Institut Pierre Simon Laplace

IPSL Climate Modelling Centre

Modèle couplé global de climat de l'IPSL

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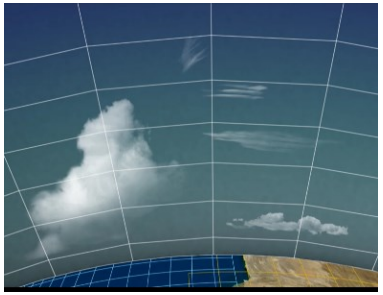
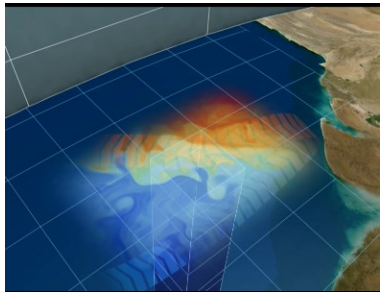
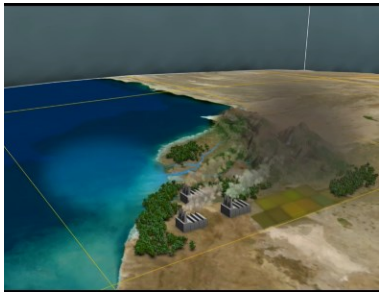
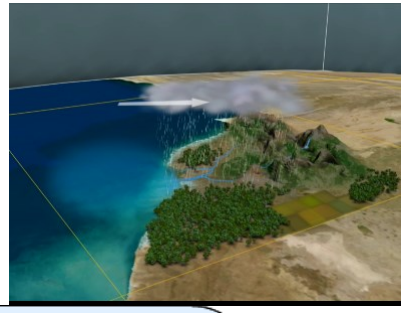
Journée BASC modélisation couplé, 3 octobre, Paris

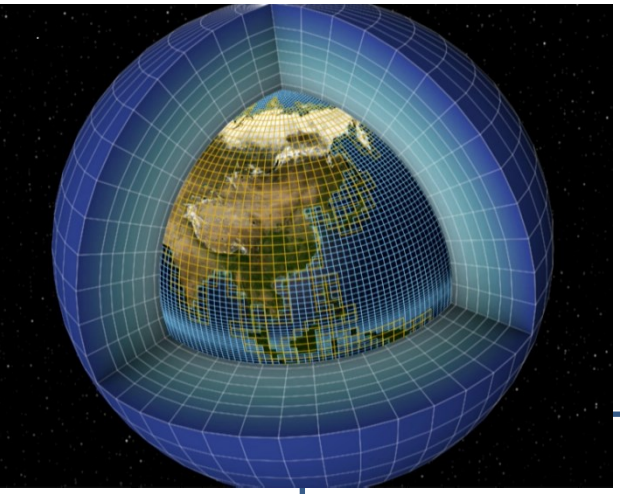
The IPSL-CM5 Earth System Model

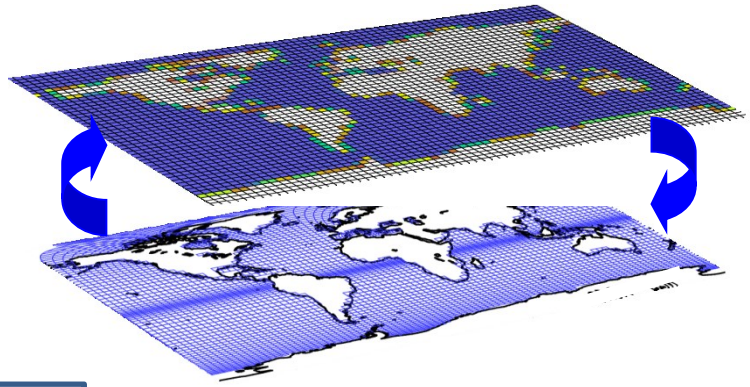
INCA / REPROBUS
(chimie atmosphérique)
(aérosol)

LMDZ
(atmosphère)

ORCHIDEE
(surfaces continentales)
(végétation)



OASIS
(coupleur)



OPA
(océan)

LIM
(glace de mer)

PISCES
(biogéochimie marine)

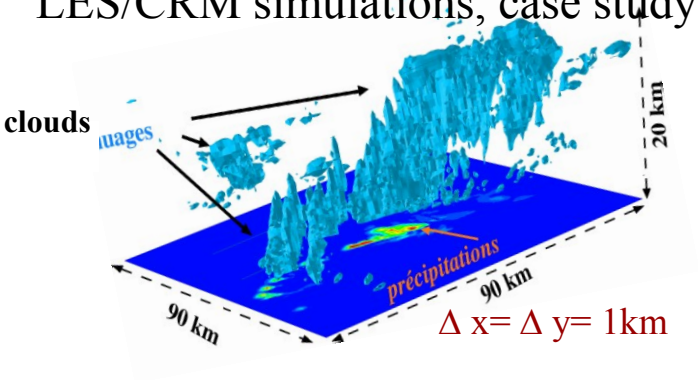
NEMO

Strong coupling between processes
Full integration of the physical and biogeochemical models

Processes: change of scales

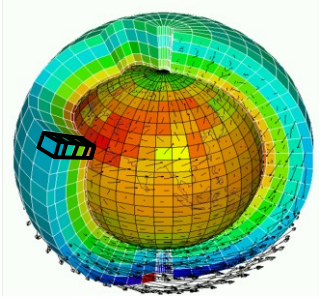
- Atmospheric parameterisations

LES/CRM simulations, case study

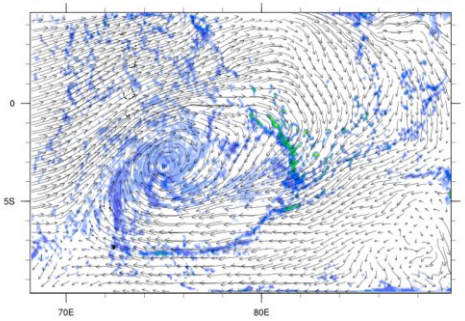


same forcings

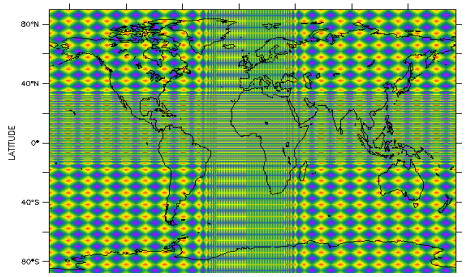
LMDZ in single column mode



Large domain CRM simulations



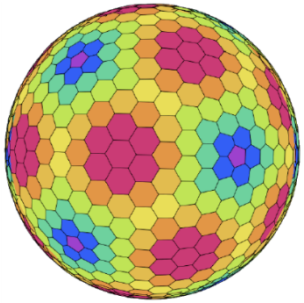
LMDZ in zoomed/nudged mode and/or with analysis restarts

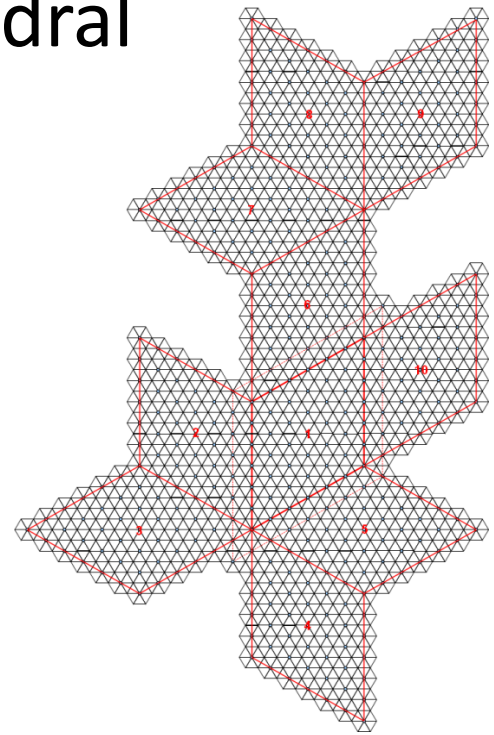


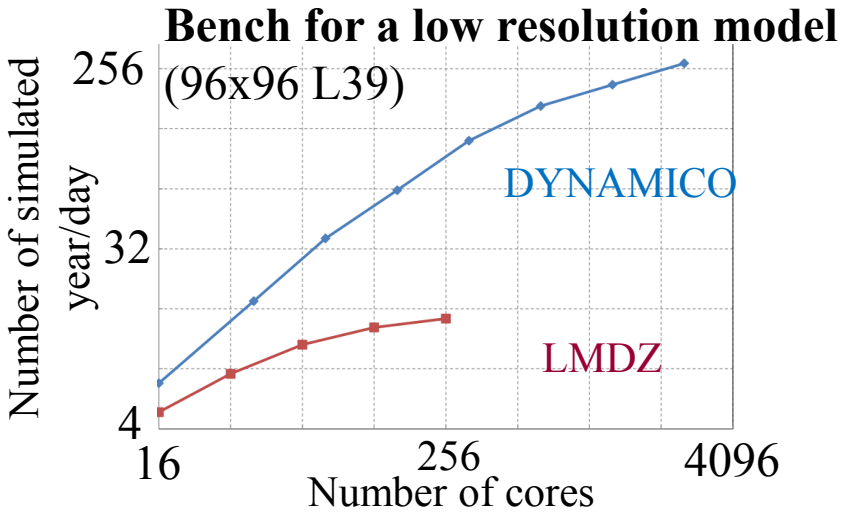
- Diurnal cycle, coupling with surface
- Intermittent precipitation (stochastic triggering of convection)
- Organised convection

- Micro et macro-physique of clouds
- ….

- DYNAMICO: new dynamical core, icosahedral







Bench with different resolutions

degrees	nb cores	year/day
3	320	**100**
1	1 280	**20**
½	11 520	***17***
¼	81 920	***14***

Present:

- New transport schema
- Quasi-uniform mesh
- Energy conserving

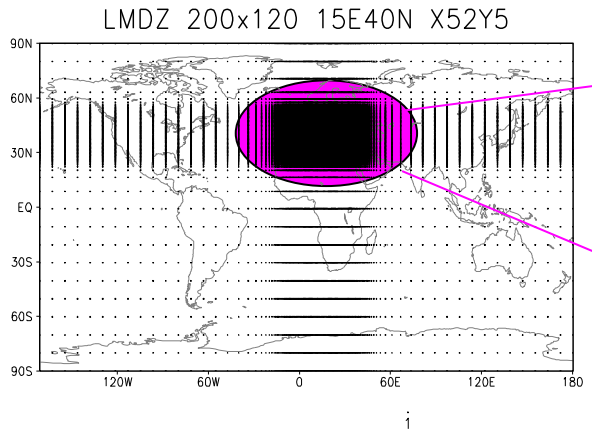
Regular increase of the horizontal resolution:

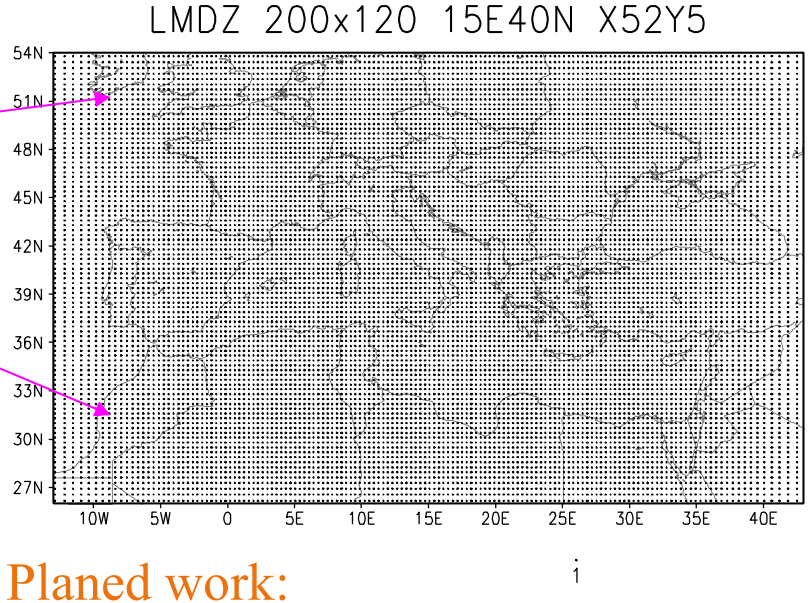
from hundreds to tenths of kilometres

Plans:

- Stretched grid
- Non hydrostatic
- In the IPSL-CM model
- Deep atmospheres (planets)

- Atmosphere: grid refinement





Example of domains:

- Mediterranean
- Europe
- West Africa
- India
- China – South Est Asia
- South America
- Antarctica
- Greenland

Planed work:

- Automation of tools
- ESM (chemistry, aerosols…)
- Coupling with the ocean (West-Africa – Gulf of Guinea, Arctic basin…)

Spécificités, forces et faiblesses:

- S’affranchir des difficultés liées aux conditions aux frontières des modèles à aire limitée
- Aborder la questions des « échelles intermédiaires » entre les échelle locales et globales
- Modèle intégré (ESM) existant et évoluant
- Paramétrisation indépendante des régions étudiées
- Échelle horizontales sup. à la dizaines de km, « régionale » et globale