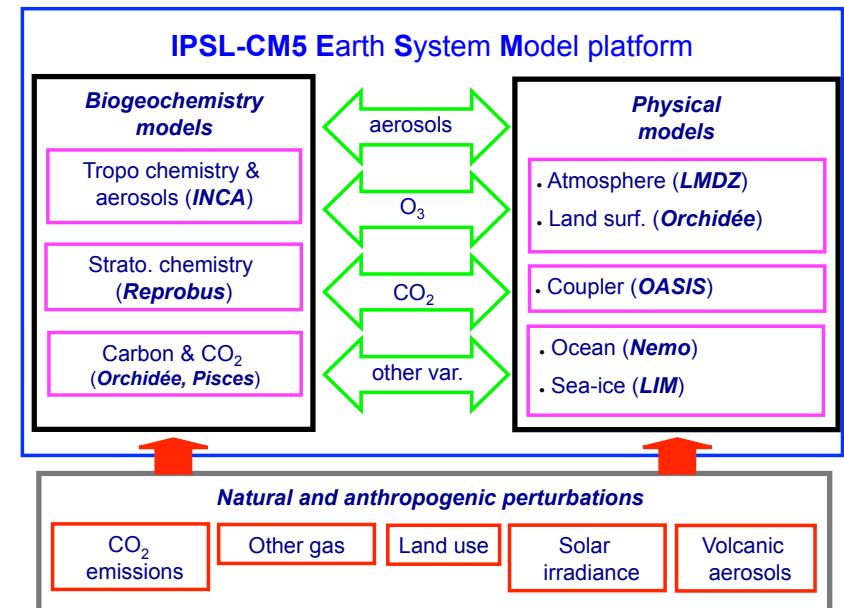


IPSL-CM and HPC

Marie-Alice Foujols : foujols@ipsl.jussieu.fr

Yann Meurdesoif, Jérôme Servonnat, Arnaud Caubel, Sébastien Masson et al.
HPC ISENES Workshop 30/1/2013



[Dufresne et al., 2012]

IPSL-CM5 configurations for CMIP5

LMDZ-ORCHIDEE-ORCA-LIM-PISCES-INCA-REPROBUS-OASIS

IPSL-CM5A
Earth System Model(ESM)

IPSL-CM5B
Idem IPSL-CM5A, with new atmospheric phys LMDZ5B

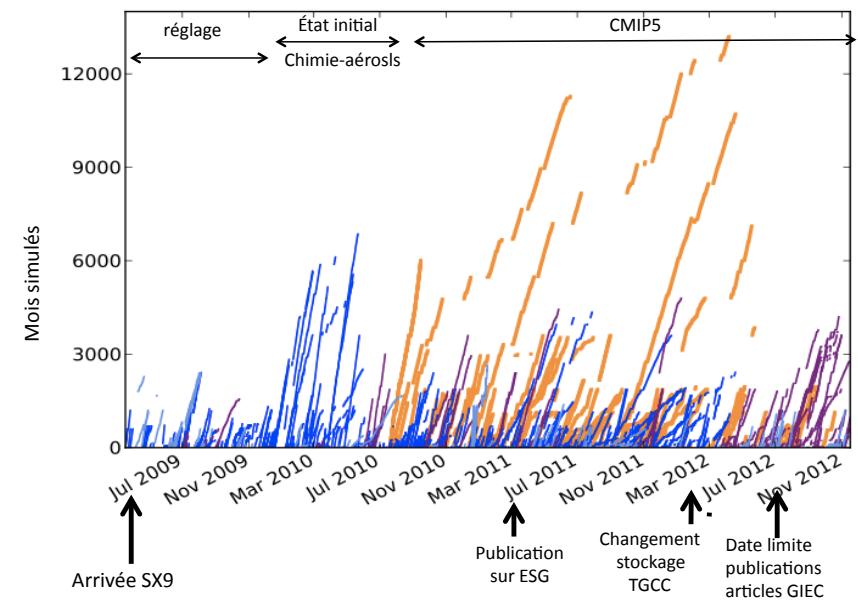
IPSL-CM5A-LR
Low resolution
atm: $3.75^\circ \times 2^\circ$ L39
oce: 2° L31

IPSL-CM5A-MR
Medium resolution
atm: $2.5^\circ \times 1.25^\circ$ L39
oce: 2° L31

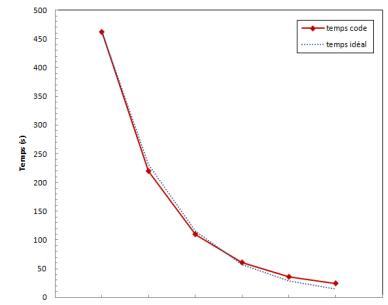
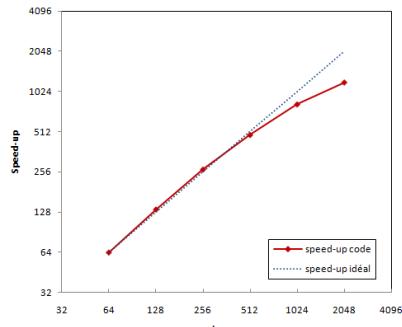
IPSL-CM5B-LR
Low resolution
atm: $3.75^\circ \times 2^\circ$ L39
oce: 2° L31

NEC SX-9 (mercure) : 48 procs, dedicated
Bull (titane)
IBM (vargas)

IPSL-CM5A-MR :
rebuild longer than computation



Grand Challenge (D8.4)



A. Caubel, Y. Meurdesoif

Grand Challenge : numbers

– Computer : Jade extension CINES :

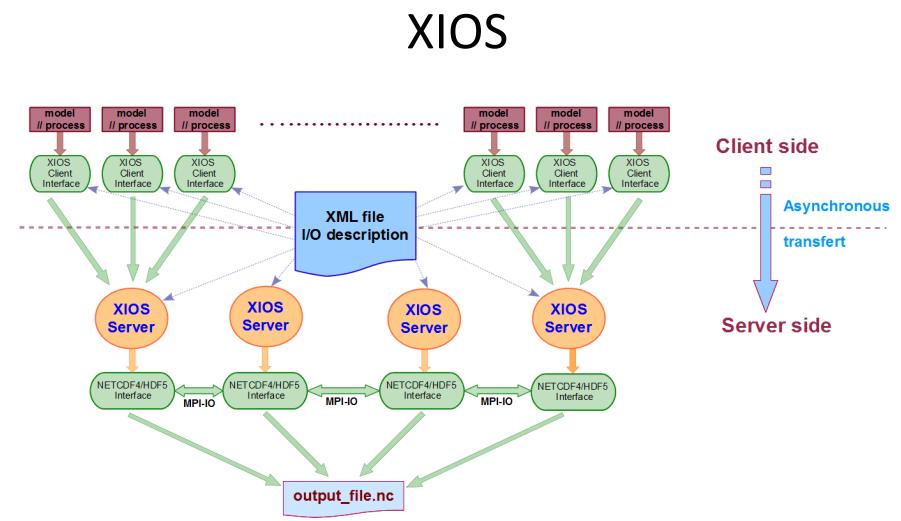
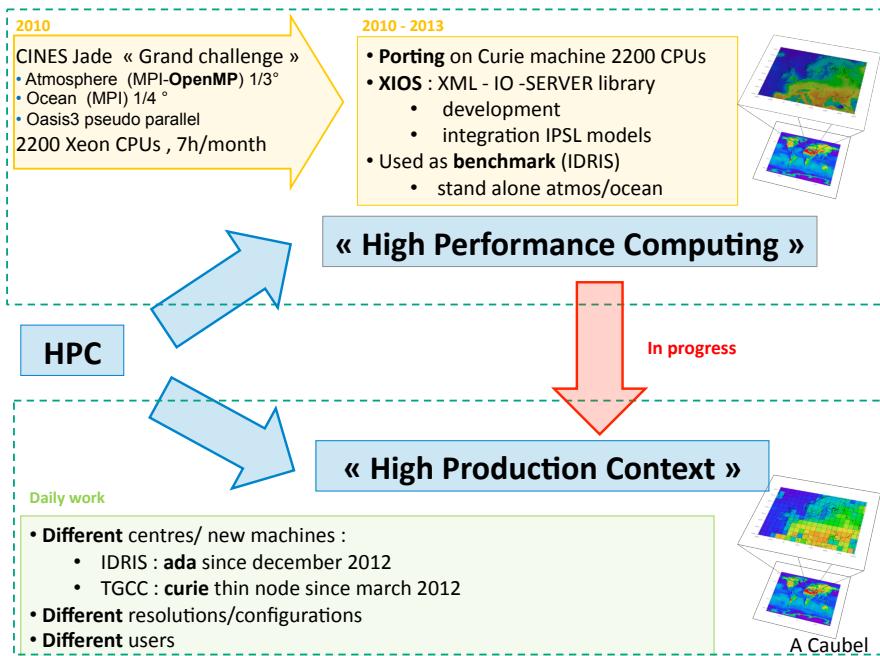
- SGI : Intel Xéon Néhalem 2.93Ghz, bi-socket/quadriceurs (8 coeurs/nœuds)
- ~ 14000 coeurs

– Total of parallelism : 2191 Core :

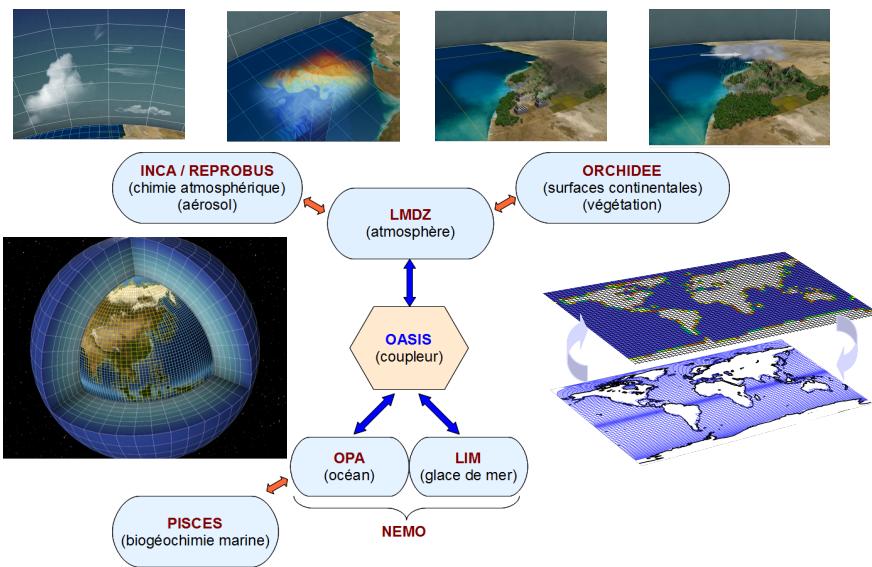
- LMDZ+ORCHIDEE : 2048 Cores
 - 256 processus MPI
 - 8 thread openMP / processus
- NEMO : 120 processus MPI
- OASIS : 23 processus (1 proc per exchanged field)

– 10 years simulated ~ 15 days on ~ 200 Cores

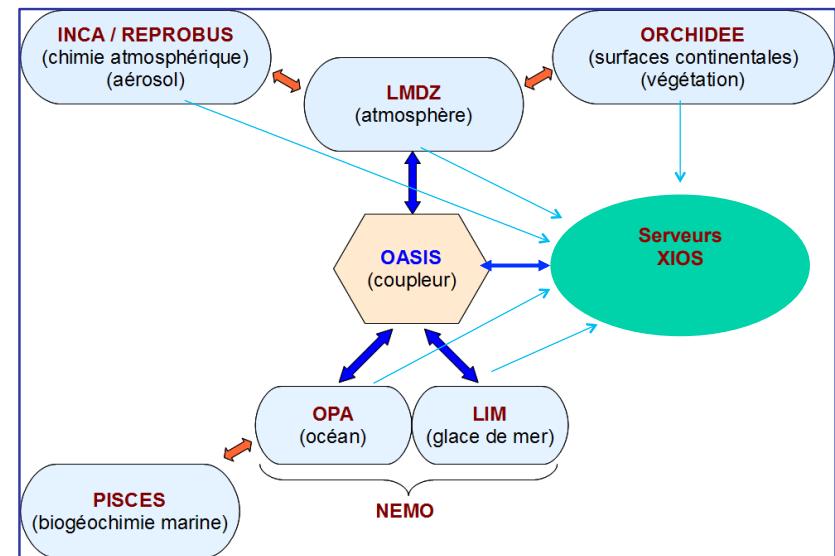
A. Caubel, Y. Meurdesoif



Y Meurdesoif



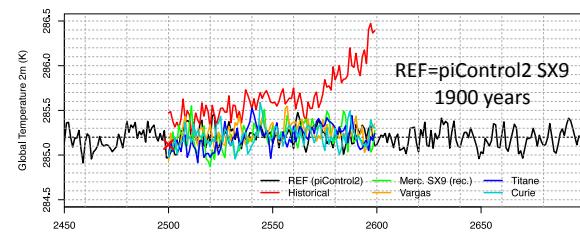
Y Meurdesoif



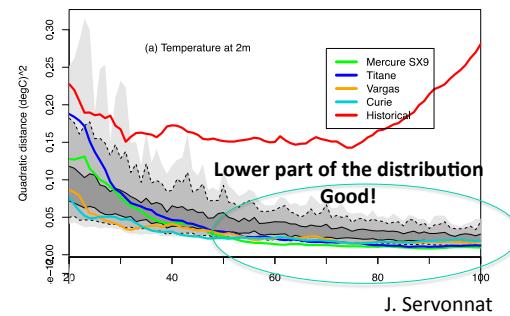
Y Meurdesoif

Comparison of the IPSLCM5A_LR climate on the different computers used at the IPSL

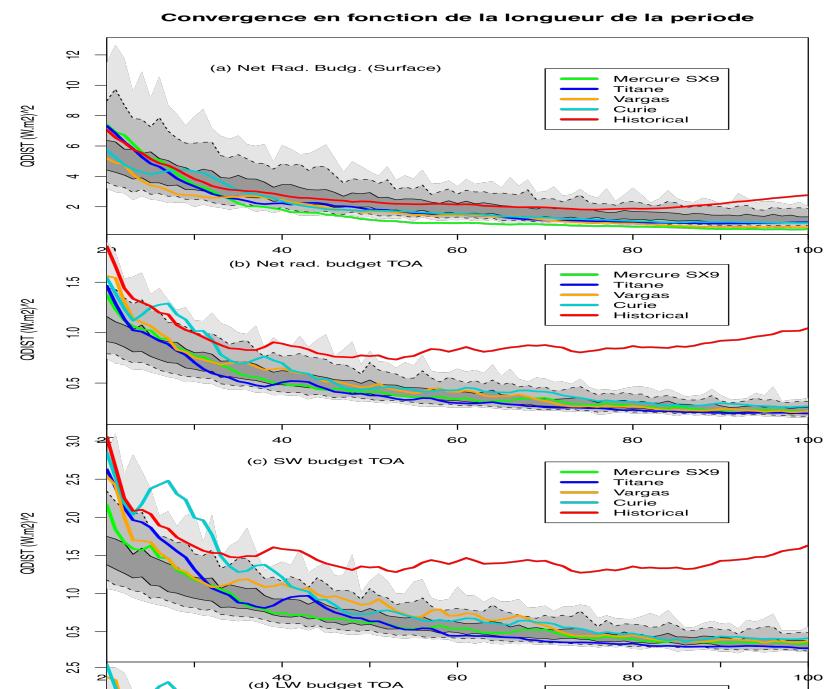
- SX9 versus => Titane, Vargas, Curie, SX9 (2) (+ an historical run)
- Calculate a climatological spatial field for a growing period (between 20 and 100 years)
- Quadratic distance between the reference and the different simulations
- Grey shading = distribution of this distance in piControl2 (SX9)



Convergence en fonction de la longueur de la période



J. Servonnat

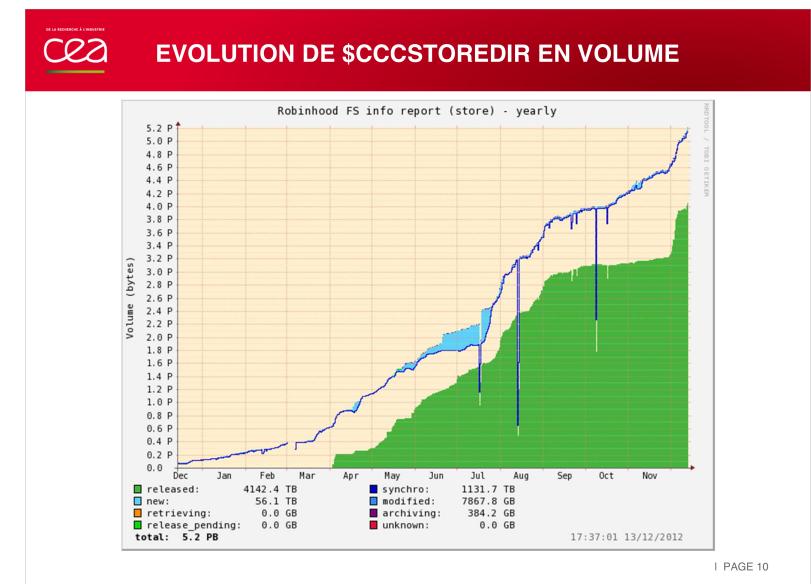
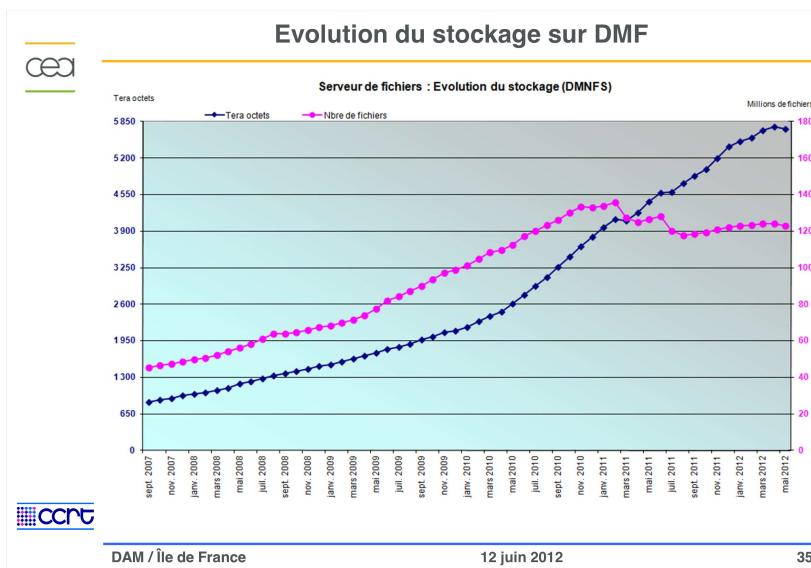


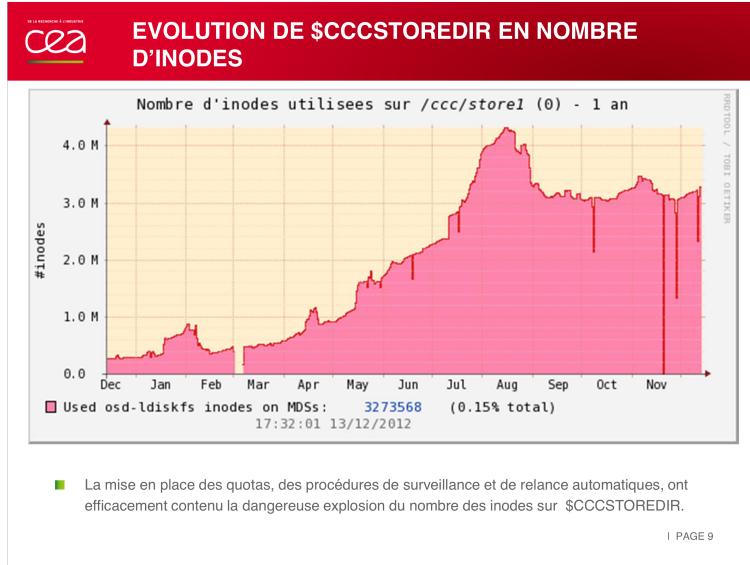
From the grand challenge to a referenced version

- time to join technical/scientific developments
- comparison results on different machine
- need to increase HPC knowledge
 - researchers
 - students
- interaction between IT experts and climate experts
- valorisation of interdisciplinary knowledge (incomes, recruitment)

Data challenge

- New file server on TGCC/CCRT : CCCSTOREDIR
- Reduction of number of inodes, on TGCC/CCRT,
 - per user :
 - DMFDIR : 5 000 000
 - CCCSTOREDIR : 100 000 (ncrcat, tar)
 - libIGCM v2
- data reduction :
 - sub domain,
 - sub mesh (1 level/10)
 - number of variables stored
- redo a subpart of a simulation (on same machine)





libIGCM options for post-processing

