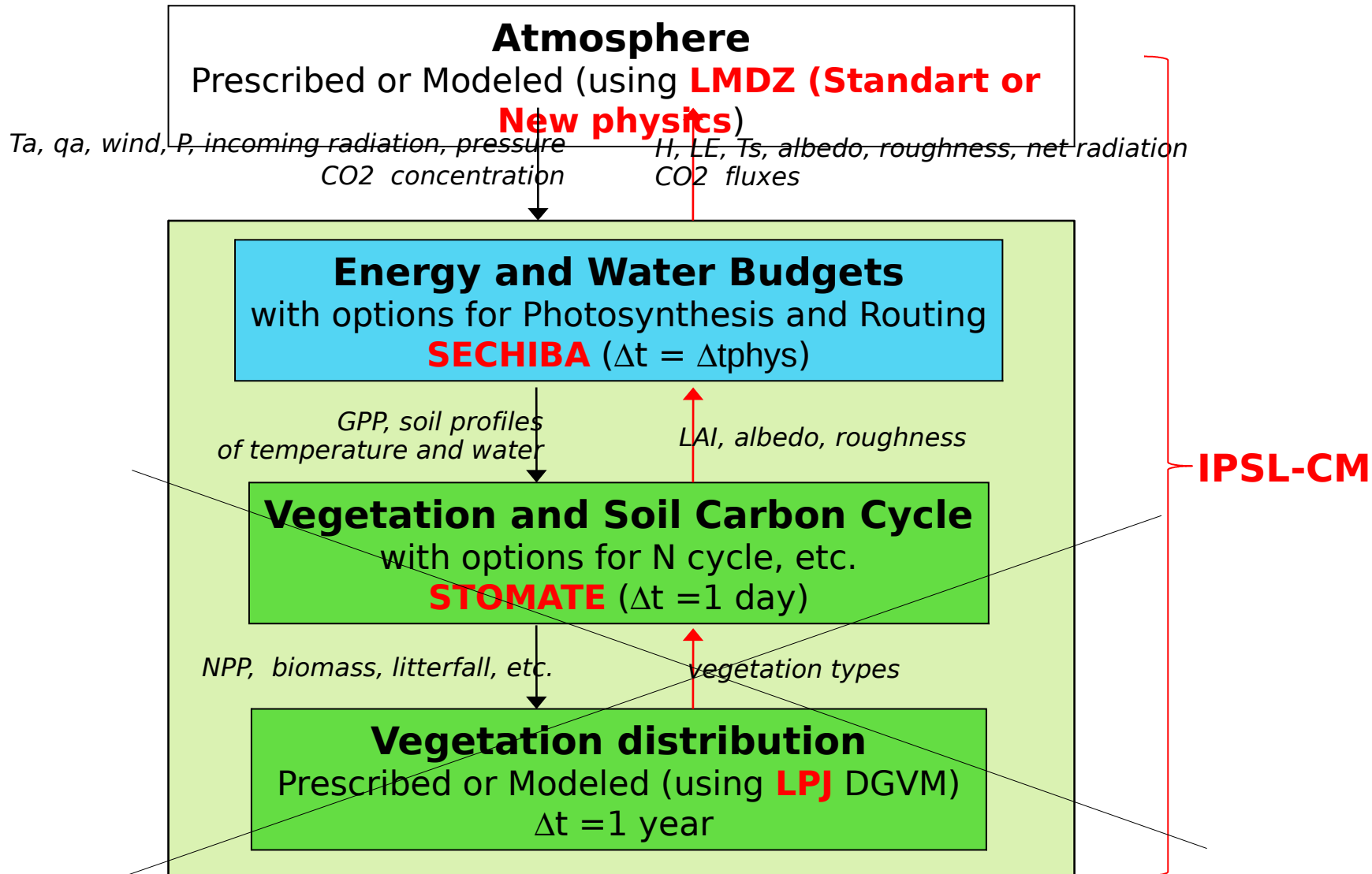


DICE contribution from LMD –  
forced LSM and coupled LSM-Atm

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

# LMDZ-ORCHIDEE



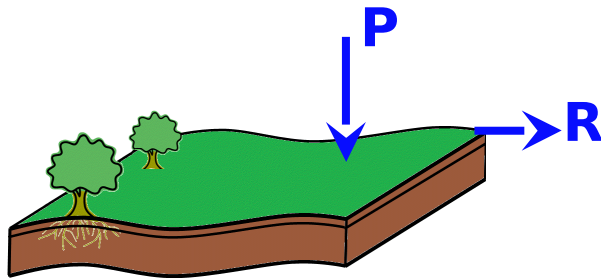
# Two versions of soil hydrology

**Choisnel = ORC2**

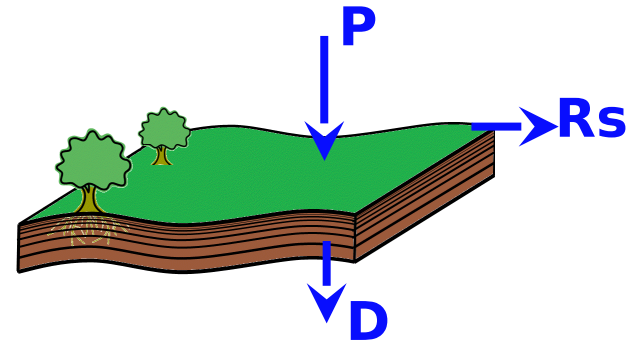
*Ducoudré et al., 1993; de Rosnay et al. 1998*

**CWRR = ORC11**

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



- **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

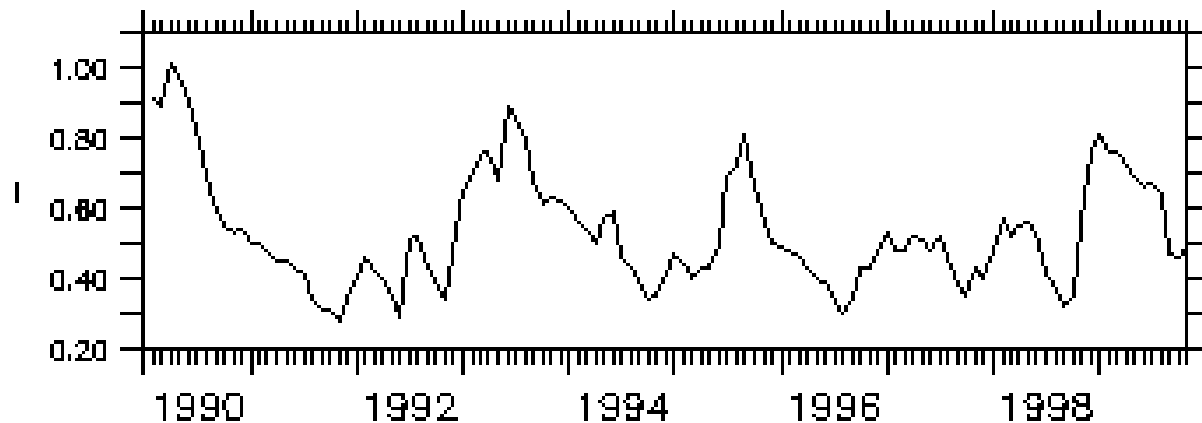
## 1- Implementation of the case :

- *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).



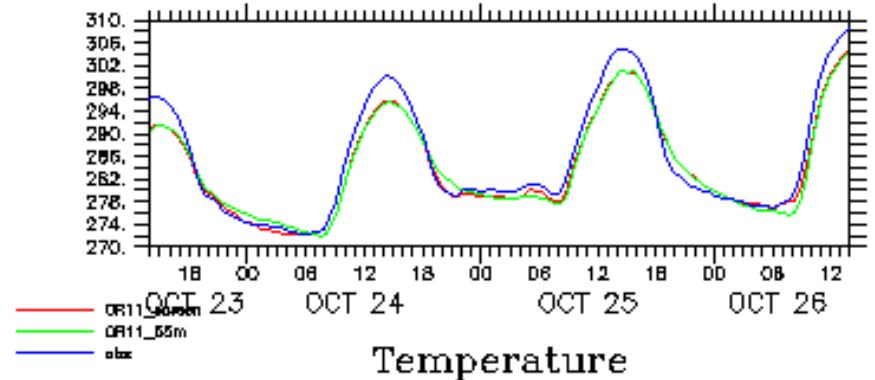
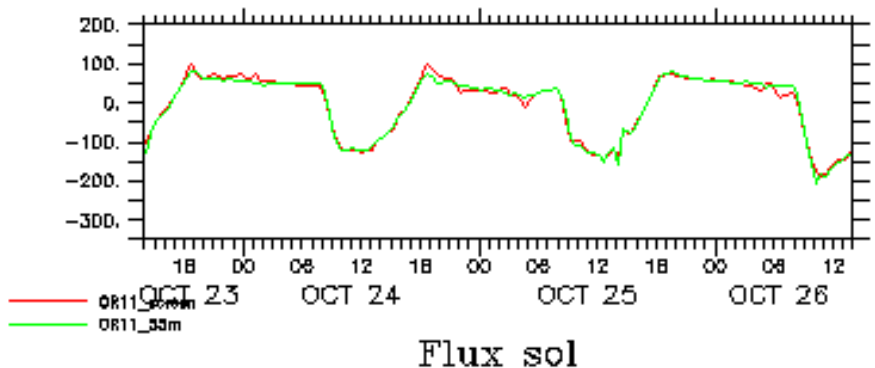
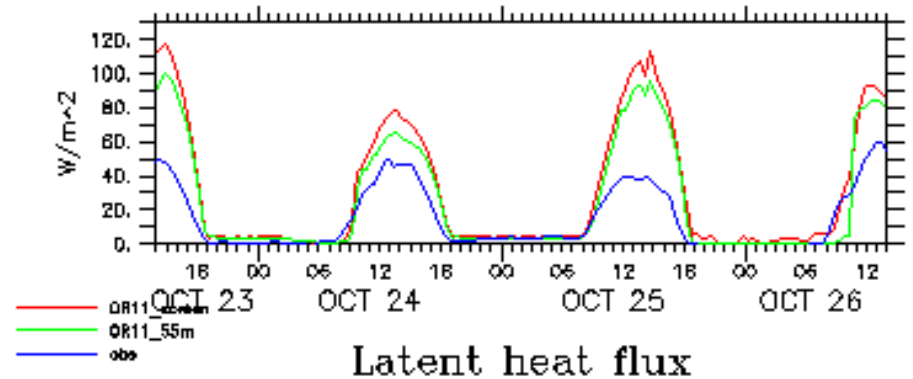
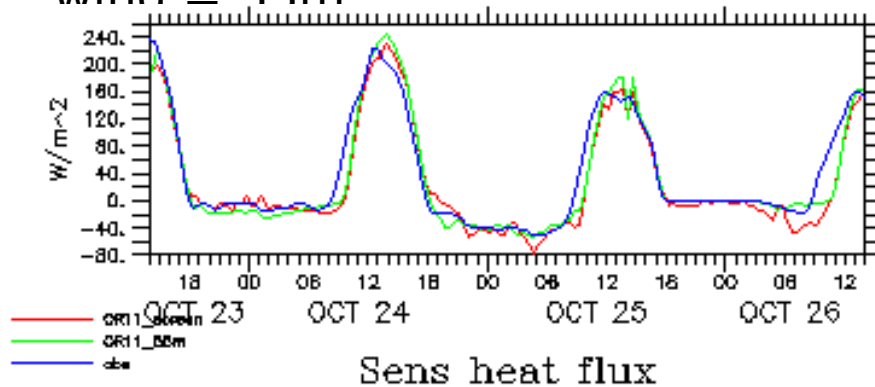
Soil wetness index

# 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

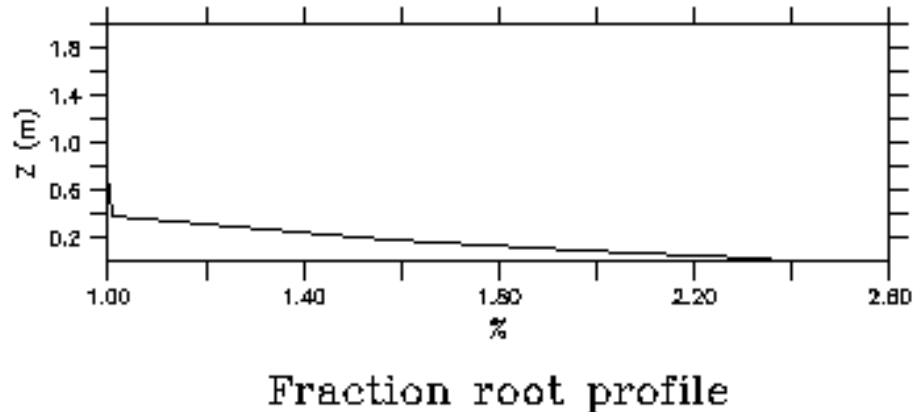
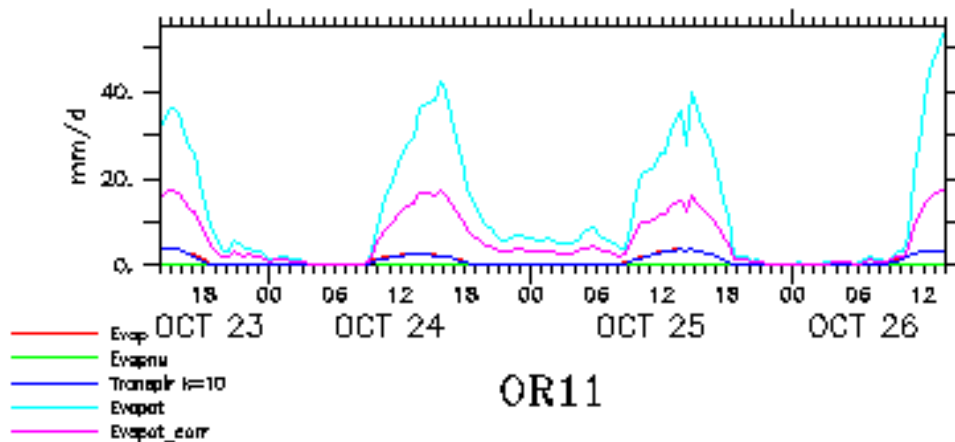
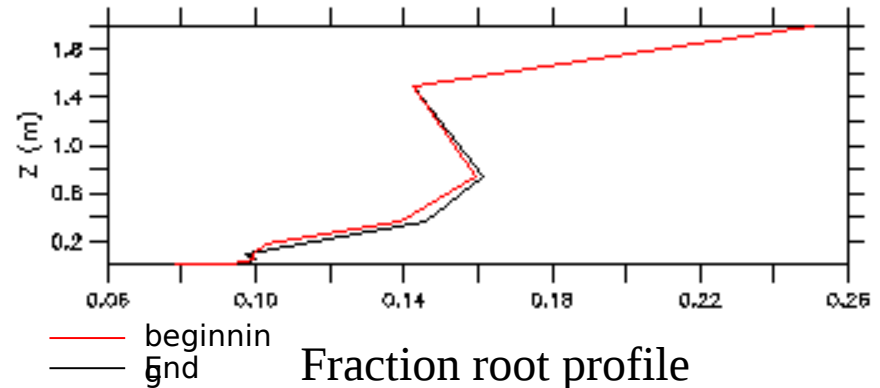
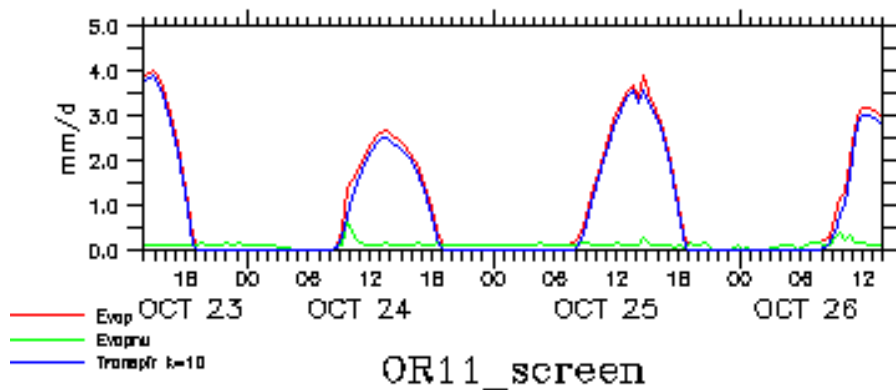
**Run 2 (55m)** : Reference height for temperature and humidity and wind = 55m



# Stage 1A : Forced LSM

## 2- Run three days (ORCHIDEE

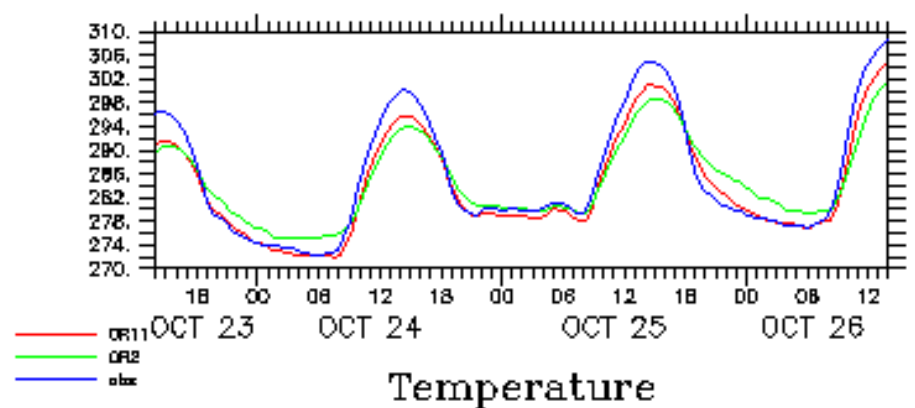
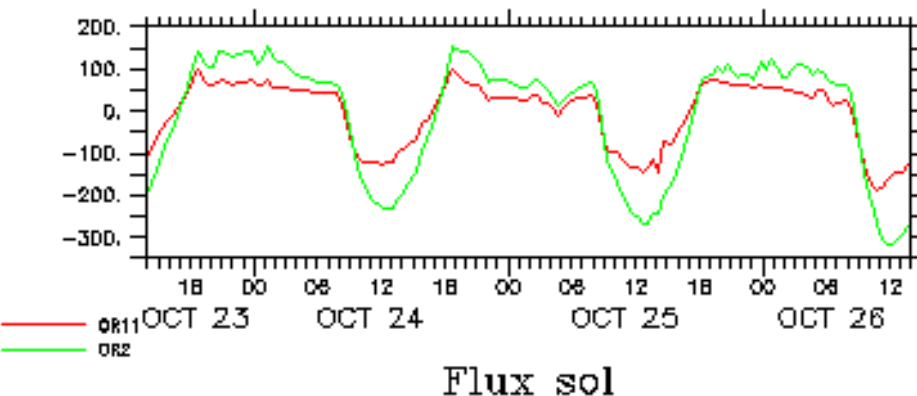
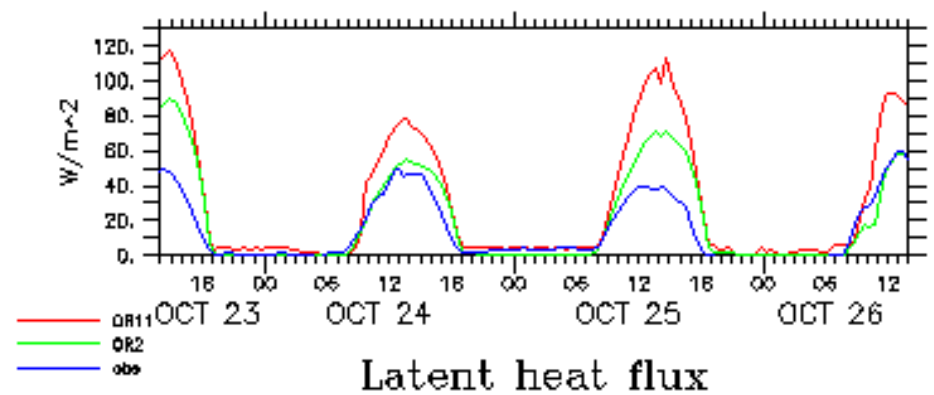
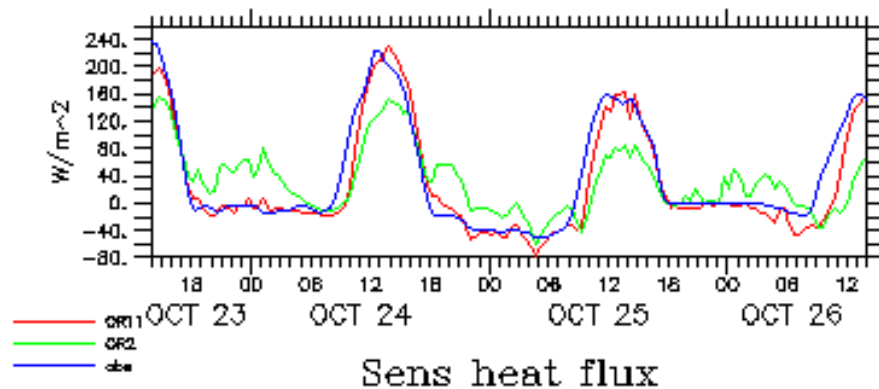
- **Residual water soil content :** 0.57
- **Saturated water soil content :** 0.43
- **Volumetric water content wilting point :** 0.10



# 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

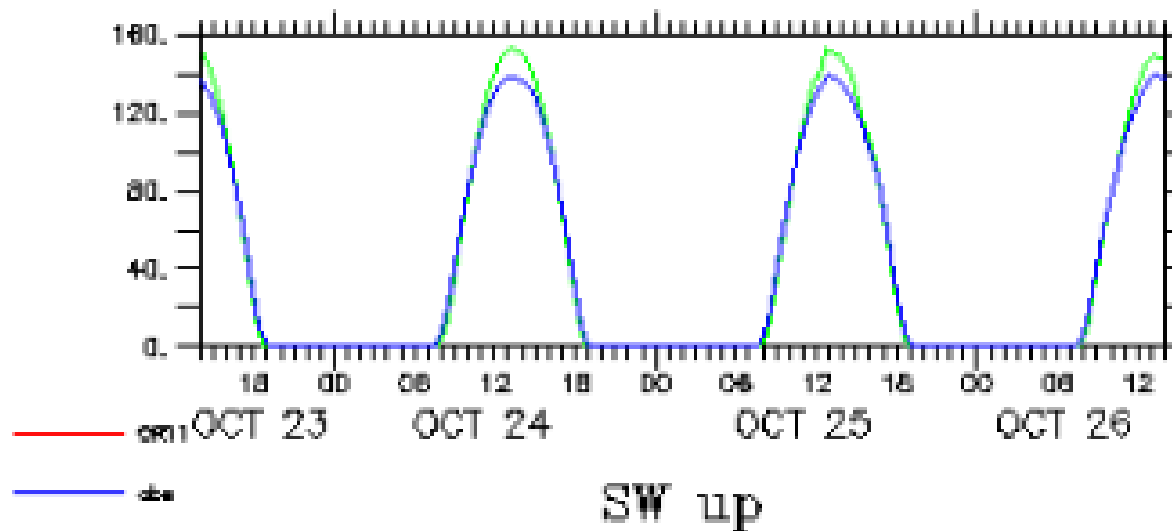




# Stage 1A : Forced LSM

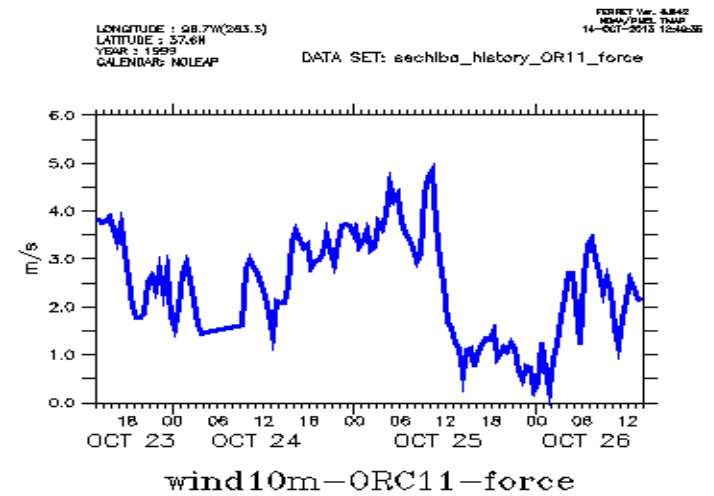
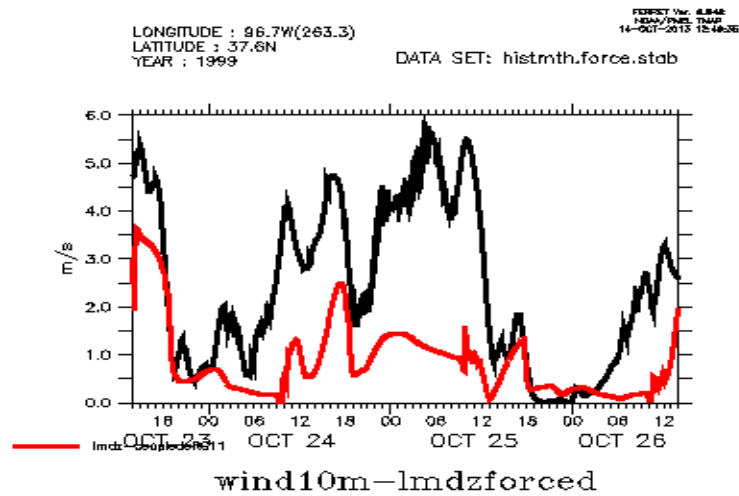
Remarque :

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



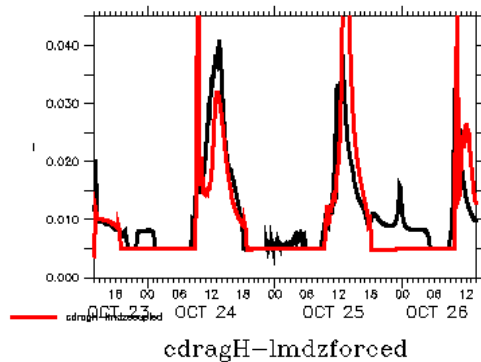
LMDZOR – coupled case

# 10m wind



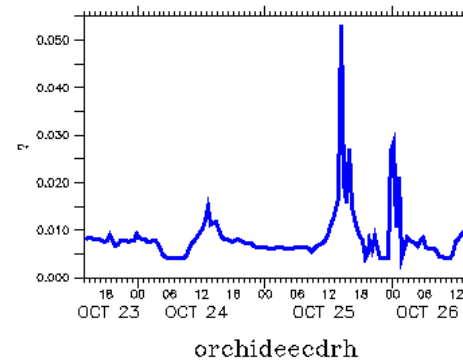
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 LATITUDE : 37.6N  
 YEAR : 1999  
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FORSETT Ver. 6.0442  
 10/14/2013 12:16:26



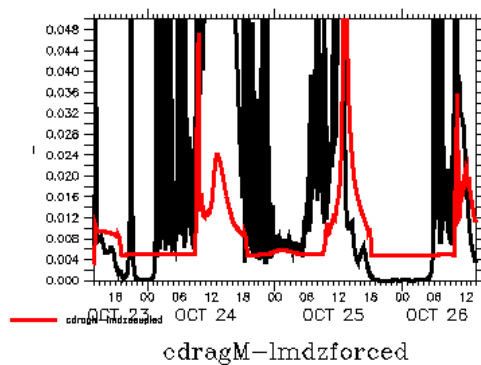
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 CALENDAR: NOLEAP  
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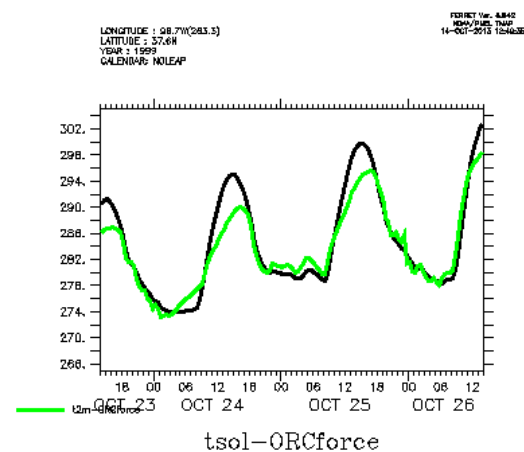
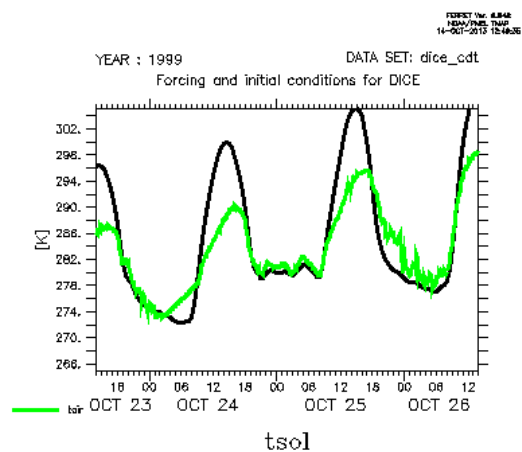
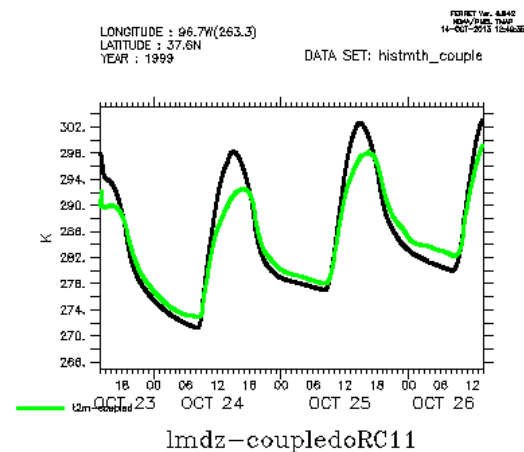
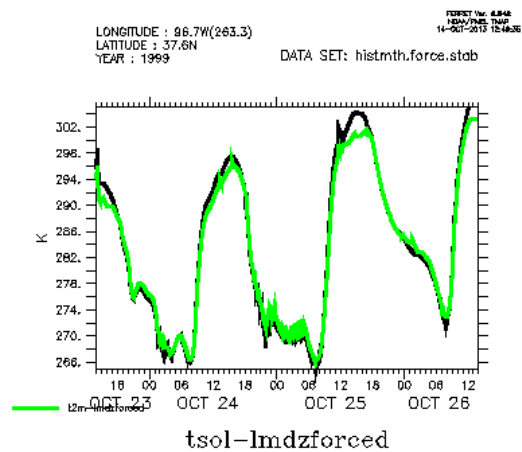
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LONGITUDE : 98.7W(263.3)  
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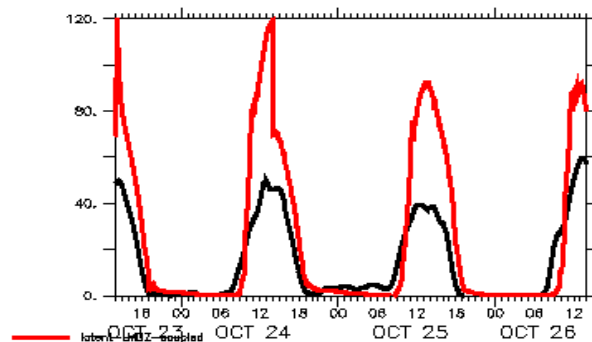
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LONGITUDE : 98.7W(263.3)  
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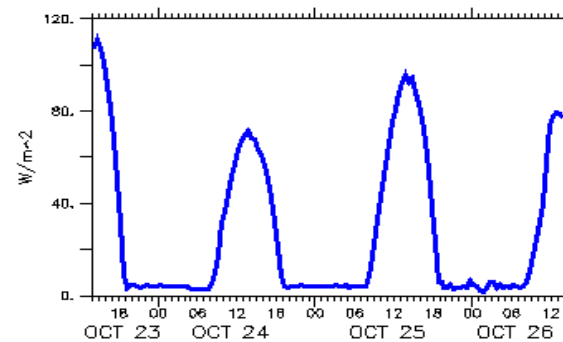
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Latent-lmdzforced

LONGITUDE : 98.7W(263.3)  
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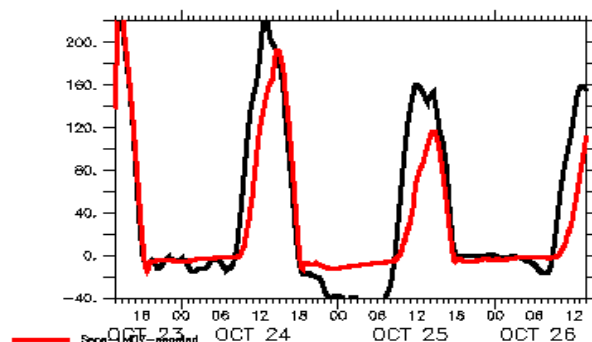
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latent-ORC force

LONGITUDE : 98.7W(263.3)  
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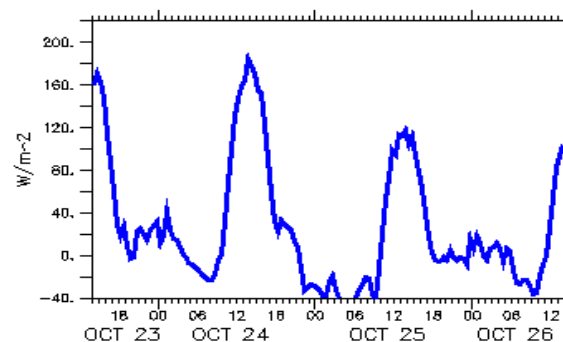
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Sens-lmdzforced

LONGITUDE : 98.7W(263.3)  
LATITUDE : 37.6N  
YEAR : 1999  
CALENDAR: NOLEAP

DATA SET: sechiba\_history\_OR11\_force



Sens-ORC force

