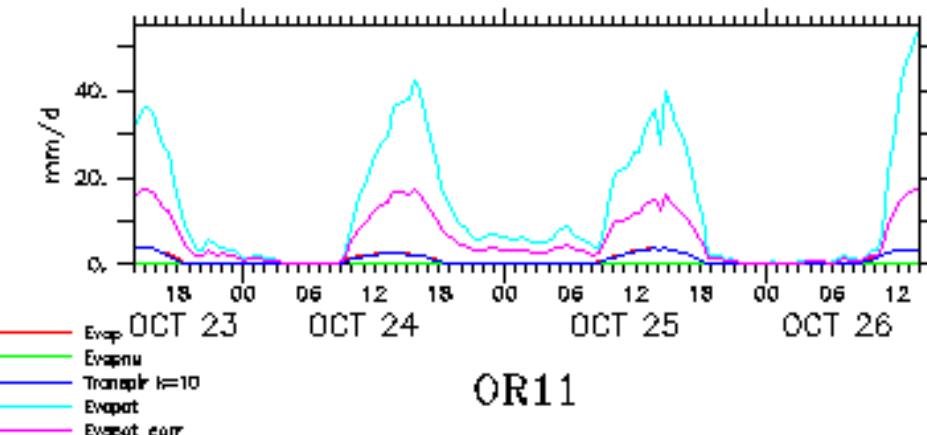
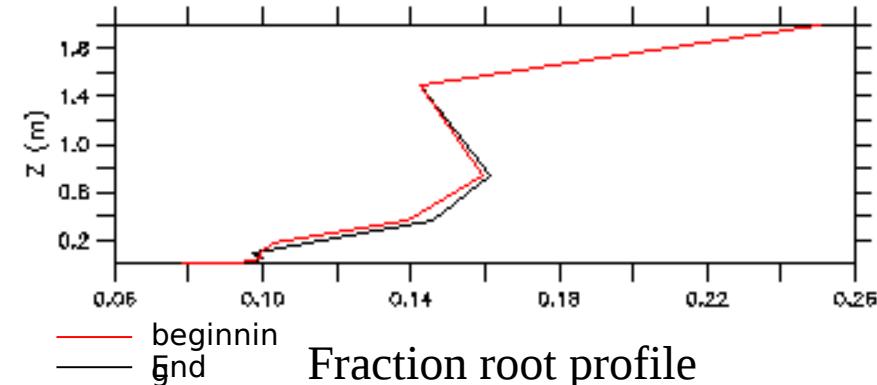
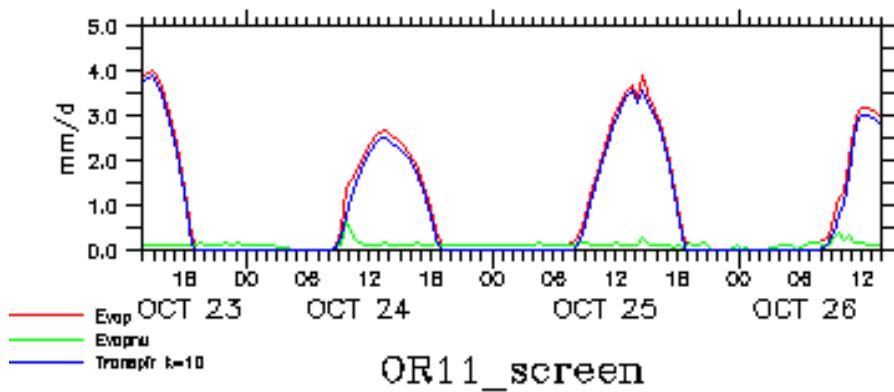
# Stage 1A : Forced LSM

## 2- Run three days (ORCHIDEE)

11) *Residual water soil content* :

0 *Saturated water soil content* : 0.43

- *Volumetric water content wilting point* : 0.10

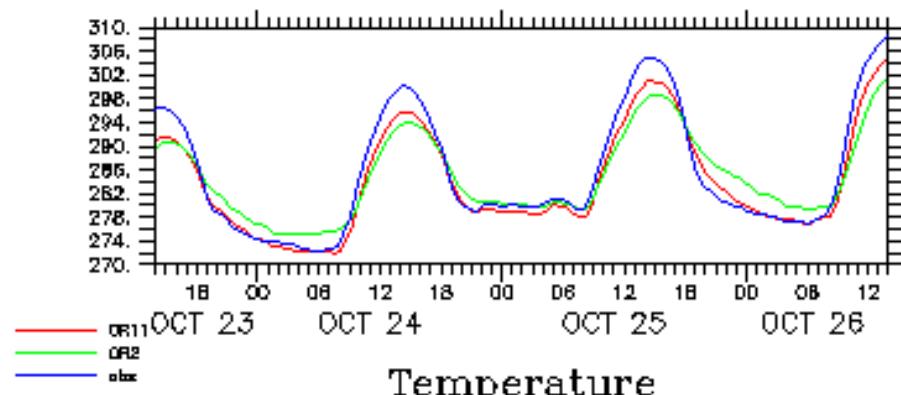
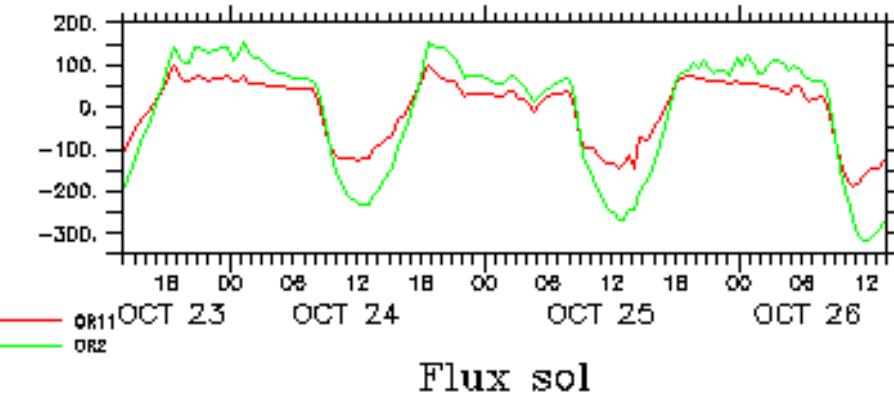
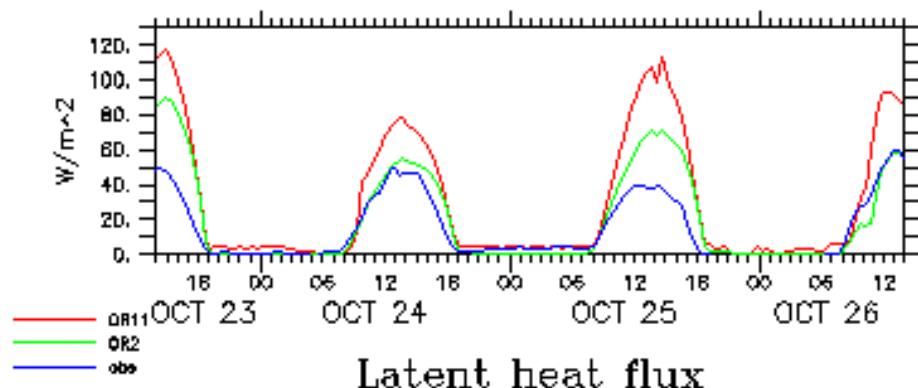
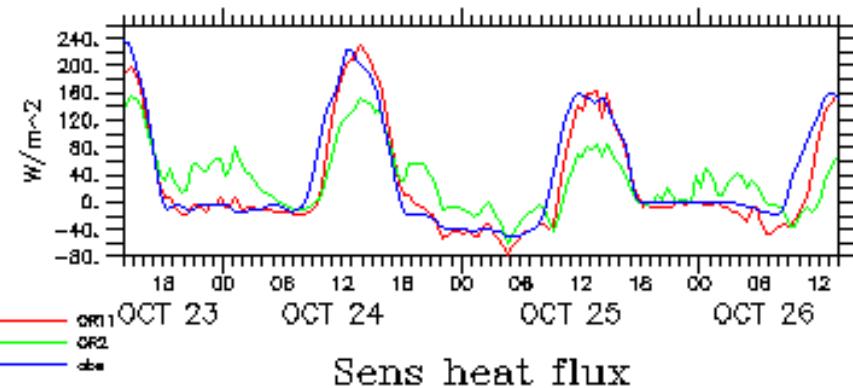


Fraction root profile

# Stage 1A : Forced LSM

## 3- Run three days (ORCHIDEE 11 / ORCHIDEE 2)

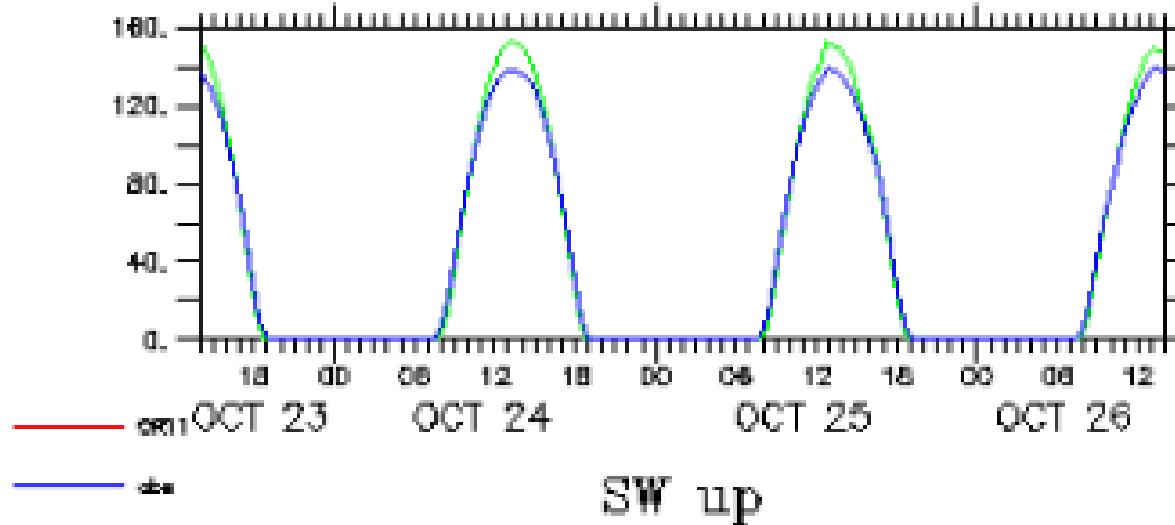
**Forcing file** : Reference height for temperature and humidity = 2 m, and for wind = 10m



# Stage 1A : Forced LSM

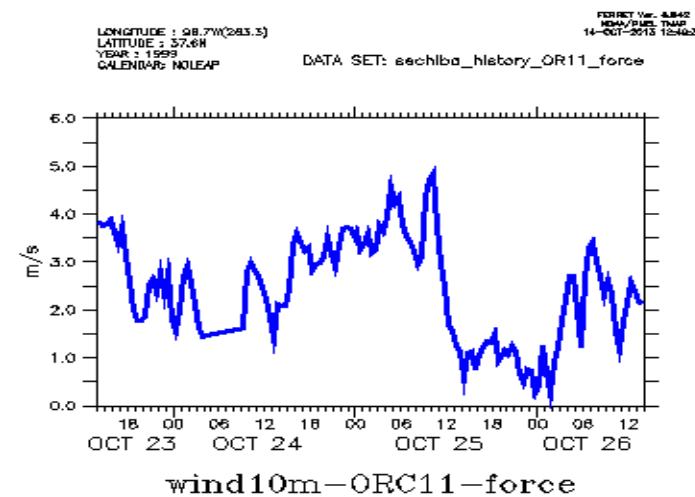
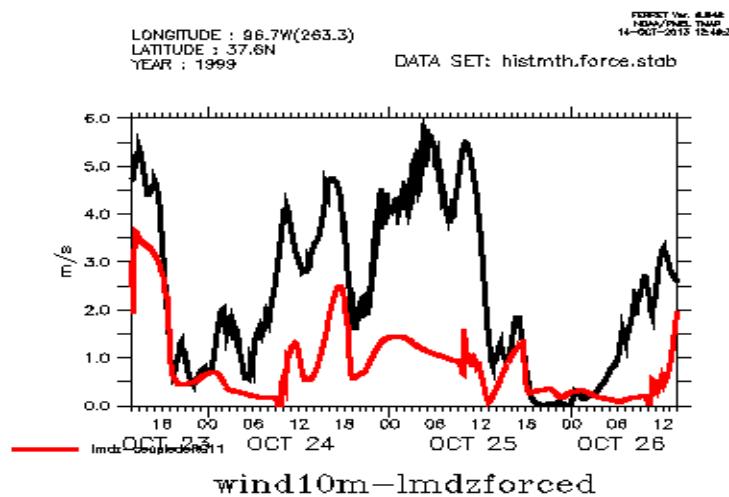
Remarque :

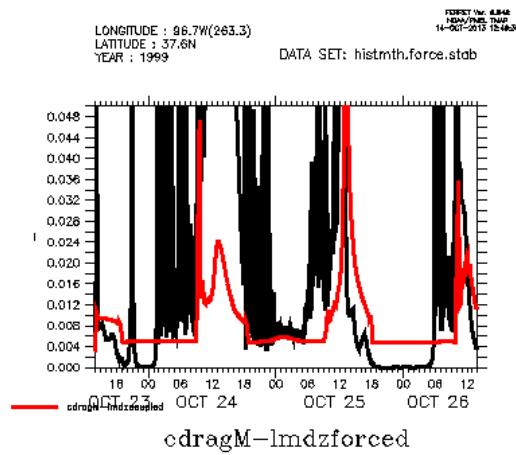
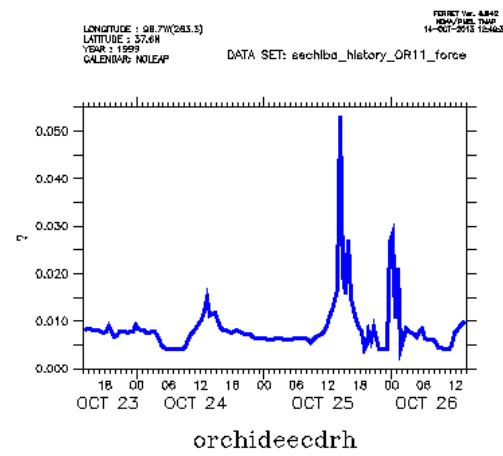
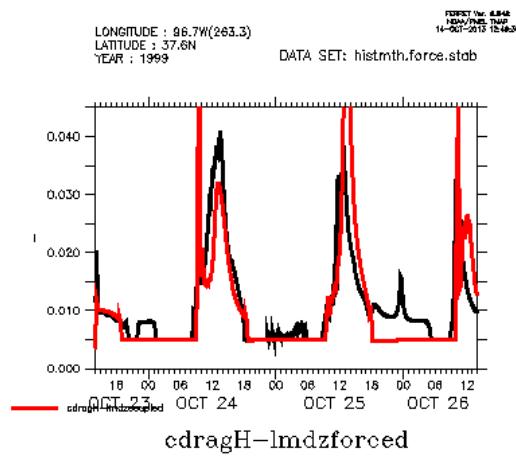
With an albedo of 0.22, we don't find the same Short wave as the observed data.



LMDZOR - coupled case

10m wind

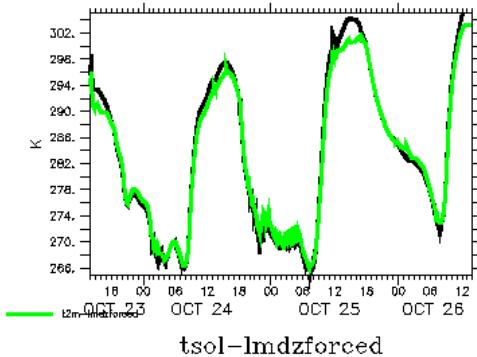




LONGITUDE : 96.7W(263.3)  
LATITUDE : 37.6N  
YEAR : 1999

DATA SET: histmth.force.stab

FOREST Ver. 4.842  
14-OCT-2013 12:46:36

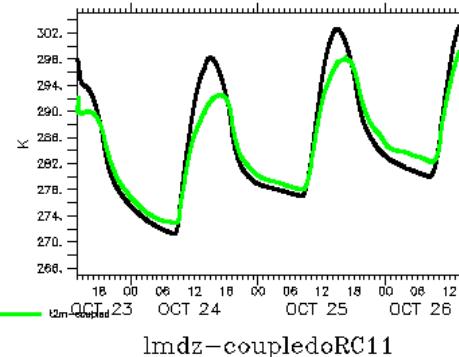


tsol-lmdzforced

LONGITUDE : 96.7W(263.3)  
LATITUDE : 37.6N  
YEAR : 1999

DATA SET: histmth\_couple

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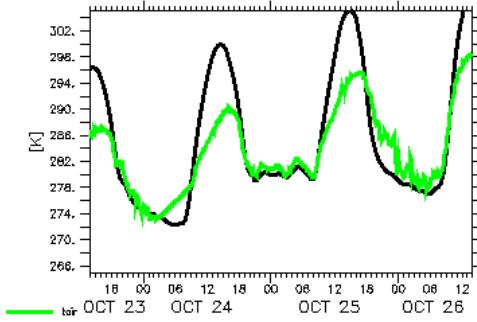
lmdz-coupledorC11

YEAR : 1999

DATA SET: dice\_cdt

Forcing and initial conditions for DICE

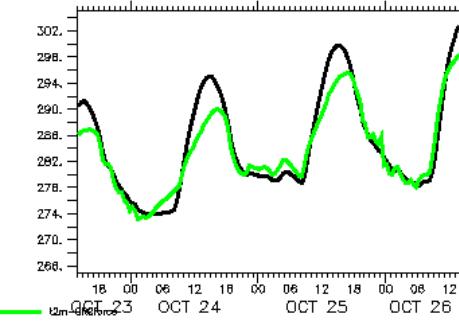
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tsol

LONGITUDE : 96.7W(263.3)  
LATITUDE : 37.6N  
YEAR : 1999  
CALENDAR: NOLEAP

FOREST Ver. 4.842  
14-OCT-2013 12:46:36



tsol-ORCforce

