Information system for adaptation to climate change in Hungary

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1. Motivation
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Motivation

- Climate change is an intensively discussed issue nowadays
- For targeted and sustainable adaptation credible information is needed
- Credibility: objective, detailed, quantitative, including uncertainty information
- High-quality meteorological information, objective and quantitative impact assessments, considering uncertainties
Adaptation to climate change in Hungary

- MoU was signed between Iceland, Liechtenstein, Norway and Hungary → 2009 – 2014 Programme of EEA

- Programme for Adaptation to climate change in Hungary (7M €)

- 3 main components:
  1. National Adaptation Geo-information System (NAGiS)
  2. Local climate change adaptation capacity building
  3. Pilot projects focusing on climate change adaptation measures at local and regional level
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Main objectives:

1. To support decision making on the adaptation to climate change by operation of a multifunctional geo-information database based on several other database

2. To develop the methodologies for data collection and processing, climate modelling, impact and vulnerability assessments in line with INSPIRE requirements

3. To operate a web-based “one-stop-shop”, an information hub for all stakeholders, decision makers, researchers

Web: nater.mfgi.hu
NAGiS prototype

• Homogenized gridded dataset from meteorological observations for 1961–2010

• Climate projections for 2 targets:
  2. 2071–2100: long-term strategy, robustness & significance

• Impact studies based on meteorological data:
  • Hydrology: ground water, drinking water
  • Natural ecosystems
  • Agriculture, forestry

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<tr>
<th>Model</th>
<th>ALADIN</th>
<th>RegCM</th>
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<td>LBC</td>
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<td>Scenario</td>
<td>SRES A1B</td>
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Improvement of climate scenarios

• 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

Web: rcmter.met.hu
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)

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<td>RCP4.5</td>
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Radiation forcing [W/m²]

- SRES (TAR) vs RCP (ARS)
- A1B vs RCP8.5
- A1T vs RCP6.0
- A1T vs RCP8.5
- A2 vs RCP4.5
- B1 vs RCP2.6
- B2 vs RCP2.6

Graph showing radiation forcing from 2000 to 2100, with lines for different scenarios.
Preliminary results

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

ALADIN – EOBS

RegCM – EOBS

ALADIN – CARPATCLIM

RegCM – CARPATCLIM

%
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
1. Extension of NAGiS to the agri-sector: impact and vulnerability indicators of the agriculture, forestry and related ecosystem services in Hungary

2. Extension of NAGiS to tourism and critical infrastructure in Hungary

3. Extension of NAGiS with forecasting the long-term social and economic development patterns in Hungary
Extension of NAGiS to further sectors

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Main objectives

• To assess the vulnerability due to climate change which will foster the development of adaptation strategies and objective decision making

• Focus on three sectors:
  1. Heatwave-induced excess mortality
  2. Impacts of extreme weather events on road accidents
  3. Climatic conditions on tourism

• To prepare indicators based on observations and model projections

Web: kriter.met.hu
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Web: kriter.met.hu
Preliminary results

Zero crossing days with precipitation [days/yr] based on observations

($T_{\text{min}} < 0$, $T_{\text{max}} > 0$, $P > 0$)

Winter mean over Hungary

[Map and graph showing climate patterns over Hungary for periods 1961-1990 and 1981-2010]
Summary

• 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)
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Thank you for your attention!

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