CORDEX and the MENA domain

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IPCC AR5 projections: regional?

- MENA is not covered completely
- Part of other continents’ subsets
- Horizontal resolution: 1-2 degrees (100-200 km)

Figure AI.41 (top) and AI.52 (bottom) from van Oldenborgh et al., IPCC, 2013: Annex I: Atlas of Global and Regional Climate Projections in: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change
Dedicated CORDEX domain for MENA

- Higher resolution climate information ($\leq 50$ km)
- Full coverage of MENA region
- Involvement of countries from the region
- Exploitation of unexplored country data
- Connection to regional/local needs for impact assessments
MENA-CORDEX brief history

- MENA-CORDEX domain established (2012)
- Motivated by RICCAR's needs for common downscaling set-up
- Detailed sensitivity analysis of domain boundaries effect carried out by SMHI
- “First” MENA-CORDEX meeting, Nicosia (2014)

- Tigris-Euphrates (north ext.) and Nile (south ext.) basins
- Arabian Sea (east ext.): tropical cyclones
--Launched December 2015
- Hosted by CyI
- Modelling groups
- Simulation updates
- List of papers/presentations
- Related news/links
MENA RCM physics sensitivity studies

- **COSMO-CLM**: improved simulation with albedo based on dry and saturated soils from MODIS and temporally varying AOD from NASA-GISS (Bucchignani et al., 2016b)

- **RegCM4**: sensitive to convection schemes, improved simulation over dry areas with Grell over Land and Emanuel over Ocean (Almazroui et al., 2016a)

- **WRF3.5**: Temperature sensitive to cloud microphysics and radiation, precipitation to cumulus convection schemes (Zittis et al., 2014; 2017)

→ Optimised model physics for the MENA domain
In peer-reviewed journals:


**MENA-CORDEX scenario runs**

- Last updated: December 2016
- Only RCA data uploaded to ESGF
- Material for multi-model assessment (at 50 km)

RCP4.5: **10** (RCM x GCM) runs
RCP8.5: **9** (RCM x GCM) runs

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CORDEX data on ESGF

From G. Nikulin, provided by DKRZ (Jan 2017)

Number of files

- RCM x GCM combinations for MENA:
  - RCP4.5: 10 (3 in ESGF)
  - RCP8.5: 9 (3 in ESGF)

- Important to upload more!
Next phase: CORE-CORDEX

Coordinated Output for Regional Evaluations (CORE)

- Provide a core set of comprehensive and homogeneous projections across all, or most, CORDEX domains
- Capture plausible range of climate change => 3-5 GCMs
- CMIP5 (CMIP6 supplement): RCP8.5, RCP2.6
- 3-4 RCMs in ~ 10 CORDEX domains
- Resolution: 10-25 km (minimum 20-25 km)
- Feedback from CORDEX communities through domain POCs
- Still under discussion (forthcoming CORDEX SAT meeting):
  - Heavy production, large resources needed; no funding; mainly for large modelling groups but small ones may also contribute

Source: G. Nikulin, CORDEX SAT
MENA-CORDEX achievements

- Brought together (small) group of modelling teams from Europe, Middle East and North Africa

- Performed decent science so far, on RCM sensitivity to physics

- Completed appropriate number of RCM scenario runs at 50 km

- Contributed to RICCAR (SMHI simulations, review, dissemination)
MENA-CORDEX challenges

- Tenuous communication
- Collection of individual efforts rather than collective action
- Varying degree of commitment
- Slow conversion of RCM output to standard CORDEX format, upload to ESGF
- Lack of resources (computing, human)
- Need for a more binding “modus operandi”
MENA-CORDEX next steps

- Reach out to add modelling teams

- Write-up common journal paper(s) with multi-model climate change assessments for MENA → publish spring 2018

- Contribute to CORE-CORDEX? (MENA in top-half list of priority CORDEX domains)

- Explore regional and international funding opportunities
Website:

http://mena-cordex.cyi.ac.cy/

Points of contact:

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