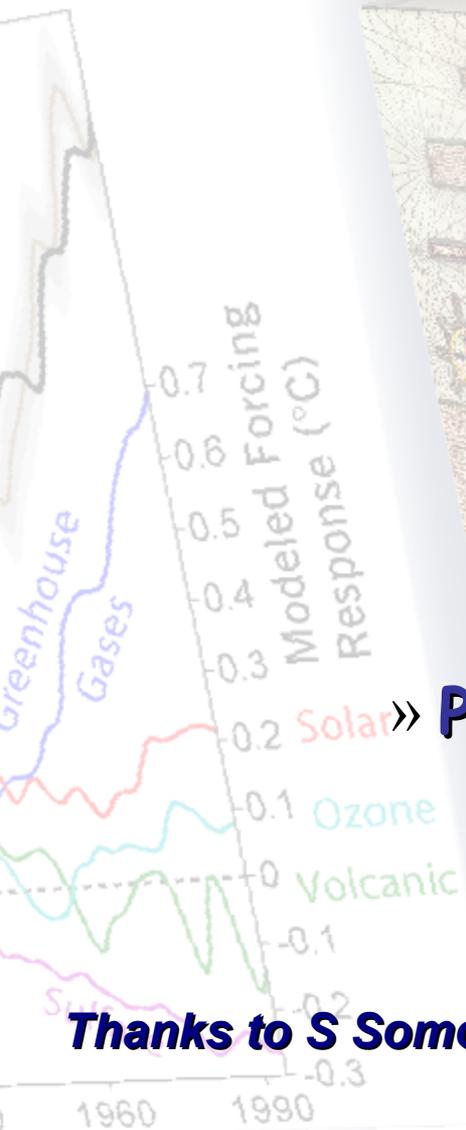


MED - CORDEX

A Coordinated Regional Downscaling Experiment for the Mediterranean Basin

» Paolo M Ruti & S Calmanti ENEA

Thanks to S Somot, C Dubois, A Carillo, G Sannino, A Dell'Aquila, S Gualdi, P Oddo





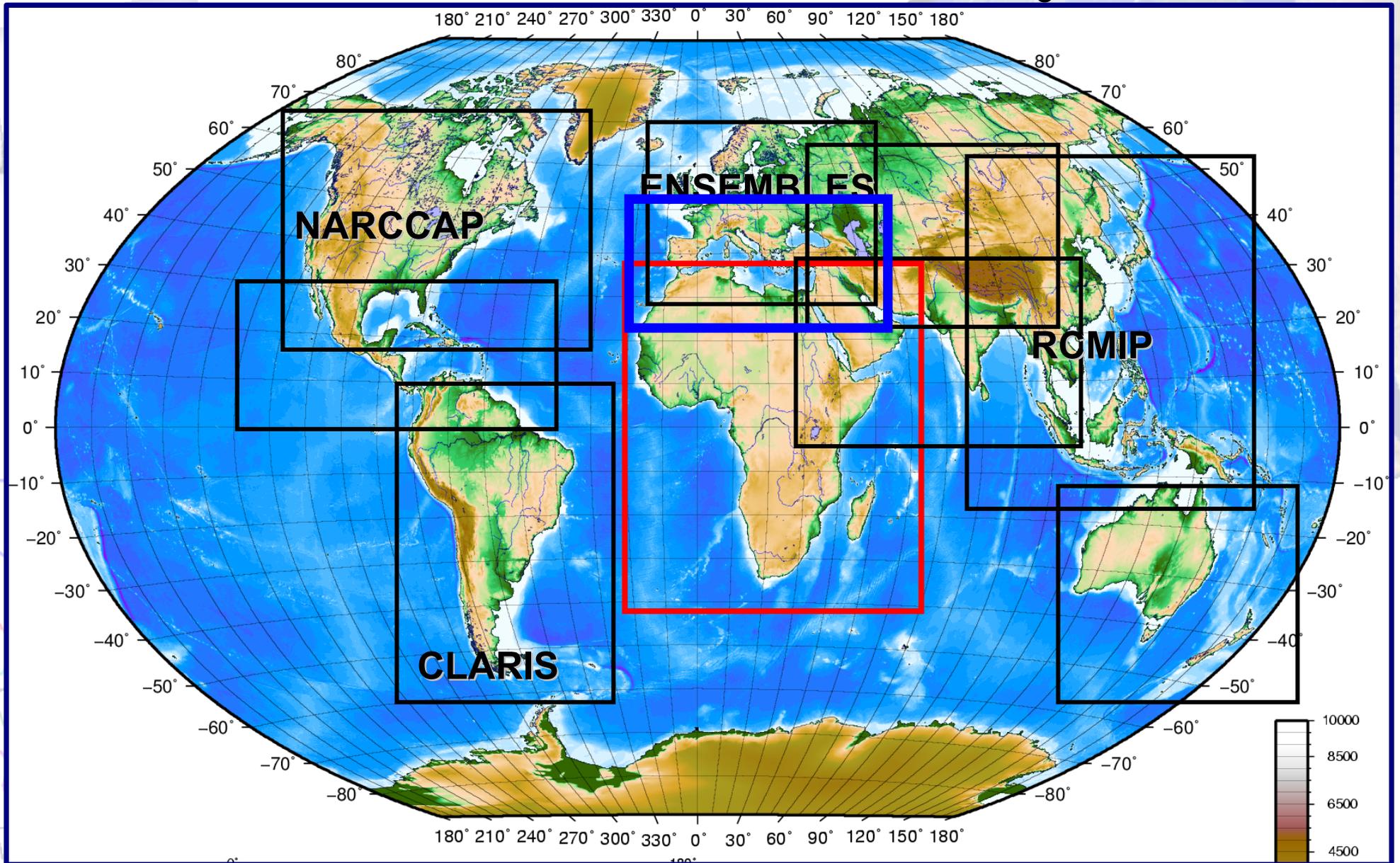
- **Why Med Cordex?**

- **The Mediterranean scenarios**

- **New issues**

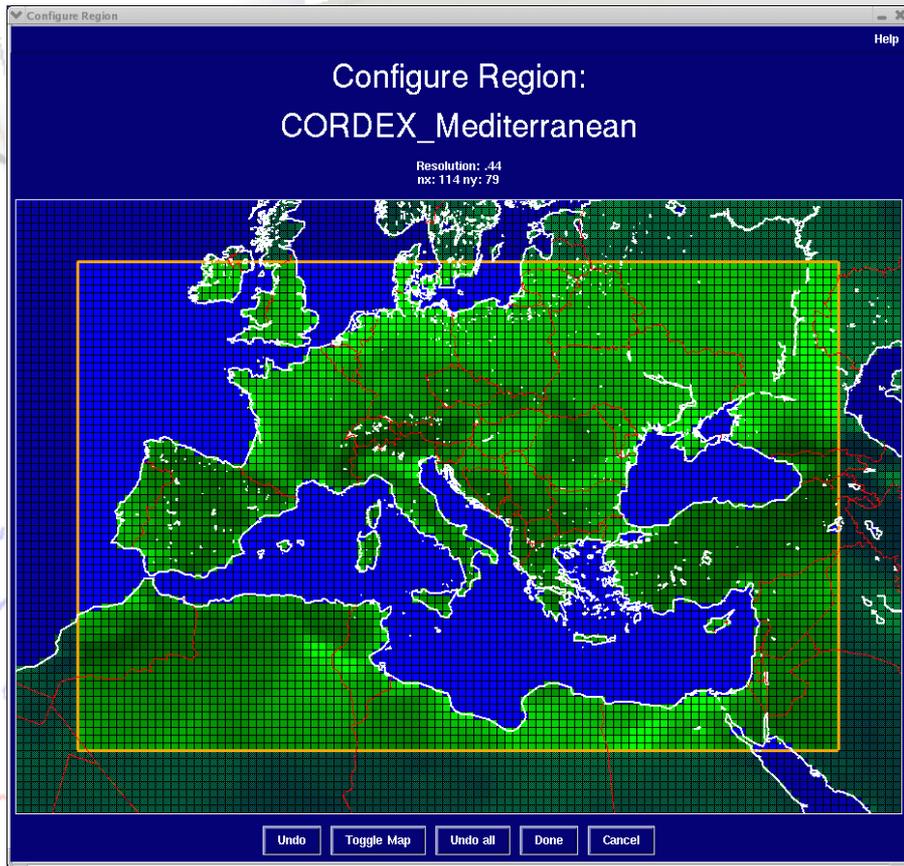
CORDEX DOMAINS

Giorgi, WMO Bulletin 2009

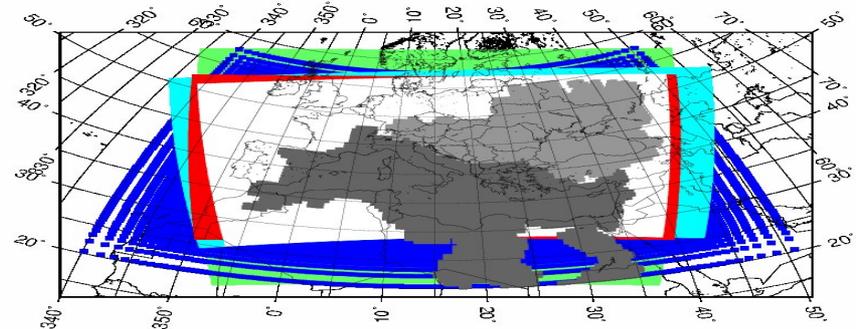


WCRP-RCM-Mediterranean: a proposal

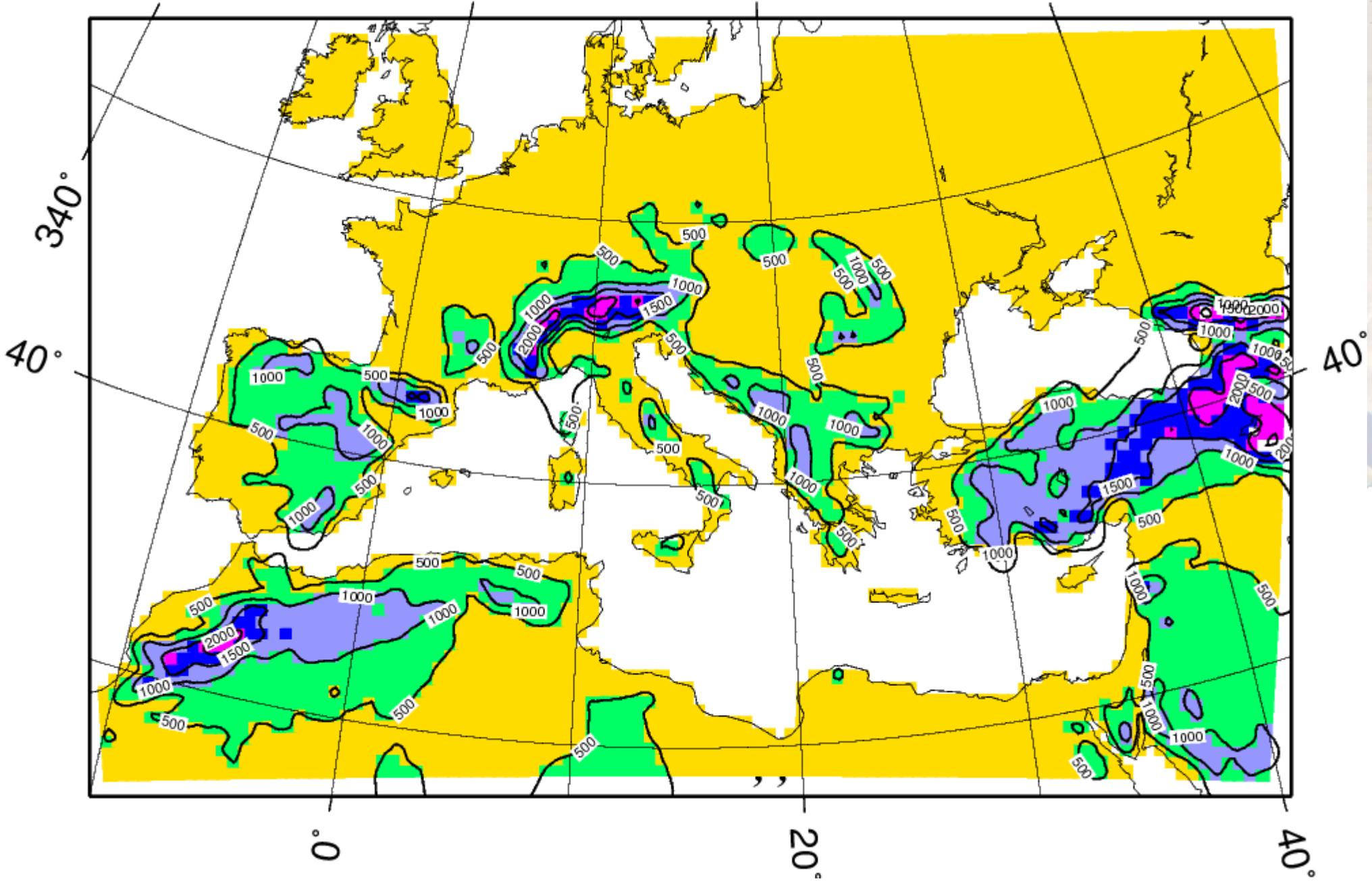
MedCORDEX minimal domain



1. CIRCE RCM domain: ENEA, MPI, LMD
2. Hymex domain: CNRM
3. MedCORDEX minimal domain in white
4. Medit. And Black seas catchment basins in grey

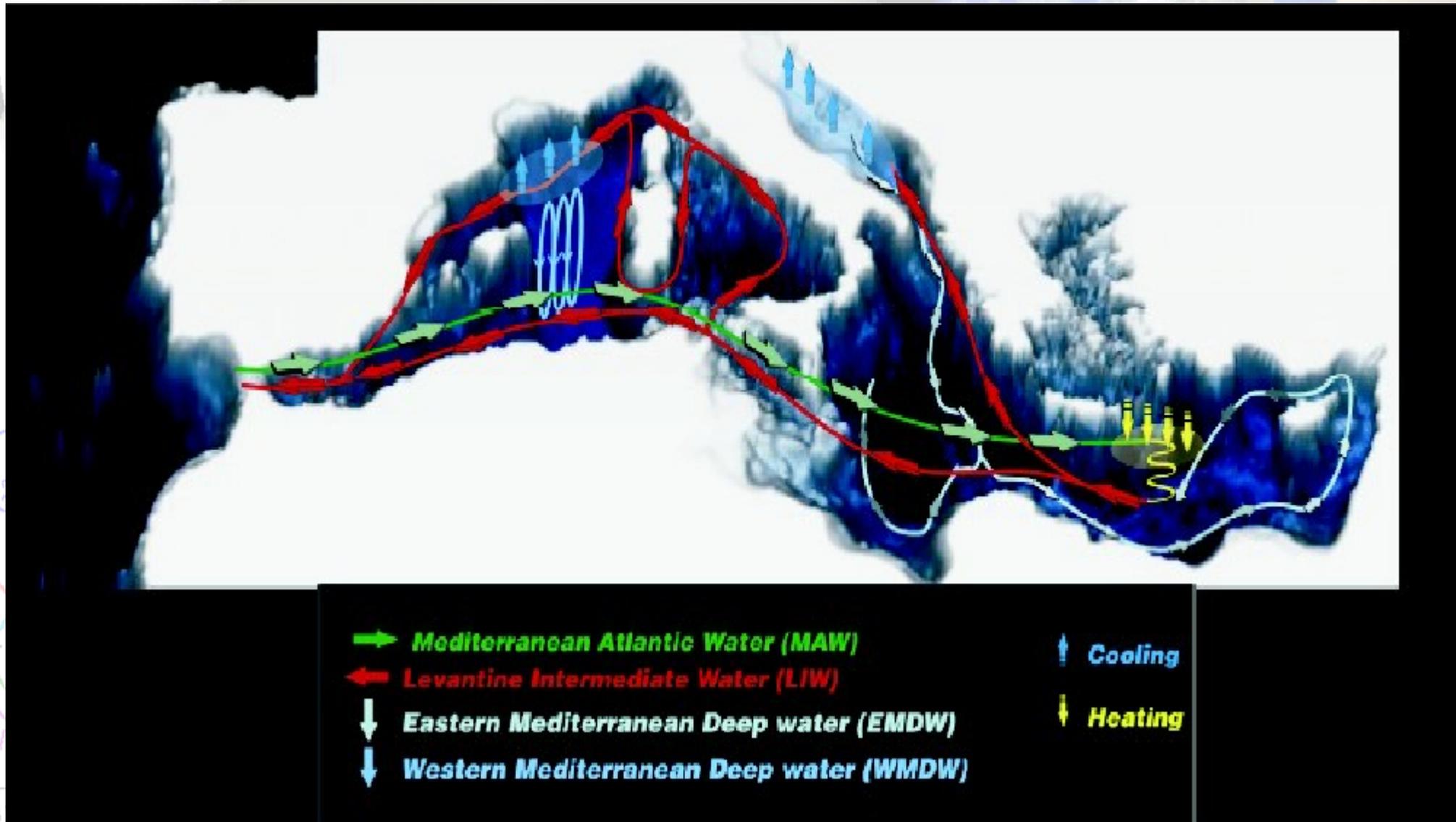


The Medbasin is characterized by extremely complex coastlines and topographical features

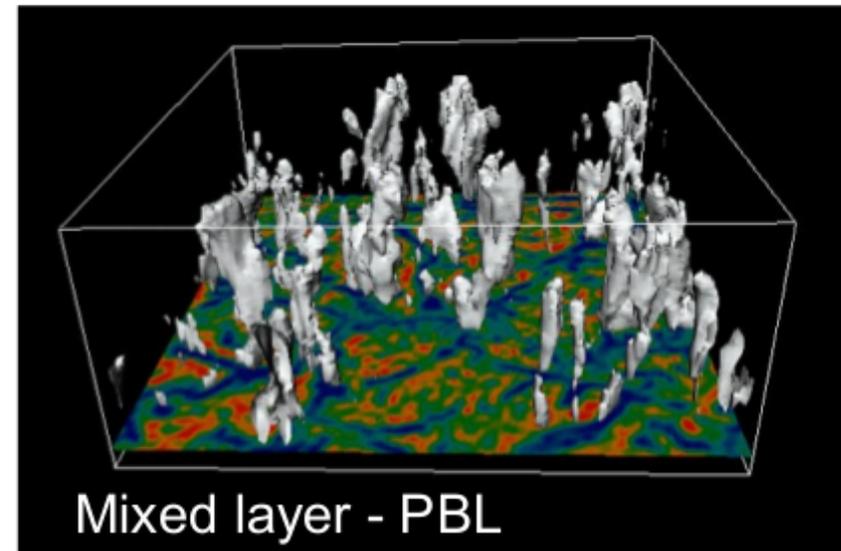
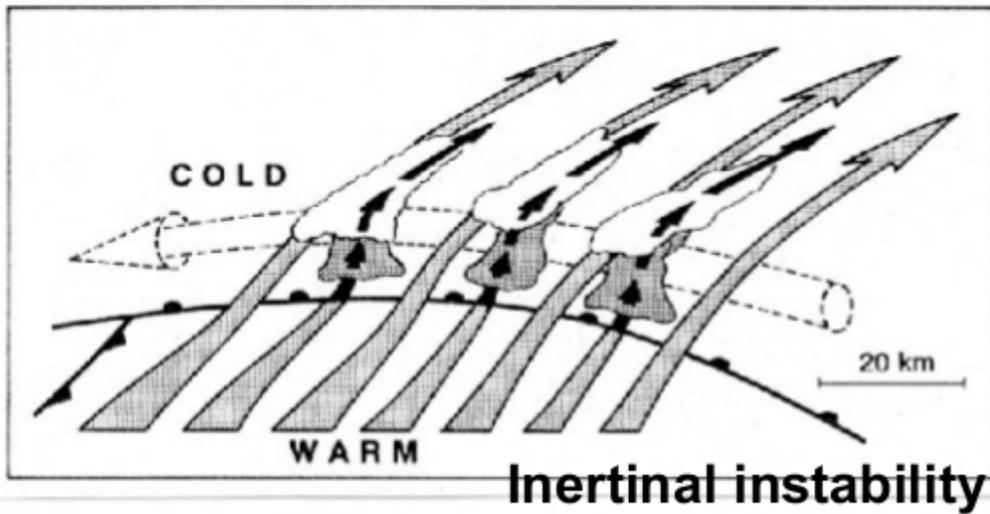
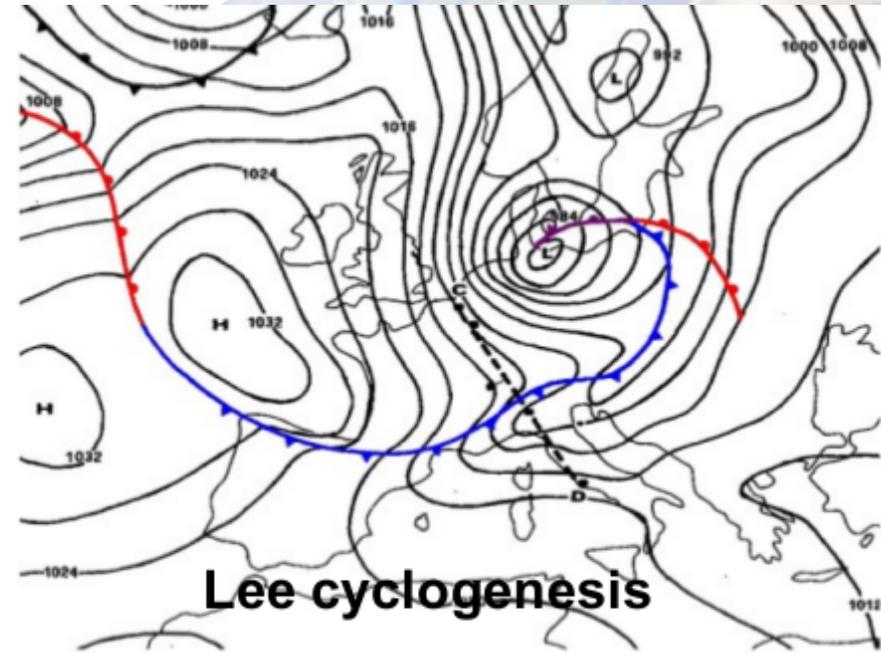


Deep Mediterranean water is produced at different locations by intense air–sea interactions: in the Gulf of Lions (western Mediterranean), the Southern Adriatic, the northeast Levantine basin and the Aegean Sea in the eastern Mediterranean

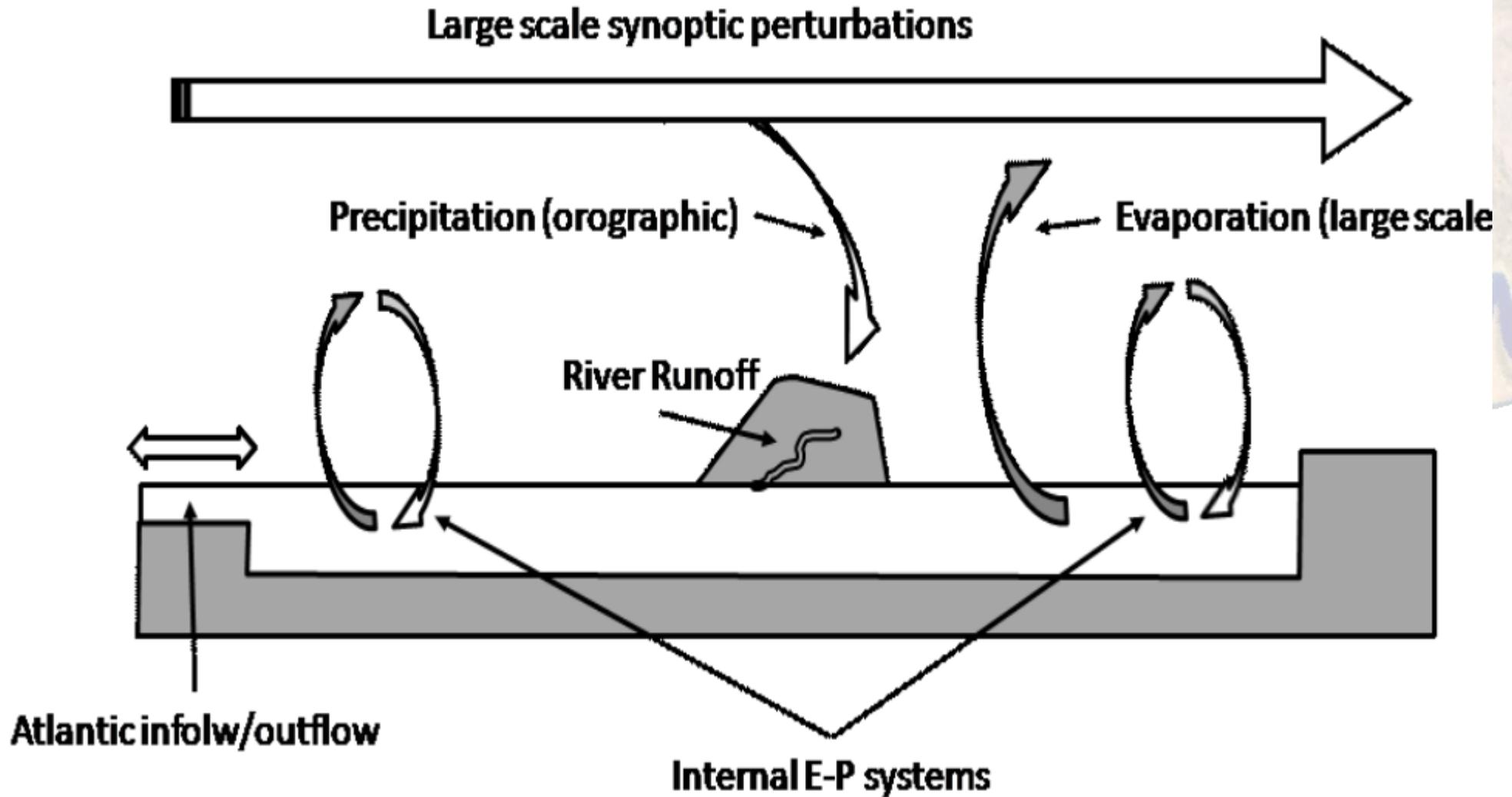
greenhouse
Sun



Climate is not just a mean ... it is a synthesis of several processes acting at different spatial and time scales

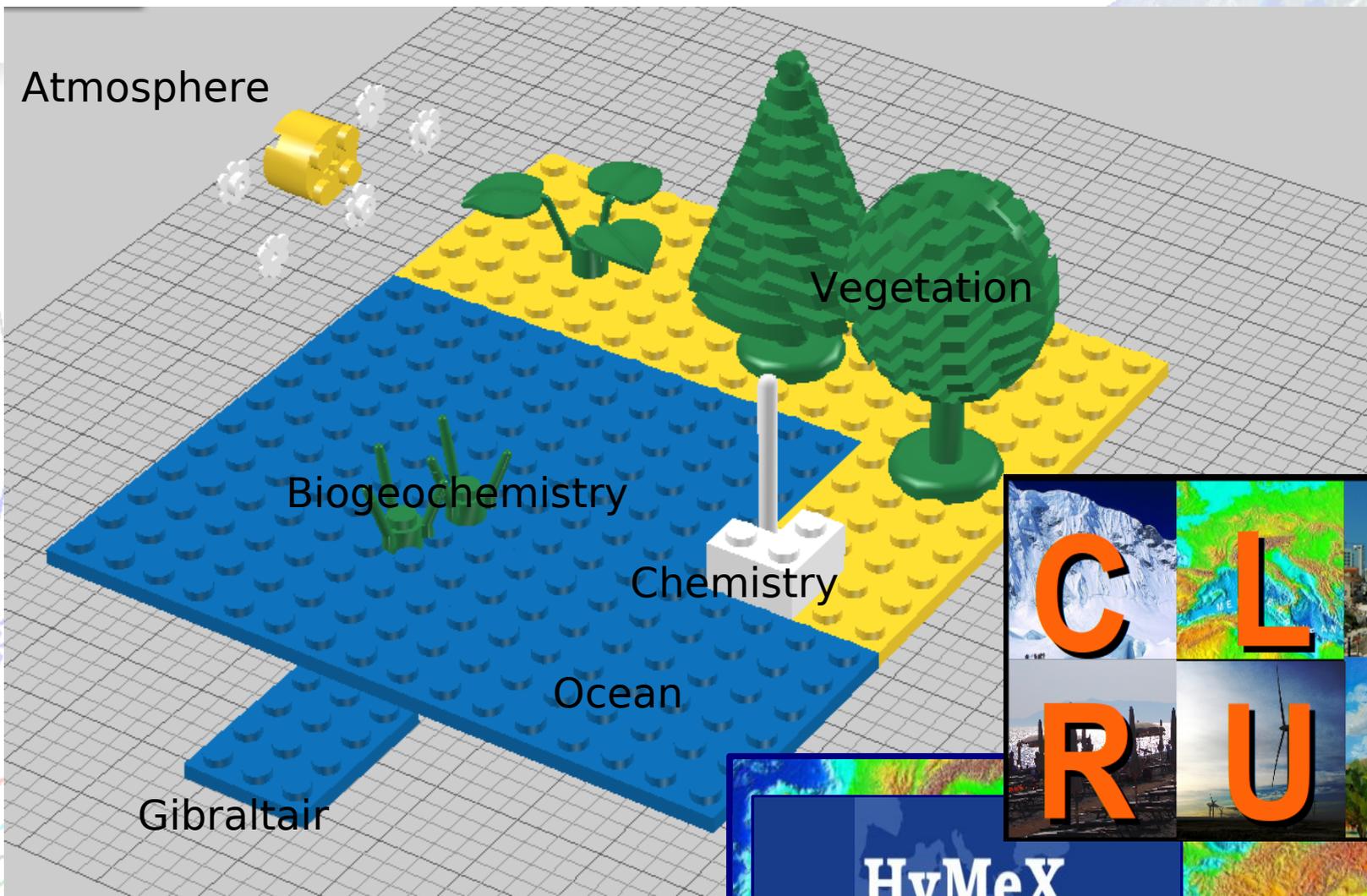


Effects on the hydrological cycle

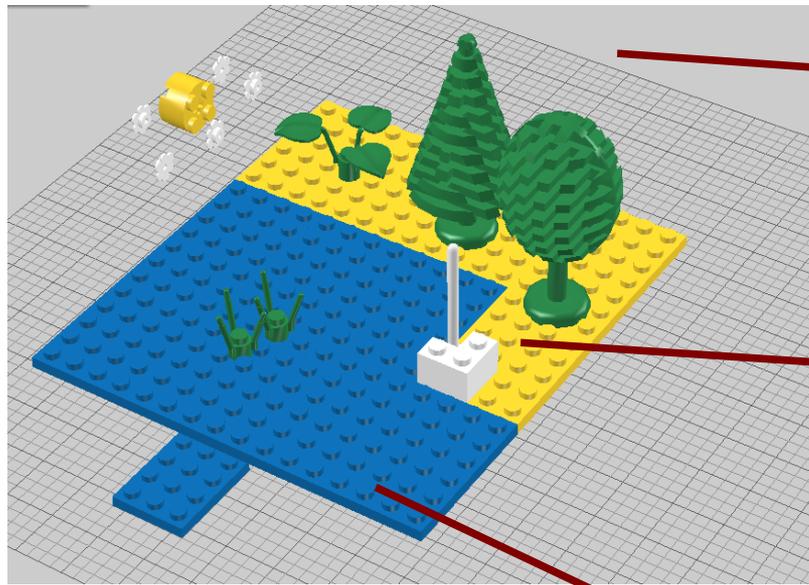


Regional Coupled Systems

LMD
MPI
METEOF
ENEA



A CHANGING CLIMATE, AN ADAPTING WORLD
CIRCE Climate Change and Impact Research: the Mediterranean Environment

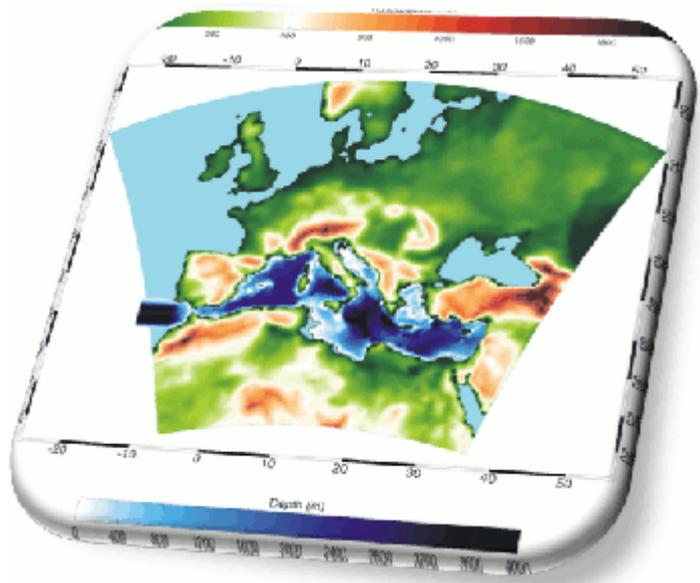


Atmo

Land Surf + Rivers

Regional Earth System Model

Med Sea + Gibraltar



Model components

RegCM3

18 sigma vertical levels

30 Km horizontal resolution

BATS + IRIS

BATS: Biosph.-Atmosph. Transfer Scheme

IRIS: interactive Rivers Scheme



SST

HF-WF-Wind

OASIS 3
Freq. 6h

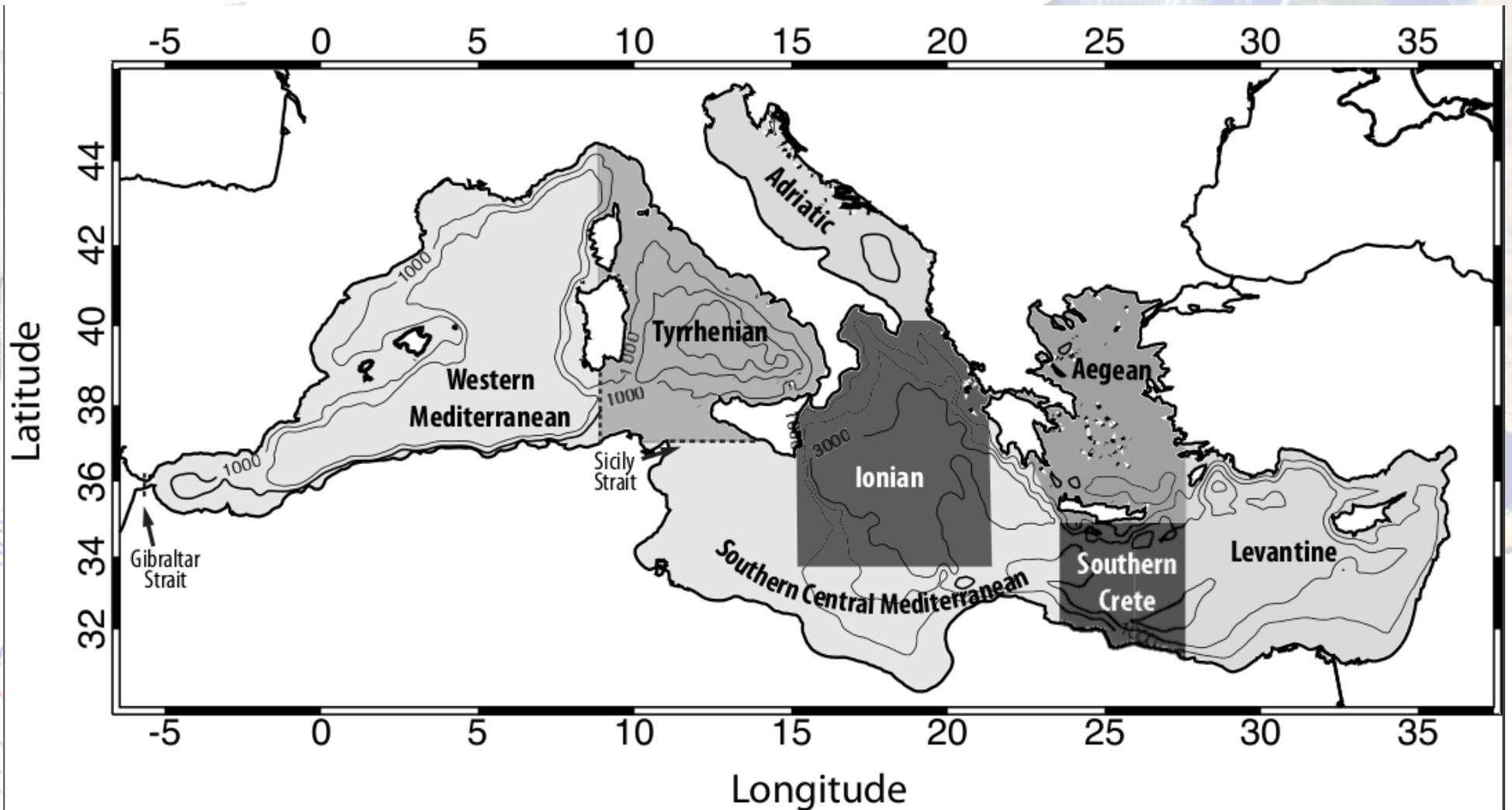


MedMIT

42 zeta vertical levels (partial cell)

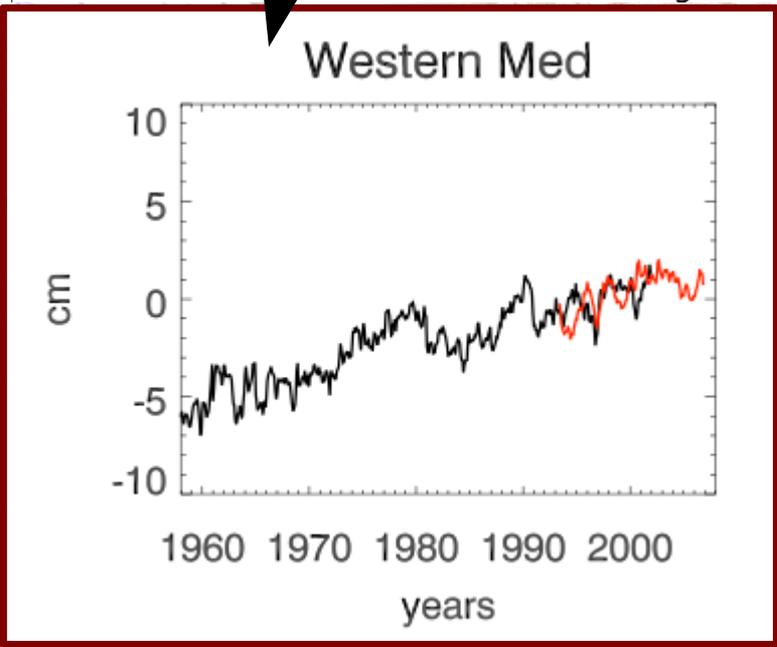
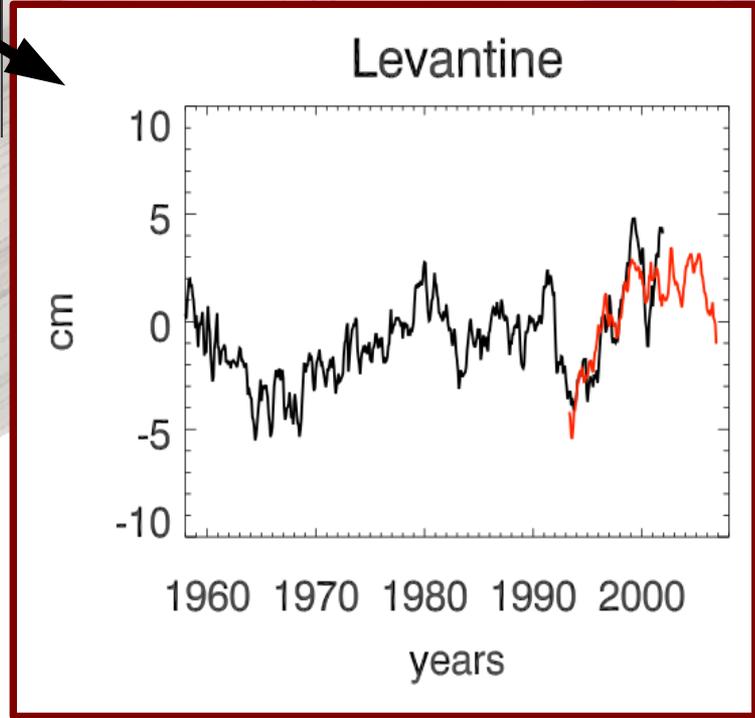
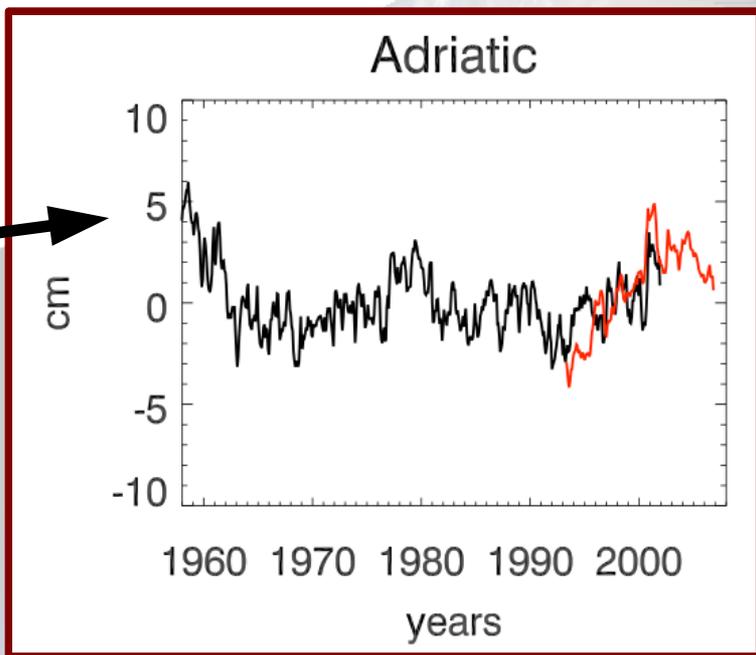
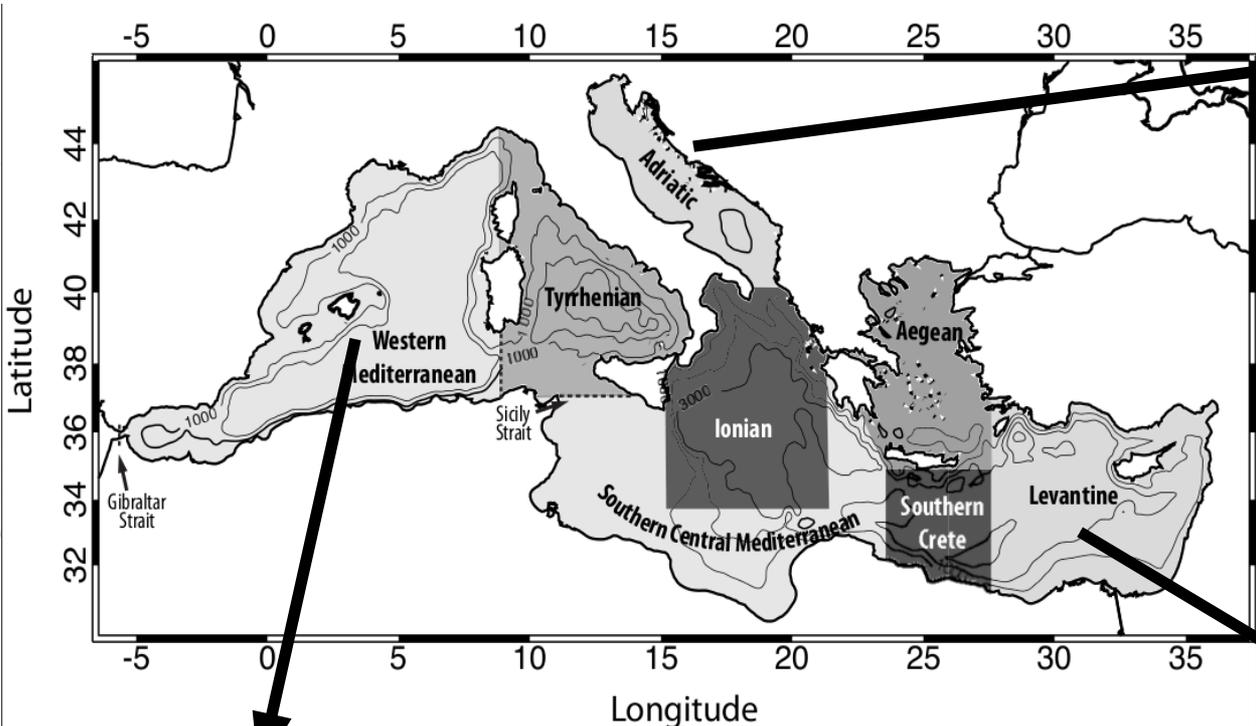
1/8° x 1/8° horizontal resolution

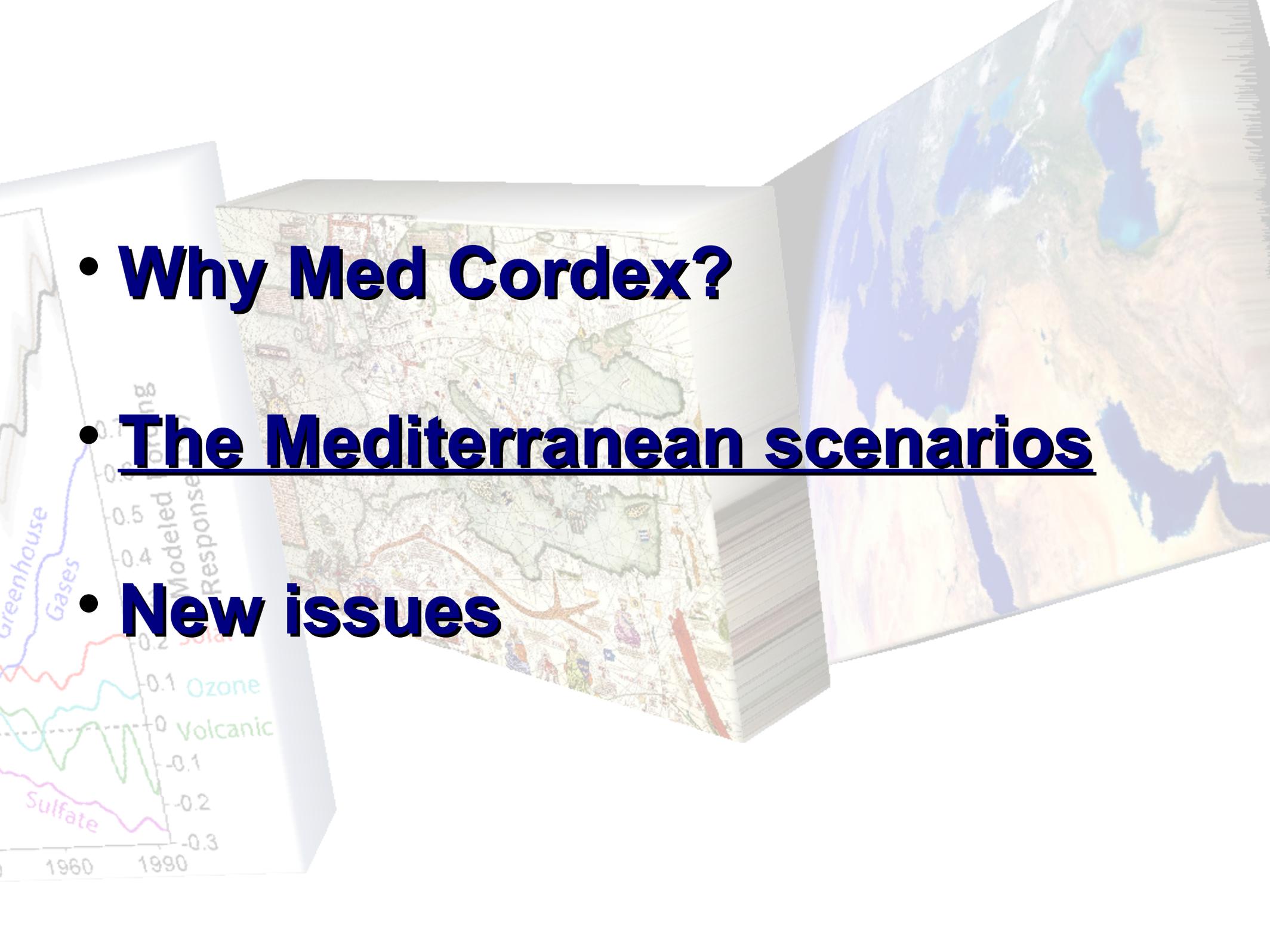
Sea Level Rise issue



Protheus system simulation (Artale et al. 2009)

Sea Level Rise issue



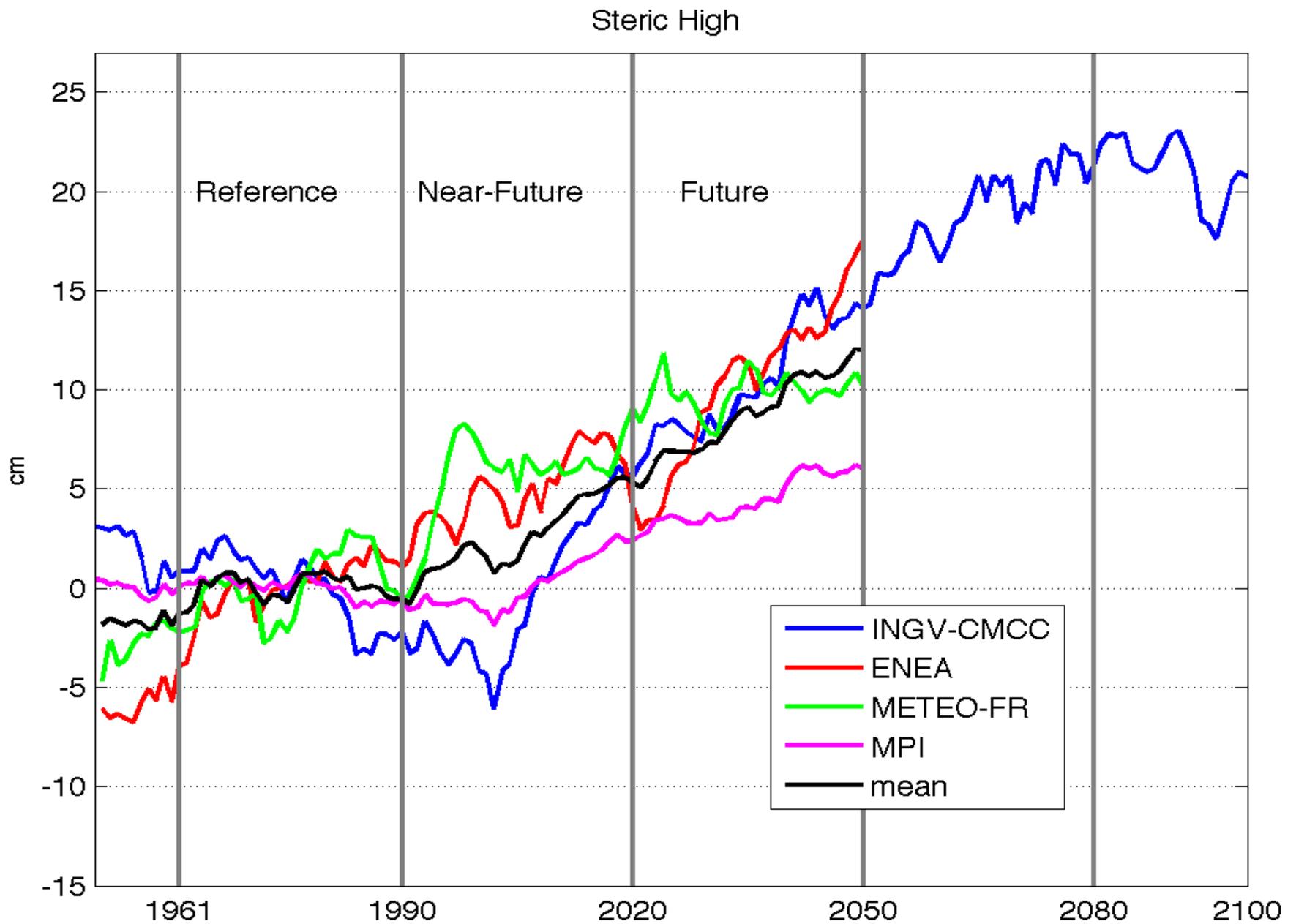


- **Why Med Cordex?**

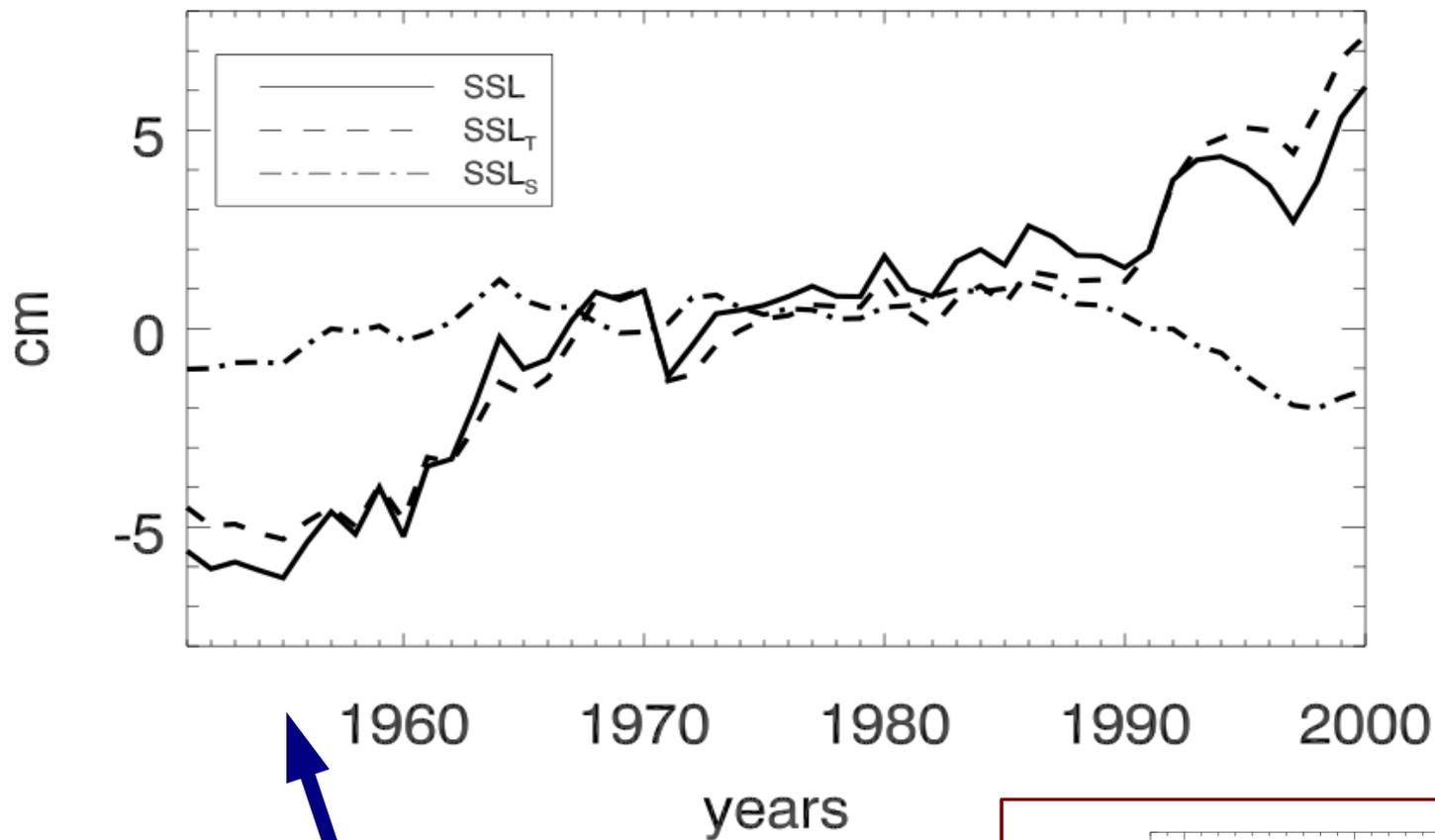
- **The Mediterranean scenarios**

- **New issues**

Sea level rise scenario

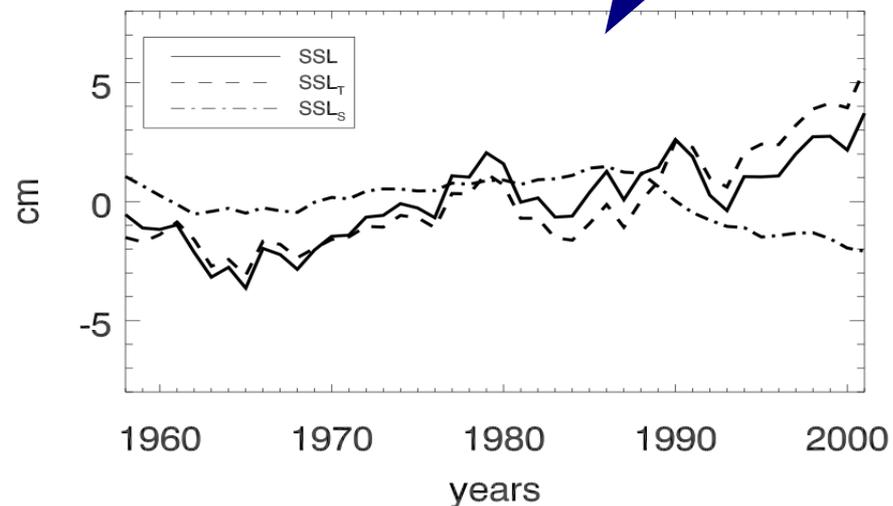


Sea Level Anomaly, Steric Component (Temp and Salinity)

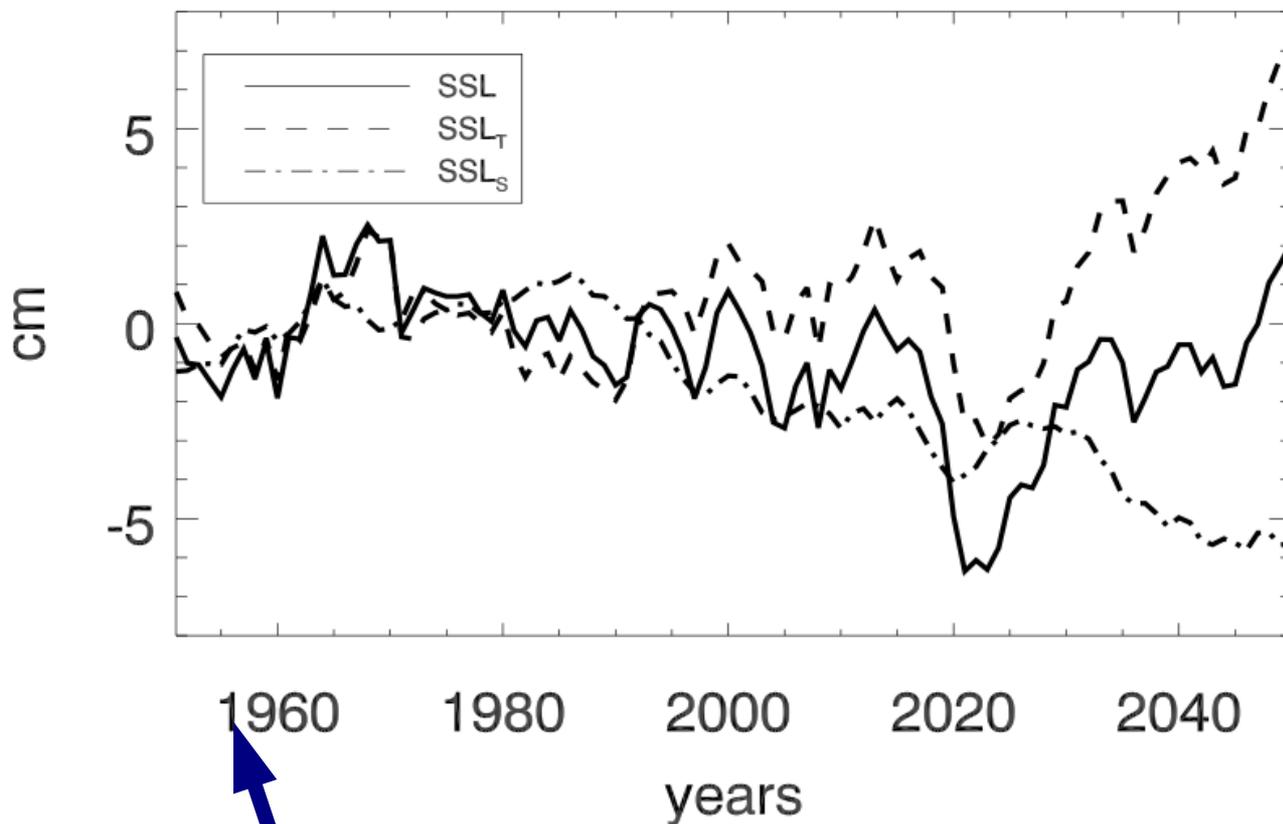


**Coupled sim
Forced by
ERA40**

Coupled sim forced by Echam5

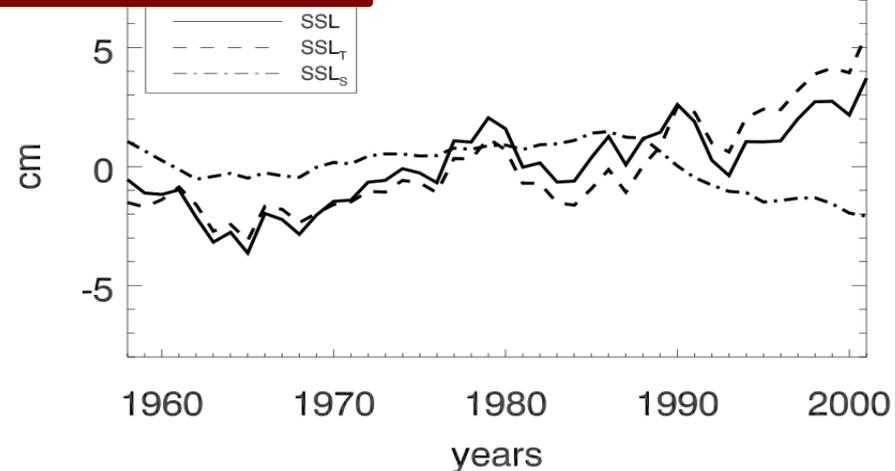


Sea Level Anomaly, Steric Component (Temp and Salinity)

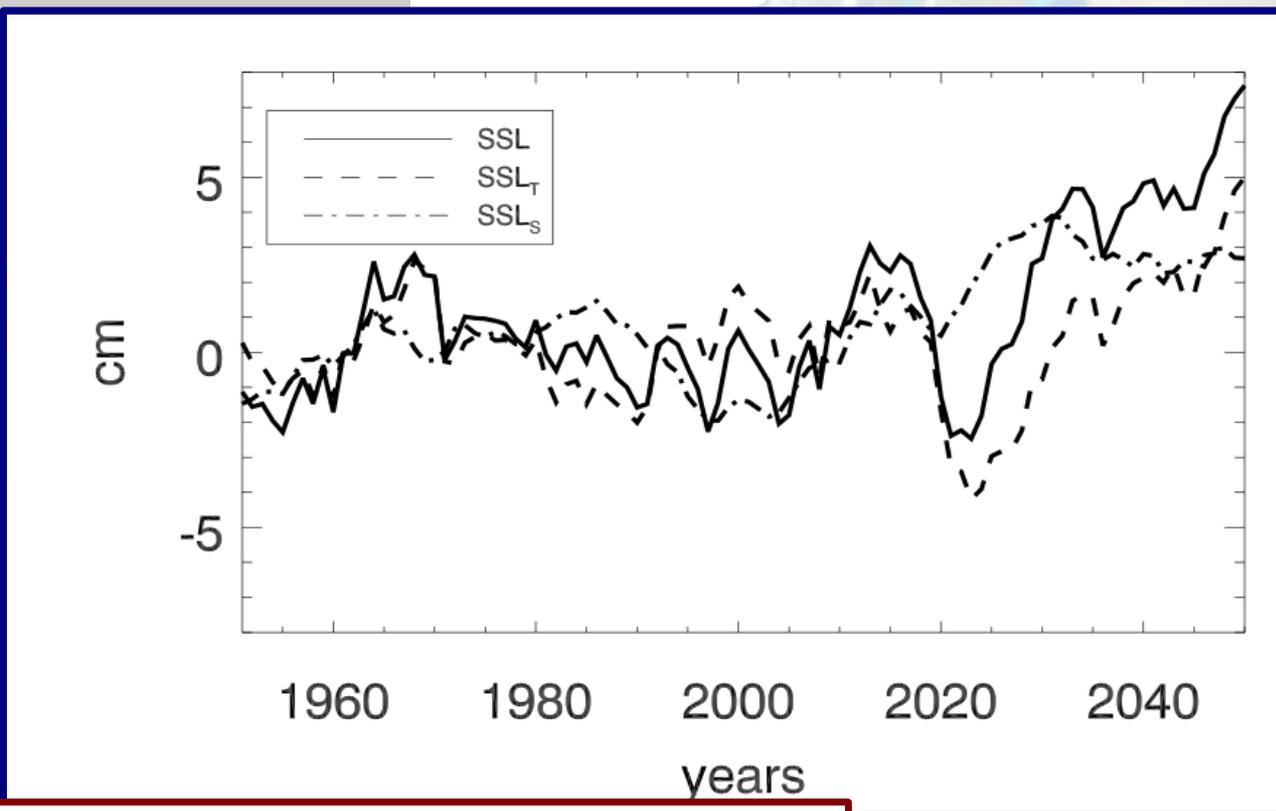
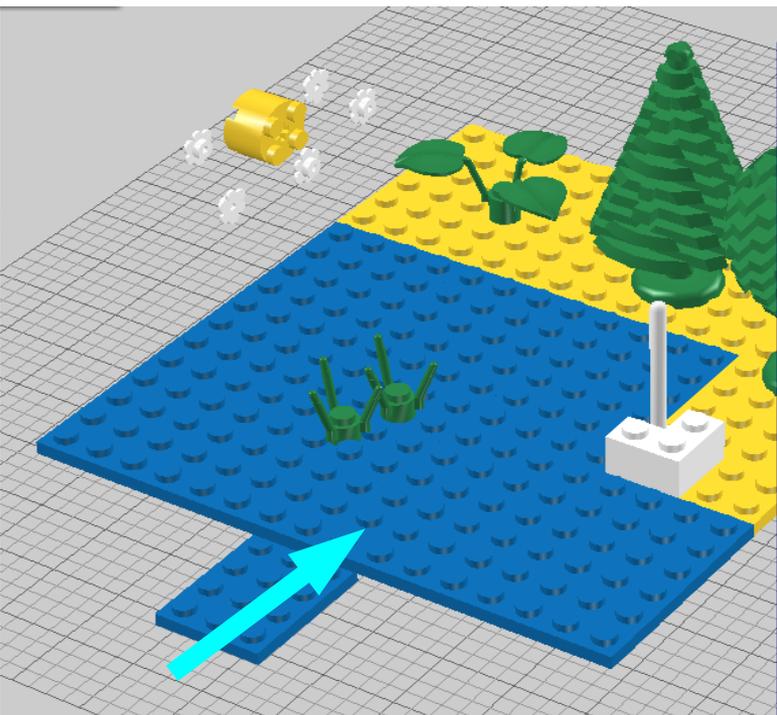


**Coupled sim
Forced by
ERA40**

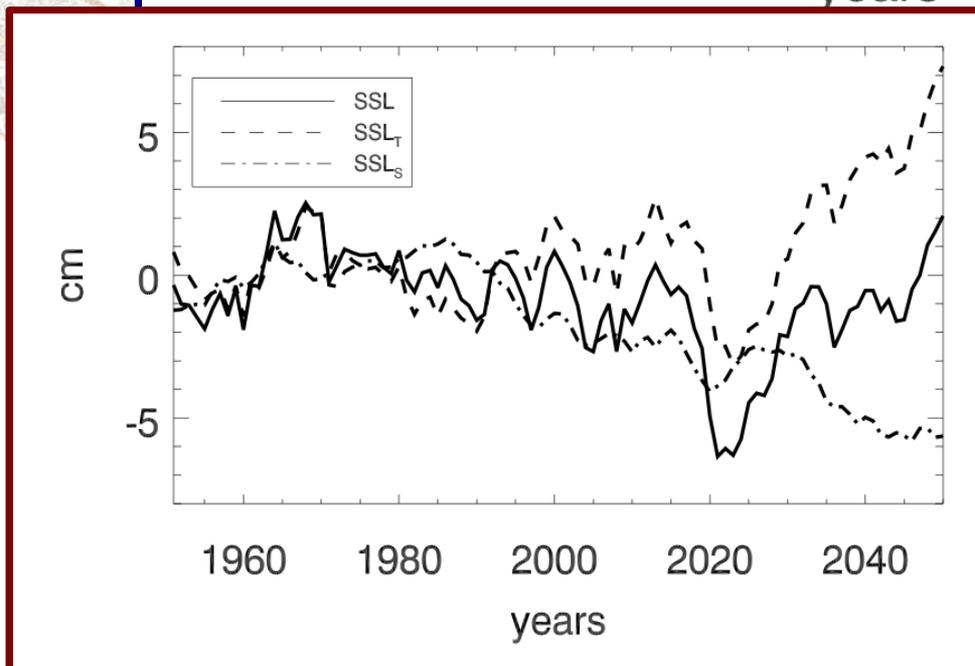
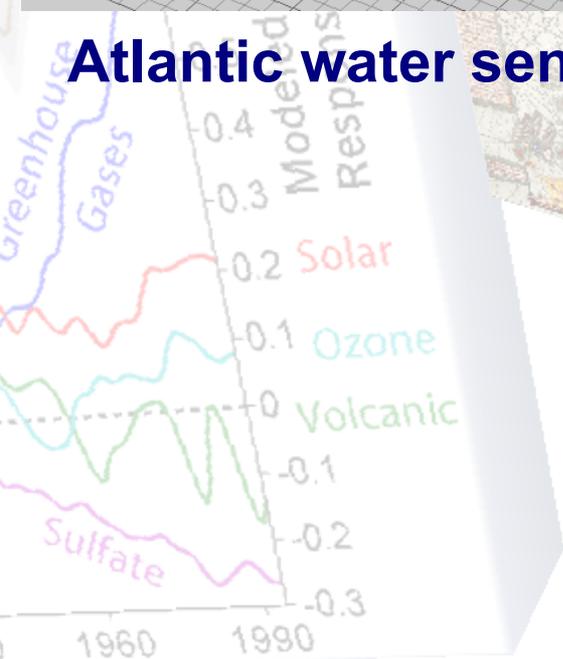
**Coupled sim forced by Echem5
Trend correction**



Sea Level Anomaly, Steric Component (Temp and Salinity)

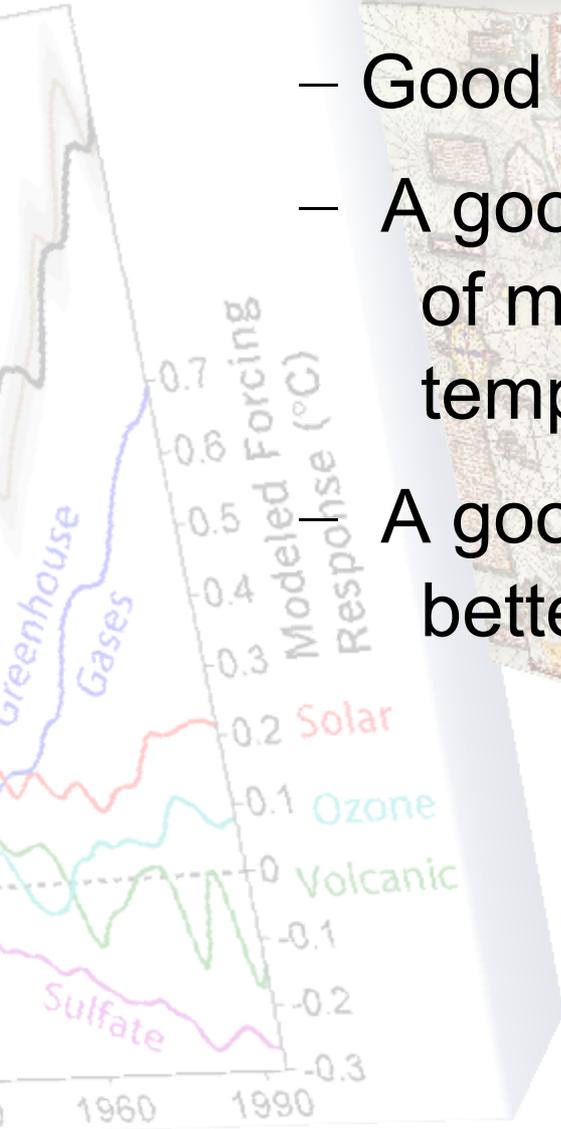


Atlantic water sensitivity



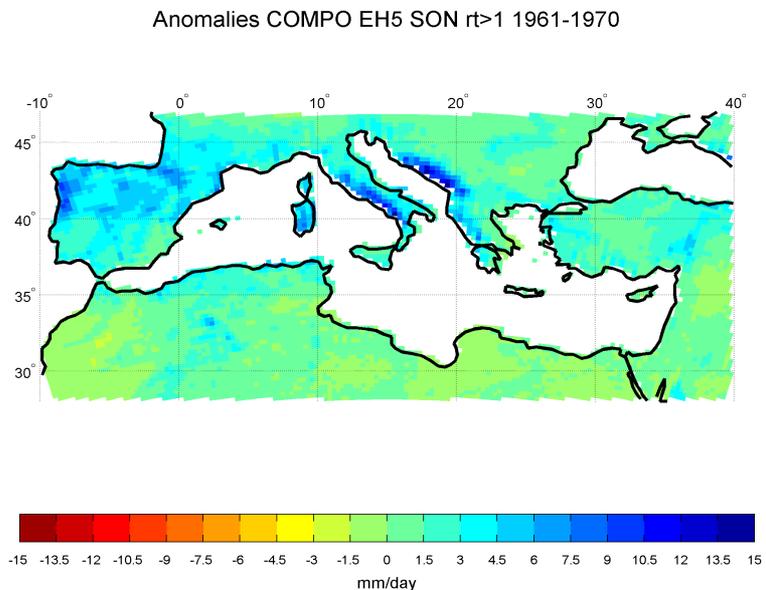
New opportunities

- Good representation of Sea Level Rise
- A good tool to evaluate the uncertainty in terms of modeling systematic errors (deep temperature bias in ocean models)
- A good tool to develop sensitivity analysis and better evaluate the near future risk



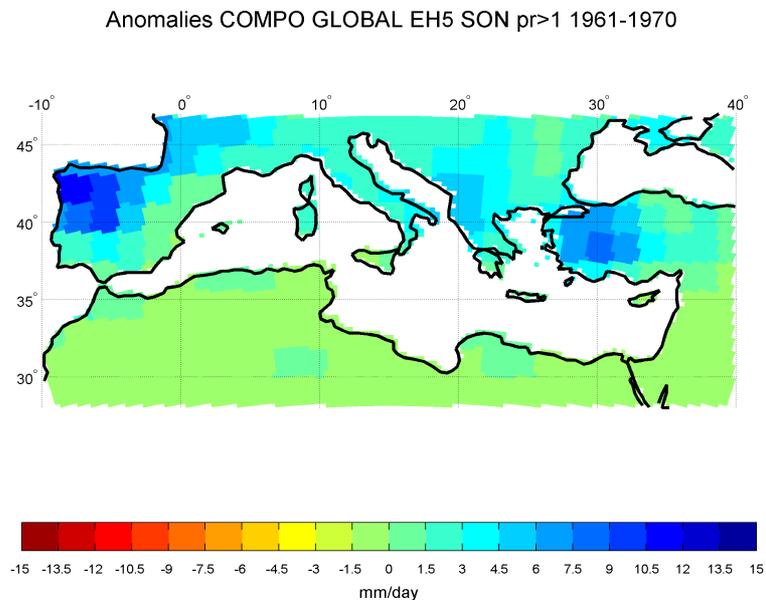
Coupled RCM

a) P_20C: Composite anomalies SON $pr > 1$ mm/d

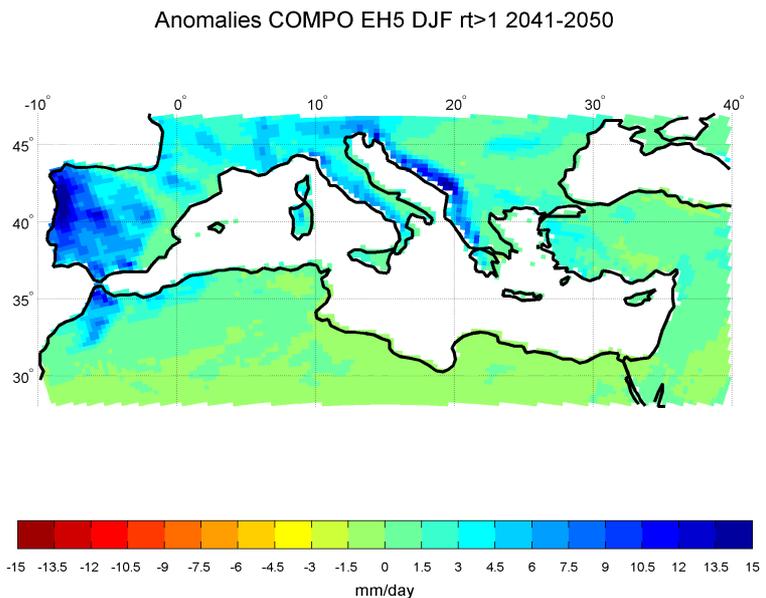


GCM driver

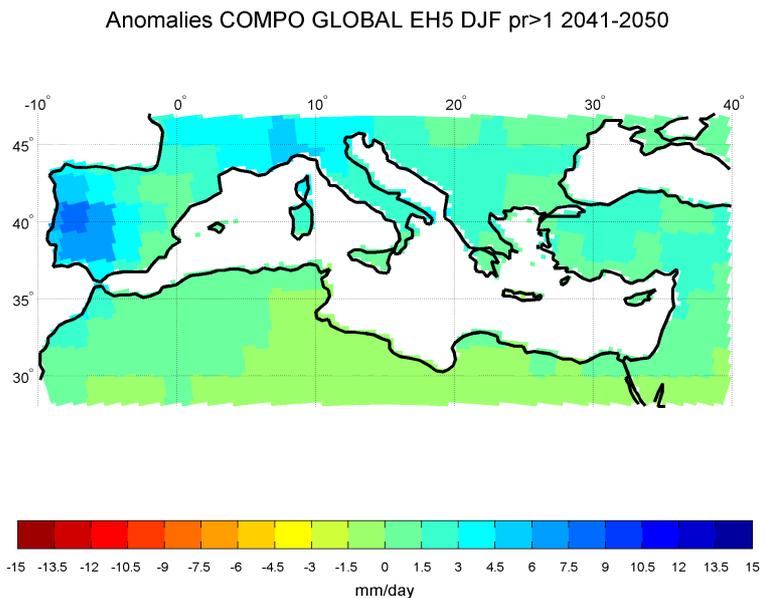
b) E_20C : Composite anomalies SON $pr' > 1$ mm/d



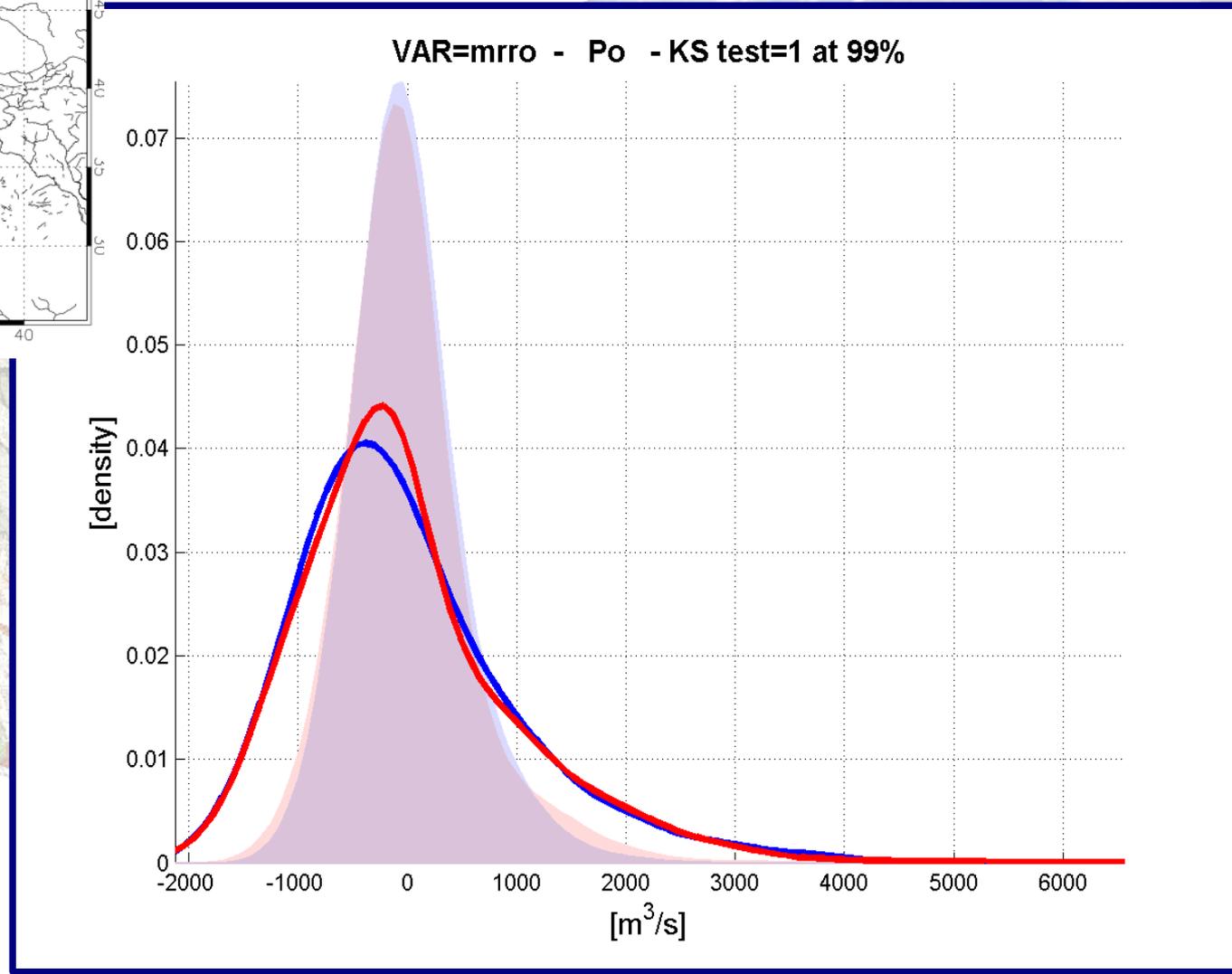
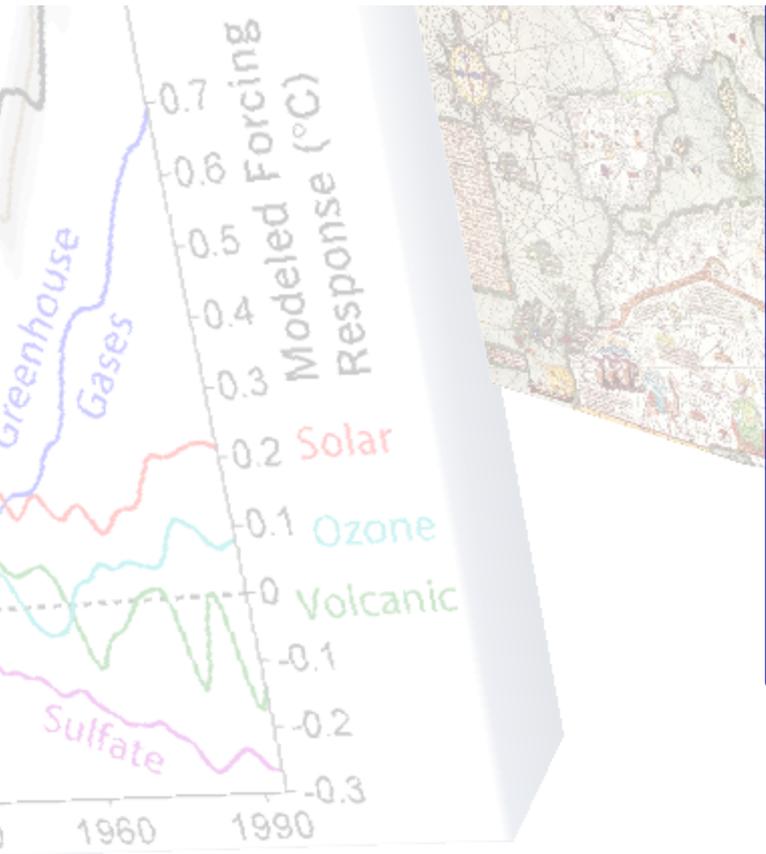
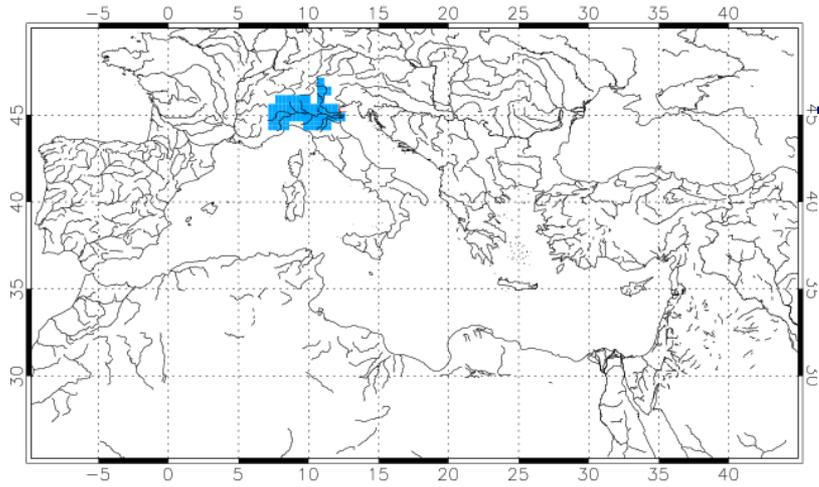
c) P_A1B : Composite anomalies DJF $pr' > 1$ mm/d



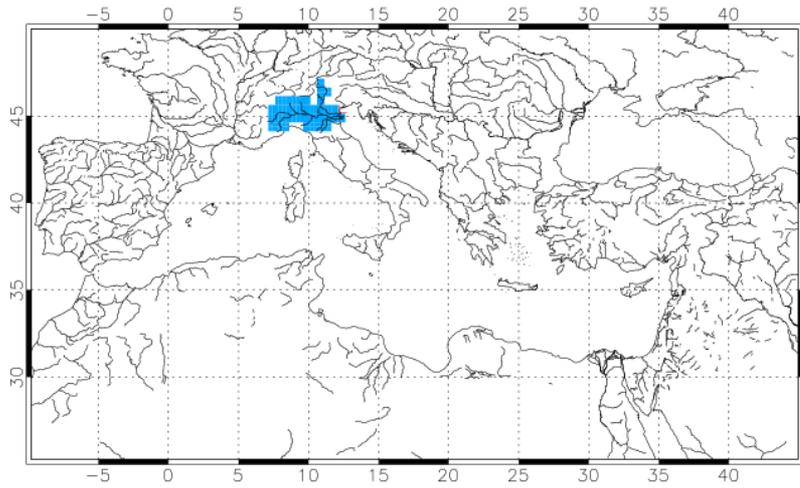
d) E_A1B : Composite anomalies DJF $pr' > 1$ mm/d



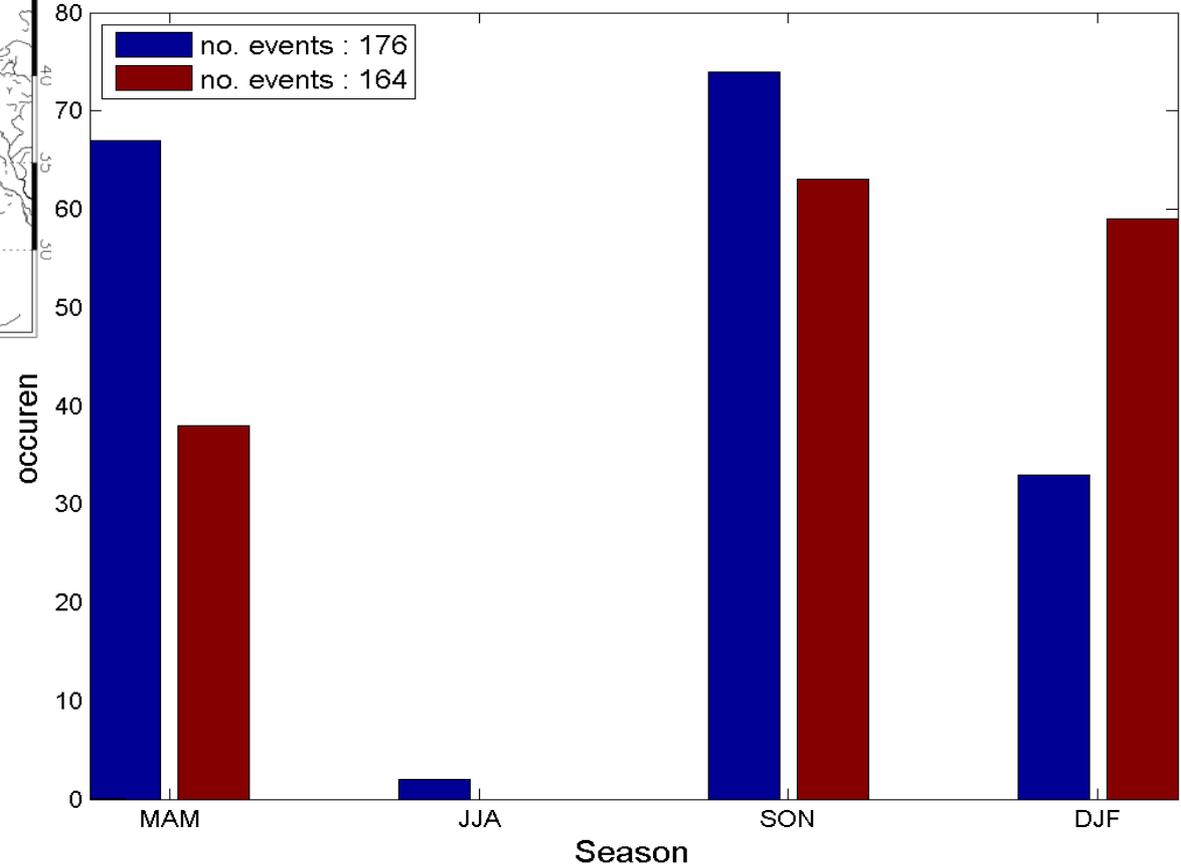
IMPACTS: Rivers



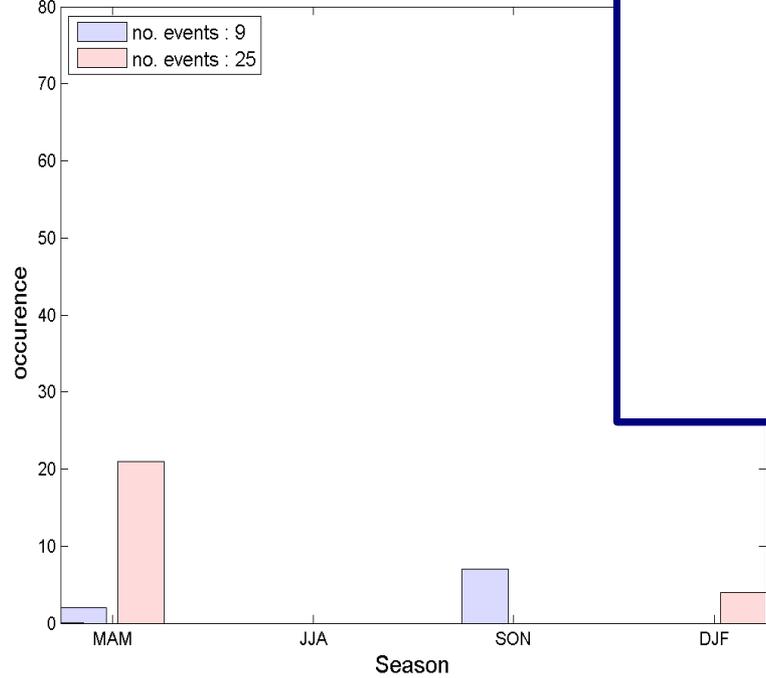
IMPACTS: Rivers



PROTHEUS VAR: $mrr_o > 2e+003$: Po

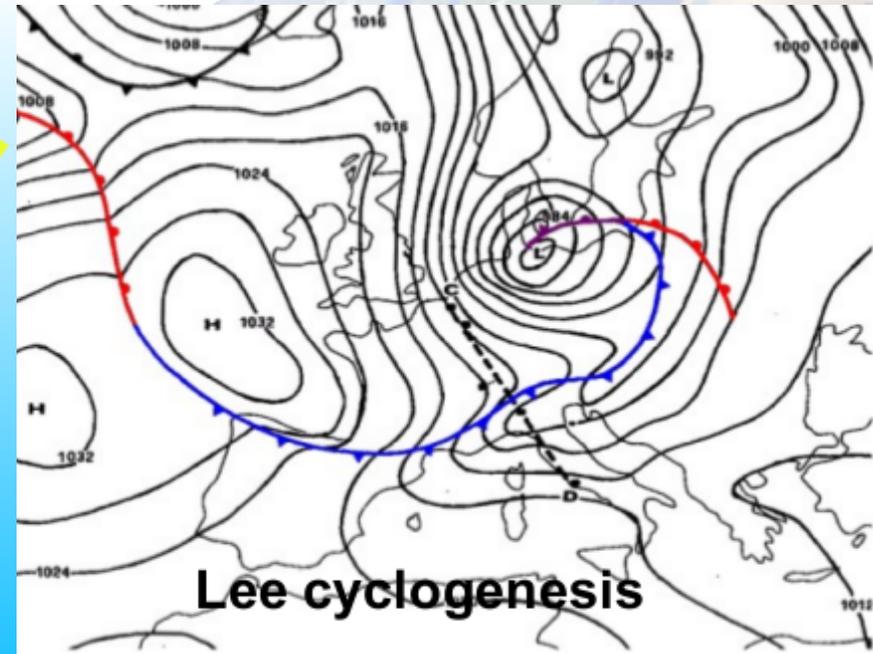
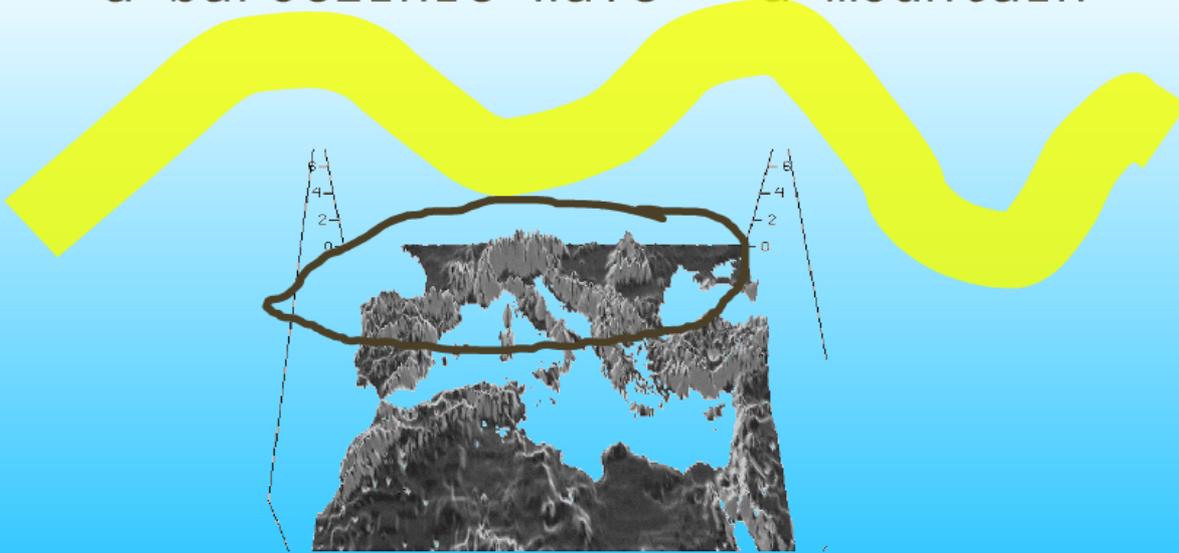


GLOBAL VAR: $mrr_o > 2e+003$: Po

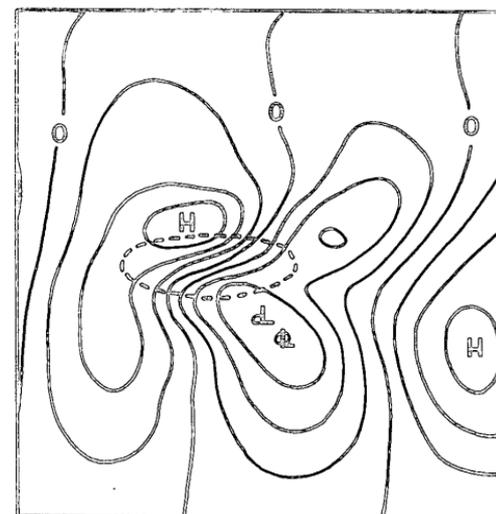
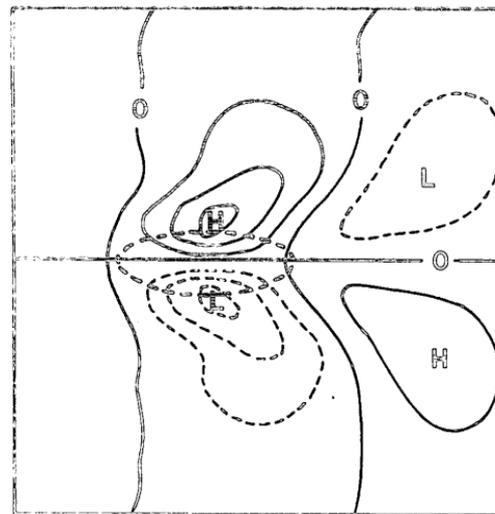
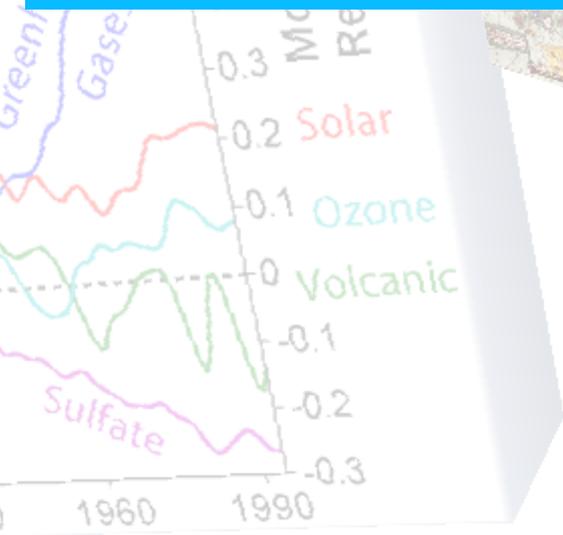


Climate is not just a mean ... it is a synthesis of several processes acting at different spatial and time scales

a baroclinic wave + a mountain



$$\psi = \Psi_{basicState} + \psi_{baroclinic} + \psi_{baroclinicCorrection}$$

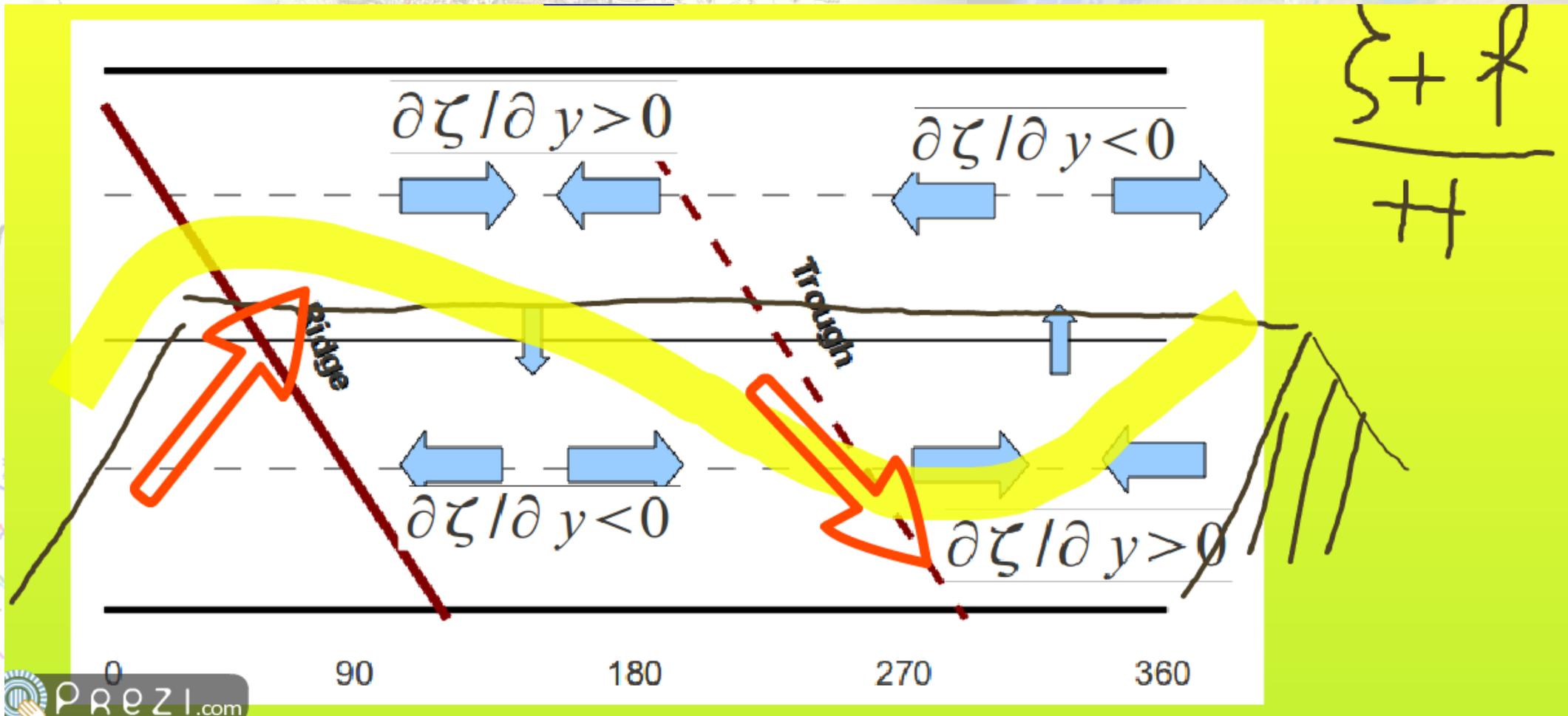


a

Speranza 85

b

Med Lee Cyclogenesis ... just an ex

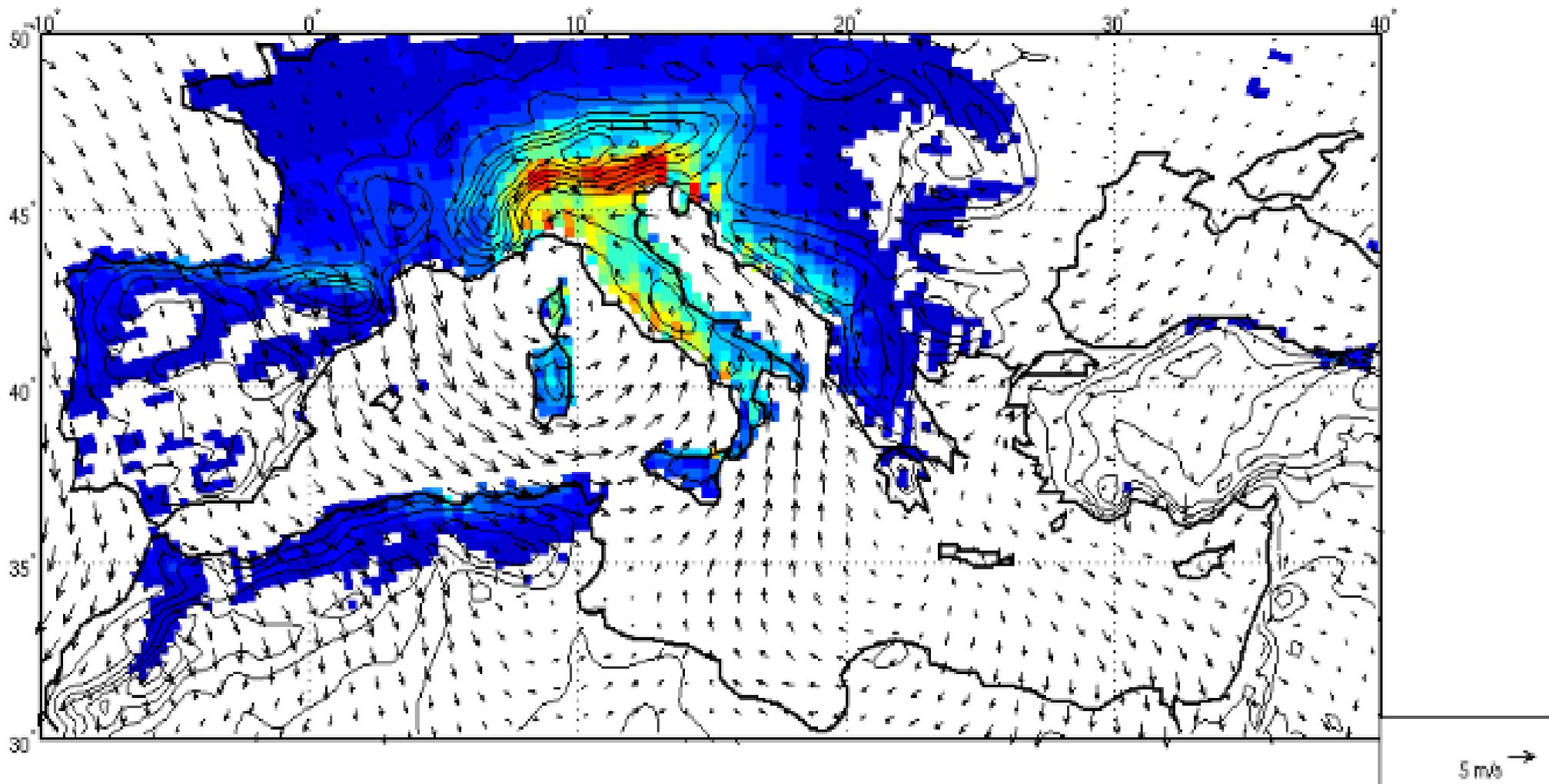


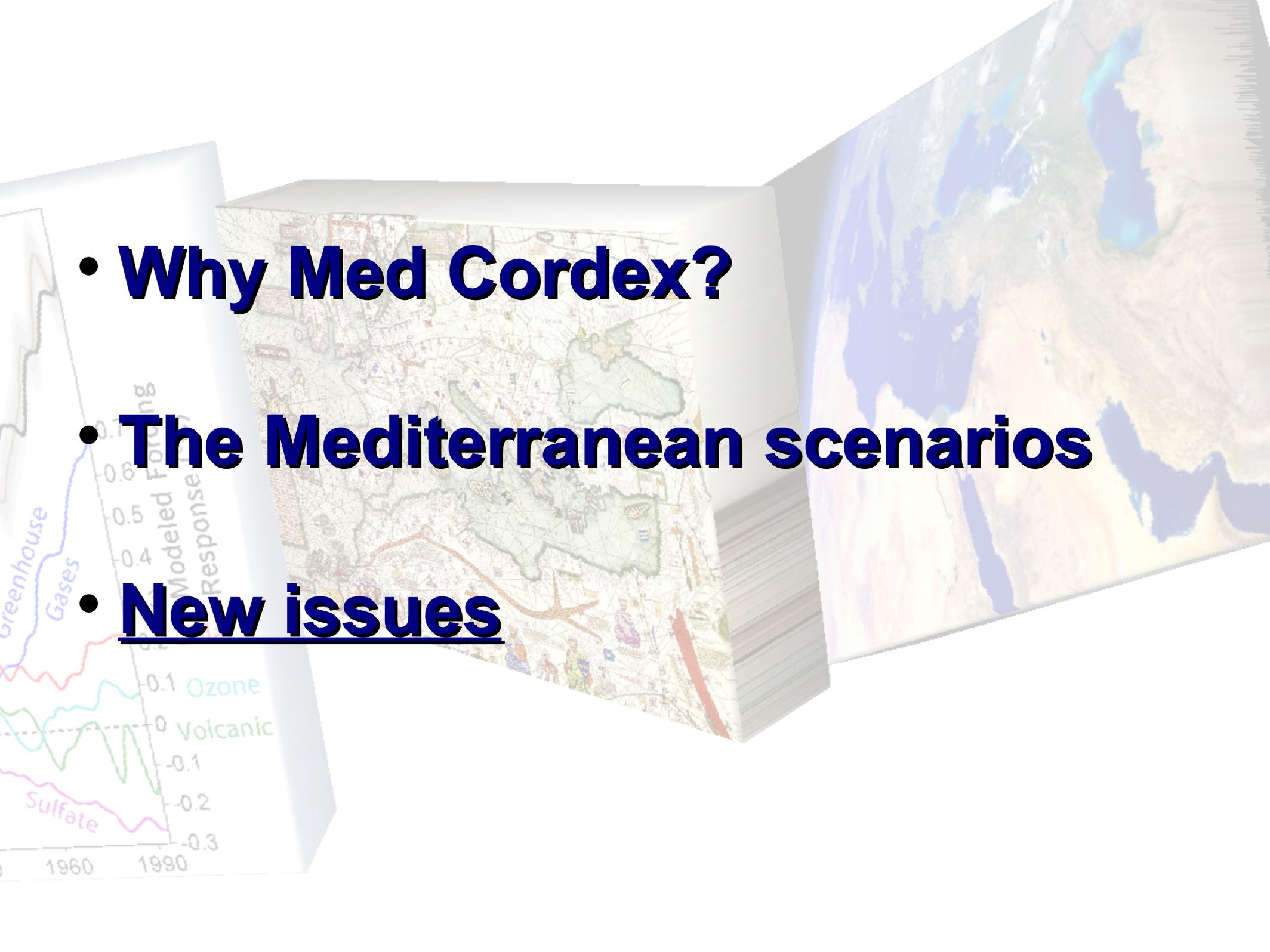
1960 1990 -0.3

Coupled – Uncoupled Cyclogenesis

1 better understanding 2 better downscaling 3 extremes

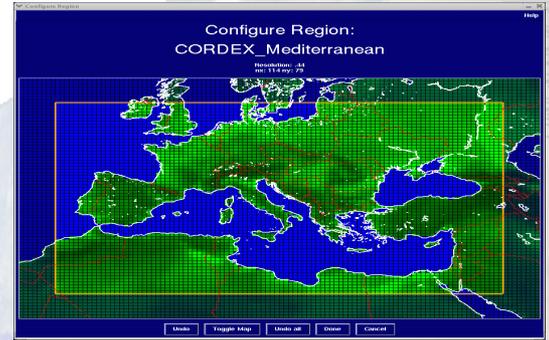
ANOMALIES EH50M-1-R-EH-20C-ANN 1991-2000 ft
COMPOSITES INDEX ANO: ft on LAND BASIN RIV.73-148 > 2STD; LAG= 0



- 
- **Why Med Cordex?**
 - **The Mediterranean scenarios**
 - **New issues**

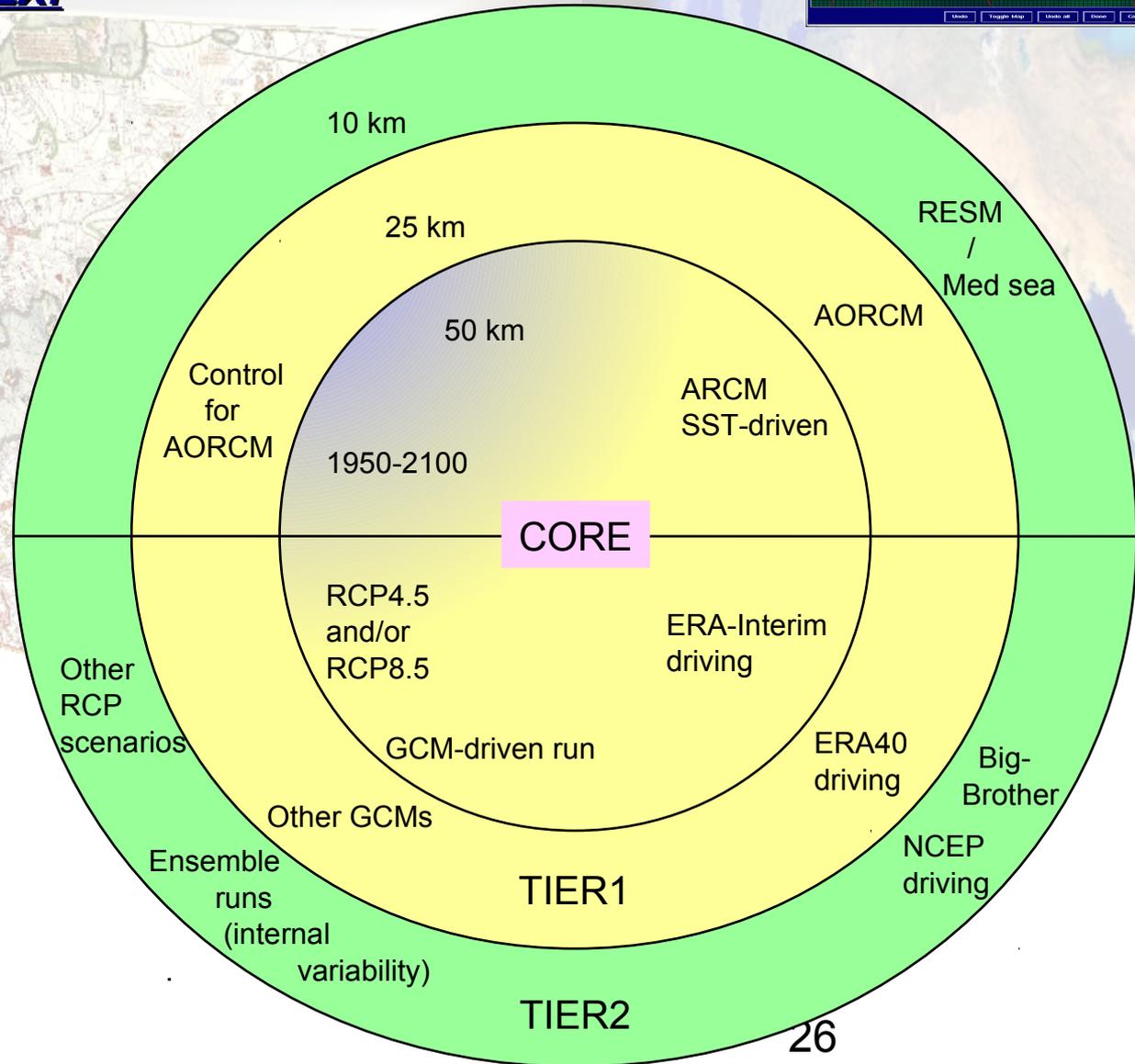


WCRP-RCM-Mediterranean: a proposal



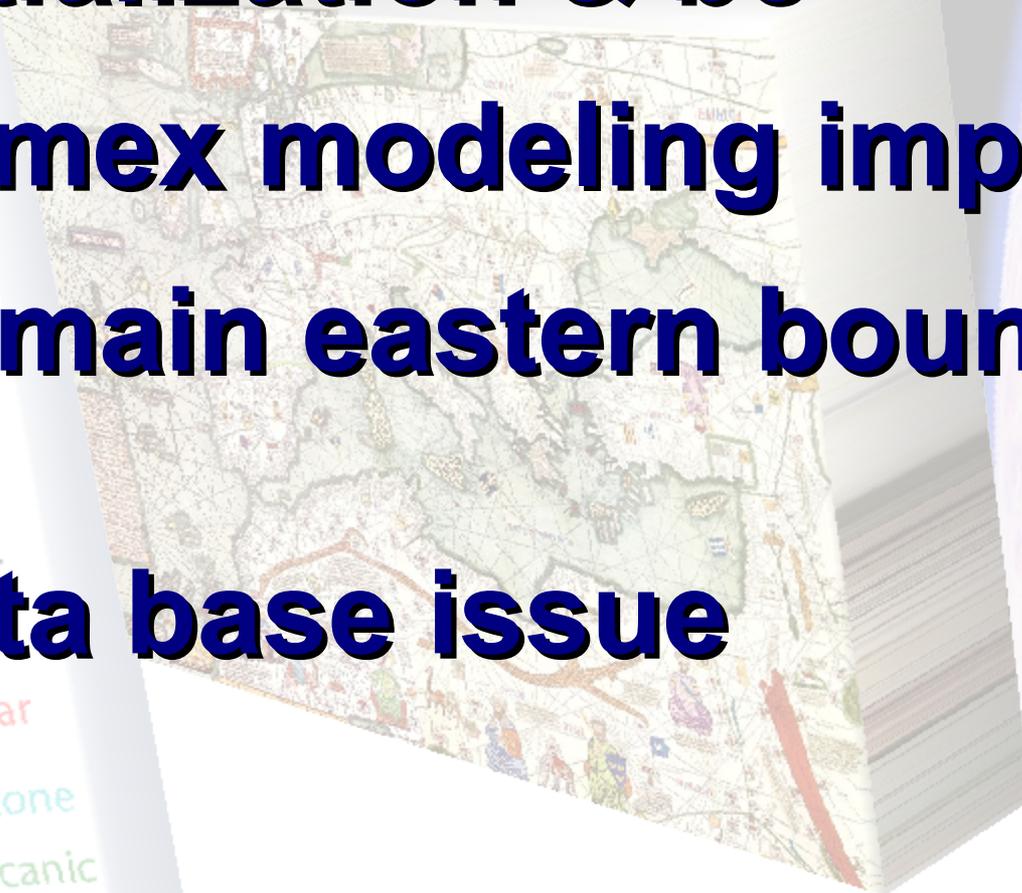
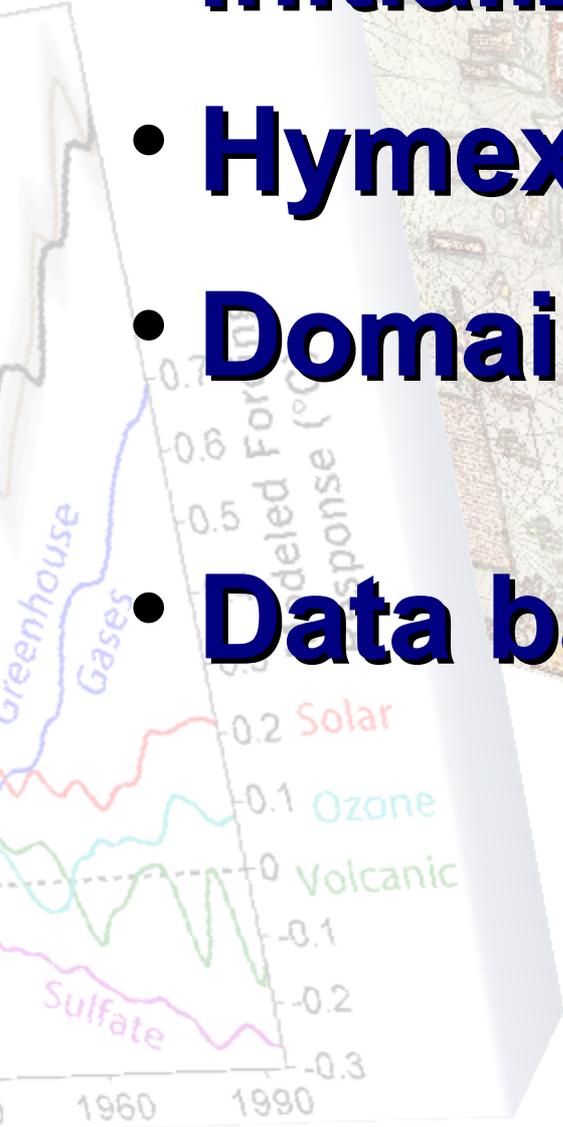
Modelling groups officially involved in CORDEX and interested in MedCORDEX:

- LMD
- ICTP-ENEA
- CNRM
- MPI
- UCLM
- WRF community
- COSMO
- IC3

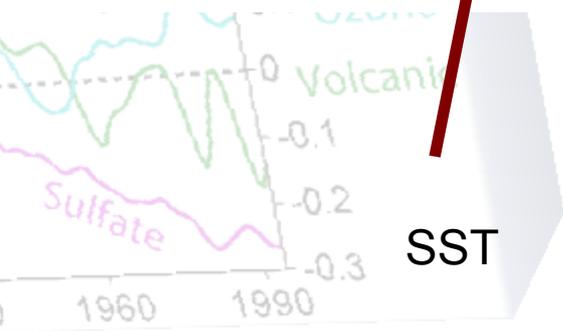
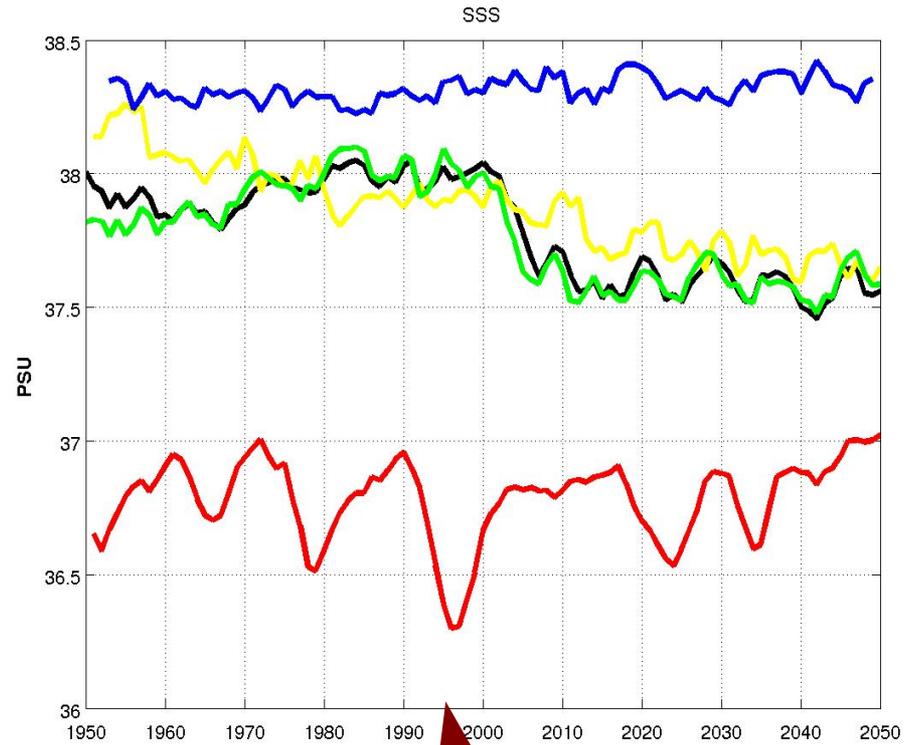
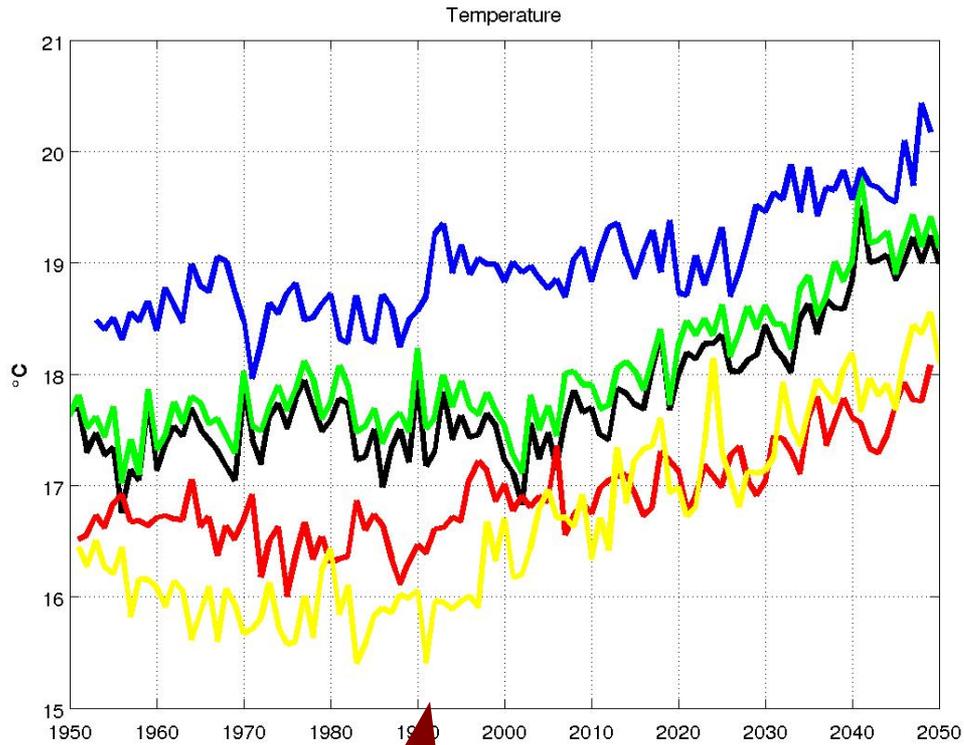


Next Talk
Hiba Omrani

- **Initialization & bc --> decadal**
- **Hymex modeling improvement**
- **Domain eastern boundary**
- **Data base issue**



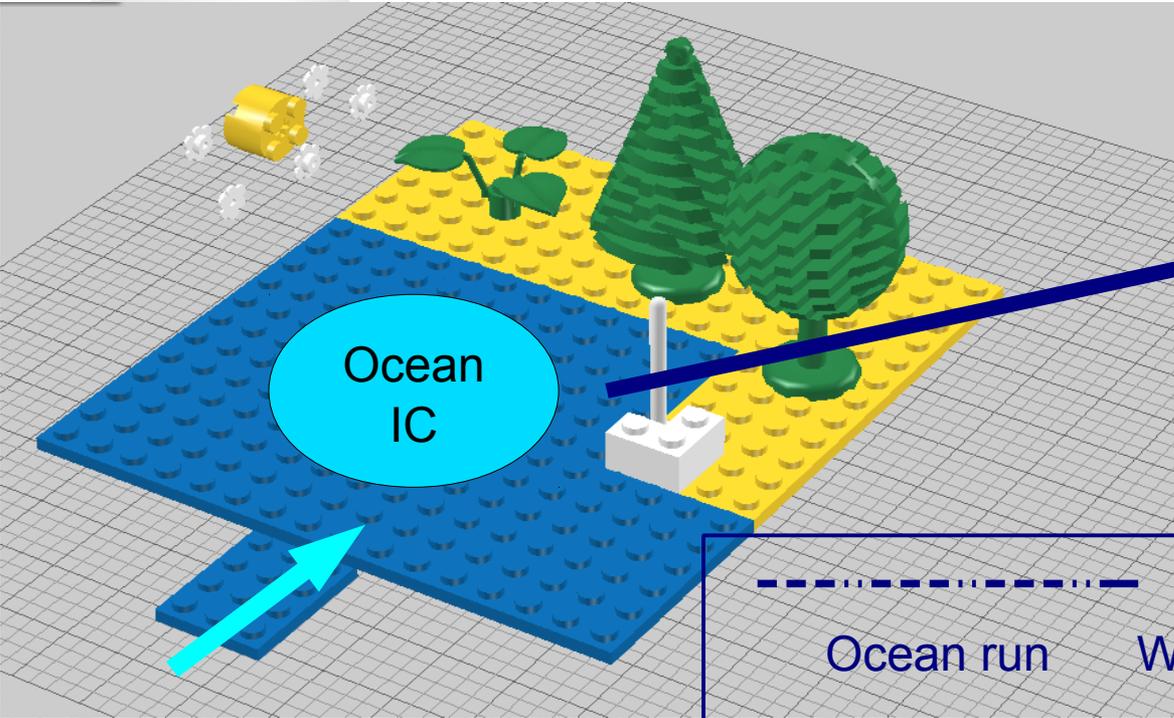
Initialization & BC



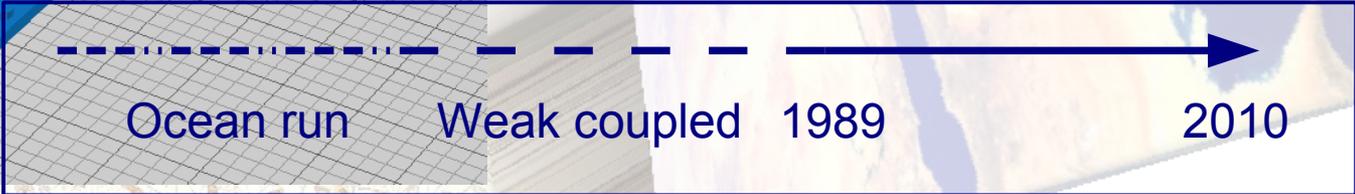
SSS

RACCM CIRCE book

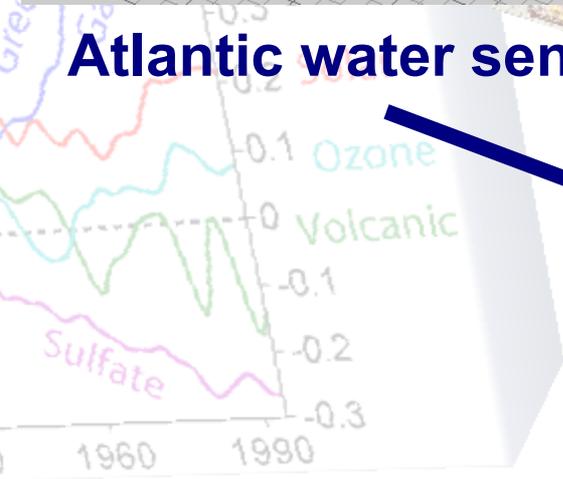
Initialization & BC



Common Protocol To initialize The Ocean



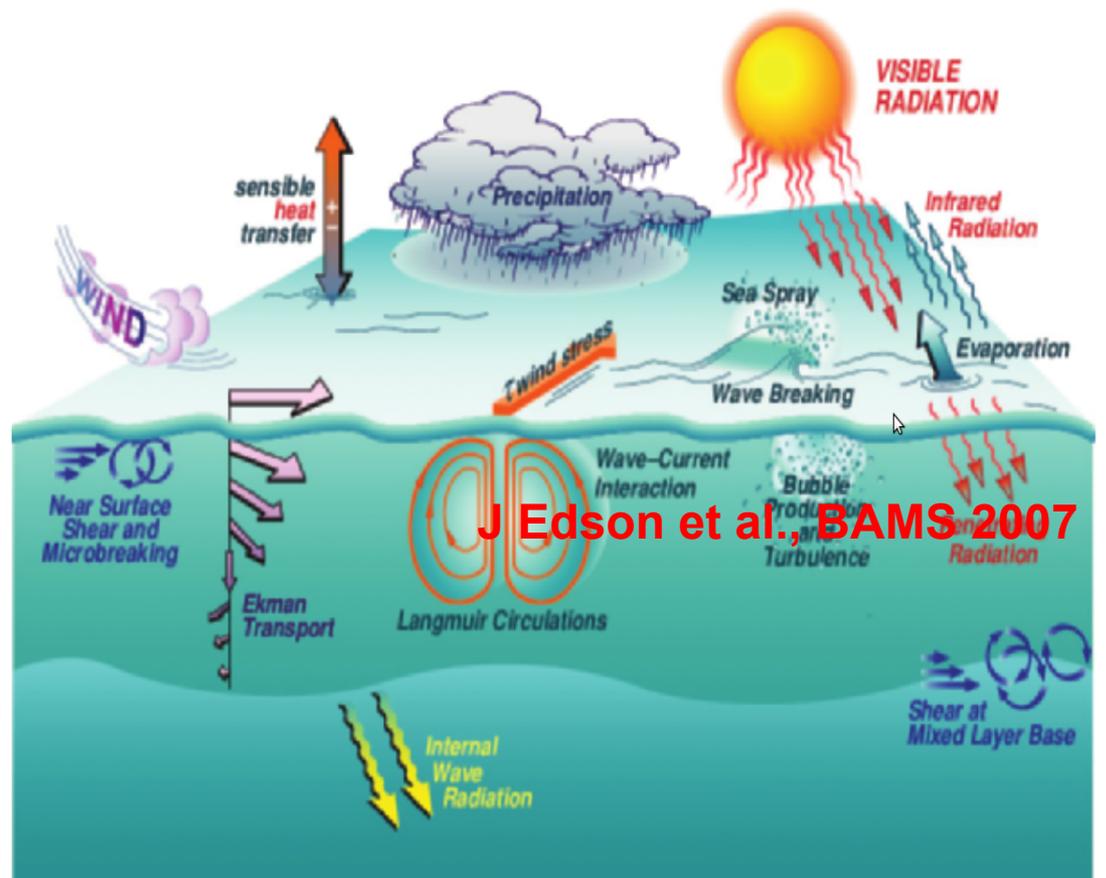
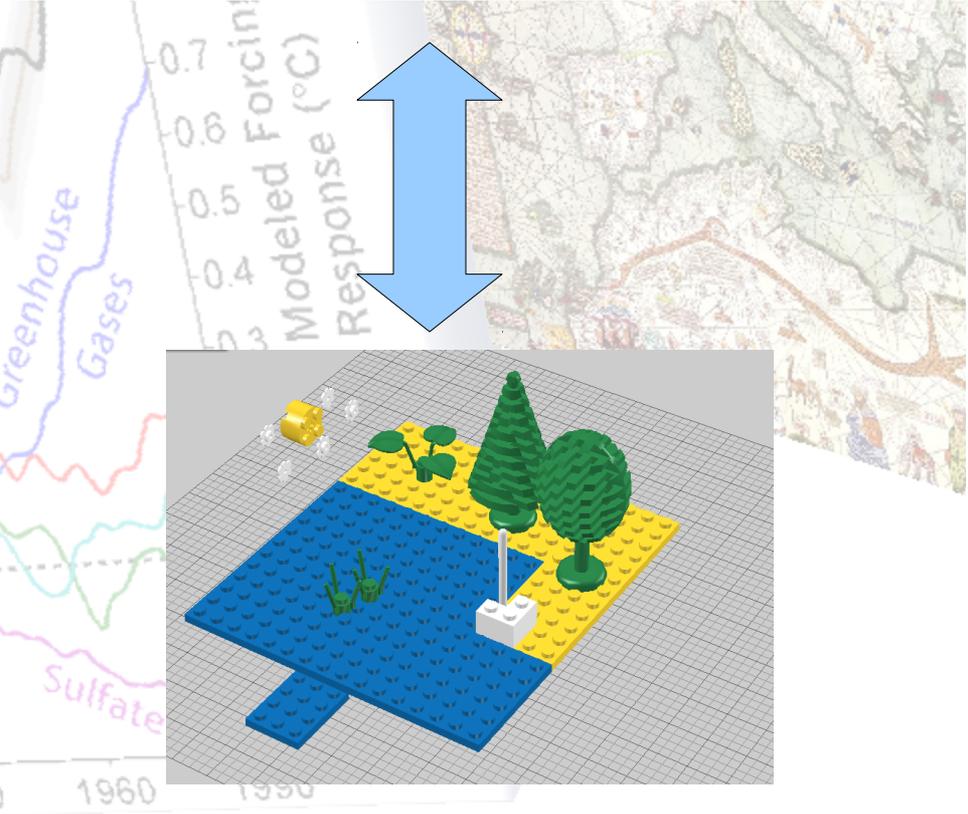
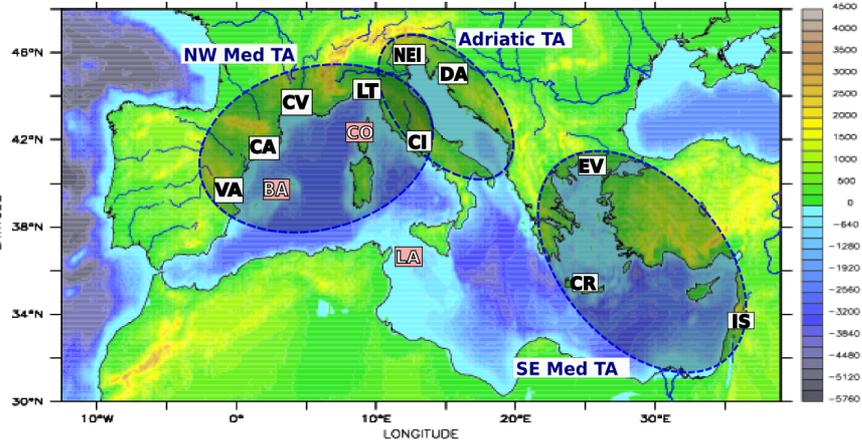
Atlantic water sensitivity



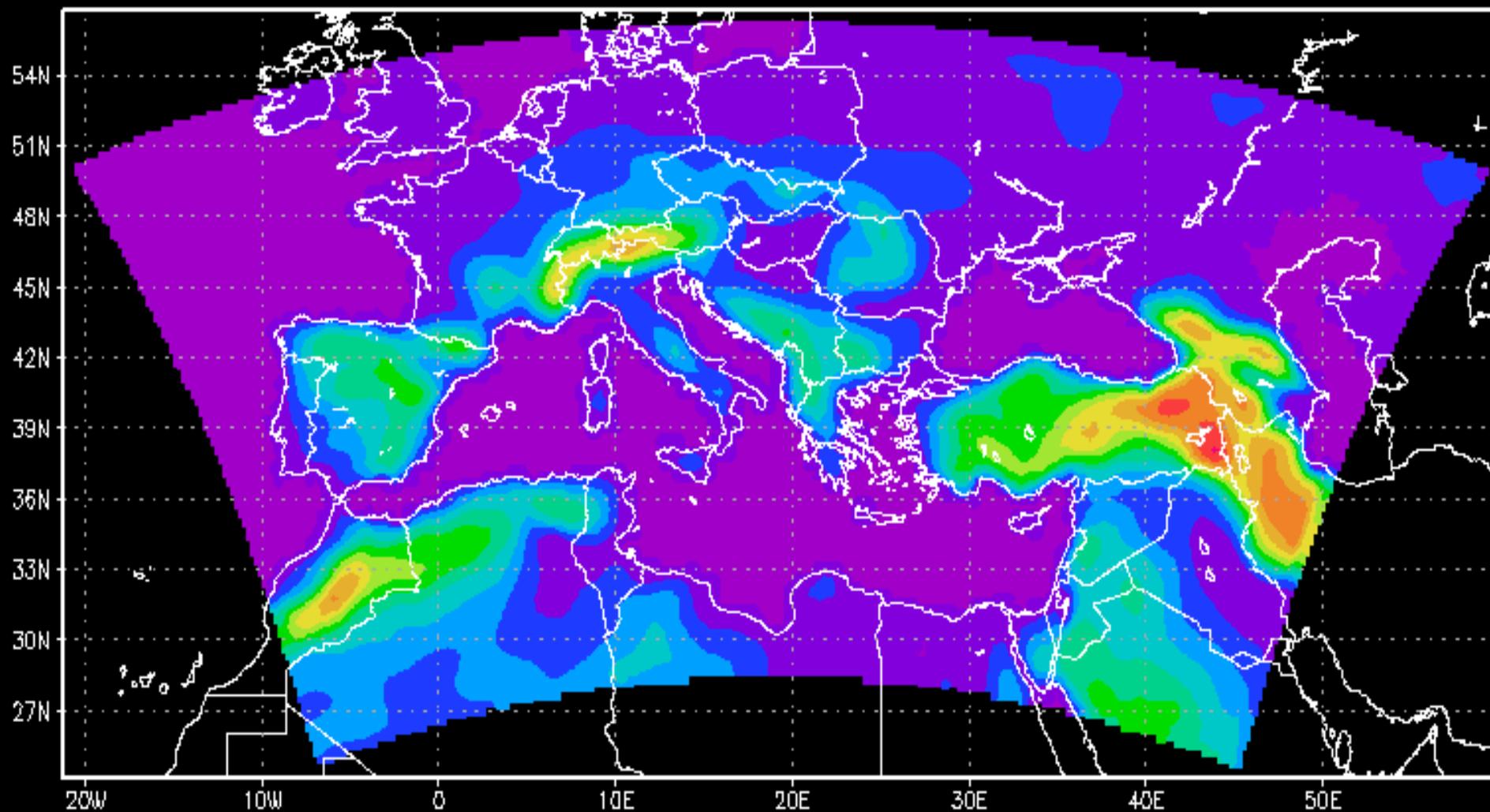
Salinity anomaly computed from Coupled GCM and then added to climatology

Hymex Field Campaign

Modeling Improvement strategy ...



Eastern boundary issue. At least 1-2 Coupled models will run using this domain



Data Base 4 MedCordex

HyMeX

HYdrological cycle in Mediterranean EXperiment

MedGLIVAR

Circe

Data Base





Food Security Case

Africa RiskView

Climate and Disaster Risk Solutions



EU FP7

0.3 Multi Risk

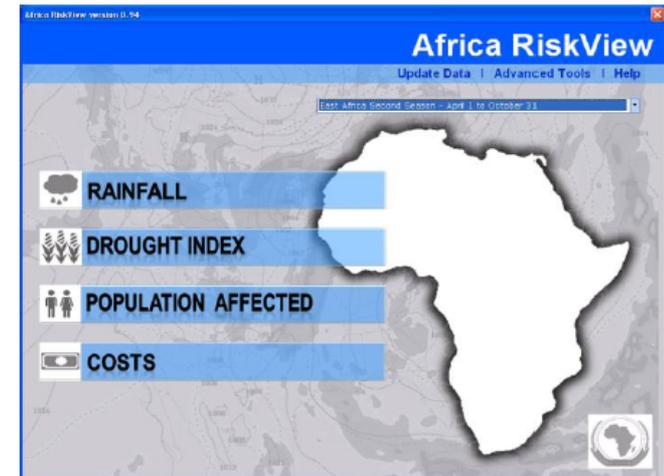
0.2 Solar

0.1 Ozone

0 Volcanic

Africa RiskView is a software platform that aims to quantify and monitor weather-related food security risk in Africa. To date it focuses on drought, but inclusion of other weather risks is planned.

Africa RiskView translates satellite-based rainfall information into near real-time impacts of drought on agricultural production and grazing. By overlaying this data with vulnerability information, the software also produces a first order estimation of the drought-affected population and, in turn response cost estimates. Through this process, *Africa RiskView* combines four well-established disciplines: crop



wfp.org

World Food Programme

Fighting Hunger Worldwide



