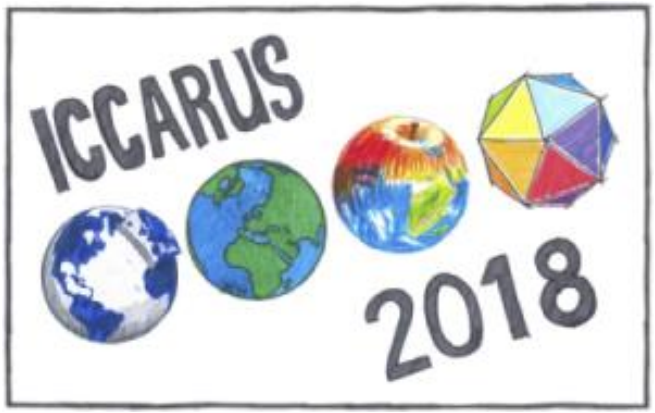


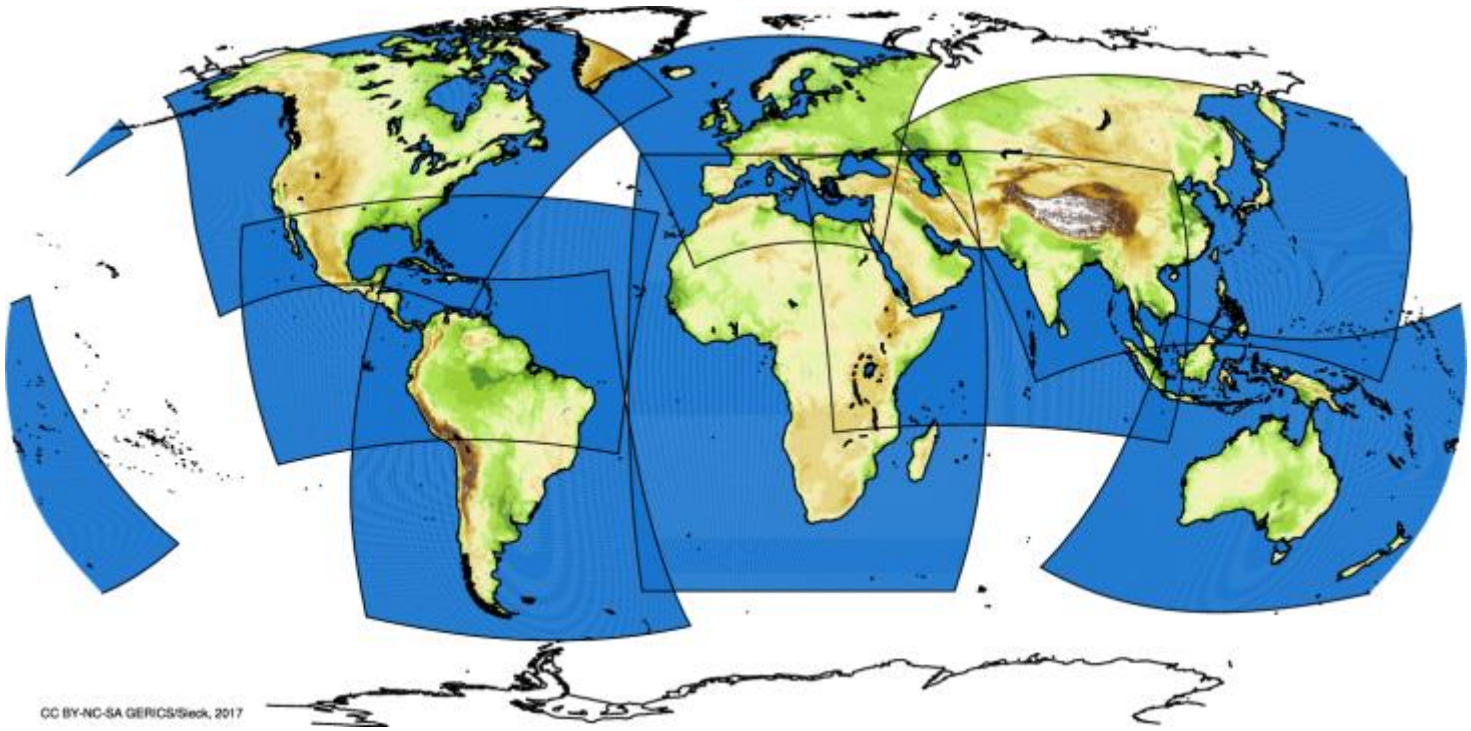
The COSMO-CLM contribution to CORDEX-CORE Africa

28th of Februari 2018

Jonas Van de Walle, O. Brousse, S. Soerland, B. Frueh, H. Feldmann, M. Demuzere, H. Wouters, H-J.Panitz, A. Dosio, E. Bucchignani, W. Thiery, N. van Lipzig

1. What is CORDEX-CORE?

Baseline set of homogeneous downscaled climate projections of regions worldwide.



1. Can we improve state-of-the-art?

Clim Dyn (2014) 42:3015–3038
DOI 10.1007/s00382-013-1834-5

COSMO-CLM (CCLM) climate simulations over CORDEX-Africa domain: analysis of the ERA-Interim driven simulations at 0.44° and 0.22° resolution

Hans-Jürgen Panitz · Alessandro Dosio ·
Matthias Büchner · Daniel Lüthi · Klaus Keuler

Received: 29 January 2013 / Accepted: 4 June 2013 / Published online: 5 July 2013

1. Sensitivity tests + choice: IFS SSC k50

Parameter	Default (COSMO 5.0)	CORDEX-Africa	Values after tests
Model version		COSMO 4.8 CLM 17	**COSMO 5.0 CLM 9**
Lake representation	Terra	Terra	Terra + **FLake**
Top layer height	23	30	30
Rayleigh sponge layer height	11	18	18
Vertical resolution (# layers)	20	35	**50**
External fields (land use, soil, aerosols, albedo)	itype_aerosol = 1 itype_albedo = 1	itype_aerosol = 2 itype_albedo = 2	itype_aerosol = 2 itype_albedo = 2
Convection scheme	Tiedtke	Tiedtke	**IFS**
Cloud scheme		icldm_rad = 4 itype_wcld = 2	**SSC** (icldm_rad = 2 itype_wcld = 2)
Tuning parameters (nrdtau, q_crit, rat_sea, tur_len, crsmin)	(5.0, 4.0, 20.0, 500.0, 150.0)	(10.0, 4.0, 20.0, 500.0, 150.0)	(10.0, 4.0, 20.0, 500.0, 150.0)
Horizontal resolution		0.44 °	0.44 °

Evaluation of 2005

OBSERVATIONS

1989-2008
ERA-Interim driven
0.44° resolution

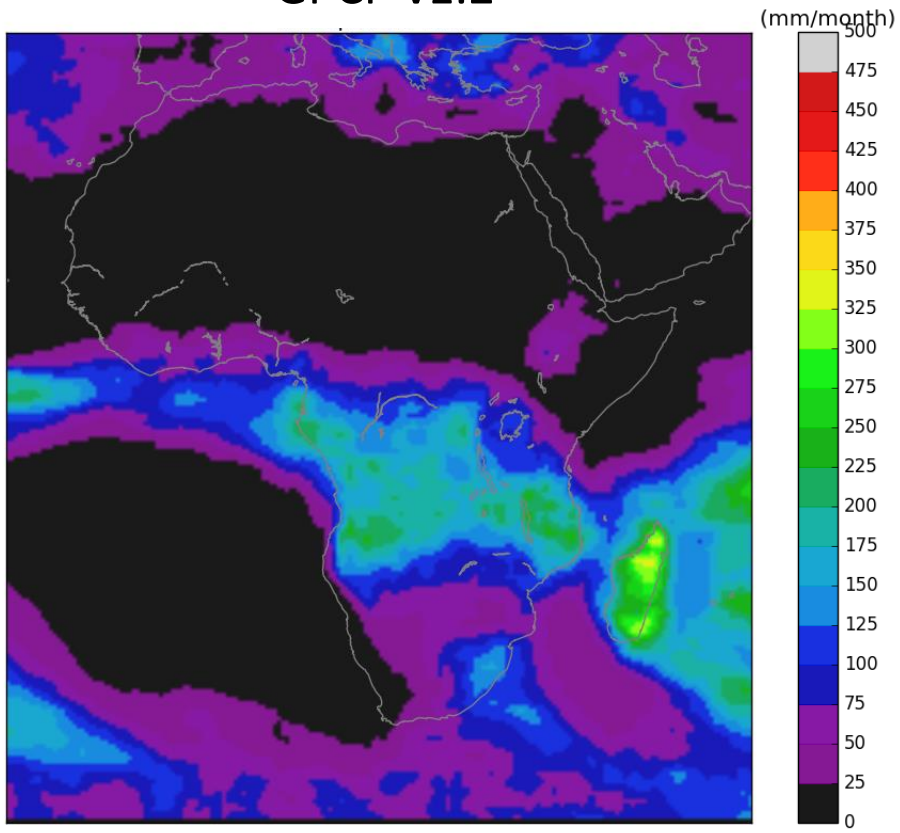
CA

2003-2005
ERA-Interim driven
0.44° resolution

IFS SSC k50

Precipitation 2005 JFM

GPCP v1.2



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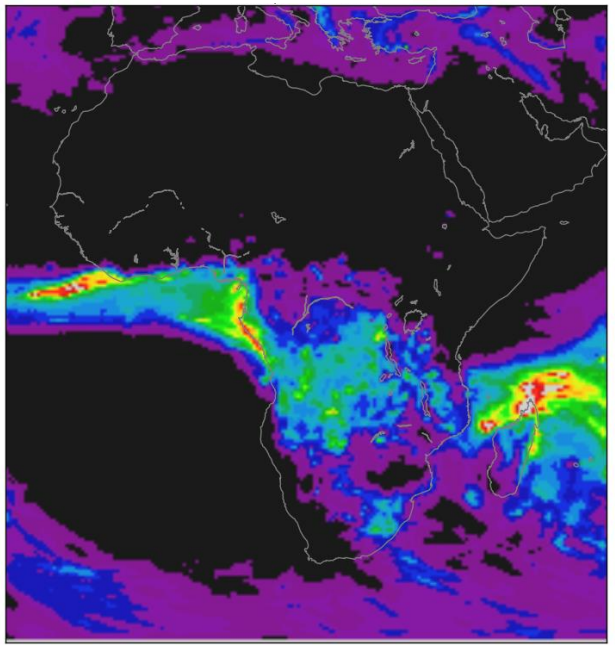
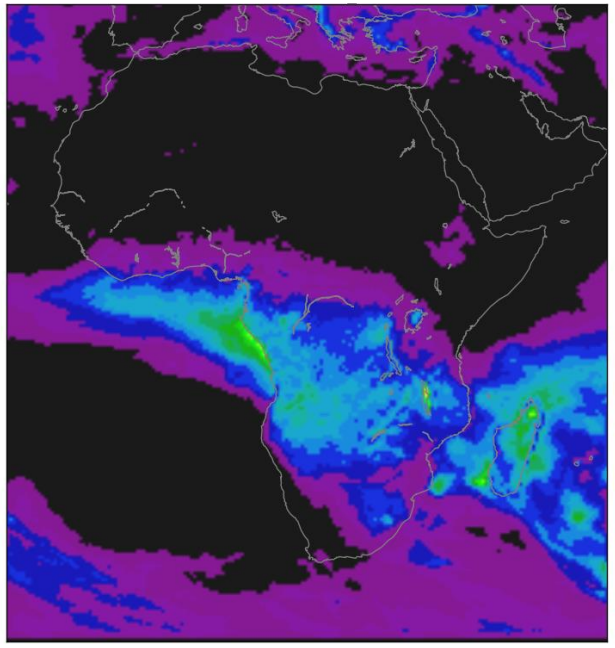
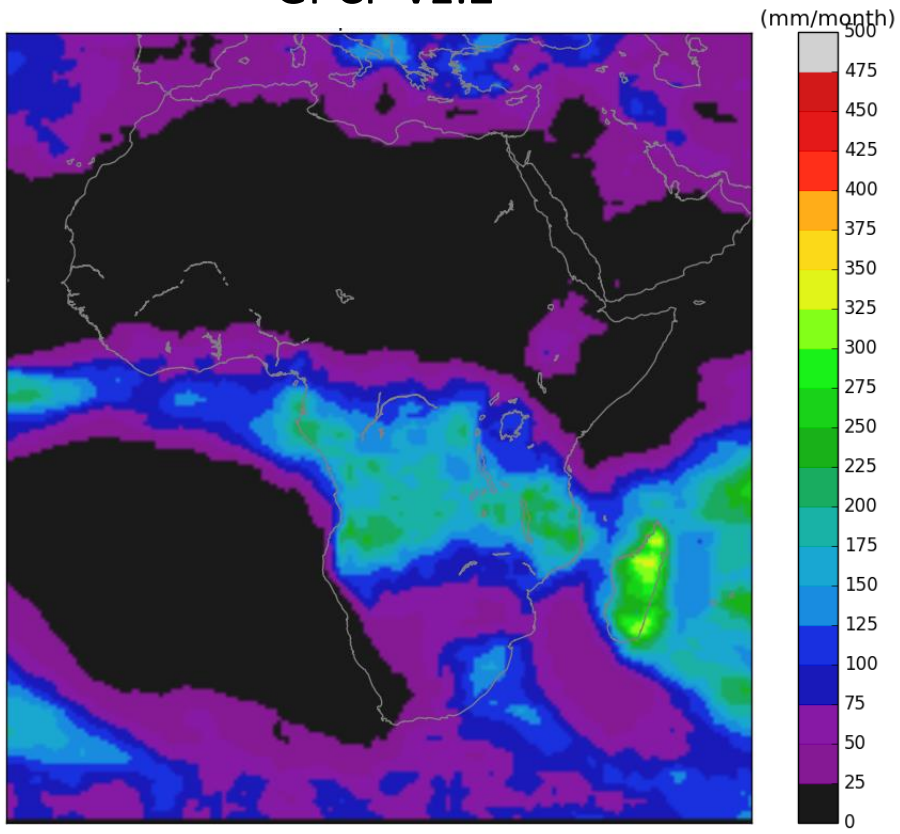


IFS
SSC
k50



Precip. bias 2005 JFM

GPCP v1.2



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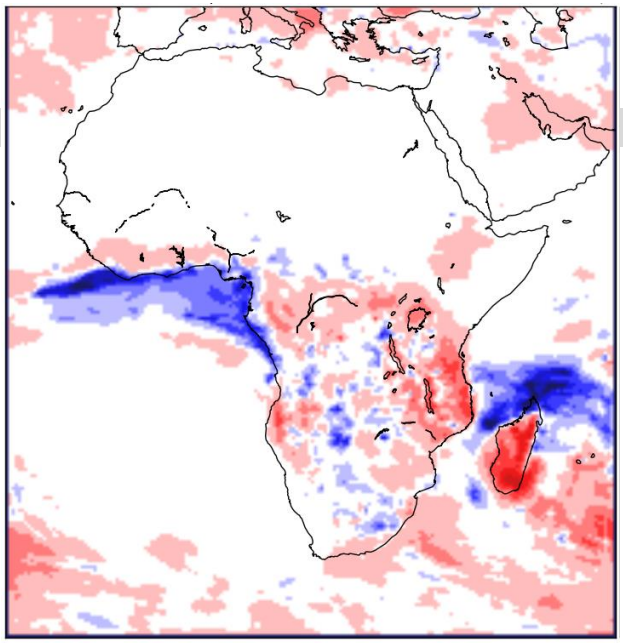
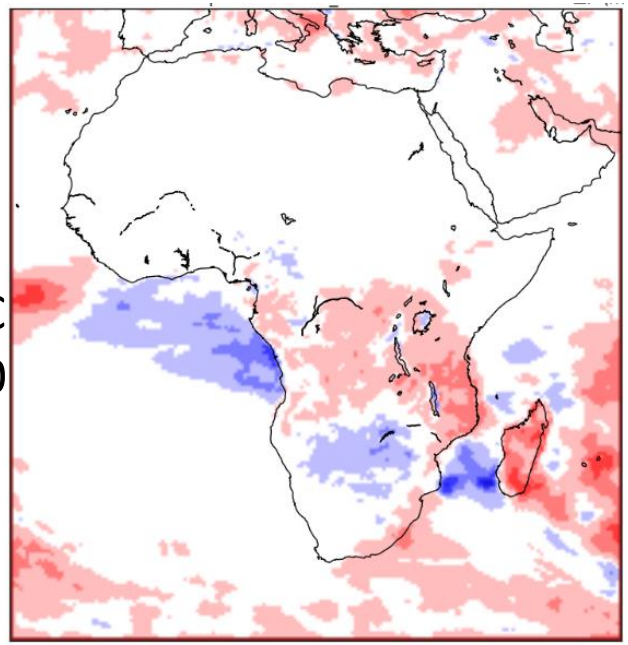
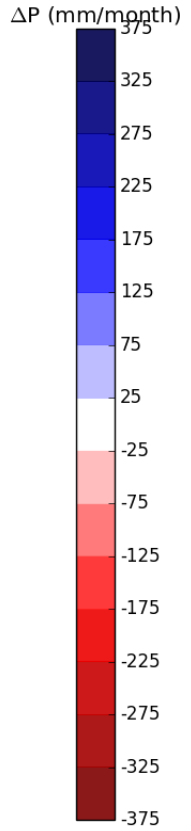


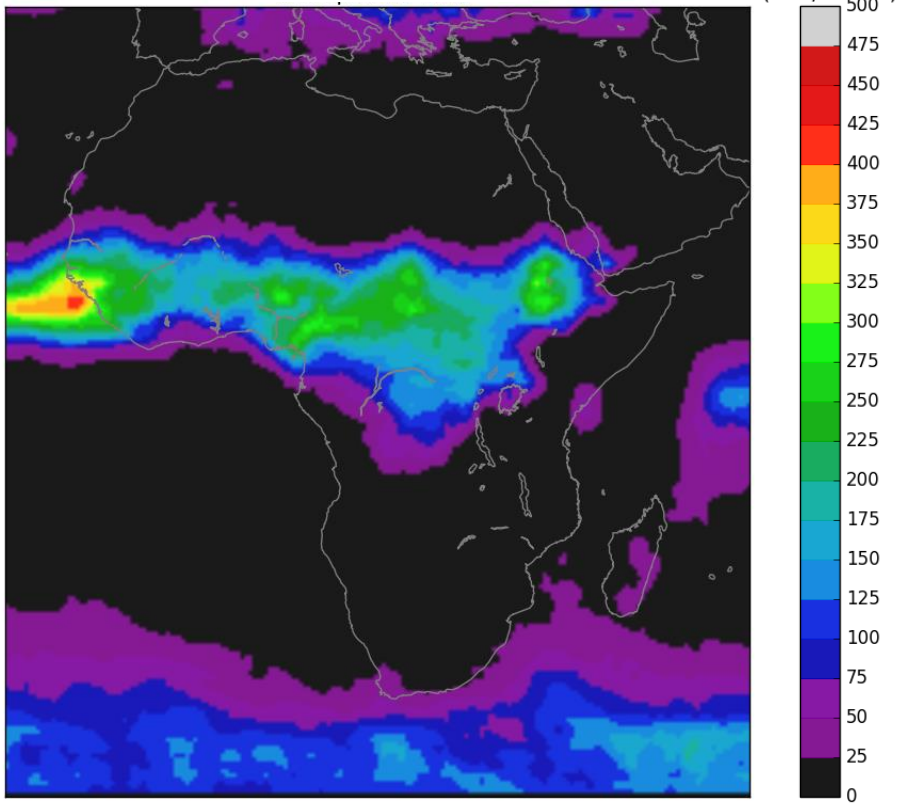
IFS
SSC
k50





Precipitation 2005 JAS

GPCP v1.2



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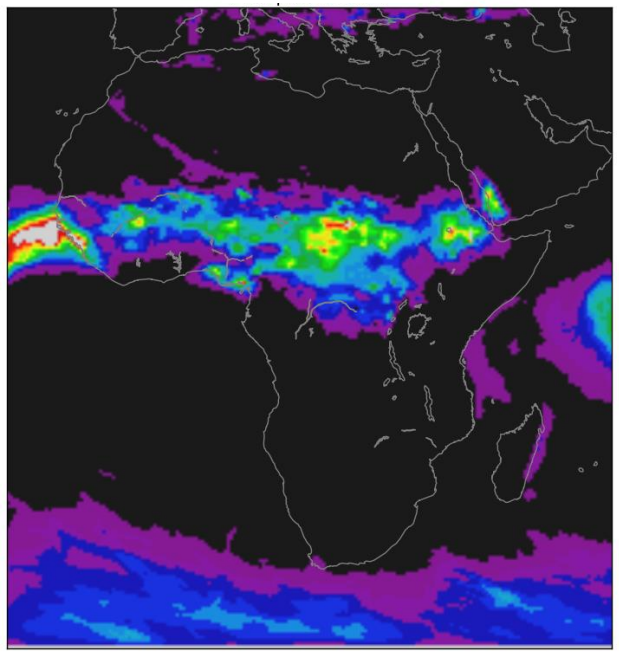
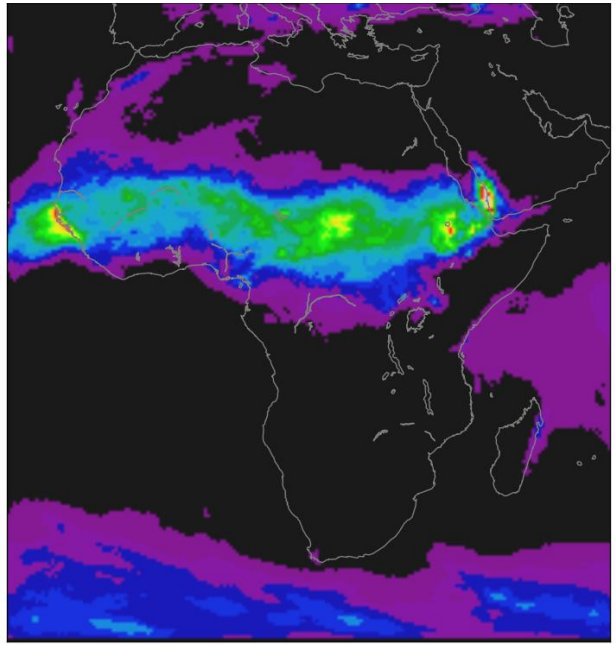
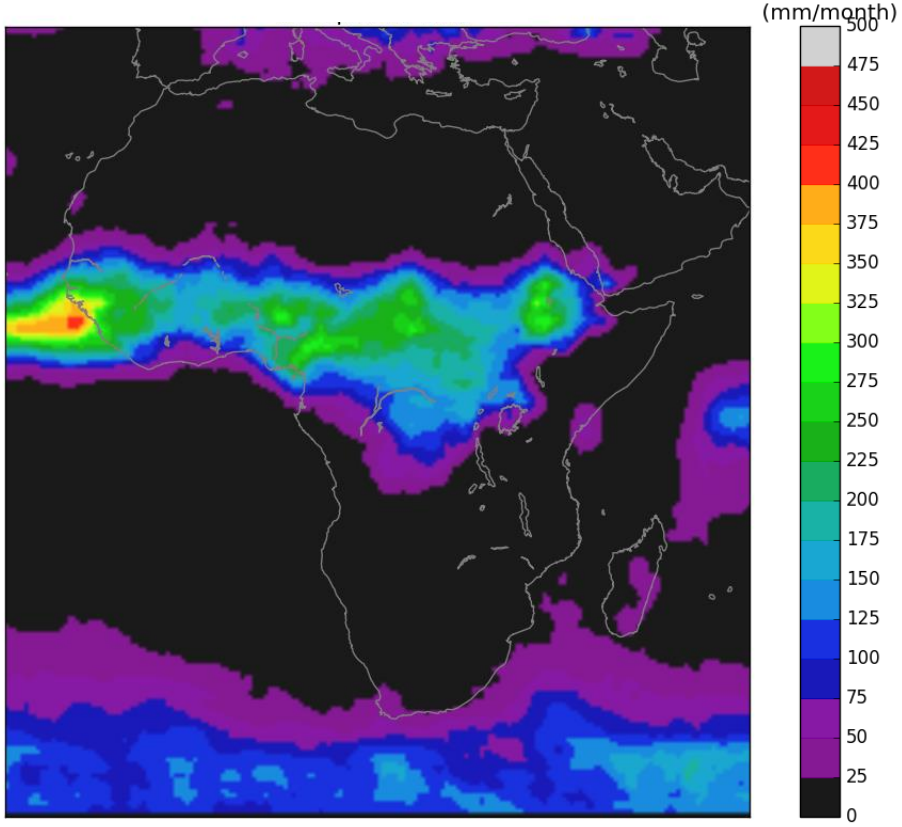


IFS
SSC
k50



Precip. bias 2005 JAS

GPCP v1.2



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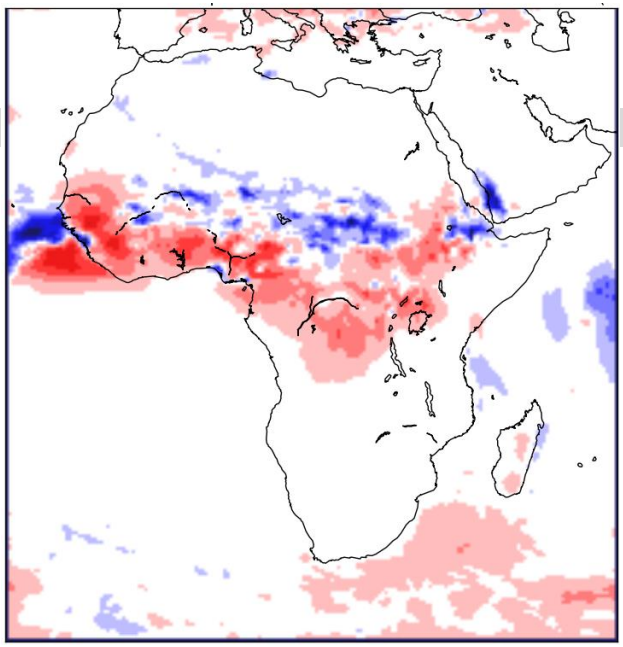
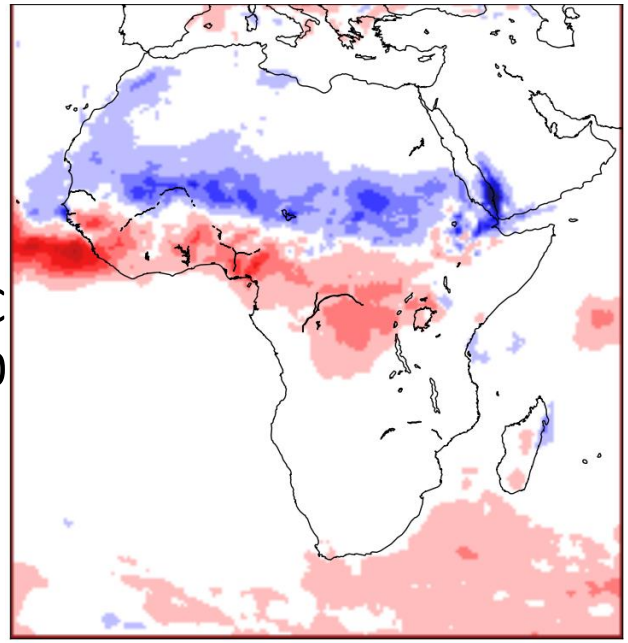
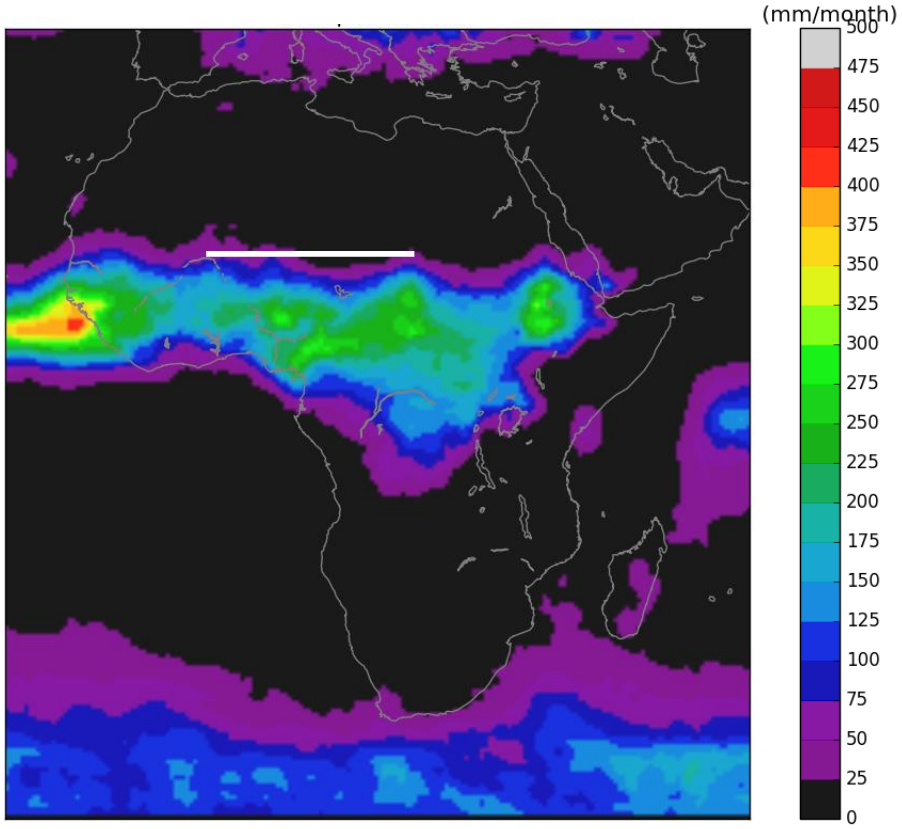


IFS
SSC
k50



Precip. bias 2005 JAS

GPCP v1.2



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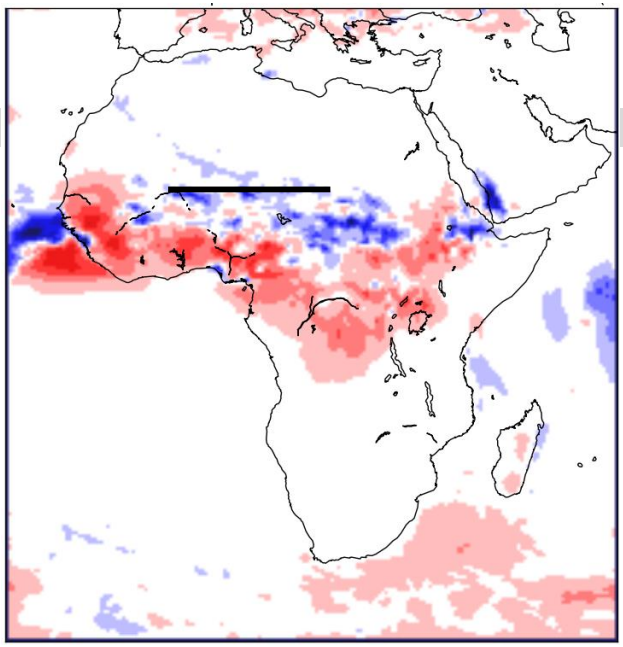
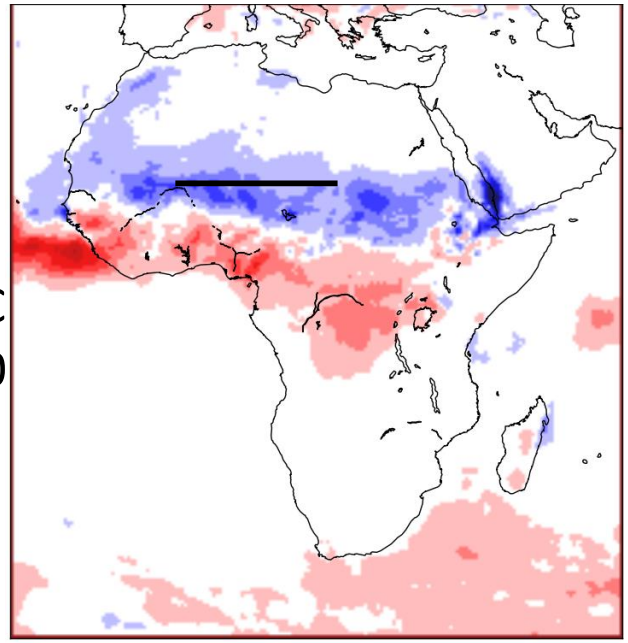
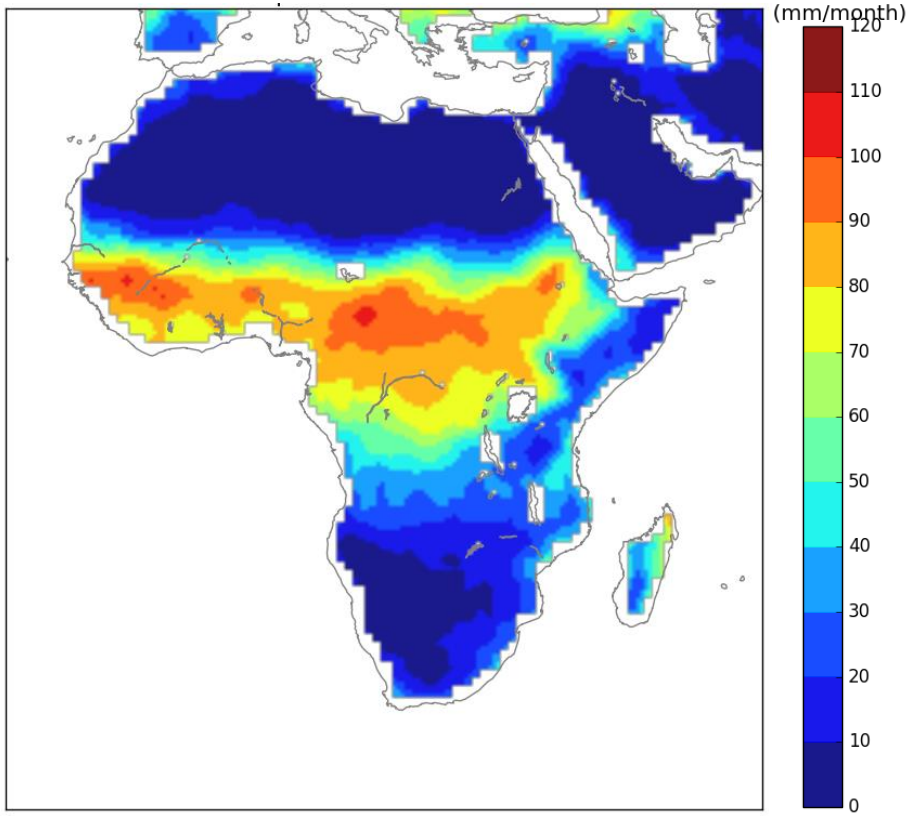


IFS
SSC
k50



ET bias 2005 JAS

LandFluxEVAL



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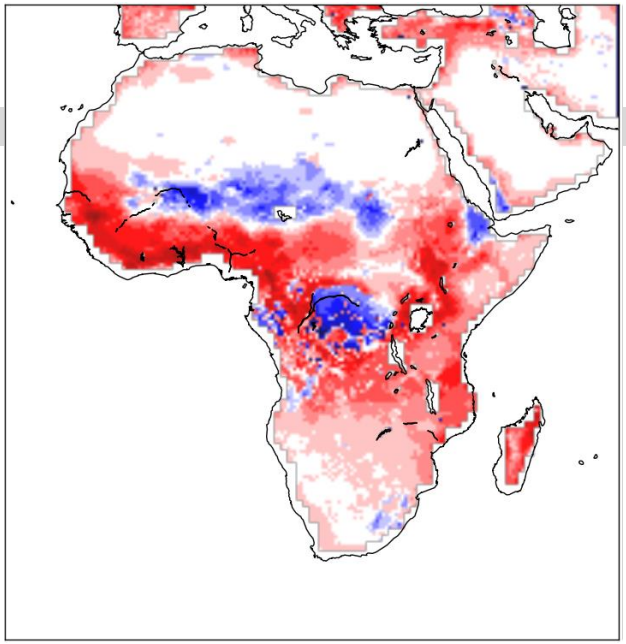
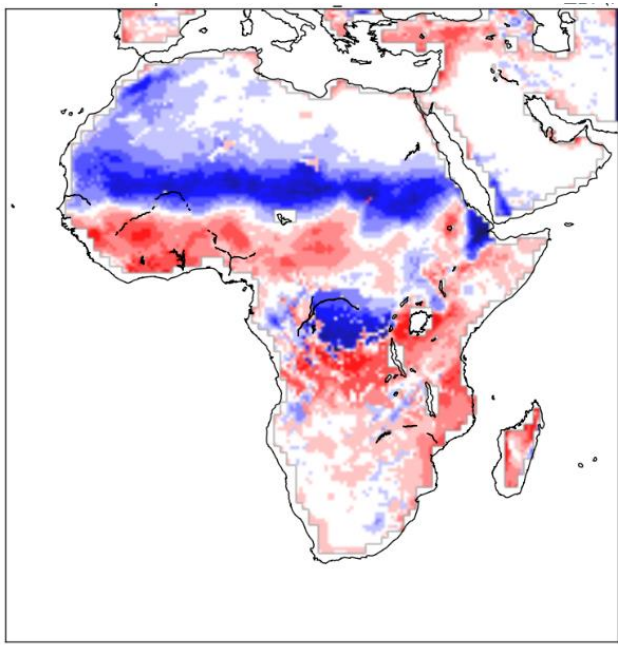
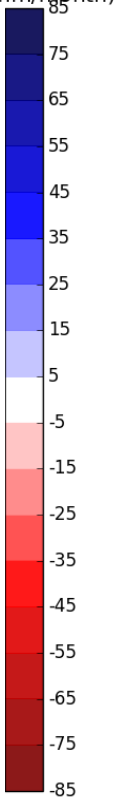


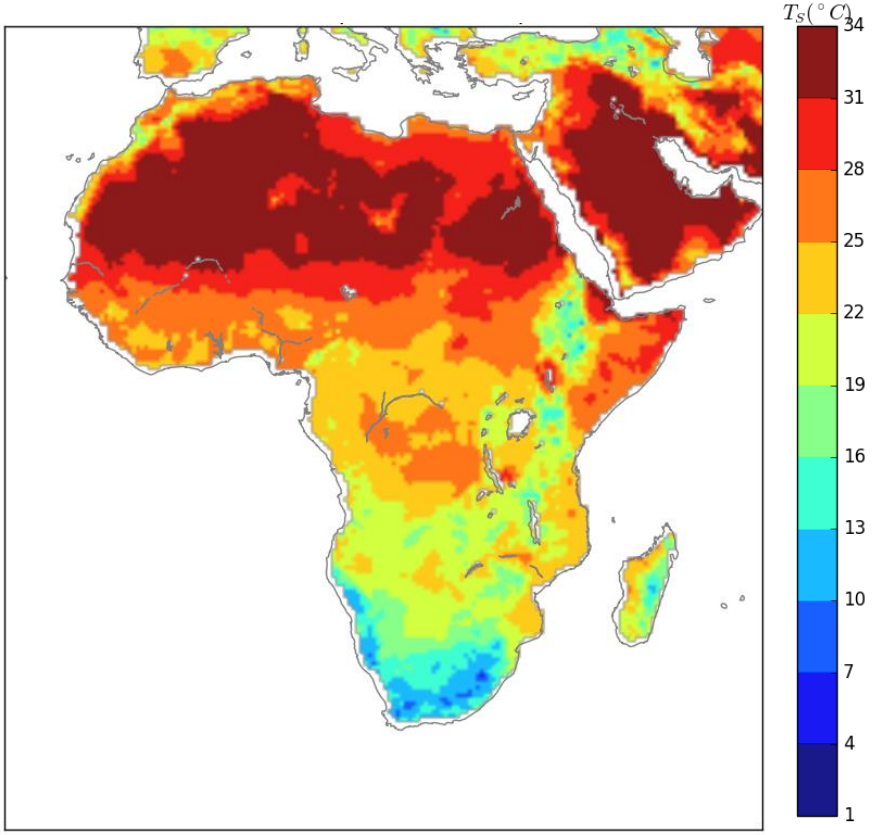
IFS
SSC
k50





Surf Temp bias 2005 JAS

UDEL



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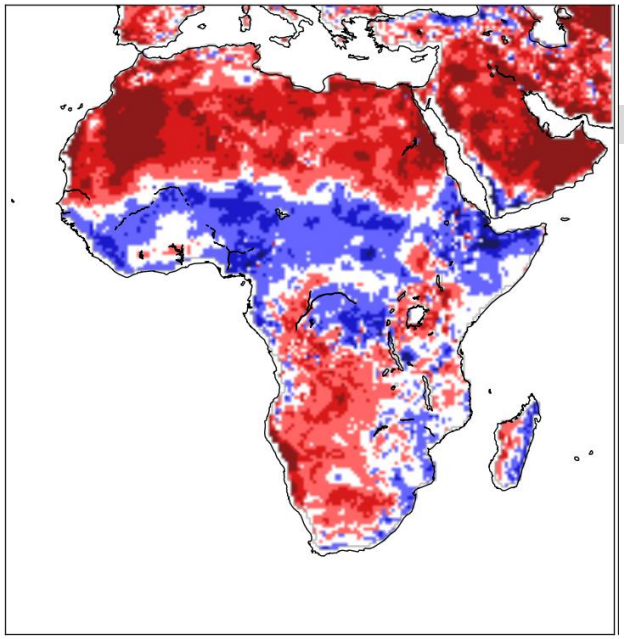
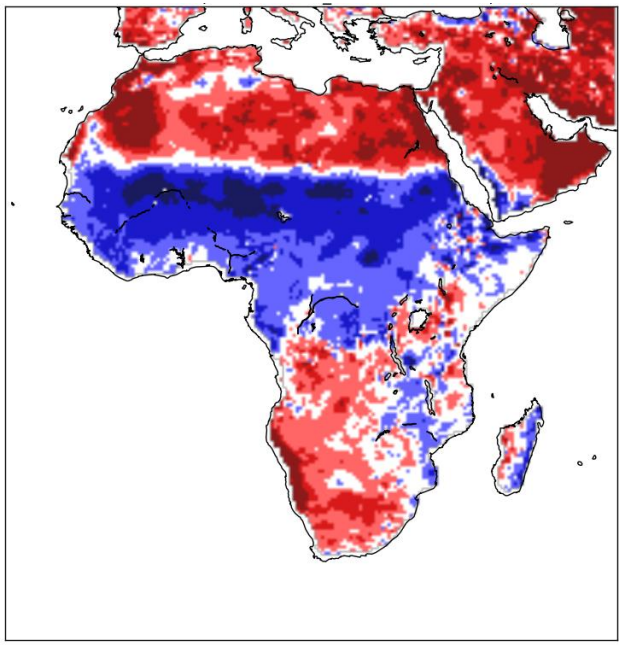
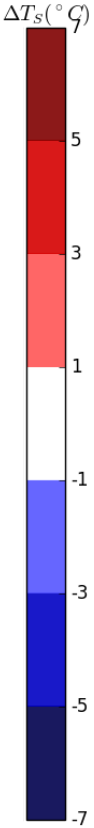


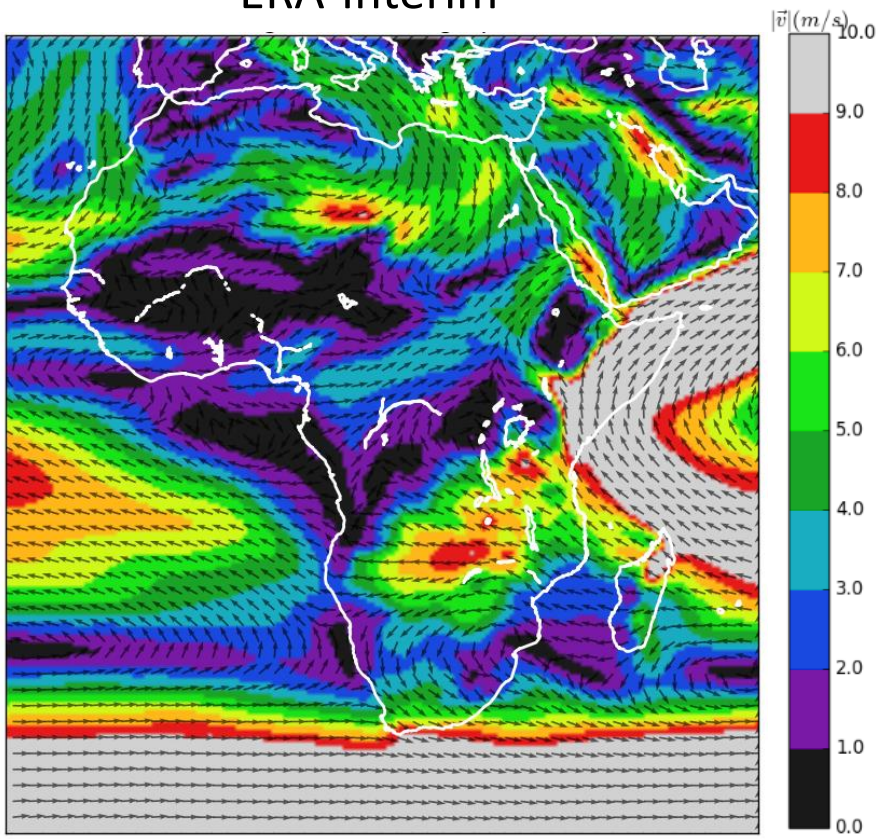
IFS
SSC
k50





Wind 850 hPa 2005 JAS

ERA-Interim



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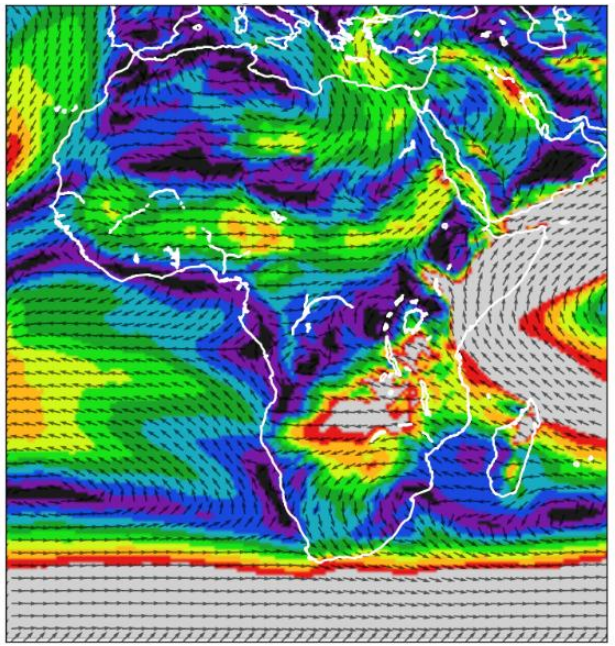
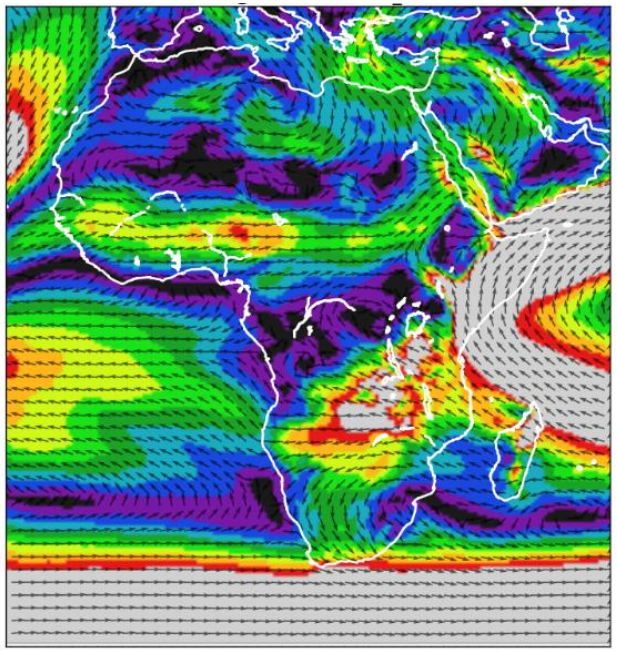
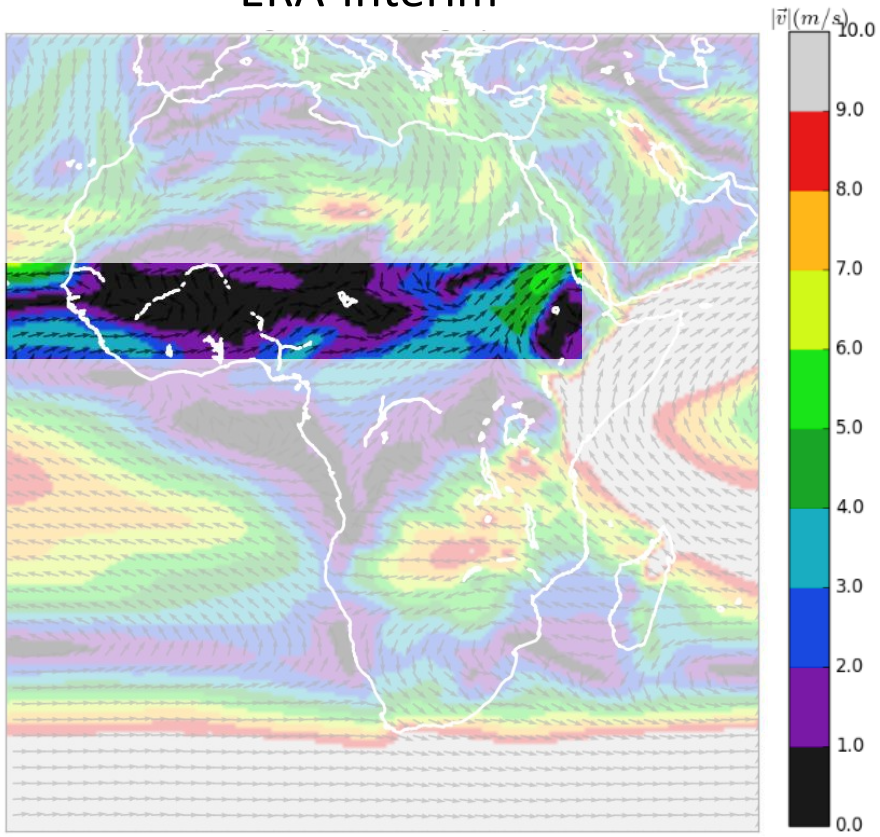


IFS
SSC
k50



Wind 850 hPa 2005 JAS

ERA-Interim



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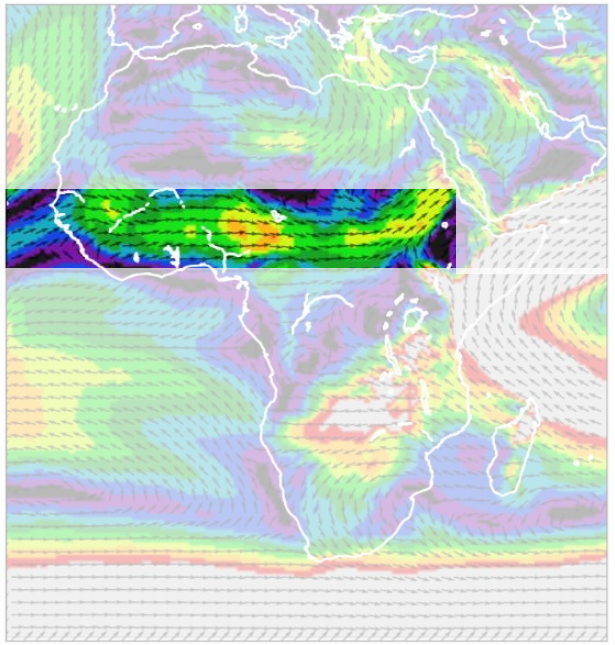
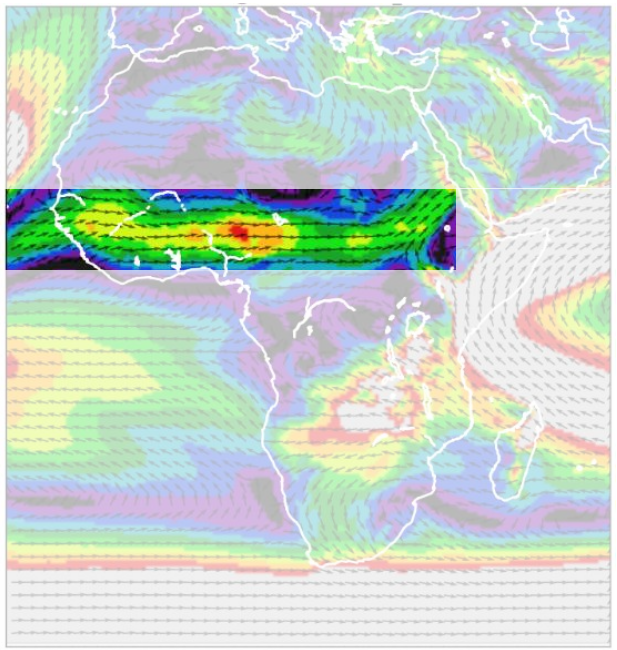
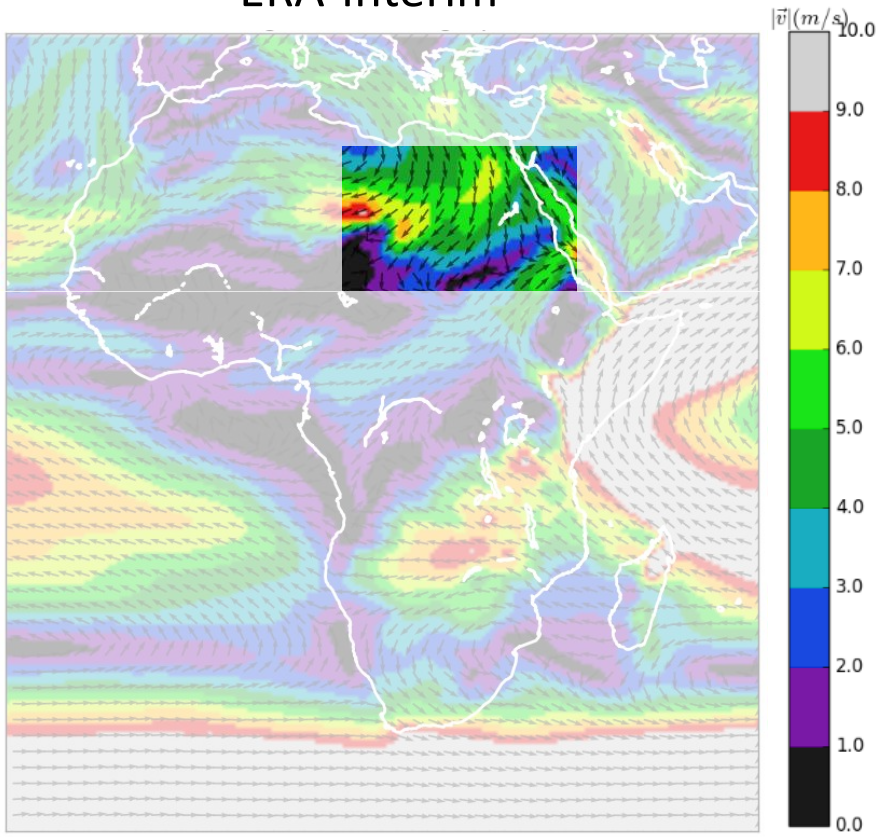


IFS
SSC
k50



Wind 850 hPa 2005 JAS

ERA-Interim



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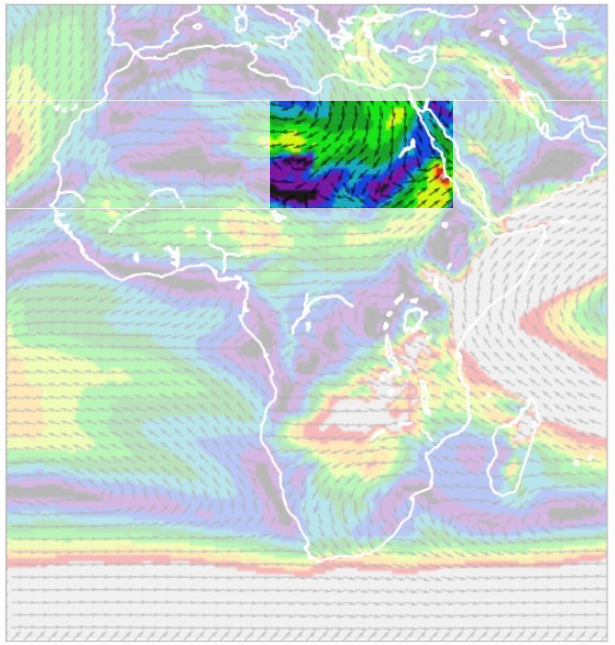
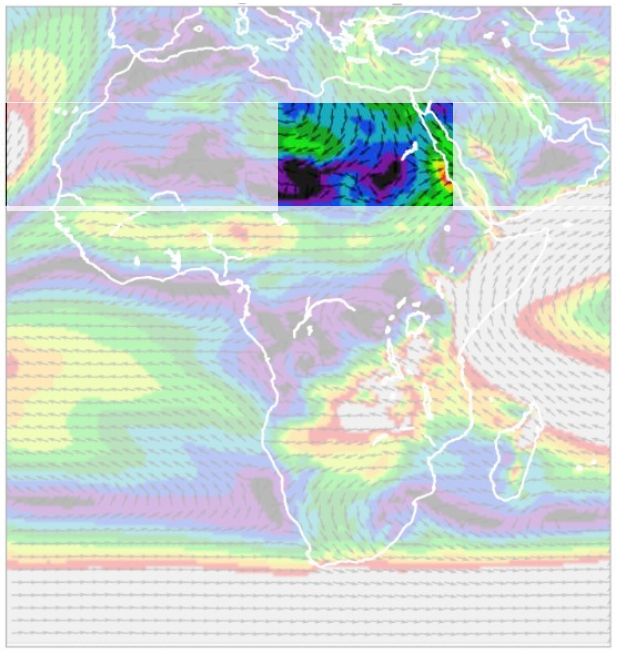


IFS
SSC
k50



Two hypotheses

1. Too strong ITCZ winds influence its location

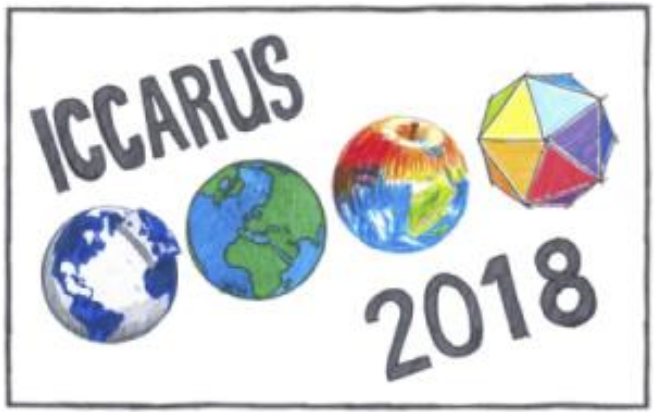
2. Overreflectance of clouds affects the energy budget

Conclusions

1. IFS SSC k50 setup

2. General reduction of biases, but shift of the ITCZ
   → no improvement

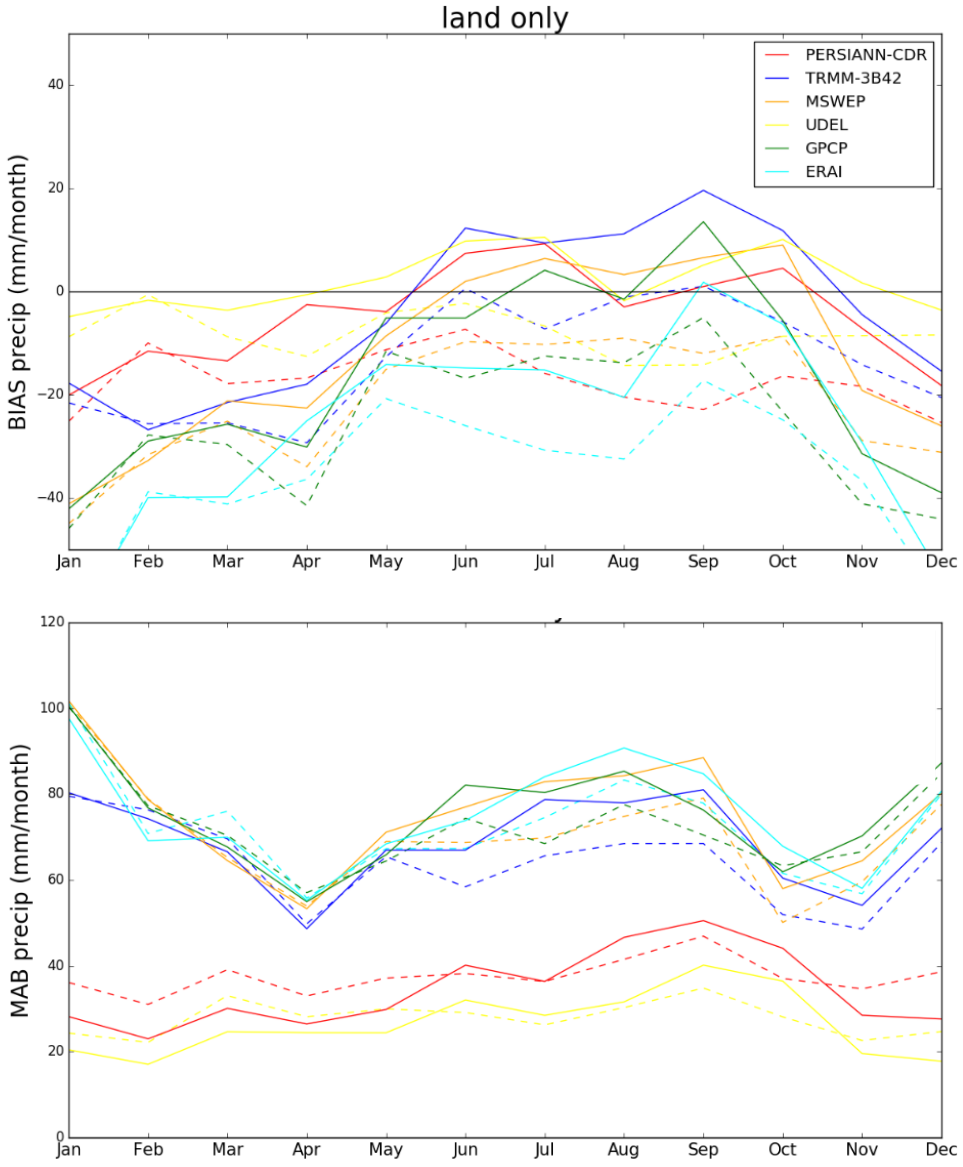
3. Two hypotheses: dynamics / cloud reflectivity



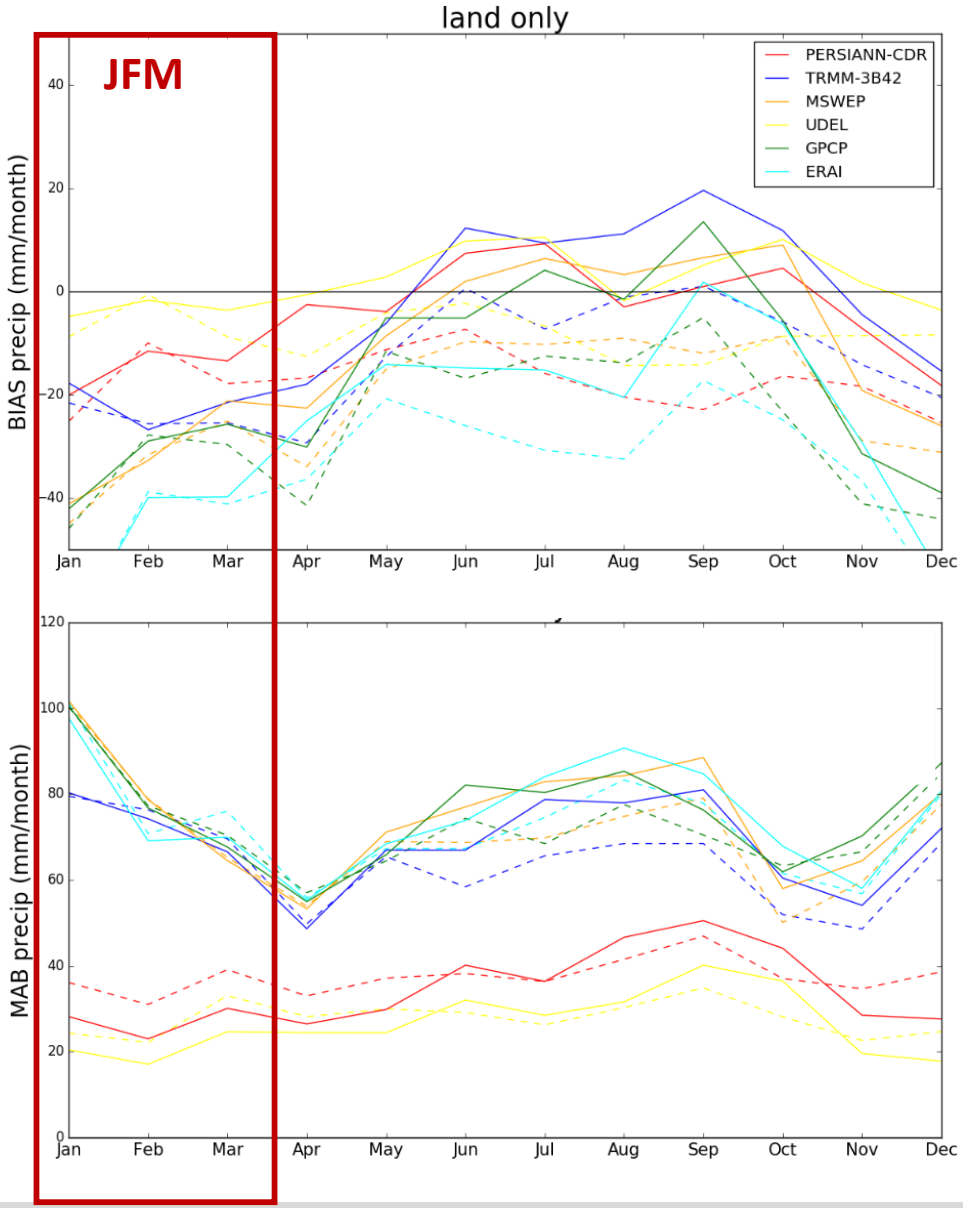
Thank you!

jonas.vandewalle@kuleuven.be

Precipitation 2005



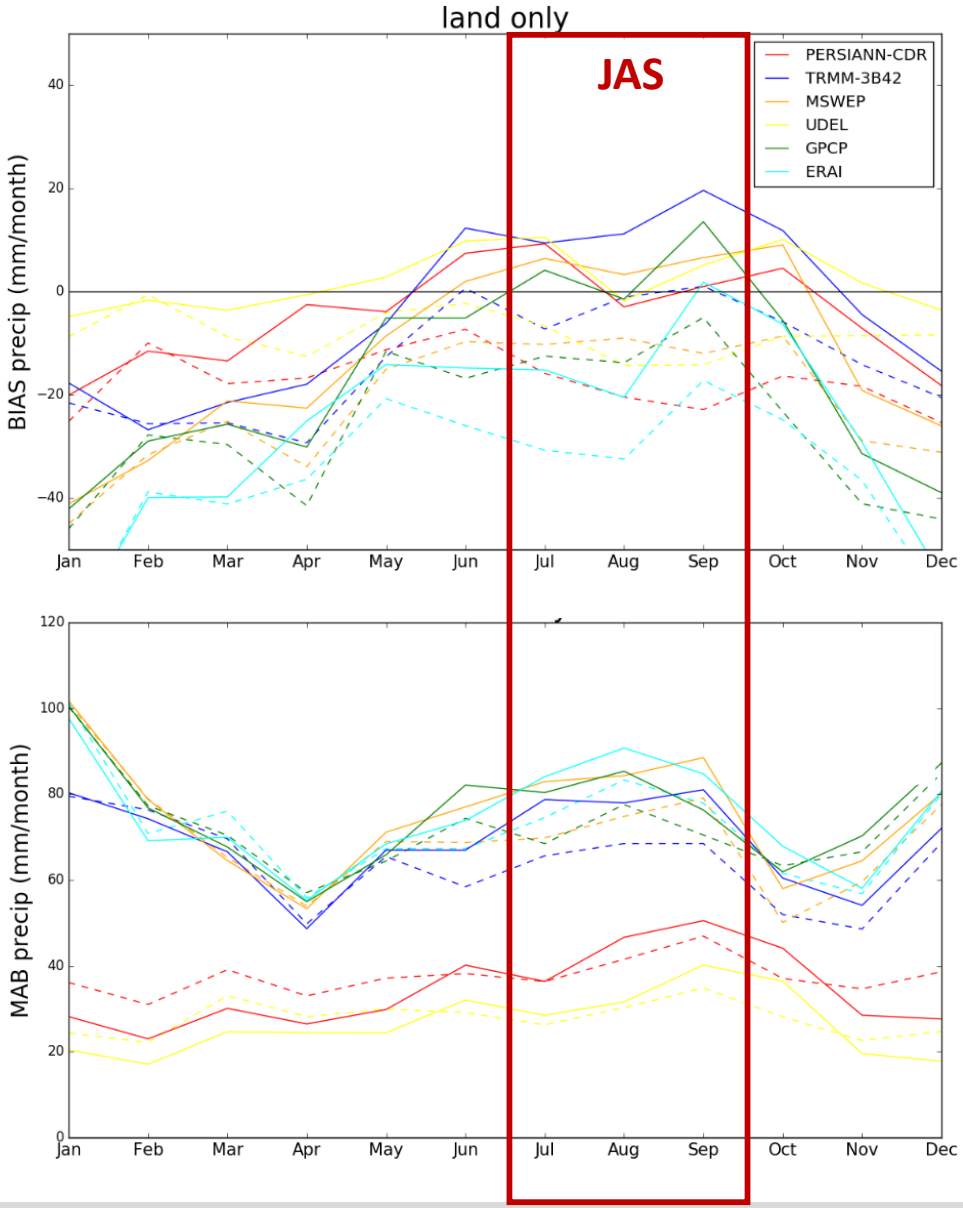
Precipitation 2005



JFM No quantitative improvement

Local peaks
→ smoother, more realistic

Precipitation 2005



JFM No quantitative improvement

Local peaks
→ smoother, more realistic

JAS Better total precipitation amount

Local peaks
→ smoother, more realistic

Northward shift of ITCZ