



LSCE

Laboratoire des Sciences du Climat et de l'Environnement
(IPSL / CEA-CNRS-UVSQ, Gif-sur-Yvette, France)

Zoomed LMDZ-OR simulations

***in the context of the ESA CCI
high resolution land cover project***

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Paris, 13 January 2020

climate change initiative

→ HIGH RESOLUTION LAND COVER

Task 5 : Product assessment

The objective is to show the added value of high resolution land cover data (derived at 10-30 meters) for climate simulations.

Three regions have been chosen :

- Africa (Ethiopia)
- Brazil (Amazonia)
- Russia (Siberia)



high resolution
land cover
cci



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Coupled LMDZOR configuration

- Coupled model IPSLCM6.1.9-LR
(includes LMDZ revision 3427 and ORCHIDEE revision 5661)
- Resolution 142 x 144 x 79
- Physics NP v6.1.3
- Wind nudging (u/v)
- PFT maps aggregated from ESA CCI yearly Medium resolution land cover maps (300 m) to 0.1°

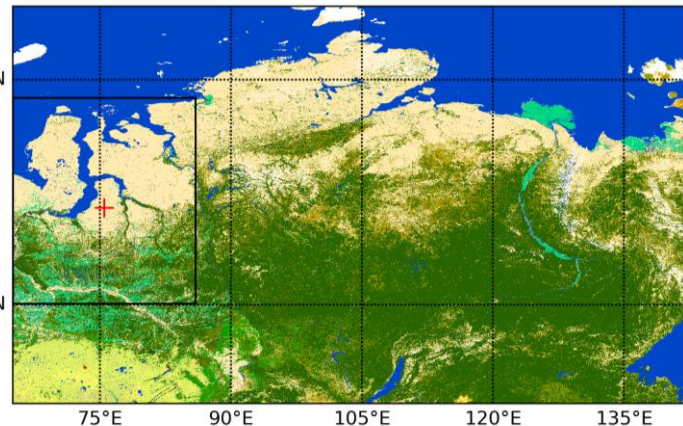
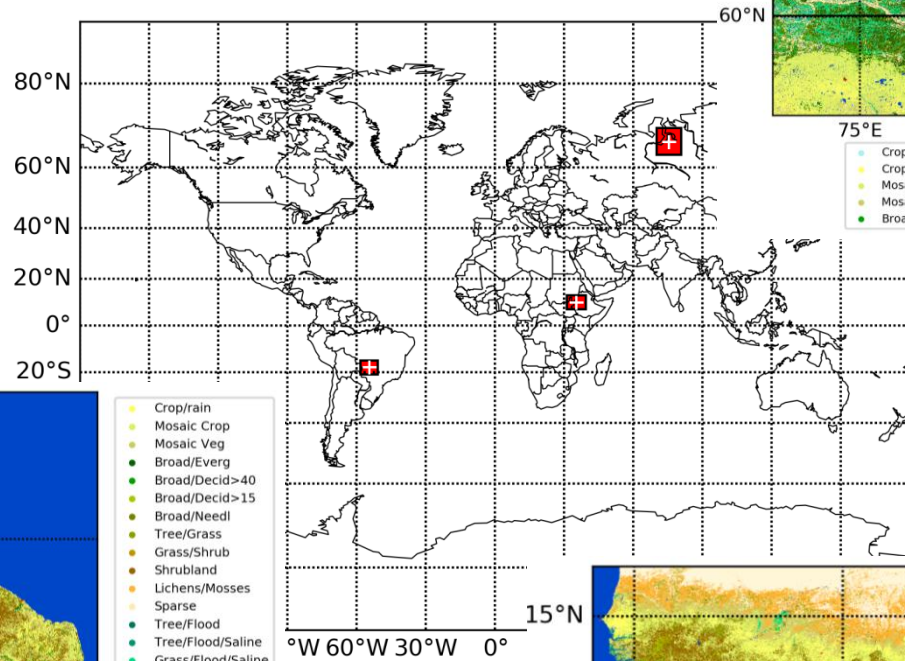
ESA land cover data : 1992 - 2015 (24 years)

Simulations have been run for 50 years to spinup the model : **1966-2015**

So that :

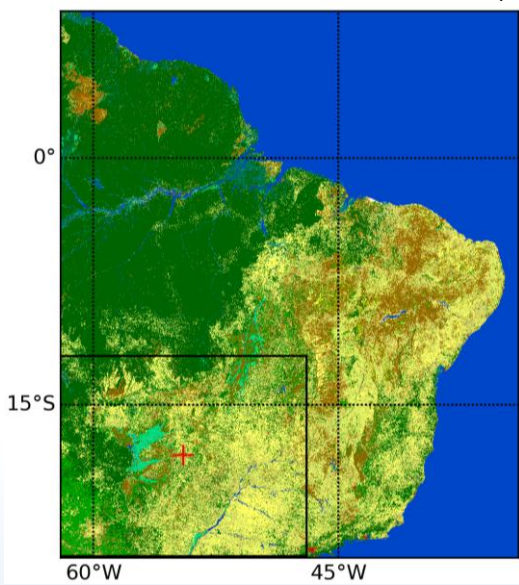
- PFT maps for 1966-1991 are recycled from 1992-2015
- Wind data (ERA-I) for 1996-1978 are recycled from 1979-1991

Regions of interest



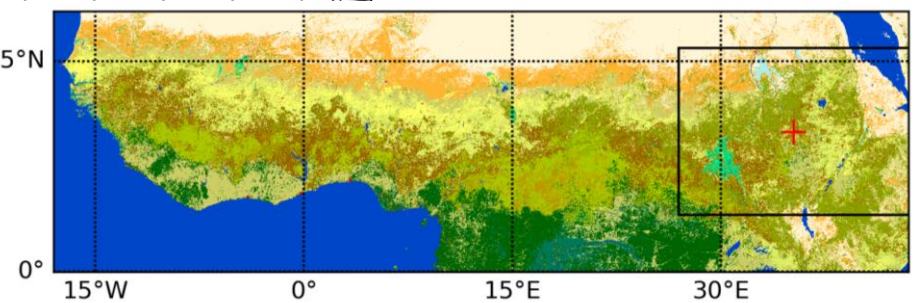
- | | | | |
|------------------|---------------------|----------------------|------------|
| ● Crop/Irrig | ● Needl/Everg | ● Shrubland | ● Bare |
| ● Crop/rain | ● Needl/Decid+Everg | ● Lichens/Mosses | ● Water |
| ● Mosaic Crop | ● Broad/Needl | ● Sparse | ● Snow/Ice |
| ● Mosaic Veg | ● Tree/Grass | ● Grass/Flood/Saline | ● No data |
| ● Broad/Decid>40 | ● Grass/Shrub | ● Urban | |

center : 75.5E / 67N
dzoom : 0.058 / 0.077



- | |
|----------------------|
| ● Crop/rain |
| ● Mosaic Crop |
| ● Mosaic Veg |
| ● Broad/Everg |
| ● Broad/Decid>40 |
| ● Broad/Decid>15 |
| ● Broad/Needl |
| ● Tree/Grass |
| ● Grass/Shrub |
| ● Shrubland |
| ● Lichens/Mosses |
| ● Sparse |
| ● Tree/Flood |
| ● Tree/Flood/Saline |
| ● Grass/Flood/Saline |
| ● Urban |
| ● Bare |
| ● Water |
| ● Snow/Ice |

center : 54.5W / 18S
dzoom : 0.042 / 0.066

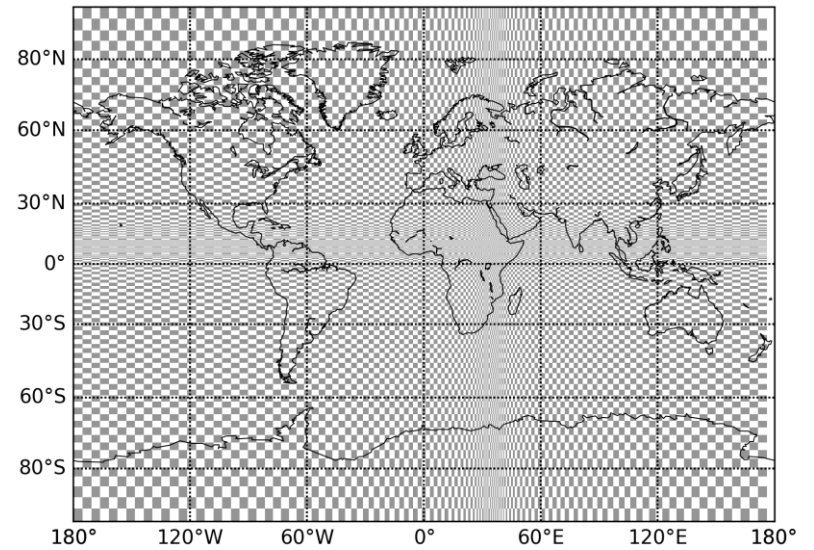
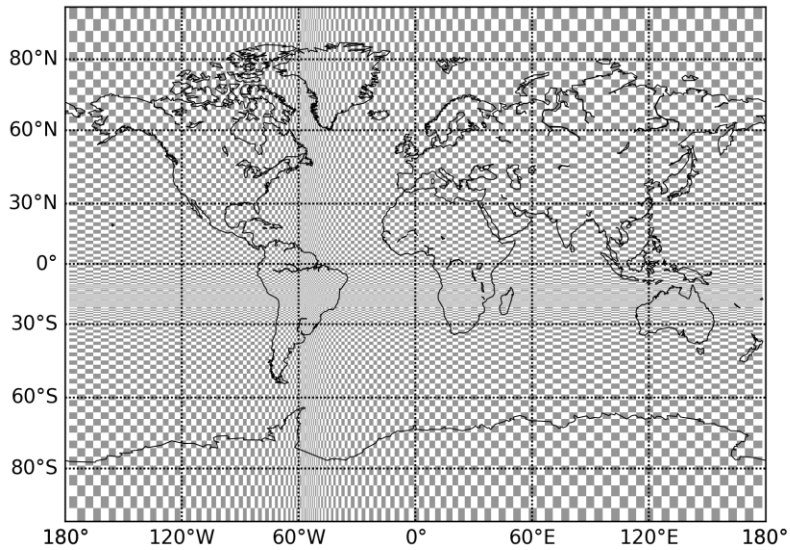
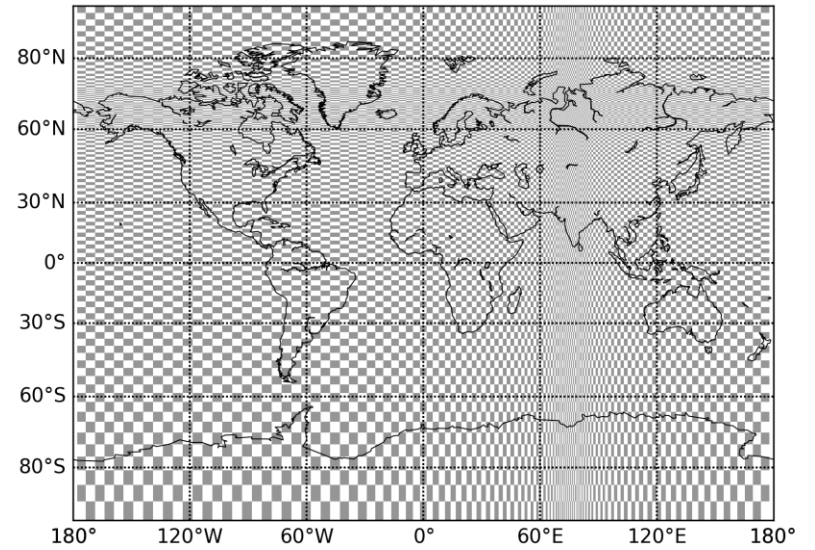


- | | | | |
|---------------|---------------------|------------------|----------------------|
| ● Crop/Irrig | ● Broad/Decid>40 | ● Grass/Shrub | ● Tree/Flood/Saline |
| ● Crop/rain | ● Broad/Decid>15 | ● Shrubland | ● Grass/Flood/Saline |
| ● Mosaic Crop | ● Needl/Everg | ● Lichens/Mosses | ● Urban |
| ● Mosaic Veg | ● Needl/Decid+Everg | ● Sparse | ● Bare |
| ● Broad/Everg | ● Tree/Grass | ● Tree/Flood | ● Water |

center : 35.25E / 10N
dzoom : 0.046 / 0.066

Zoomed grids

grossismx = 5
grossismy = 5



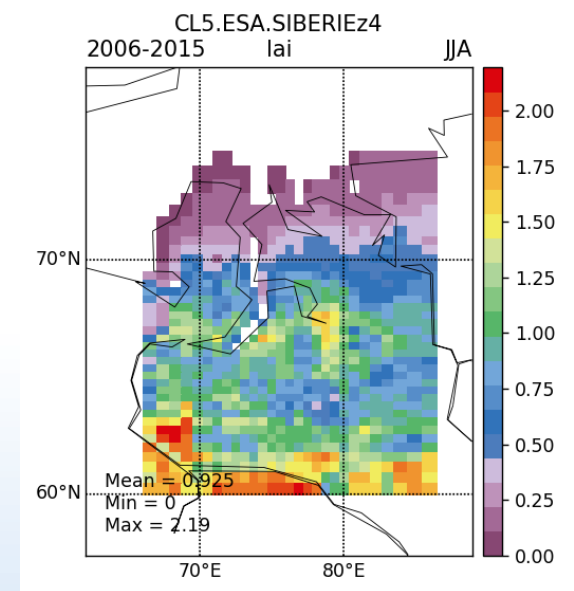
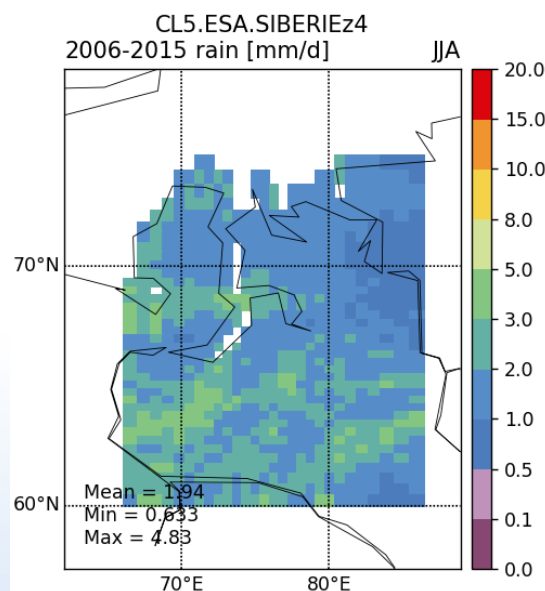
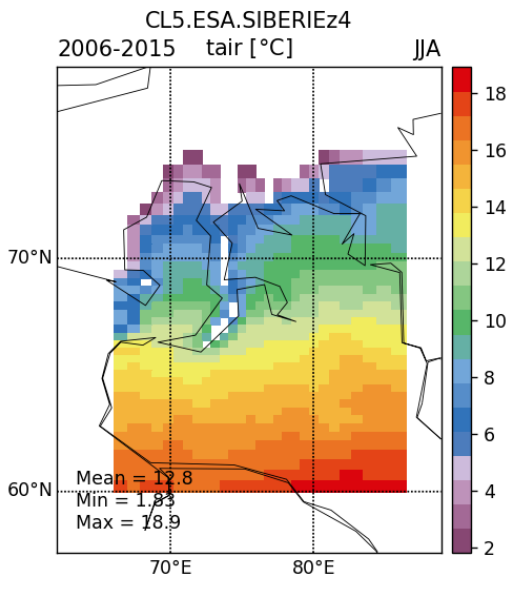
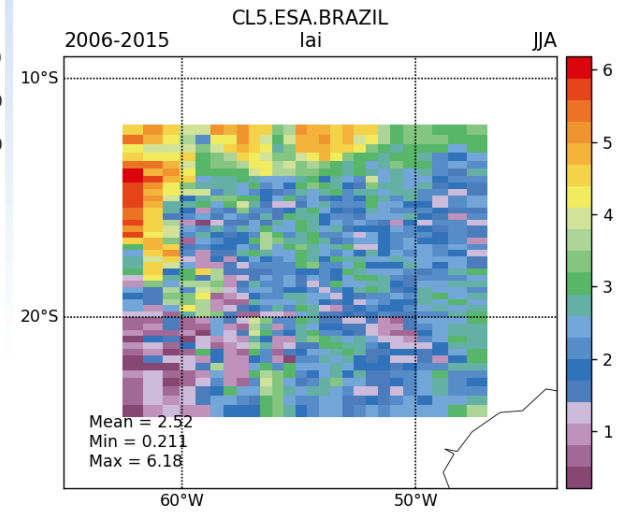
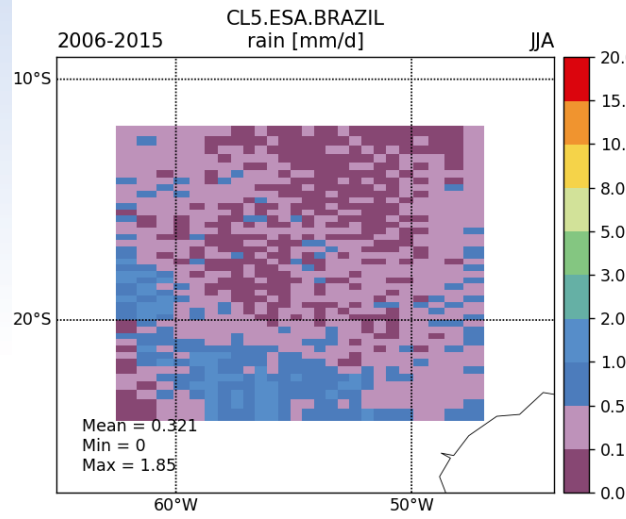
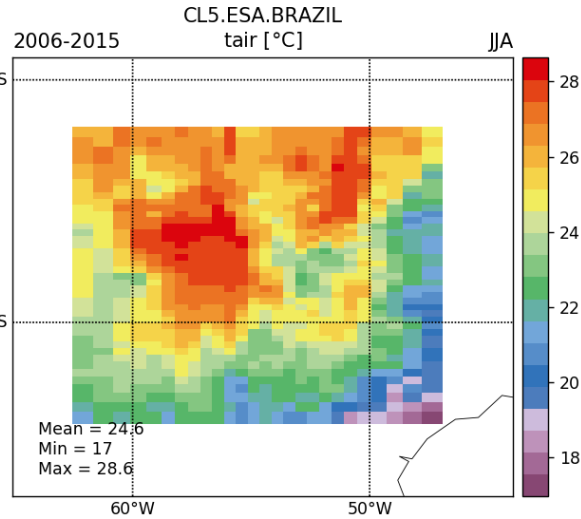
Zoomed configurations

Parameter	Africa	Brazil	Siberia	Siberia_bis
day_step			3360	
iperiod			7	
iphysic			35	
clat clon	35.25 10	-54.5 -18	75.5 67	
grossismx grossismy	5	5	5	4
dzoomx dzoomy	0.046 0.066	0.042 0.066	0.058 0.077	
taux tauy			3	
tetagdiv tetagrot tetatemp	1200	1200	1200	800
cell size in zoom center	54.8 km 28.2 km	52.9 km 28.2 km	21.7 km 28.2 km	27.2 km 35.3 km

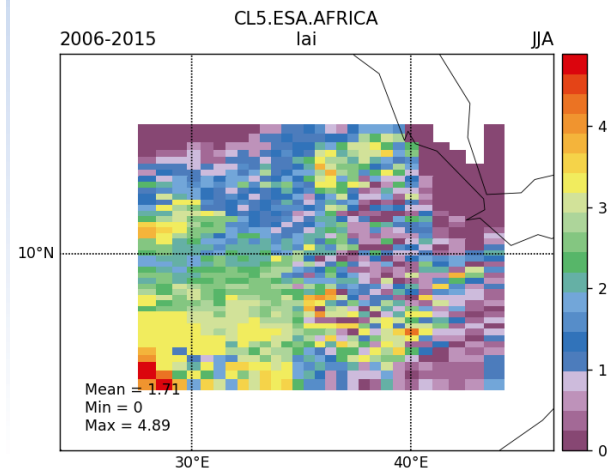
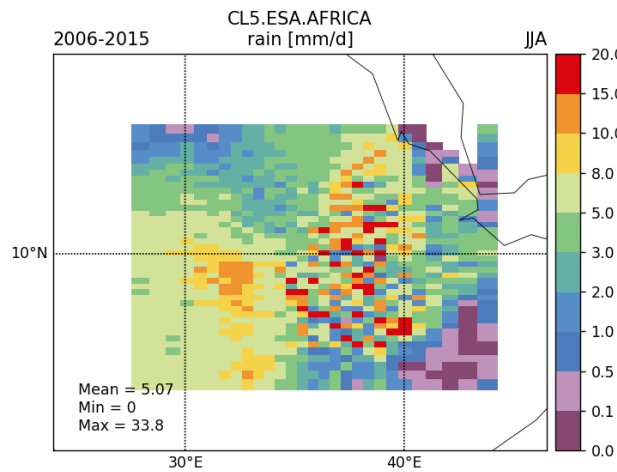
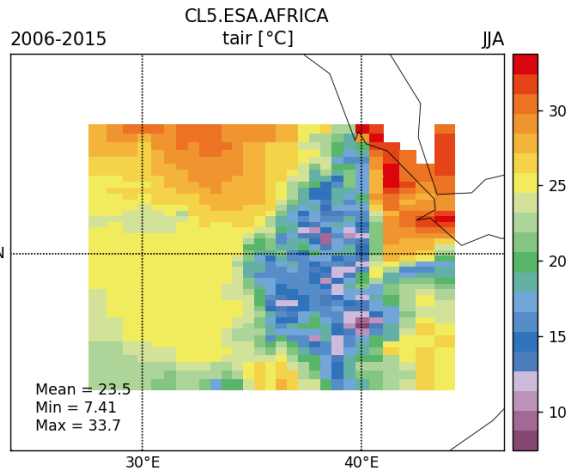
**Crashing ("hgardfou plantage"
or "les thermiques vont trop haut")**

Brazil and Siberia : no problems identified

Air temperature, precipitations and leaf area index in summer

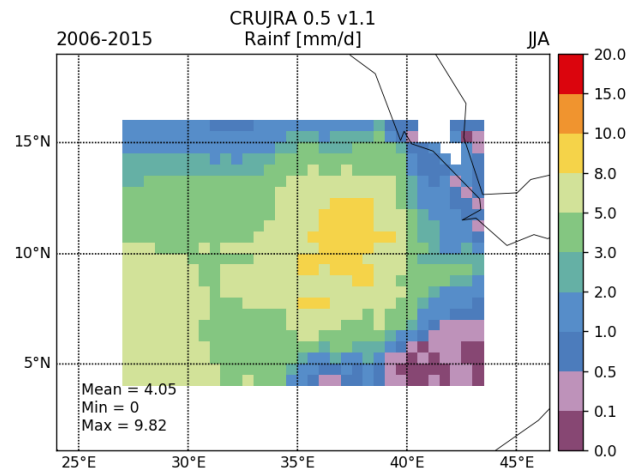
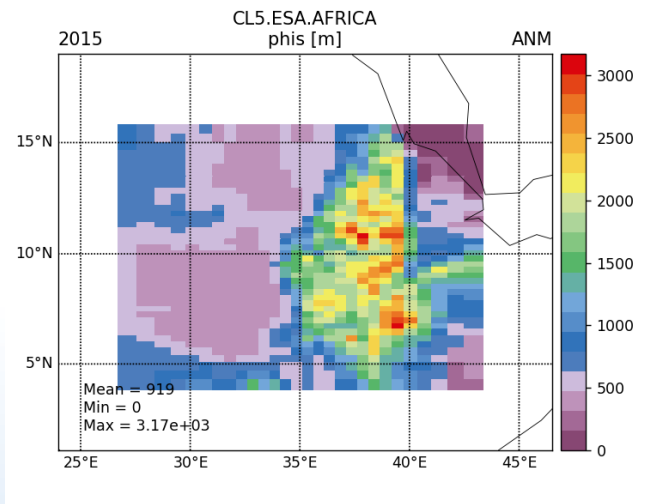


Africa : too much rainfall

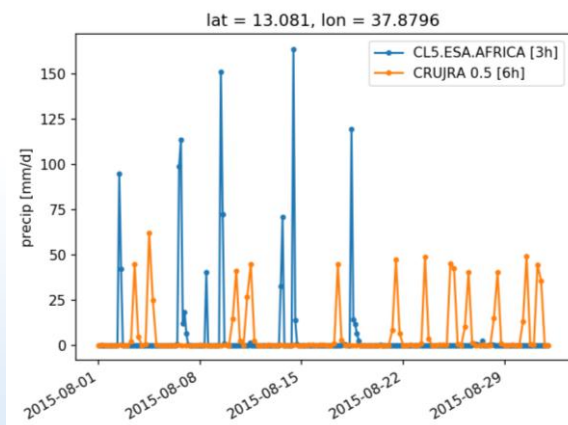
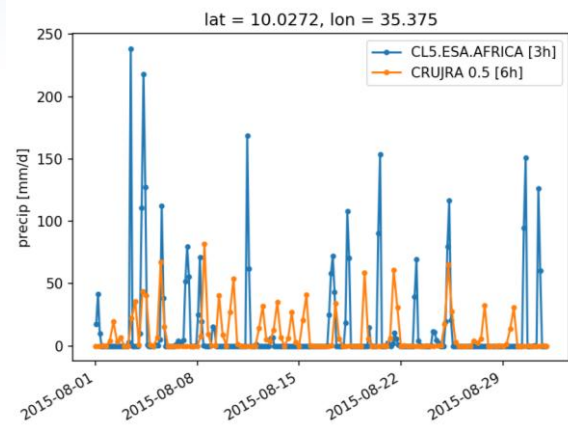
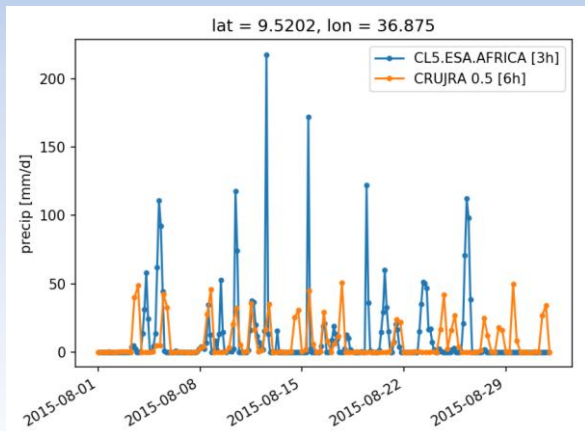


High variance
of topography

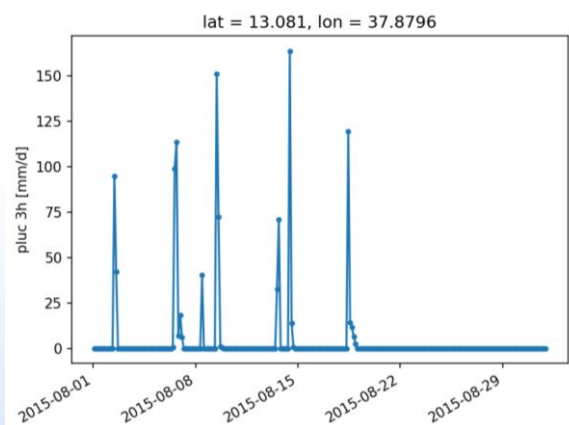
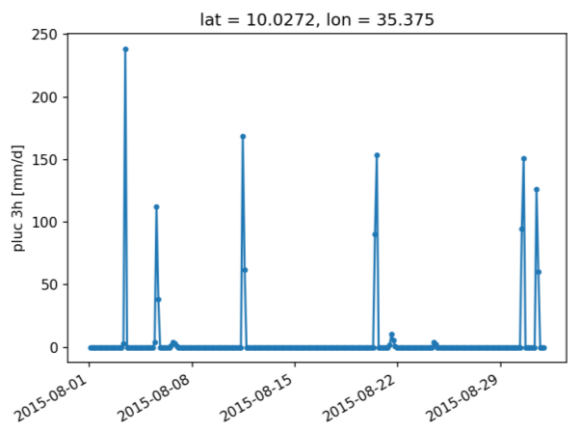
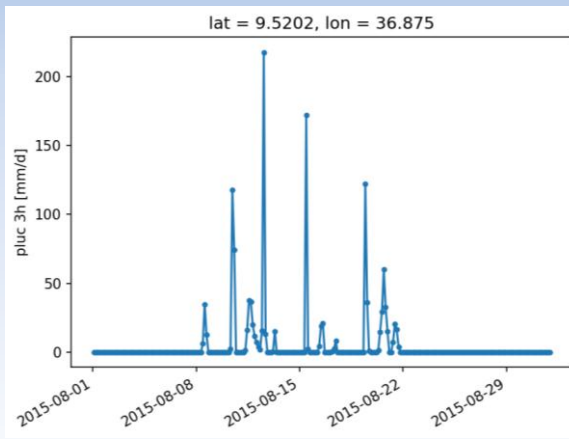
Comparison with
meteo forcing



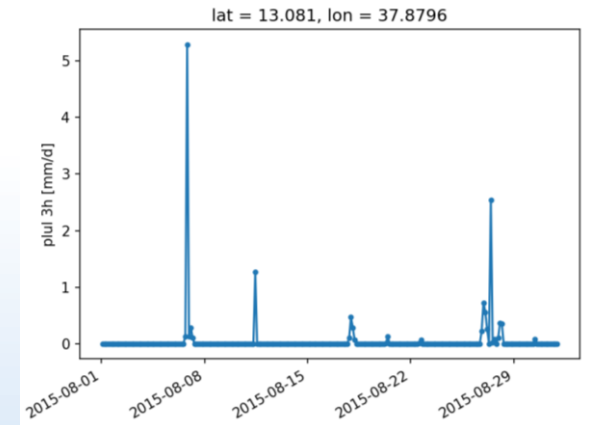
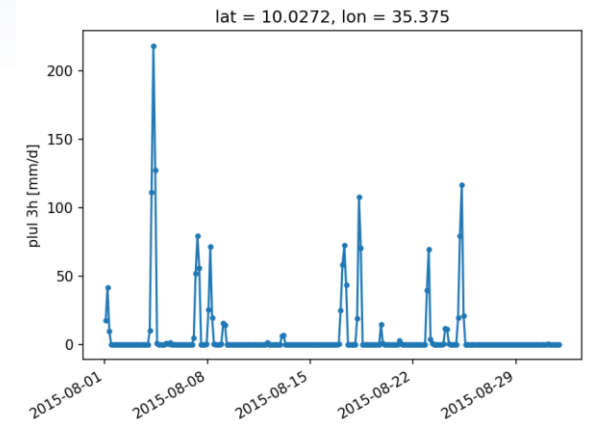
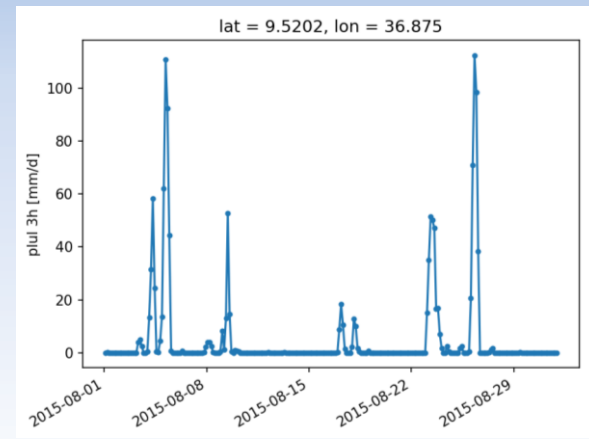
Total Precipitations



Convective



Large-scale



For more results :

Coupled simulations results :

<https://orchidas.lsce.ipsl.fr/mapper?set=ESA.HRLC&mode=CL>

Forced simulations results :

<https://orchidas.lsce.ipsl.fr/mapper?set=ESA.HRLC&mode=FR>

A closer look on Africa :

<https://orchidas.lsce.ipsl.fr/dev/lccci/africa.php>

Some questions

- **How to solve the African Rainfall issues ?**
 - **Other parameters to optimize ?**
 - **Which Spatial / Temporal scale are “suitable” to study Atmosphere – Land Cover feedbacks**
- **Siberian region**
 - **How to make Zoom 5 running ?**
- **Can we increase Zoom coef to have smaller grid cell in the zoom area (smaller than 50 x 30 km) ?**