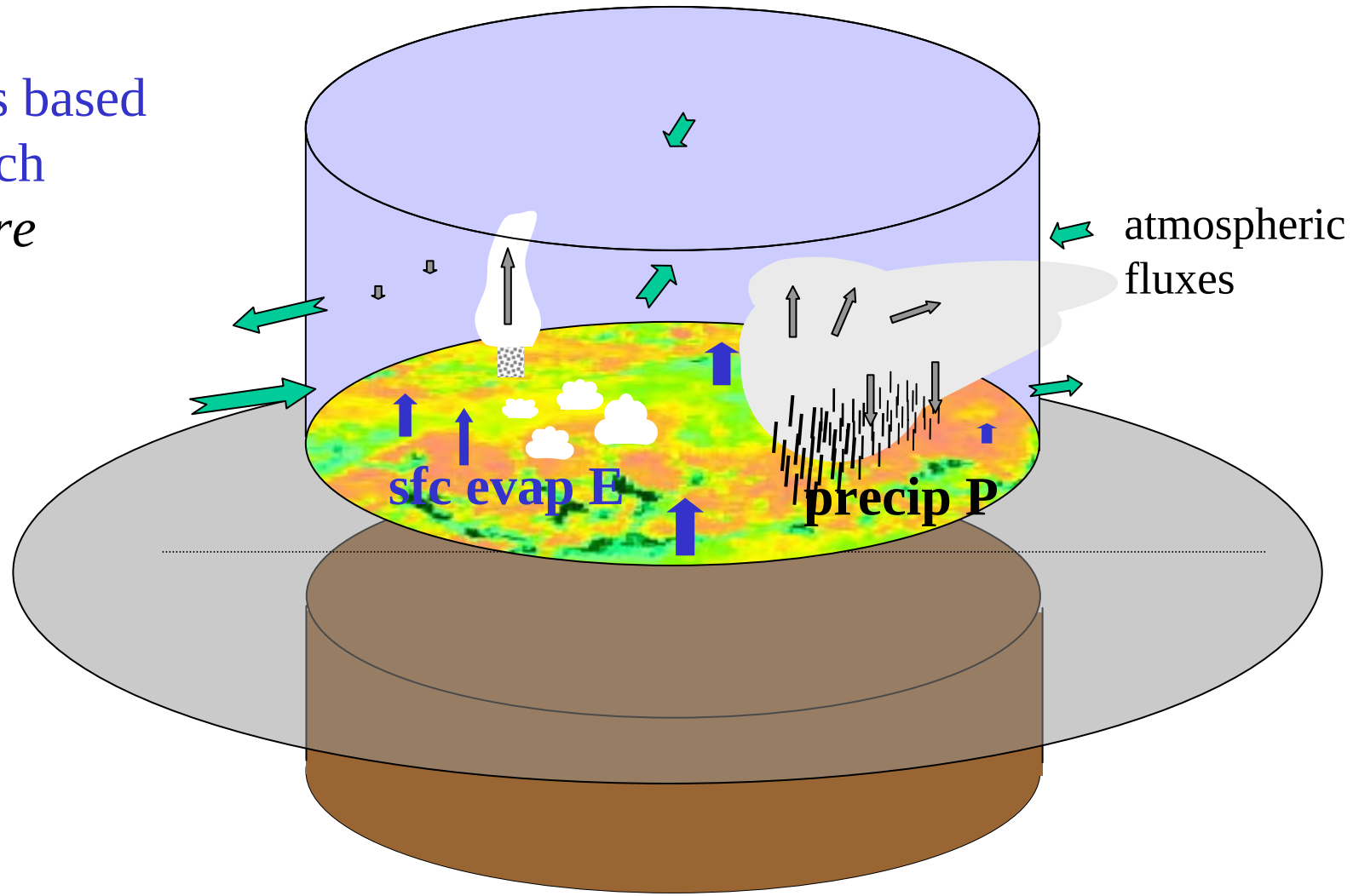
for WP1.2 evening meeting, 21 Sept 2005, Francoise Guichard

atmospheric water cycle at large-scale

summary of CRC & CNRM activities

process based approach *moisture budget*



CRC Dijon, materiel from Pascal Roucou

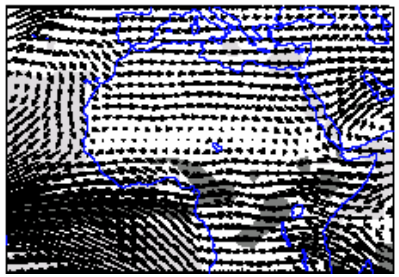
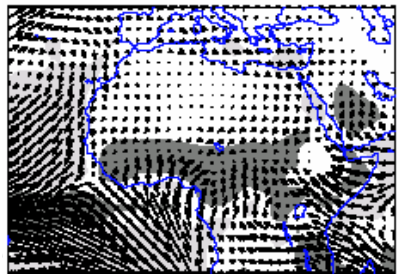
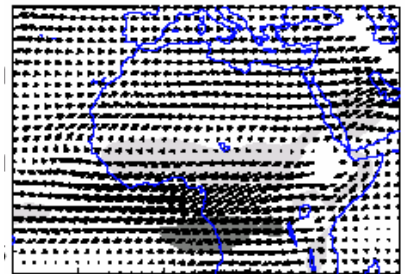
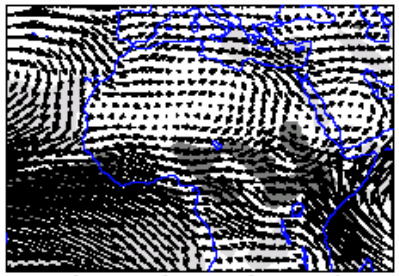
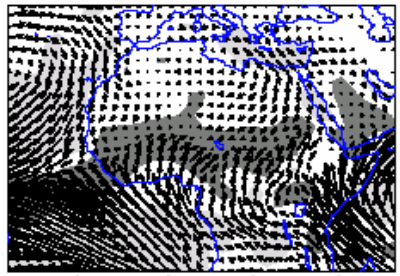
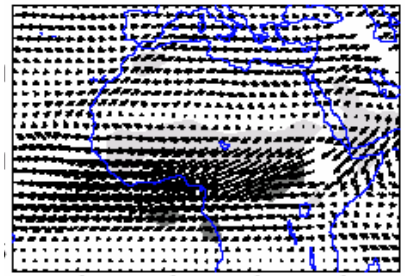
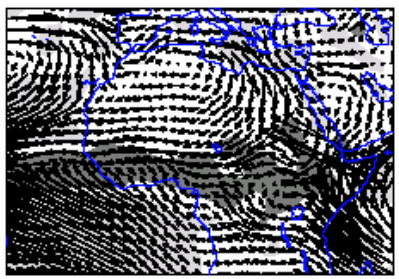
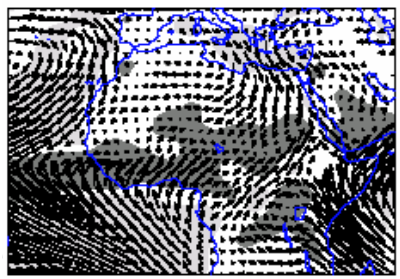
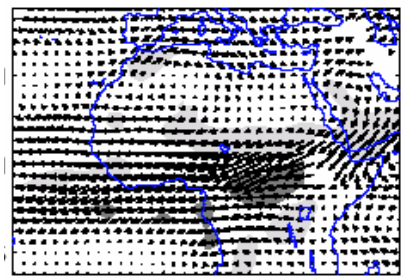
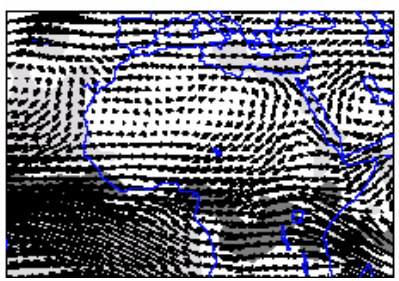
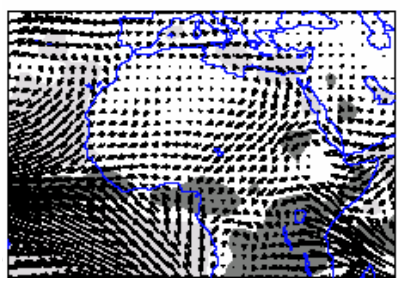
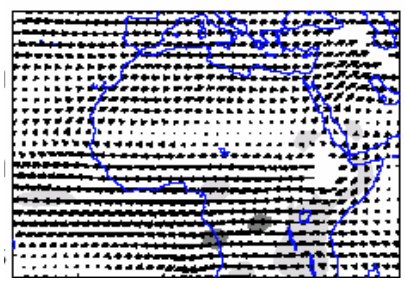
(in short)
analyse of atmospheric water vapour flux from analyses

- ❑ seasonal cycle
- ❑ wet/dry year signatures

- ➢ atmospheric regional predictors
- ➢ diagnostic for model comparison

P. Roucou

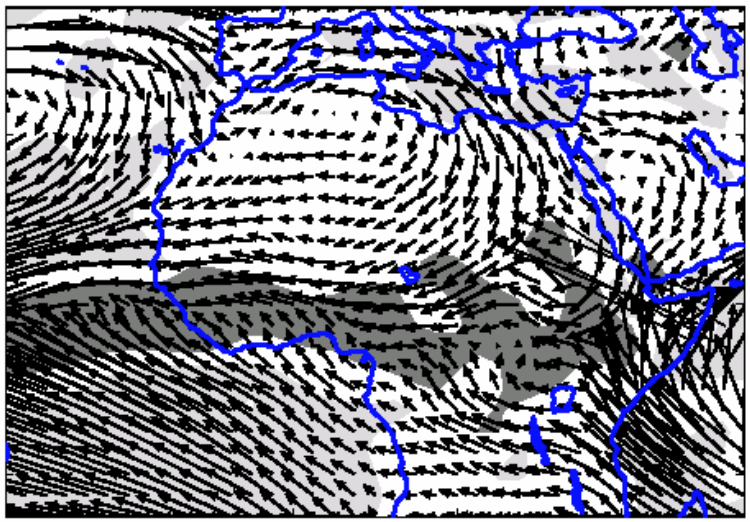
atmospheric horizontal water fluxes (NCEP2)

	column-mean	low levels [surf,875hPa]	upper lev [875hPa,300hPa]
Mar-Apr			
May-Jun			
Jul-Aug-Sept			
Oct-Nov			

P. Roucou

Jul-Aug-Sept horizontal water fluxes (NCEP2)

column-mean

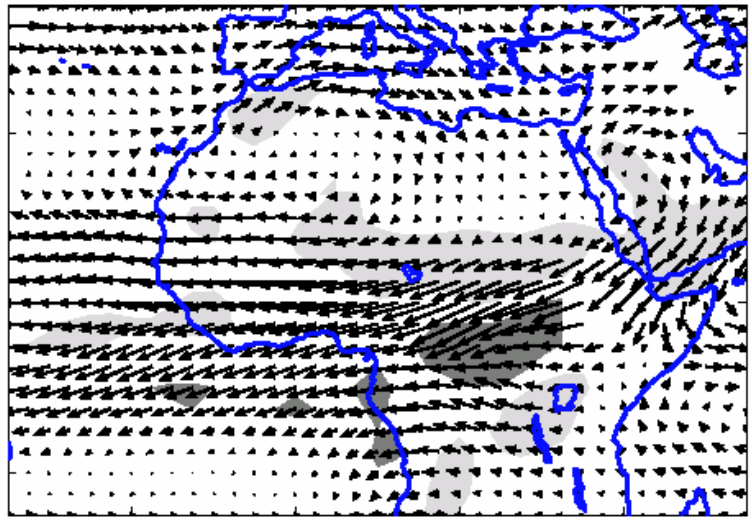


convergence

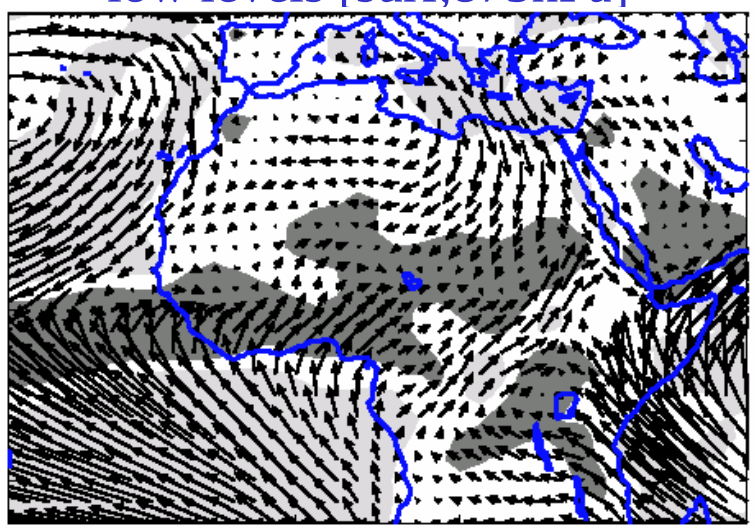
divergence

100 kg/m/s

upper levels [875hPa,300hPa]

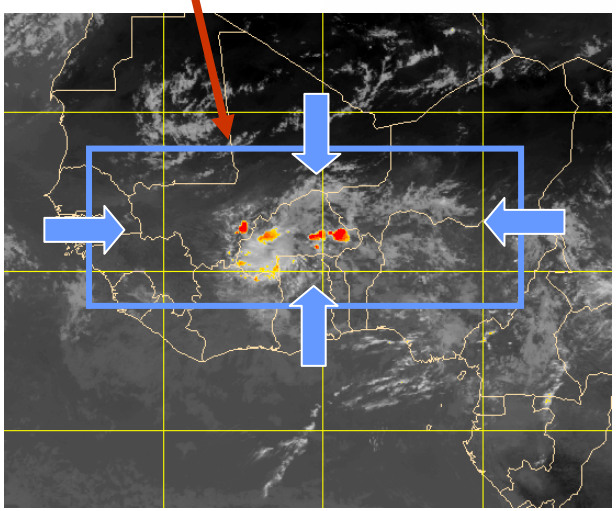


low levels [surf,875hPa]

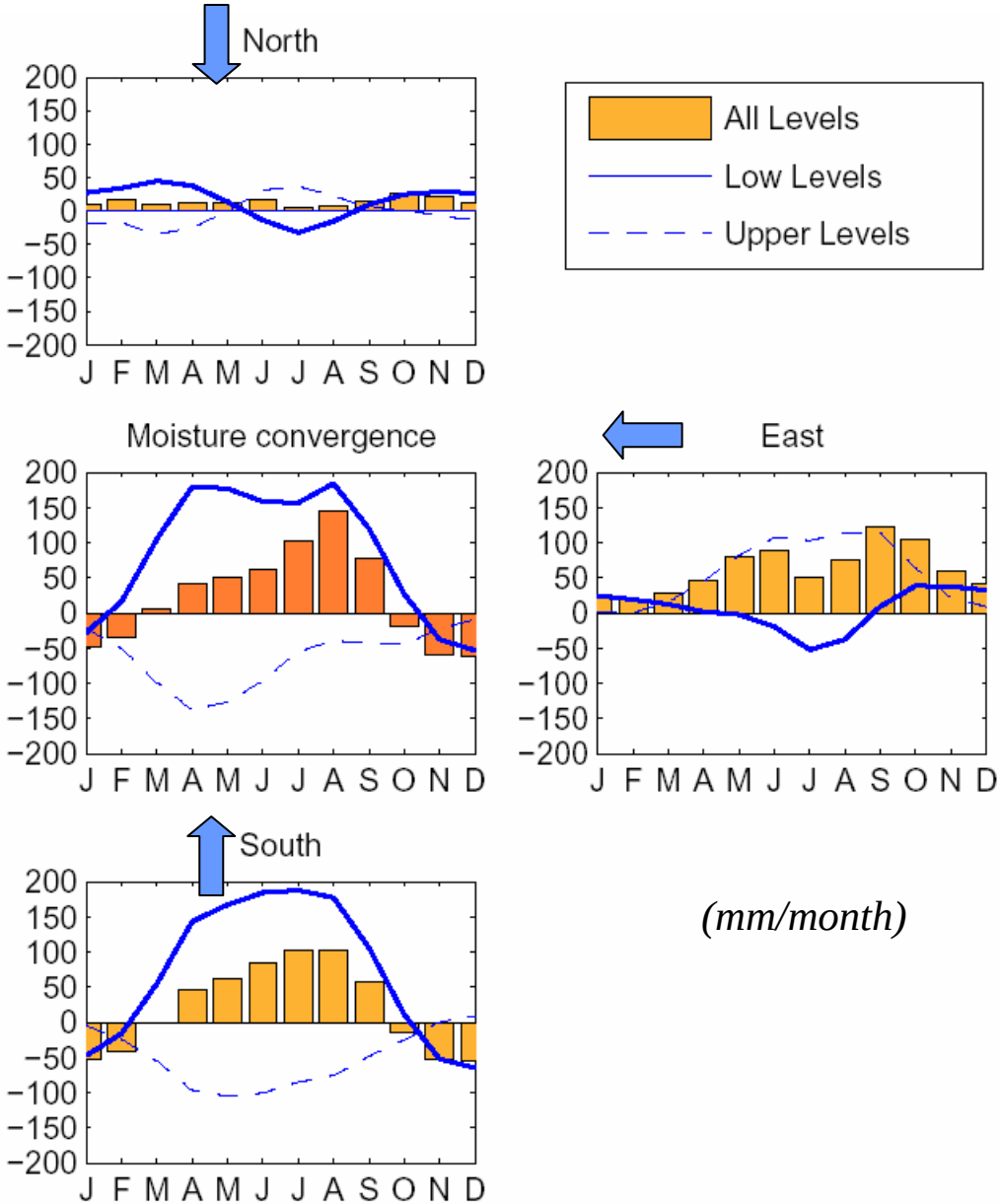


P. Roucou

monthly-mean series of horizontal moisture fluxes across this regional box



source image sat: P. Chapelet (ENM)

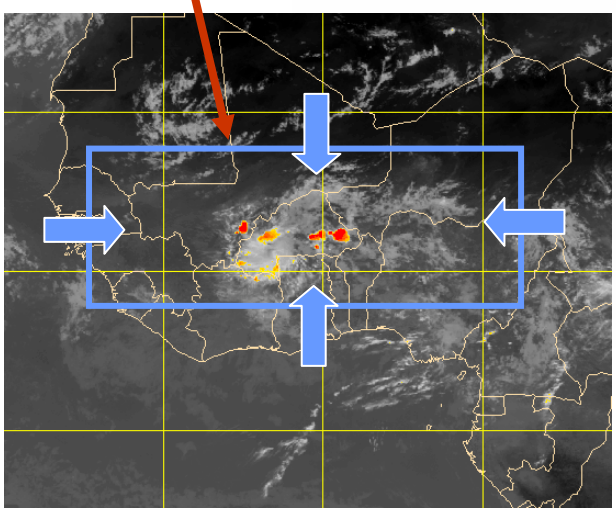


(mm/month)

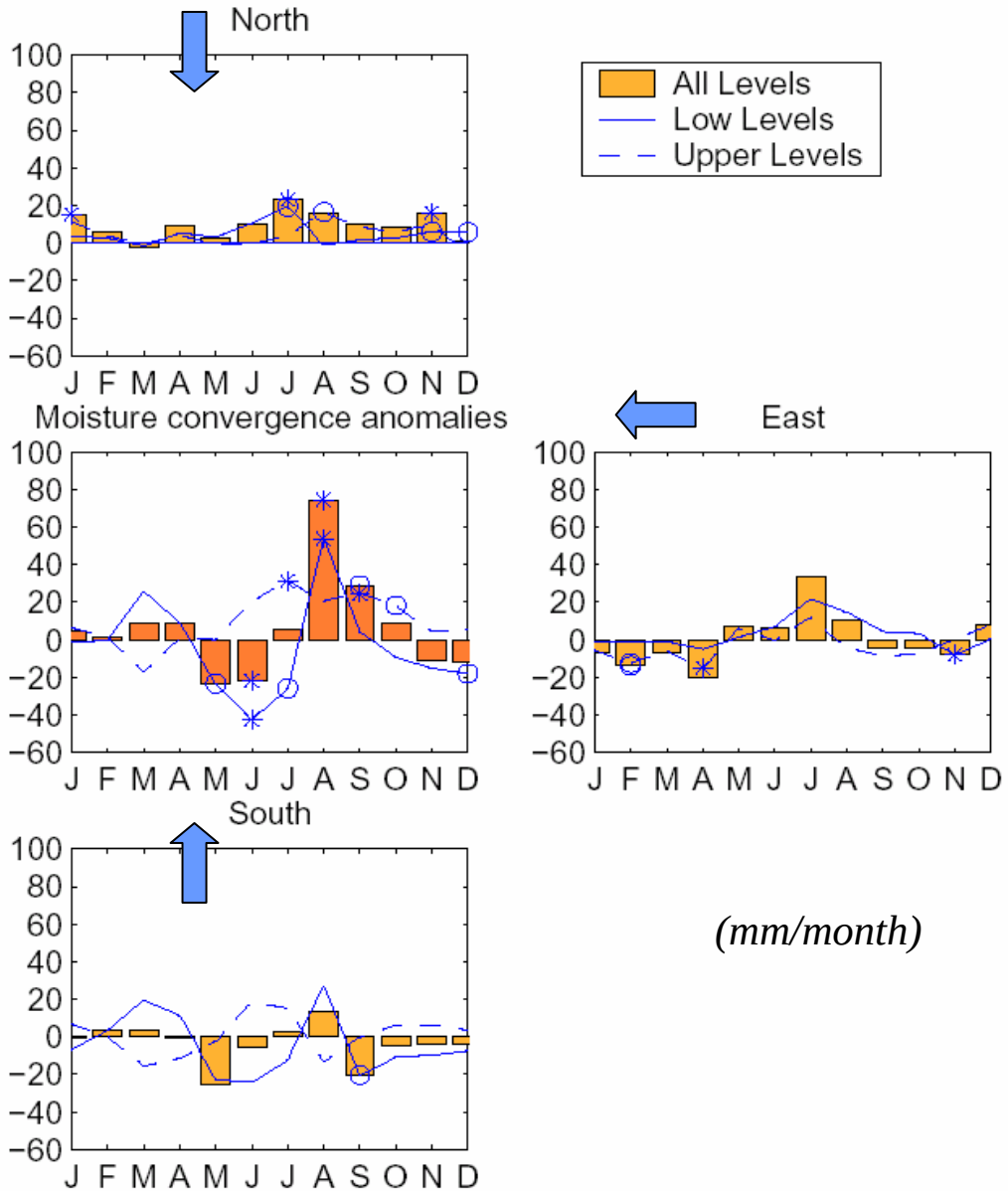
P. Roucou

wet-dry anomalies

monthly-mean series of horizontal moisture fluxes across this regional box



source image sat: P. Chapelet (ENM)



(mm/month)

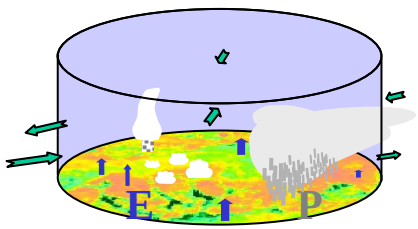
CNRM, Toulouse

assess what currently exists

methodology based on a combined use of :

- ❑ (re-)analyses (ECMWF, NCEP) , observations & observational products
- ❑ CRM simulations *(CRM: cloud resolving model)*

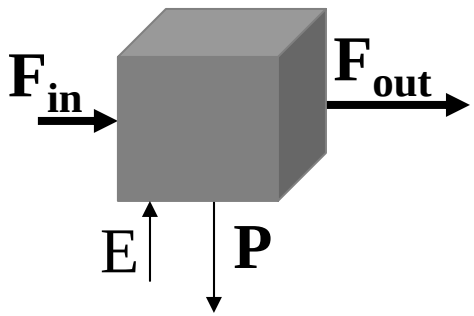
➡ scale: Δx = 500 km , Δt = 5 days (intraseasonal)



➡ *0D* atmospheric water budget

$$\partial Q/\partial t = E - P + F_{net}(Q)$$

[Q: total water] **analysis** **simulated**



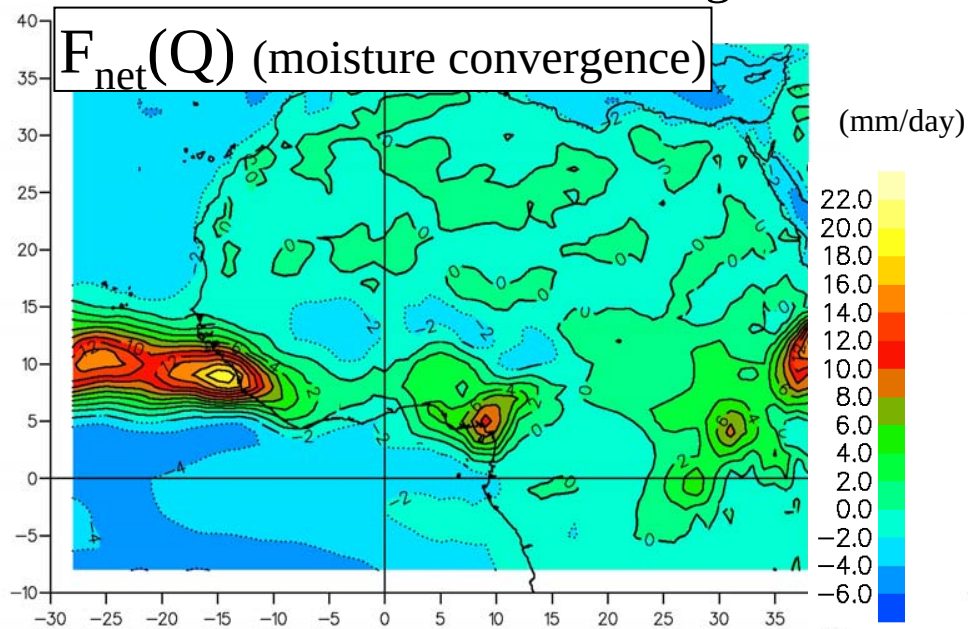
such (Δx,Δt) water budget results from very high sub(Δx,Δt) variabilities of all of its components

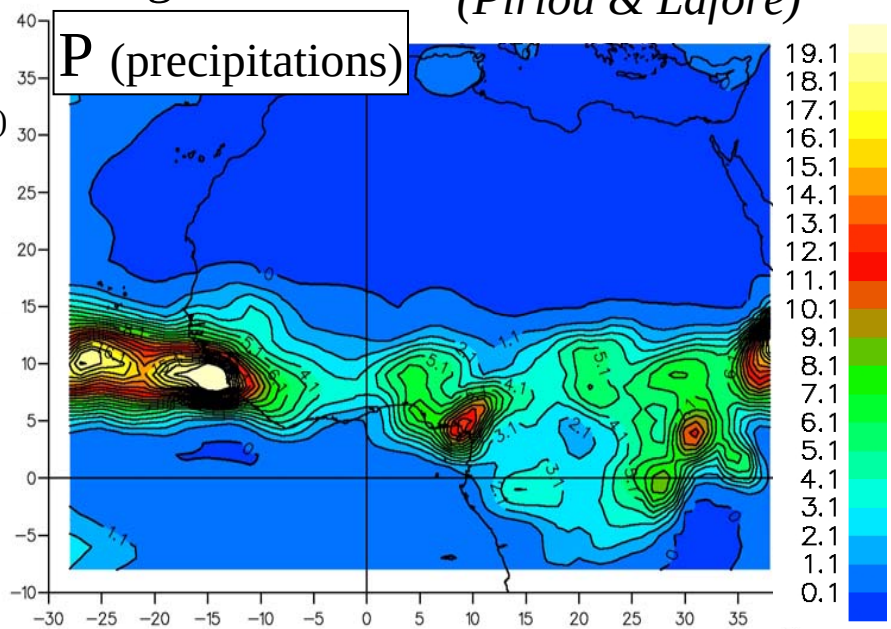
accuracy issues

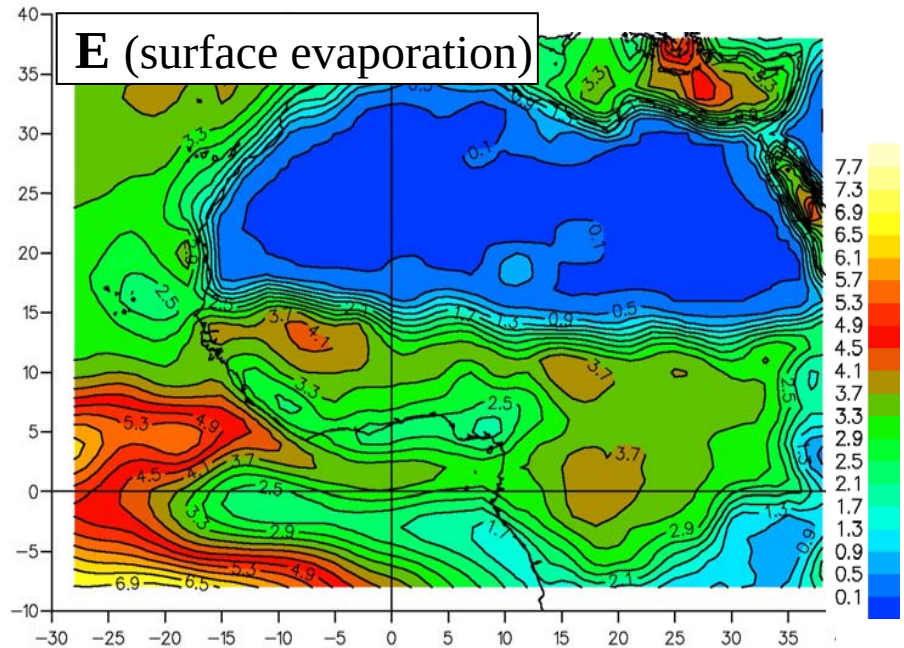
under-sampling & representativity (6h sampling), current weaknesses of models used for NWP (spin-up/down, diurnal cycle of convection, impact on the surface..., links with model parametrizations)

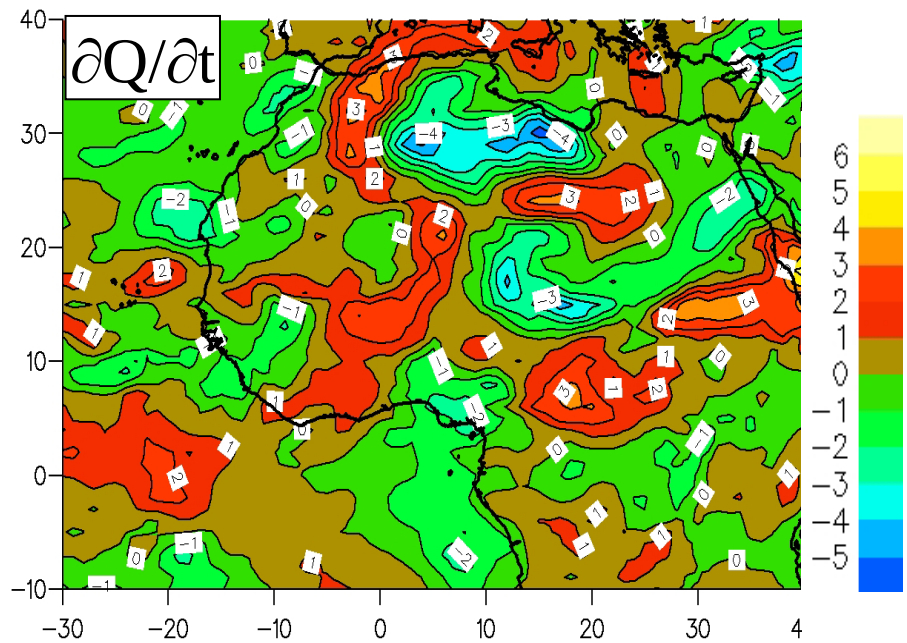
0D atmos water budget derived from ECMWF analyses+forecasts $[\partial Q/\partial t = E - P + F_{net}(Q)]$ for Aug 2000 , 3° x 3° avg

(Piriou & Lafore)





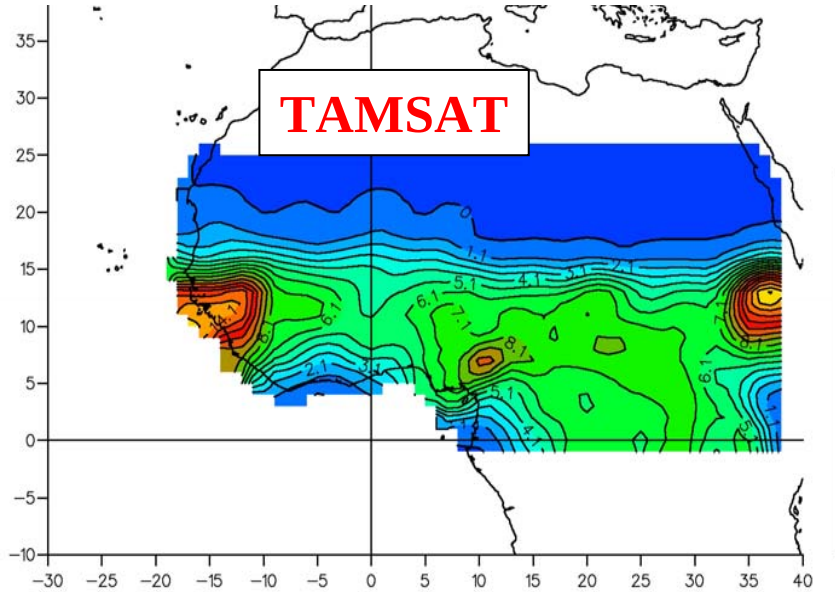


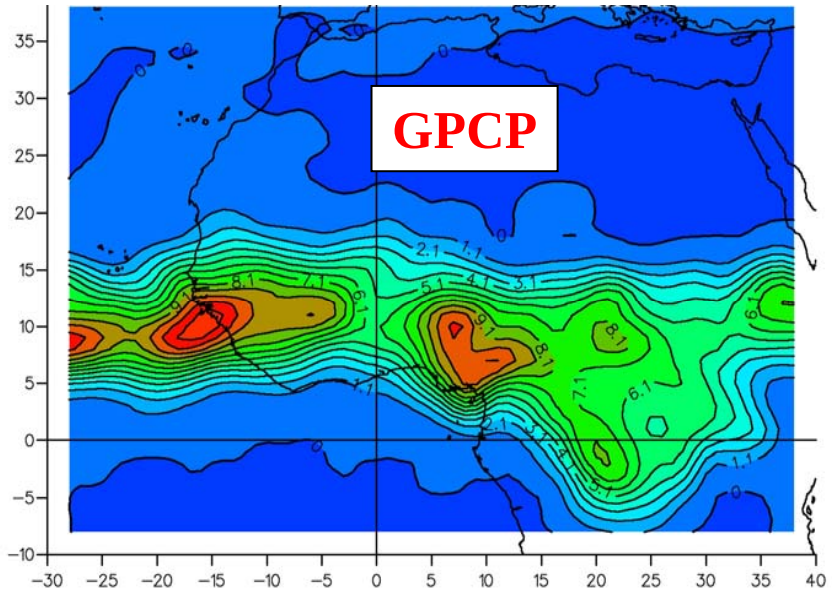


comparison of precipitation estimations

(Piriou & Lafore)

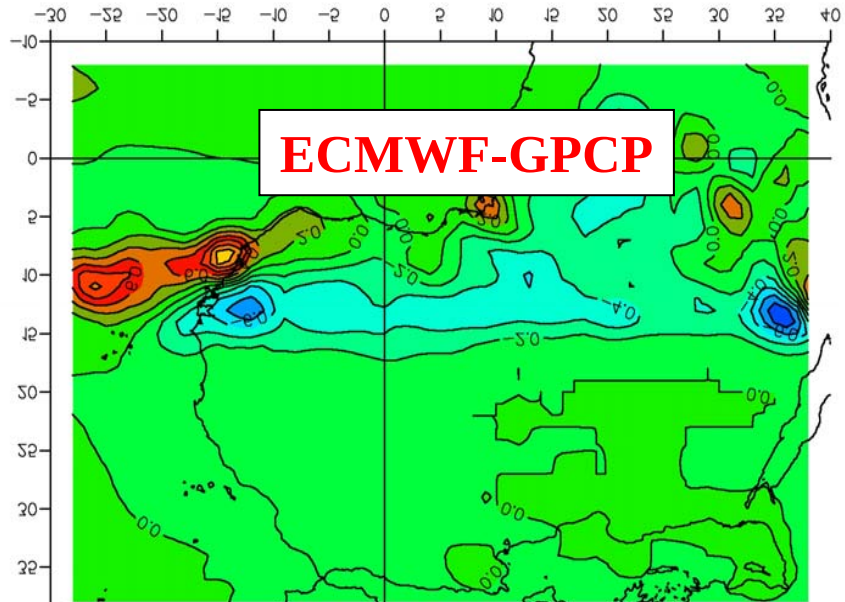
Aug 2000 , 3° x 3° avg

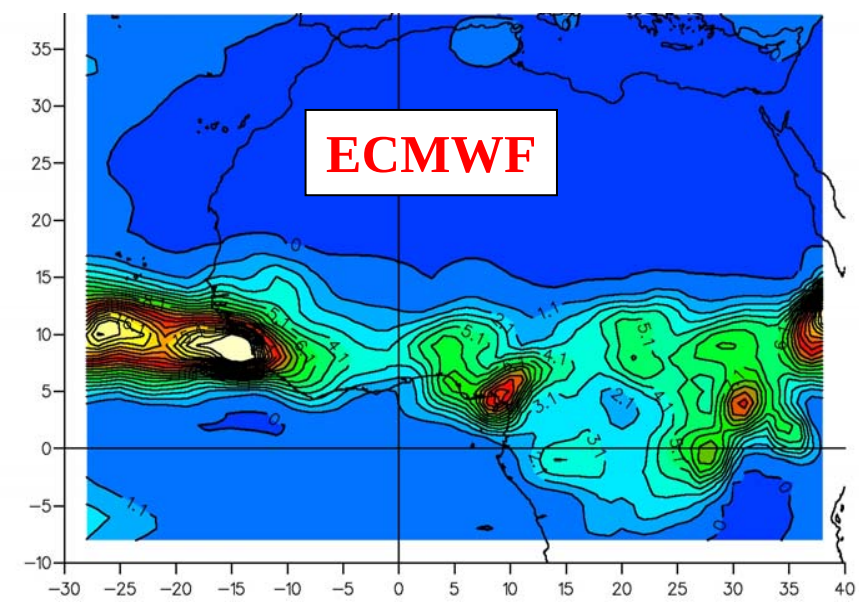




(mm/day)

19.1
18.1
17.1
16.1
15.1
14.1
13.1
12.1
11.1
10.1
9.1
8.1
7.1
6.1
5.1
4.1
3.1
2.1
1.1
0.1



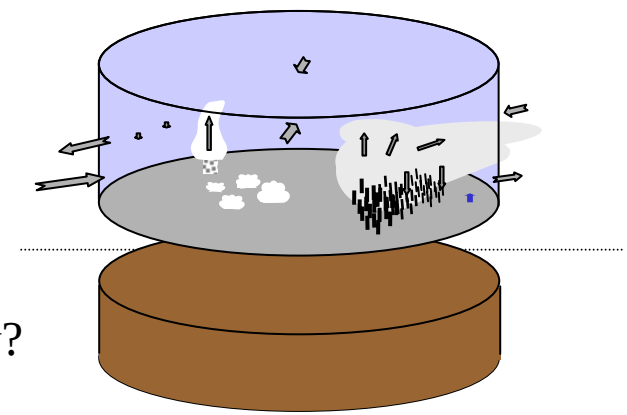


monsoon 2000, integration of:

- ❑ other NWP analyses & products: CEP oper, ERA 40, NCEP(2)
- ❑ additional observational products, precipitation...

more broadly:

- ❑ local measurements (high frequency long term data) along the S-N WA gradient
  e.g. precipitable water from GPS, O. Bock
- ❑ confrontation with LSM simulations outputs, LDAS (surface evaporation)
- ❑ relevance of feedback loops involved at different scales in this type of budget estimate *(i.e. what it is made of)*



interface & below?

plusieurs points de mesures GPS le long du transect NS (existants & à venir – AMMA)