RCMGiS – New climate scenarios based on radiative forcing change over the Carpathian Basin (EEA-C13-10)

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Bilateral meeting for the discussion of interim development results of the NAGiS Project
10 December 2015
OUTLINE

1. Motivation
2. Estimation of future climate change
3. RCMGiS project
Motivation

- Climate dynamics research since 2004
- Adaptation in Hungary: based either on the principle for preparing for *any* possibility or on the scenario kept *intuitively* the most likely
- Not sustainable (expensive, wrong ways)
- For targeted and sustainable adaptation *credible* information is needed
- High-quality meteorological information, objective, quantitative and comparable impact assessments, considering uncertainties
Present

- National Climate Change, Strategy National Adaptation Strategy

- Adaptation information system, scientifically sound input data for the climate impact assessments

- Programme for *Adaptation to Climate Change in Hungary*

- 3 important topics:
  1. Development of NAGiS
  2. Extension of NAGiS to further sectors (critical infrastructure, tourism, agriculture, forecasts)
  3. Improvement of climate scenarios
Scientific background

- Description of processes and interactions in climate system with modelling tools
- Physical laws – set of partial differential equations → numerical models

- Representation of anthropogenic activity
- Global climate models for simulation of Earth system
- Regional climate models for investigation of local changes
Climate projections for 2 targets:

1. 2021–2050: „short-term” planning
2. 2071–2100: long-term strategy, robustness & significance

Impact studies based on meteorological data (for Hungary):

- Hydrology: ground water, drinking water
- Natural ecosystems
- Agriculture, forestry

<table>
<thead>
<tr>
<th>Model</th>
<th>ALADIN</th>
<th>RegCM</th>
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<tr>
<td>LBC</td>
<td>ARPEGE</td>
<td>ECHAM</td>
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<td>Resolution</td>
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<td>Scenario</td>
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Improvement of climate scenarios

• Title: New climate scenarios based on radiative forcing change over the Carpathian Basin

• Consortium:
  – Hungarian Meteorological Service (coordinator)
  – ELTE Department of Meteorology (partner)

• Duration: 15 December 2014 – 31 December 2015

• Financial background: EEA Grants, ~300 000 EUR

• Web page: rcmter.met.hu
Main objectives

1. Development of climate model data providing future climate information for NAGiS

2. Quantification of climate projection uncertainties

3. Provision of climate model data for impact assessments

4. Training and support of the users to apply projection results and uncertainty information
Model simulations

- 2 regional climate models

- Core simulations:
  1. Sensitivity studies (domain size, parameterization)
  2. Re-analysis and GCM-driven validation runs (homogenized and gridded reference data)
  3. Climate change projections

- New model versions, forcing fields, emission scenarios, domains

- Uncertainties: scenario (temperature) and model uncertainties (precipitation)
Preliminary results

Winter precipitation validation for 1981–2000 (ALADIN; RegCM) – (E-OBS; CARPATCLIM)

ALADIN – EOBS

ALADIN – CARPATCLIM

RegCM – EOBS

RegCM – CARPATCLIM

Bartholy, Pieczka, Pongrácz

Bartholy, Pieczka, Pongrácz

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Application of model information

- Climate models provide input data for objective impact assessments

- Quantitative information + uncertainties

- Support of users: consultation workshops (later)

- Extension of NAGiS to further sectors: tourism and critical infrastructure in Hungary
Trainings for users of climate information

- Workshops for users (first was in June)
- Aim: consultation about user needs, possibilities and limitations of model data
- Main conclusions:
  - Points of data use: public accessibility, availability, spatial and temporal resolution (quality?)
  - Current resolution is not sufficient for every study (interpolation of model data instead of modifying the impact model?)
  - Uncertainty information: some good examples, but users need help to avoid ad hoc model data selection
High-quality meteorological information

Objective and quantitative impact assessments

Ideal path of development: information not only about projection uncertainty, but uncertainties in every level

Iterative consultation between meteorologists and users

Importance of training, even decision makers (not fully hopeless)

Thank you for your attention!
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