The Med-CORDEX initiative: status of the simulations and first achievements

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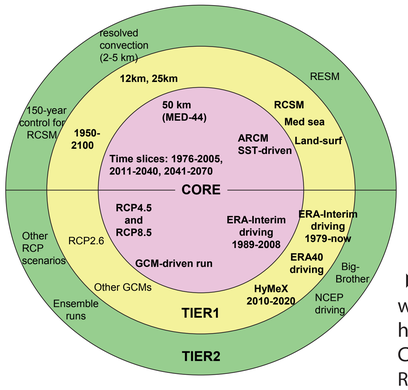
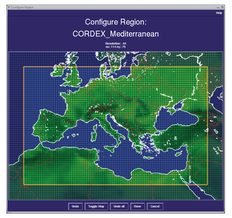
01 | MOTIVATIONS for Med-CORDEX

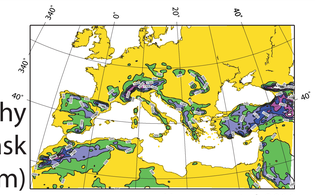
- A climate change hot-spot (Giorgi, 2006)
- Many regional physical processes (complex topography, cyclogenesis, regional winds, islands, narrow and shallow straits, key role of the rivers, extreme events, ...)
- Proved added-value of high-resolution RCMs (Gibelin and Déqué, 2003; Gao et al. 2006; Herrmann et al. 2011)
- Proved added-value of Regional Climate System Models (RCSMs) including air-sea-land-hydrology coupling (Somot et al. 2008; Artale et al. 2010)
- To serve the scientific objectives of MedCLIVAR and HyMeX
- Natural follow-on of the CIRCE project (existing modelling community)
- To share expertise and good practices in multi-component regional climate modelling
- To promote model intercomparison for ARCMs and RCSMs
- To enhance the communication between the various communities (ocean, atmosphere, land, hydrology)
- To create new evaluation methods for the multi-component RCSM (best use of the new satellite products and new in-situ dataset)
- To be in phase with the HyMeX in-situ field campaign (2012-2013)
- To work together for the improvement of the RCSM and of their components (atmosphere, land surface, river, ocean)
- To deliver quality-checked regional climate products to the climate community and the impact community
- To deliver improved messages about the climate change in the Mediterranean area for the next IPCC report (IPCC-AR5)

02 | Med-CORDEX FRAMEWORK



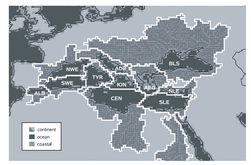


MedCORDEX domain (MED-44)



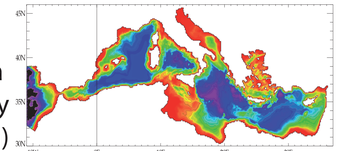
Orography land-sea mask (12km)

Herrmann et al. 2011



Rivers and Black Sea catchment basin (50km)

Ludwig et al. 2009



Med Sea bathymetry (10km)

Beuvier et al. 2010

- Organisation:
  www.medcordex.eu
  hymex-ttm3@cnrm.meteo.fr
  Contact: S. Somot, P. Ruti
  Ruti et al. (submitted to BAMS)
- Med-CORDEX started in 2009
- Med-CORDEX is endorsed by CORDEX, MedCLIVAR and HyMeX
- Med-CORDEX database is open at www.medcordex.eu (ENEA)
- Example file naming:

pr_MED-44_ECMWF-ERAINT_evaluation_r1i1p1_CNRM-ALADIN5_v1_day_19910101_19951231.nc

03 | MODELS and SIMULATIONS

MedCORDEX - CORE simulations Atmosphere-RCM: MED-44 (50km, 0.5°)			ERAI	ERA40	HIST	RCP8.5	RCP4.5
	institute	model	resol.	1979-now	1958-2001	1950-2005	2006-2100	2006-2100
RUN	ITU	RegCM4	50km	1989-2008				
	TAU	RegCM						
	IIBR	RegCM						
	Eotvos Lorand U	RegCM						
	ENEA	RegCM3.1	30km	1982-2010	1958-2001			
	ICTP	RegCM4	50km	1989-2008	1958-2001	1950-2005	2006-2100	2006-2100
	MPI	REMO	50km	1989-2008	1958-2001			
	CNRM	ALADIN5.2	50km	1979-2012	1958-2001	1950-2005	2006-2100	2006-2100
	LMD	LMDZ	30km	1979-2009	1958-2001			
	Univ. Belgrade	EBU	50km	1989-2008				
	IPSL	WRF3.1.1	50km	1989-2008		1971-2005	2006-2070	
	UCLM	PROMES	50km	1989-2008				
	GUF	CCLM	50km	1989-2008				
	CMCC	CCLM	50km					
	IC3	WRF						

unknown | planned | done | archived

MedCORDEX - TIER1 simulations Atmosphere-RCM: MED-22 (25km, 0.22°)			ERAI	ERA40	HIST	RCP8.5	RCP4.5
	institute	model	resol.	1979-now	1958-2001	1950-2005	2006-2100	2006-2100
RUN	MPI	REMO	25 km	1989-2008	1958-2001			
	IPSL	WRF3.1.1	20km	1989-2011		1989-2005	2006-2070	
	UCLM	PROMES	25km	1989-2008				

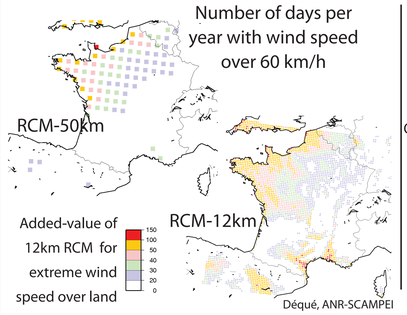
MedCORDEX – TIER1 simulations Atmosphere-RCM: MED-11 (12 km, 0.11°)			ERAI	ERA40	HIST	RCP8.5	RCP4.5
	institute	model	resol.	1979-now	1958-2001	1950-2005	2006-2100	2006-2100
RUN	ITU	RegCM4	15km					
	ICTP	RegCM4	12km					
	MPI	REMO	12km					
	CNRM	ALADIN5.2	12km	1979-2012		1950-2005	2006-2100	2006-2100
	UCLM	PROMES	12km	1989-2008				
	GUF	CCLM	10km	1989-2008				
	KIT	CCLM	7km					

MedCORDEX – TIER1 simulations RCSM (same atm. as corresponding ARCM)				ERAI	ERA40	HIST	RCP8.5	RCP4.5
	institute	model	comp.	1979-now	1958-2001	1950-2005	2006-2100	2006-2100
RUN	ENEA	PROTHEUS	ALRO	1982-2010	1958-2001	1971-2005		
	MPI	REMO/MPI-OM	ALRO	1989-2008	1958-2001	*in test*		
	CNRM	RCSM2012-50km	ALRO	1980-2012	1958-2001	*spin-up*		
	LMD	LMDZ/NEMOMED8	ALO	1979-2009	1958-2001	1950-2005	2006-2100	2006-2100
	Univ. Belg.	EBU/POM	ALO	1989-2009				
	IPSL	MORCE-MED-20km	ALO	1989-2008		1971-2005	2006-2100	
	UCLM/UPM	PROMES/MOSLEF	ALO	1989-2008				
	INSTM	LMDZ/ROMS-MED	ALO	1979-2009				
	UAH	REMO/MITgcm	ALO	1989-2008				
	GUF	CCLM/NEMOMED12	ALO	*test*				
	CMCC	CCLM/NEMO-MFS	ALO					
	IC3	WRF/ROMS	ALO					

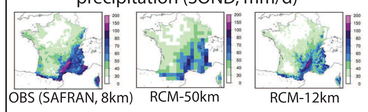
- 20 different modelling groups from 9 different countries (France, Italy, Spain, Serbia, Turkey, Israel, Tunisia, Germany, Hungary) in Europe, Middle-East and North-Africa
- 10 atmosphere RCMs (including 5 RCMs at 12 km), 8 regional ocean models and 12 Regional Climate System Models
- 6 different GCMs from CMIP5 as driver for the RCMs
- Most of the ERAInterim driven runs are finished as well as the first RCP scenarios

Updated information available on www.medcordex.eu

04 | RESULTS: 12-km RCMs, evaluation runs



Déqué, ANR-SCAMPEI

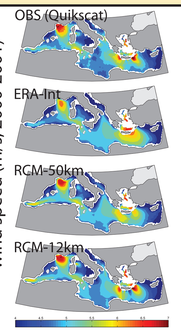


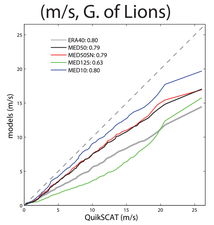
Detection of Automn Heavy Precipitation Events in SE France (SOND)

	Event number	Detection rate (%)	Maximal rain rate (mm/day)	Area ($\times 10^3$ km^2)
Observations	198		162	2.3
RCM-12km	76	38%	185	3.7
RCM-50km	53	27%	190	4.3

Added-value of 12km RCM for extreme precipitation over land

Colin, 2011

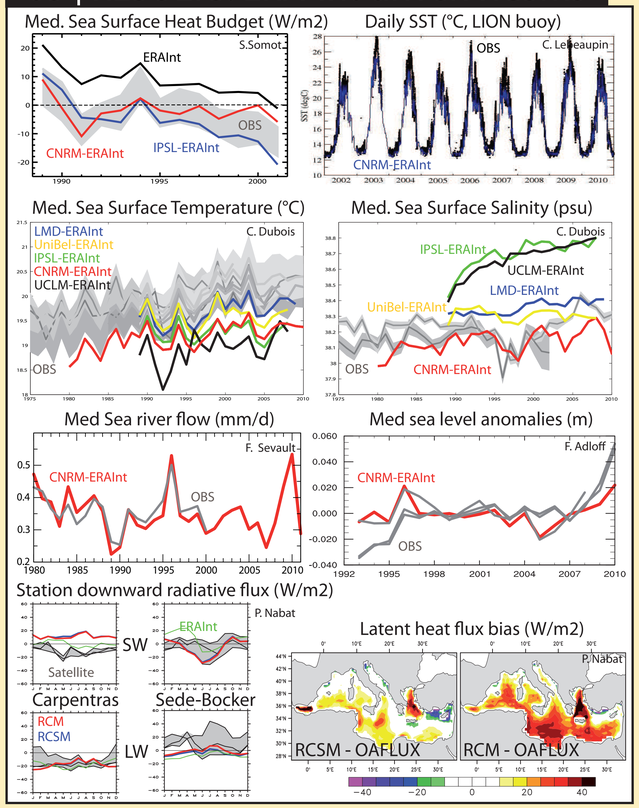




Added-value of 12km RCM for wind speed over sea

Herrmann et al. 2011

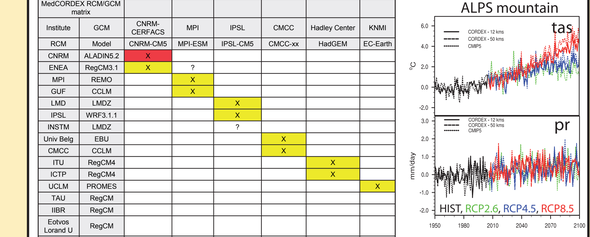
05 | RESULTS: ERA-Int driven RCSMs

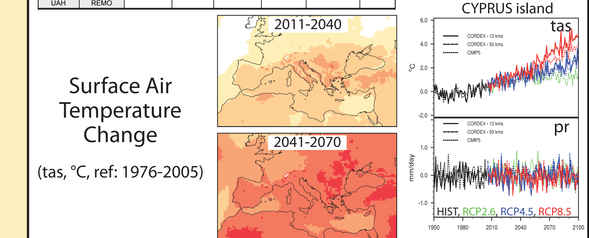


06 | RESULTS: RCP scenarios

GCM/RCM matrix for Med-CORDEX

MedCORDEX RCM/GCM matrix							
Institute	GCM	CNRM-CERFACS	MPI	IPSL	CMCC	Hadley Center	KNMI
RCM	Model	CNRM-CM5	MPI-ESM	IPSL-CM5	CMCC-xx	HadGEM	EC-Earth
CNRM	ALADIN5.2	X					
ENEA	RegCM3.1	X	?				
MPI	REMO		X				
GUF	CCLM		X				
LMD	LMDZ			X			
IPSL	WRF3.1.1			X			
INSTM	LMDZ			?			
Univ Belg	EBU				X		
CMCC	CCLM				X		
ITU	RegCM4					X	
ICTP	RegCM4					X	
UCLM	PROMES						X
TAU	RegCM						
IIBR	RegCM						
Eotvos Loland U	RegCM						
IC3	WRF						
UAH	REMO						





Surface Air Temperature Change

(tas, °C, ref: 1976-2005)

GCM: CNRM-CM5
RCM: CNRM-ALADIN52

WCRP CORDEX | MedCLIVAR | HyMeX | CNRS | METEO FRANCE Toujours un temps d'avance