DAY TO DAY EVALUATION OF THE VARIOUS PHYSICS OF LMDZ MODEL AT INTRUMENTED SITES

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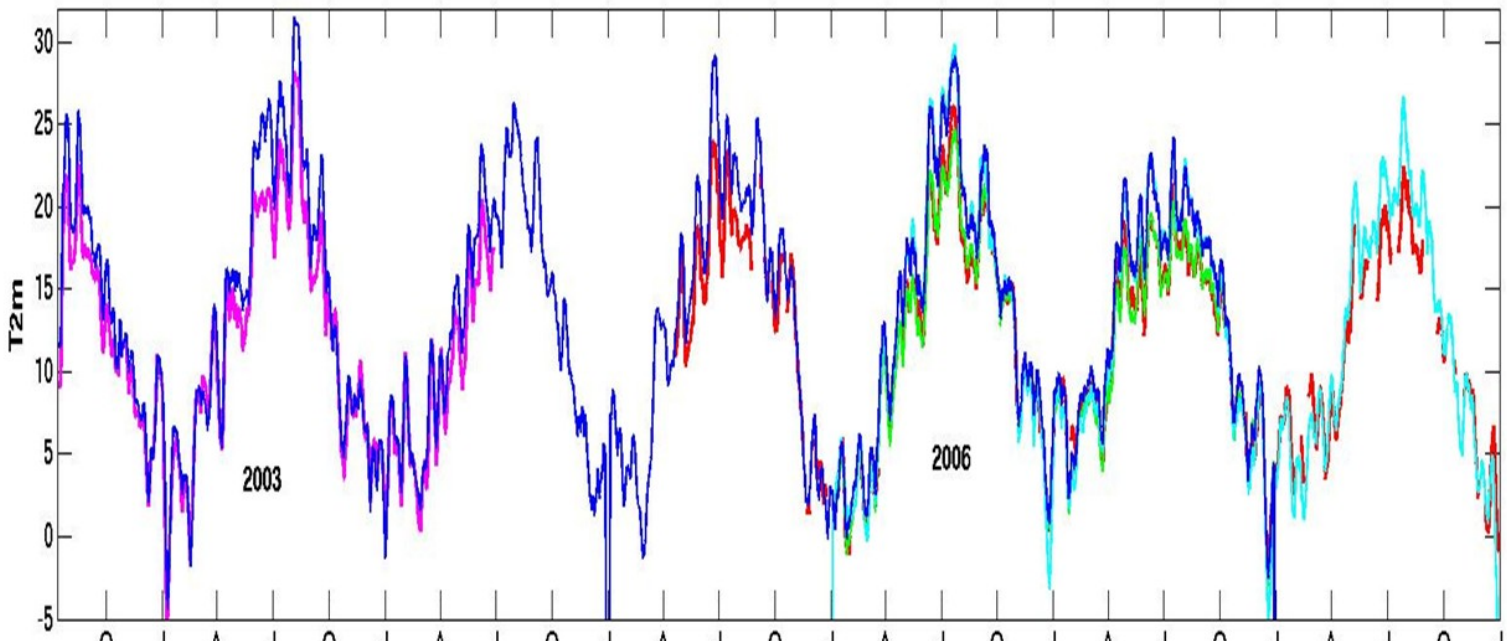
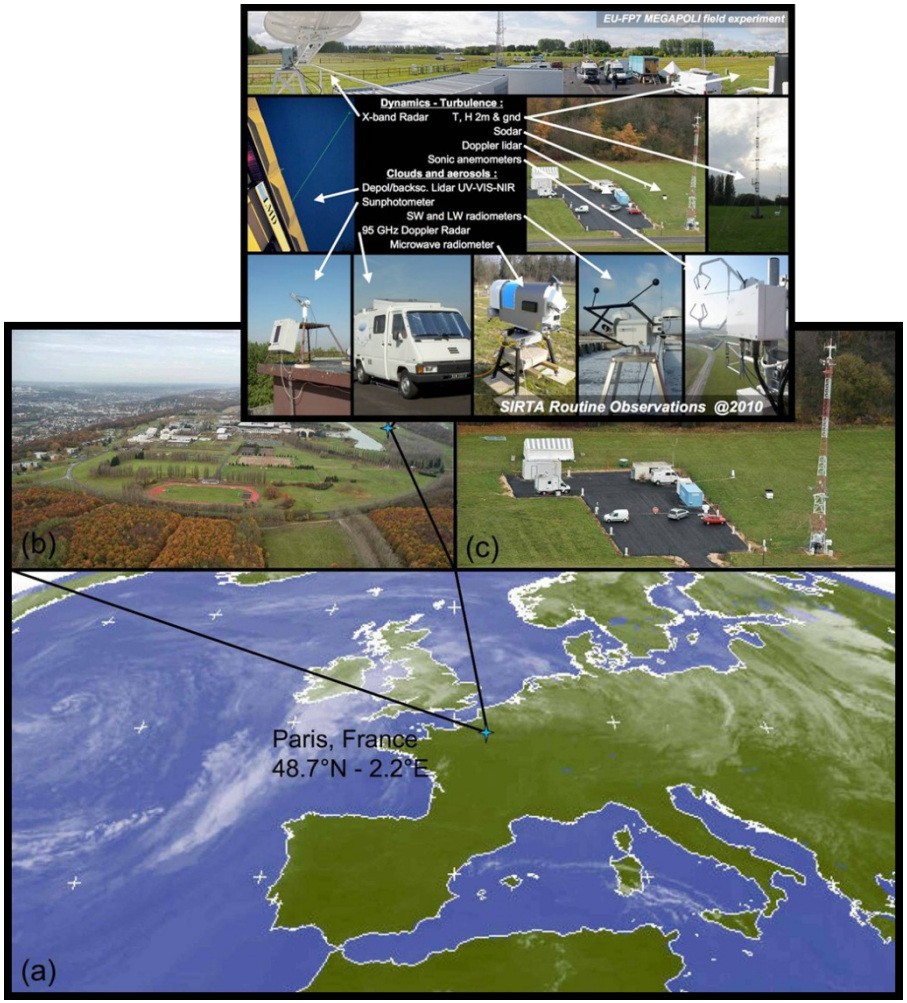
- To evaluate and help to the development of the new physics of IPSL-CM5b
- To explore the question: How SCM and/or zoomed-nudged numerical experiments and instrumented sites observations allow to evaluate a climate model



The SCTD data base
10 years, meteo, clouds, surface fluxes
(ARM format)



SCTD variables 2 different files

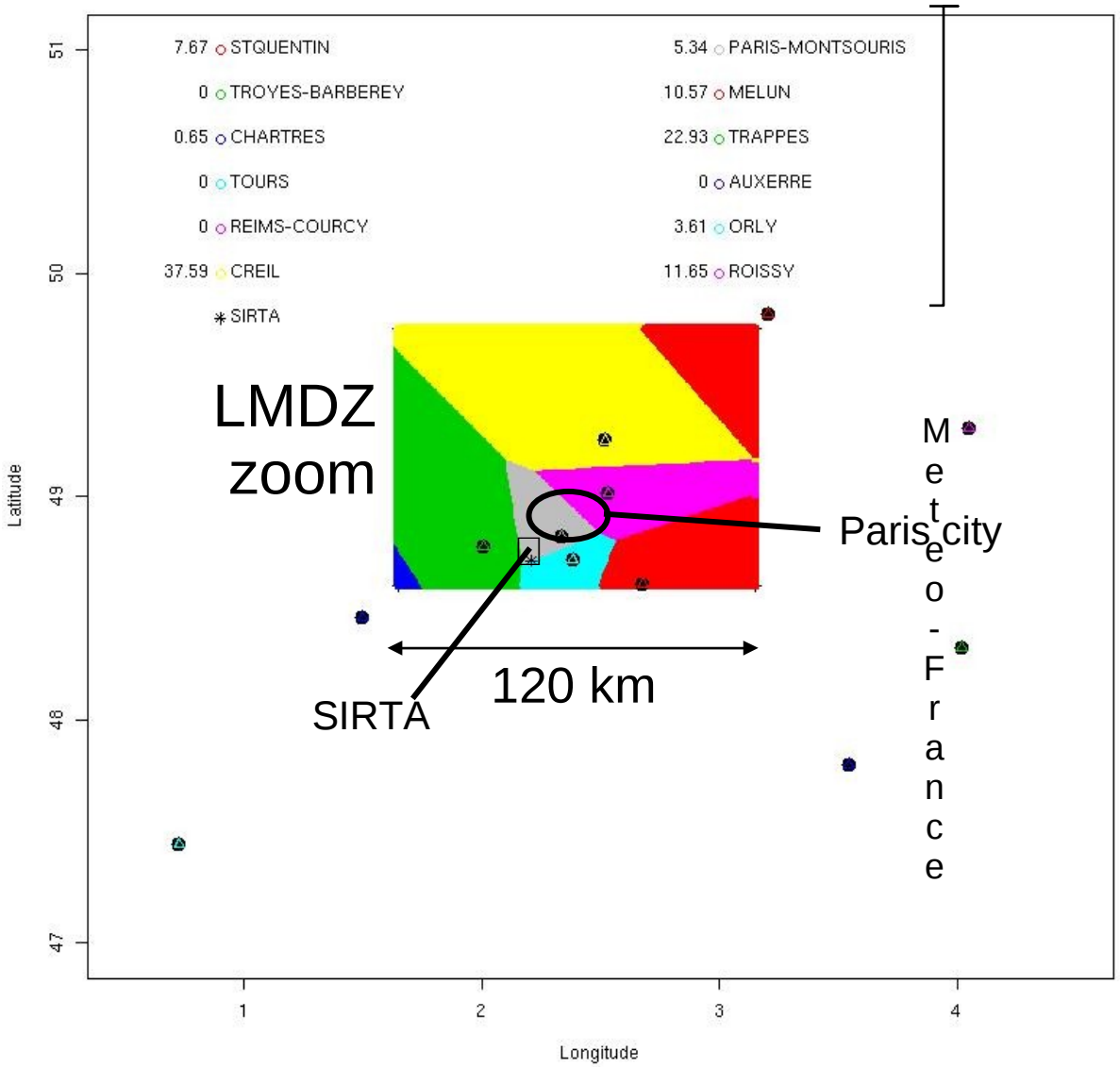
CLOUDS *Cld. fraction/Altitude*	ALS450 lidar(1)	2008-//		
	LNA Lidar(2)	2002-//		**Done**
	TSI440 sky-imager(3)	2008-//		
	Rad. flux analysis(4)	2003-//	BSRN	
	MSG(5)	2000-//	Meteosat	Beg-2011
AEROSOLS *Optical thickness*	Sun-photometer	2002-//	AERONET	**Done**
BOUNDARY LAYER – *Altitude*	LNA Lidar	2008-//		**In progress**
SURFACE WEATHER *In-Atmos./In-Ground measurement*	In-situ	2005-// SIRTA	Météo-France	**In progress**
Precipitation		2000-// Paris area(6)		Mid-2010
WATER VAPOR *Integrated water vapor* *+ liquid water content*	GPS	2007-// SIRTA 2000-// Paris area(7)	RPG-IGN	**In progress** Beg-2011
	Sun-photometer	2002-//	AERONET	**Done**
	µ-wave radiometer	2006-//		End-2010
RADIATIVE fluxes *SW/LW Down.*	Pyrano., pyrhelio., Pyrgeo.	2003-// SIRTA	BSRN	**In progress**
SW/LW Up.		2000-// Paris area(6)	Météo-France	Mid-2010
	Pyrano., Pyrgeo.	2007-//		**In progress**
TURBULENT heat fluxes Sensible and latent	3D Sonic anemometer	2005-//		Beg-2011
THERMODYNAMIC PROFILES Temp., humid., press., wind speed and dir.	Radiosonde	2000-//	Météo-France	End-2010
LIDAR Attenuated backscatter	ALS450 lidar(1) LNA Lidar(2)	2008-// 2002-//		**In progress**
RADAR Reflectivity	BASTA radar	2009-//	CloudNet	Beg-2011

SCTD file : almost ten years, all possible variables

EUCLIPSE file : only EUCLIPSE time-period, only variables required by CFMIP

Contribution to EUCLIPSE

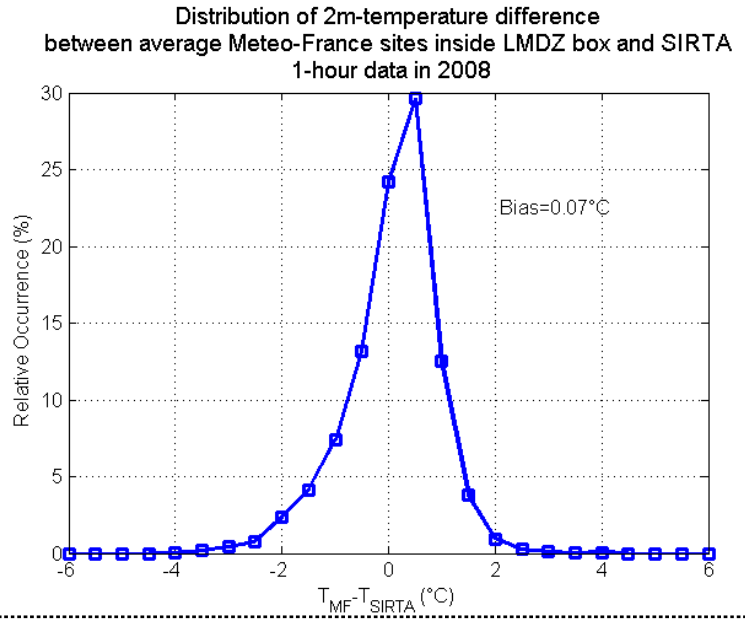
DATABASE issues and actions: *representativity of SIRTA at regional scale*



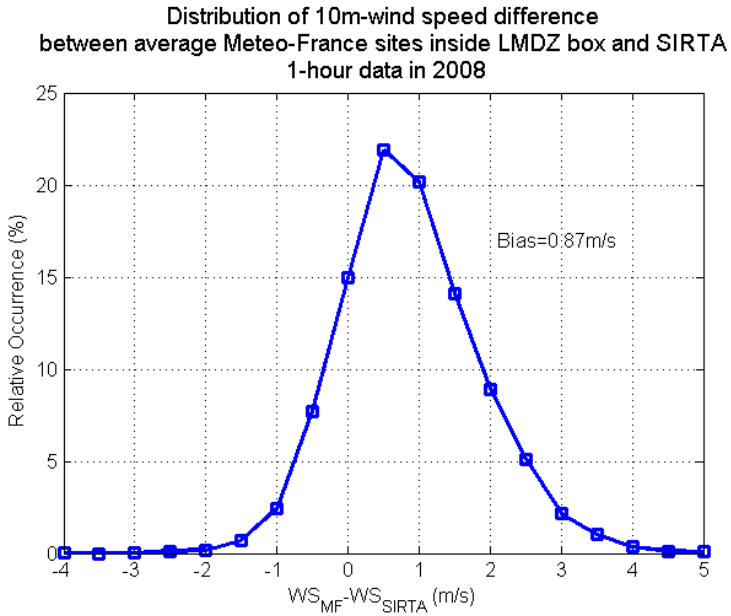
DEPHY

representativity of SIRTA at regional scale

TEMPERATURE



WIND SPEED



Physics developments

LMDZ – Atmospheric model

	BOUNDARY LAYER	CLOUDS	CONVECTION
AR4	LOUIS	Bony, Emanuel 2001	Emanuel
NPV2.0	Rio et al. 2010	Jam et al.2011	Grandpeix et al. 2010
NP1.0	Rio et al.2010	Jam et al. 2011	Grandpeix et al. 2010 + Modif AR5 (Wb)

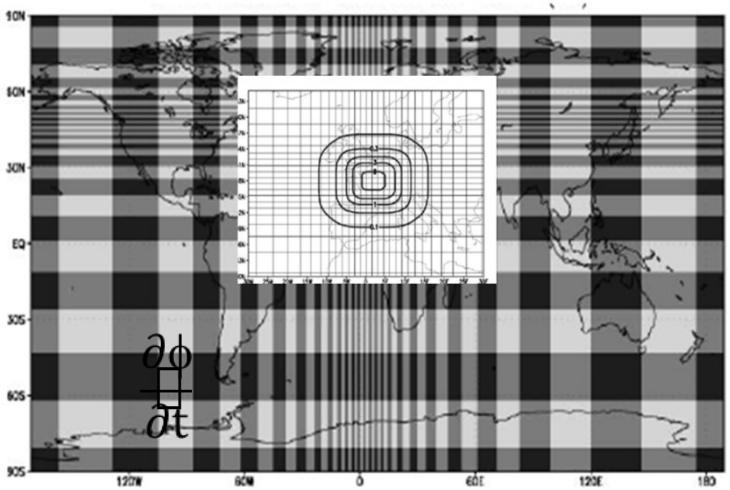
SOIL HYDROLOGY

Bucket β constant	Manabe	Coindreau et al. 2007
ORCHIDEE 2	Choisnel	Polcher 1994
ORCHIDEE 11	CWWR	De Rosnay 1999, Campoy et al. 2011

ϕ_a from ERAI

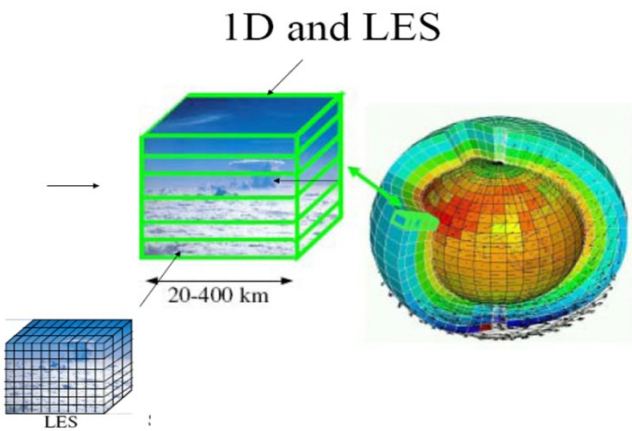
τ time constant varying from 10 hours in the zoomed area to 30mn

Boundary conditions from LMDZ



LMDZ : streched grid + nudging

Boundary conditions



SCM

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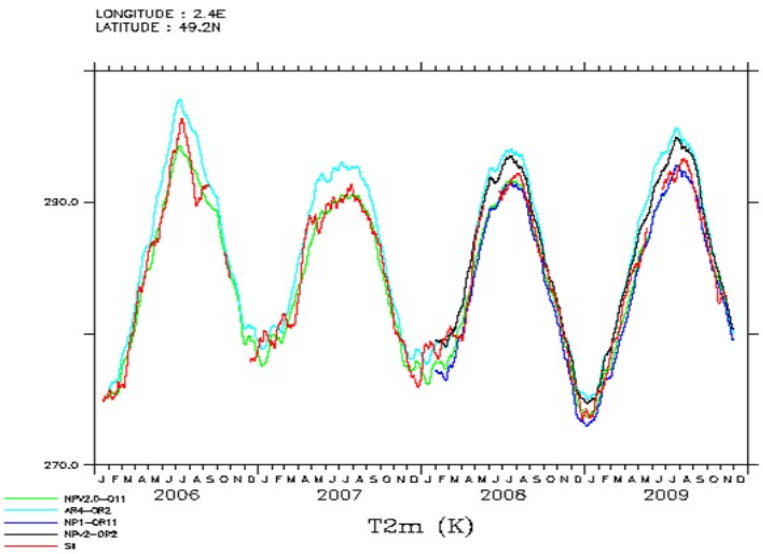
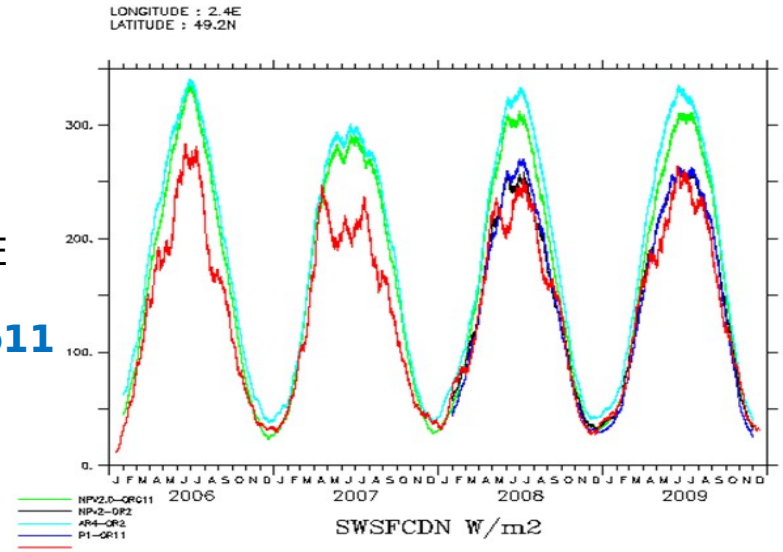
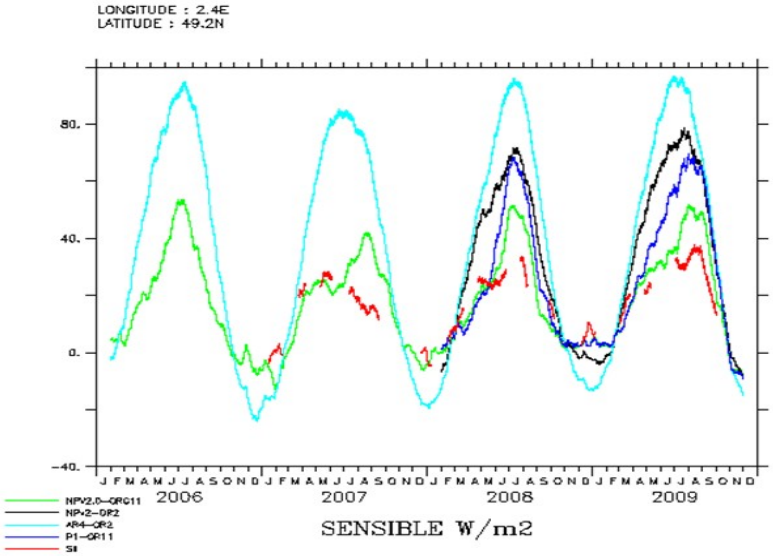
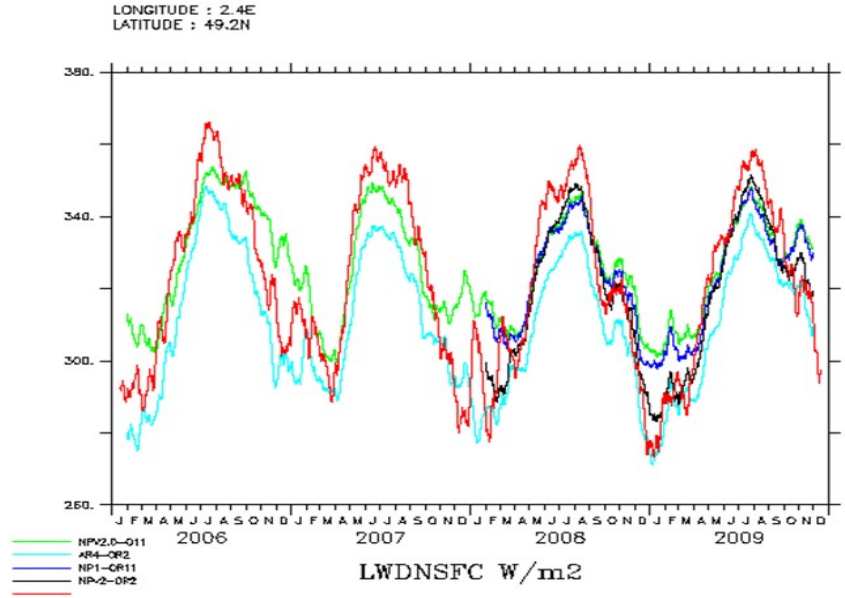


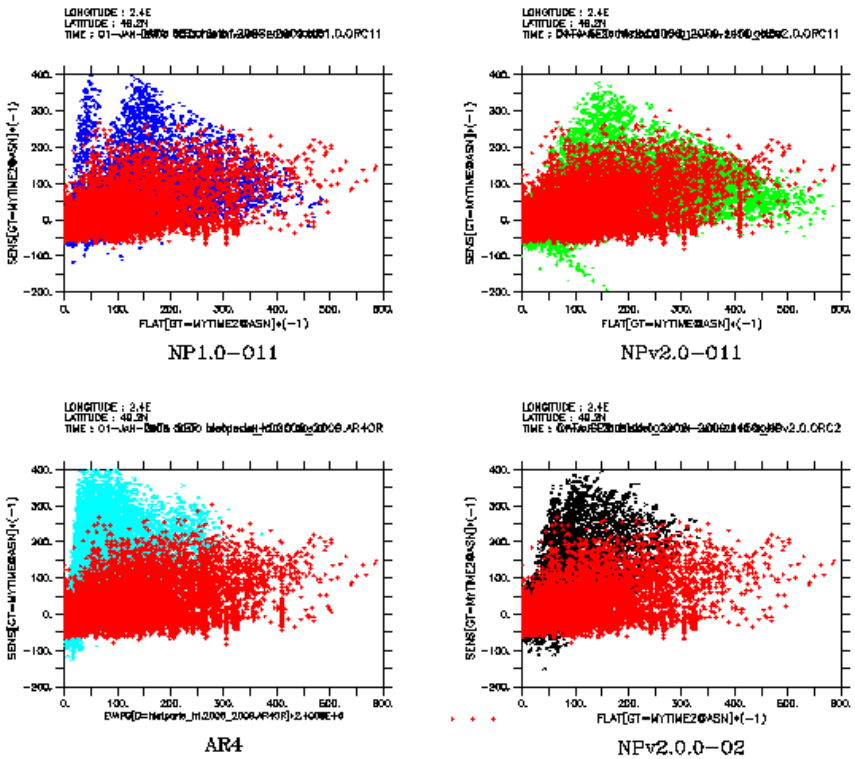
NPv2.
Hydro11
NPv2.
ORCHIDEE
AR4
P1-hydro11
SIRTA



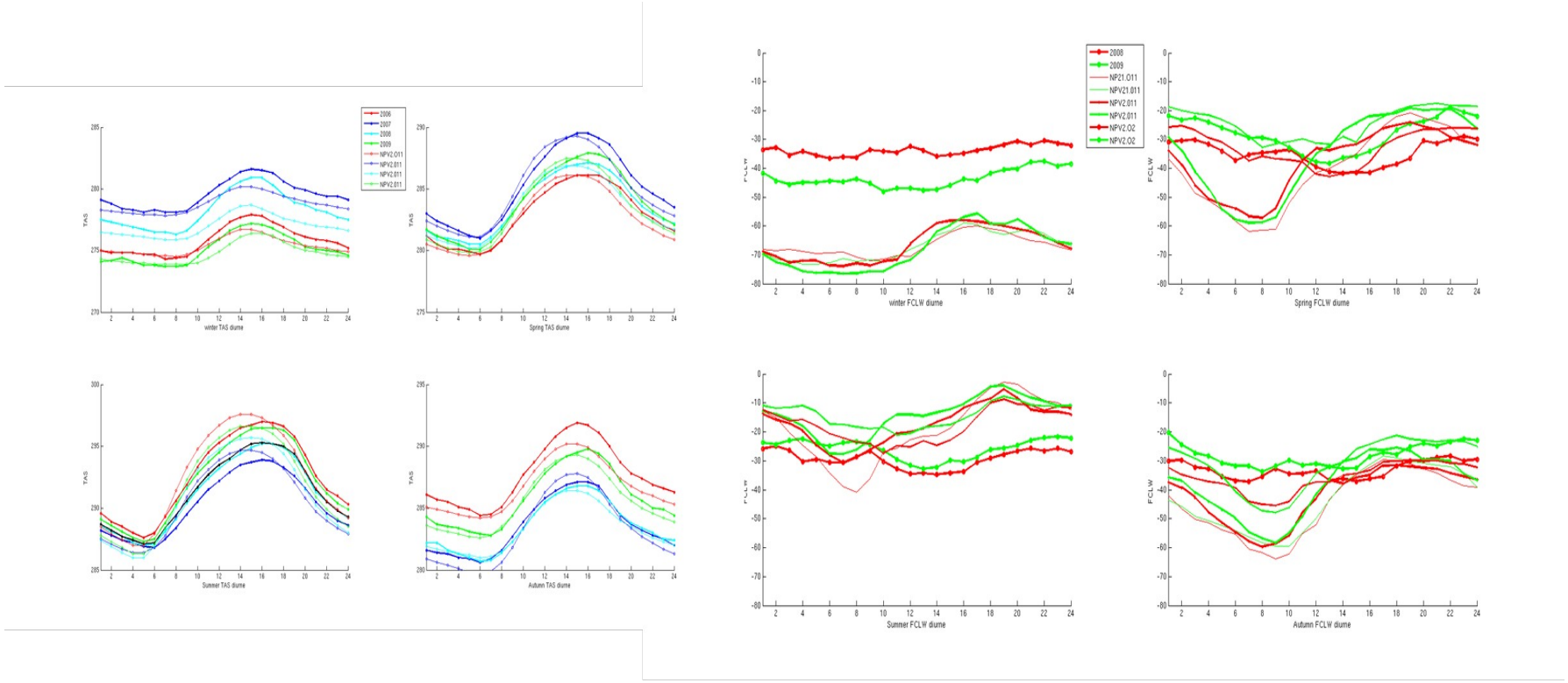




Latent/sensible heat partition

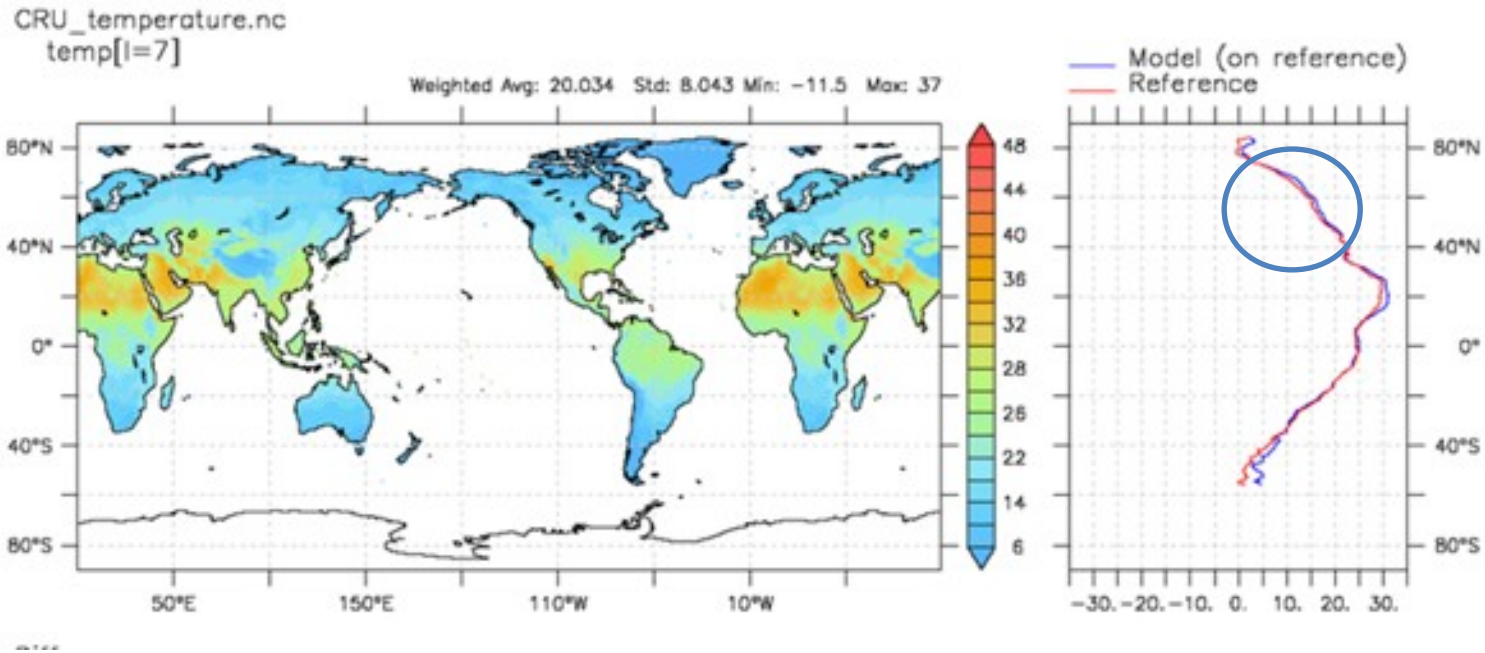


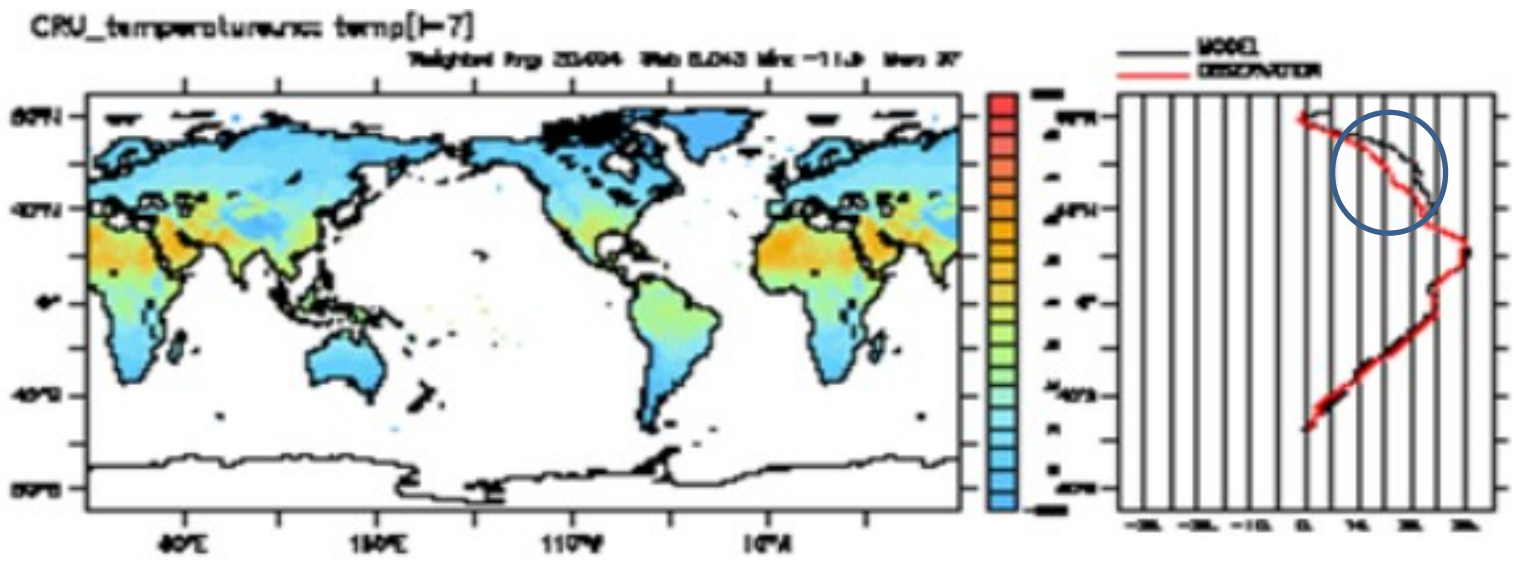
Diurnal cycles of radiative impact of clouds



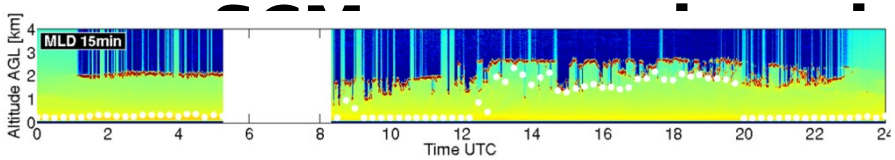
DJF: Cold biais consistent with an over-estimation of the cloudiness and the humidity

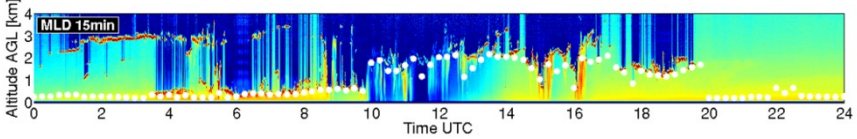
- Radiative impact of clouds too high in winter (too much clouds)
- Diurnal cycle inconsistent: clouds are missing in the late afternoon and to frequent in the early morning (especially MAM and SON)

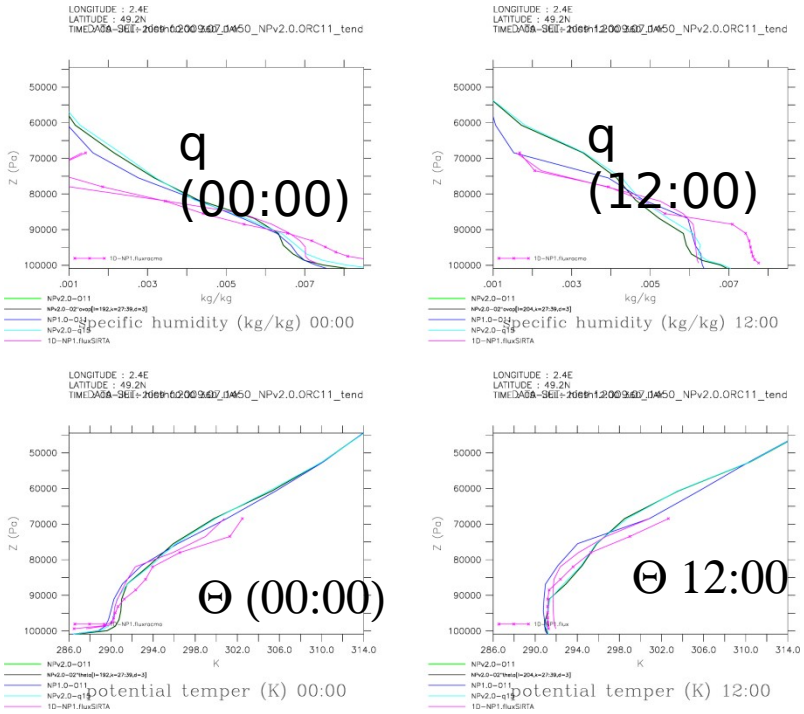

CRU_temperature.nc
temp[l=7]
Weighted Avg: 20.034 Std: 8.043 Min: −11.5 Max: 37
Model (on reference)
Reference
80°N
40°N
0°
40°S
80°S
50°E
150°E
110°W
10°W
48
44
40
36
32
28
26
22
14
6
−30. −20. −10. 0. 10. 20. 30.

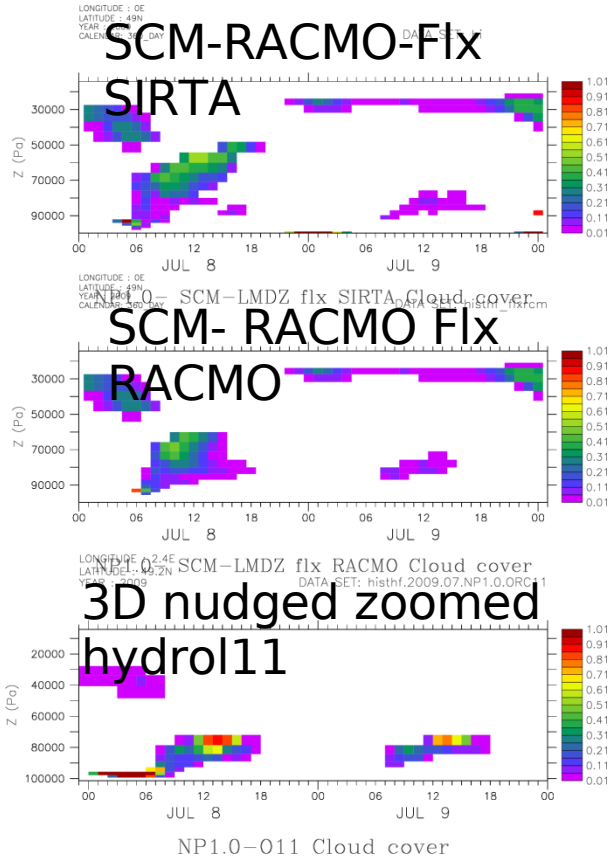

CRU_temperature.nc temp[l=7]

Case study/sensitivity study
Low level clouds in summer over continental surface

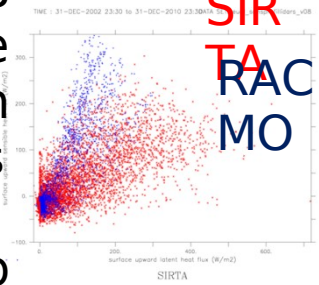








Sensible



Latent heat

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