News from EURO-CORDEX

Daniela Jacob, Andreas Gobiet, Claas Teichmann, Heimo Truhetz

Climate Service Center
Hamburg
General CORDEX Aims [Giorgi et al., 2009; TFRCD mandate]

1. Model evaluation framework
   Coordinate evaluation and possibly improvement of regional climate downscaling (RCD) techniques.

2. Climate projection framework
   Coordinate the production of multi-model RCD-based regional climate change information over regions worldwide, as input for impact and adaptation studies and for AR5.

3. Communication / Interface
   Promote interaction between GCM, RCD, and end-user communities.
COordinated Regional climate Downscaling EXperiment

- 12 domains with a resolution of 0.44° x 0.44° (approx. 50x50km²)
- Focus on Africa (mandatory domain)
- High resolution simulations with 0.11° x 0.11° (approx. 12x12km²) for Europe (by some participating institutions)

Orography of CORDEX model domains in [m] (except for the Arctic and Antarctica)
EURO-CORDEX

- The European branch of the WCRP CORDEX initiative
- Coordination of GCM-RCM simulation matrix
- Joint evaluation, joint analysis of climate projections
- Interface to the user community
**EURO-CORDEX Aims**

1. **Joint evaluation** in the European region  
   (GCM evaluation, RCD evaluation, reference datasets)

2a. Design of the EURO-CORDEX **simulation matrix**.  
   (GCM-RCD matrix)

2b. **Joint analysis of climate projections** in the European region.

3a. **Cooperation with GCM community**:  
   (GCM analysis for European region)

3b. **Interfaces to user community**  
   (Error correction, ensemble based products, regionally relevant indicators)

3c. **Dissemination** of EURO-CORDEX results  
   (AR5, users)
EURO-CORDEX Community

- 26 modelling groups in Europe using 10 different regional climate models
- Voluntary effort, contributions are funded by the contributors
- Coordination: D. Jacob (CSC Germany) and A. Gobiet (University of Graz, Austria)
EURO-CORDEX Setup

- **Region (center of boundaries):**
  ~ 27N – 72N, ~338W – 45E

- **Spatial resolution:**
  - EUR-11: 0.11 degree
  - EUR-44: 0.44 degree

- **Periods:**
  - Control: 1951 – 2005
  - Scenario: 2006 – 2100

- **Driving GCMs:** CMIP5

- **GHG scenarios:**
  - rcp45 (focus)
  - rcp85, rcp26

www.euro-cordex.net
The CMIP5 ensemble features a range of performances, but **no remarkable outlier**. 

→ No reason to **disqualify single simulations/models** as drivers for the EURO-CORDEX RCMs.
Simulation Matrix:

**EUR-11 Status**

Currently **26 scenario simulations** planned, running, or finished:

- 5 different GCMs
- 8 different RCMs
- 3 emission scenarios:
  - rcp45: 14 runs
  - rcp85: 9 runs
  - rcp26: 3 runs
Currently 26 scenario simulations planned, running, or finished:
- 5 different GCMs
- 8 different RCMs
- 3 emission scenarios:
  - rcp45: 14 runs
  - rcp85: 9 runs
  - rcp26: 3 runs

Sampling of GCMs looks reasonable, but inclusion of wetter GCMs would be advantageous (e.g., CanESM2, MIROC-ESM).
Simulation Matrix: EUR-44 Status

Currently **49 (!) scenario simulations** planned, running, or finished:

- >10 (!) different GCMs
- 8 different RCMs
- 3 emission scenarios (rcp45, rcp85, rcp26)
Currently 49 (!) scenario simulations planned, running, or finished:
- >10 (!) different GCMs
- 8 different RCMs
- 3 emission scenarios (rcp45, rcp85, rcp26)

Sampling of GCMs looks good, again inclusion of very wet GCMs would be advantageous (e.g., MIROC-ESM).
EUR-44: 49 scenario simulations
• Hindcast: 20 runs (16 finished)
• Control: 29 runs (18 finished)
• Scenario: 59 runs (32 finished)

EUR-11: 26 scenario simulations
• Hindcast: 15 runs (9 finished)
• Control: 22 runs (13 finished)
• Scenario: 35 runs (13 finished)
EURO-CORDEX Evaluation

EURO-CORDEX aims for a systematic evaluation of its simulations

- Evaluation studies:
  - **Basic evaluation** of the EUR-11 hindcasts (Lead: Keuler and Kotlarski)
  - How do models simulate **heat waves**? (Vautard et al. 2013)
  - Quantities relevant for **air quality modeling**. (Lead: Colette)

- Further planned evaluation studies:
  Surface energy budget, precipitation extremes, wind, alpine region, surface hydrology, storms and cyclones, coastal climate, added value of high resolution.
EURO-CORDEX aims for a systematic analysis of the multi-model ensemble climate projections

- All studies ensemble-based, with articulated uncertainties
- Planned climate change analysis studies:
  - Overview analysis (Jacob et al, in revision)
  - Heat waves
  - Clouds and snow
  - Precipitation extremes
  - Alpine climate change
  - Climate classifications
  - Diurnal cycle
  - Indices relevant for impacts of climate change
  - Cold waves and snow temperature feedback
  - Climate sensitivity
  - Present day and future changes of hydrological cycles in the major European midlatitude river basins
  - Forest fire risk scenarios
  - Land-atmosphere coupling
EURO-CORDEX aims to generate results with relevance!

Planned activities:

• Bias correction (in cooperation with the VALUE COST action)
• Impact-relevant indices (cooperation with JPI Climate, WG2 envisaged)
• Guidance material
Time Schedule for EURO-CORDEX

- Quality control together with testusers
  - Starting May 2013
- Discussion about bias correction and indices
  - Summer to Fall 2013
- Release to the public
  - end of 2014, beginning of 2015

- Presentation of first results on the International Conference on Regional Climate - CORDEX 2013
EURO-CORDEX is unique:

- Higher spatial resolution than available before (12.5 km grid, compared to 25 km and 50 km in ENSEMBLES and PRUDENCE)
- Based on the newest generation of global climate models (CMIP5)
- Based on the new emission scenarios (RCPs)
- Much more comprehensive uncertainty estimation will be feasible than before:
  - Multi-GCM, multi-RCM, multi em. Scenario ensemble.
  - More ensemble members (EUR-44)
- Interaction with users is a major focus