



On the radiation budget in regional climate simulations for West Africa

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- Appetizer: West African Monsoon
- Radiation budgets in ENSEMBLES RCMs
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West-African Monsoon System





The WAM is driven by the latitudinal thermal gradient between the cold sea surface temperatures in the Guinea Gulf and the high surface temperatures in the Saharan Heat Low region

In the following: Monsoon season, 1990 - 2006

COSMO-CLM in ECHAM5/ERA-Interim



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COSMO-CLM in ECHAM5/ERA-Interim

OLR:



Explanation/Part 1



ECHAM5 - ERAInt SST JJAS clim





ECHAM5 overestimates SST in the source region ...

Explanation/Part 2



CCLM_EC5-CRU T2m

CCLM_ERAINT-CRU T2m



Rad. budget of ENSEMBLES RCMSERSITÄT



GROUP	MODEL
DMI	HIRHAM
GKSS ->HZG	CCLM
HC	HadRM
ICTP	RegCM
KNMI	RACMO
METNO	HIRHAM
MPI	REMO
SMHI	RCA
UCLM	PROMES

http://ensembles-eu.metoffice.com/

Forced by ERA-Interim!

Evaluation period: 1990 - 2006 (Sat. data limits the period)



Mean Summer Solar Net Downwelling Flux at SFC (Ref: GEWEX/SRB)



... there are uncertainties

Rad. budget of ENSEMBLES RCMS^{GOETHE} Explained Variance of Solar Errors: [Cor(ΔA-TS, ΔRad-TS)]²,...



Rad. budget of ENSEMBLES RCM







Albedo in COSMO-CLM / 1



Using MODIS based background albedo for bare

soils => higher albedos in the Sahara =>



D Luethi, HJ Panitz, M Büchner

Albedo in COSMO-CLM / 2





Consideration of grid-scale slope in

parallel-beam albedo dependence on sun elevation

beam-perpendicular surface area

Albedo in COSMO-CLM / 2







Conclusions

- COSMO-CLM is warming up over Africa (too warm already over the Sahara ...)
- albedo a "simple" process has still room for improvement
- a small change can have a large impact

Nature never breaks her own laws. - Leonardo da Vinci

C-CLM Projection (A1b)





C-CLM Projection (A1b)



COSMO-CLM precipitation 2071-2100 minus 1961-1990



COSMO-CLM precipitation 2071-2100 minus 1961-1990



