Új regionális klímaprojekciók a Kárpát-medencére

New regional climate projections for the Carpathian Basin

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Magyarország hosszú távú társadalmi és gazdasági fejlődési pályájának előrejelzése című projekt zárórendezvénye
Final event of the project entitled *Long-term socio-economic forecasting for Hungary*

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

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- National Climate Change Strategy, National Adaptation Strategy
- Adaptation information system, scientifically sound input data for the climate impact assessments

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- Programme for *Adaptation to Climate Change in Hungary*
- 3 important topics:

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2. Extension of NAGiS to further sectors (critical infrastructure, tourism, agriculture, forecasts)
3. **Improvement of climate scenarios**

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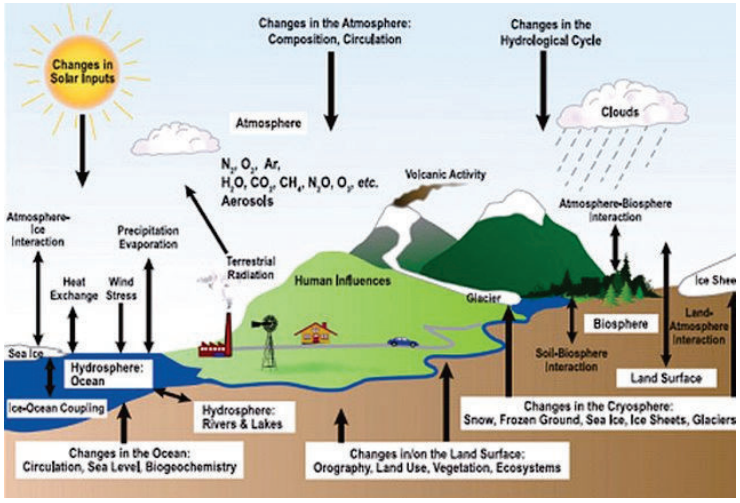
- 3 important topics:

1. Development of NAGiS
2. Extension of NAGiS to further sectors (critical infrastructure, tourism, agriculture, forecasts)
3. **Improvement of climate scenarios**

Scientific background

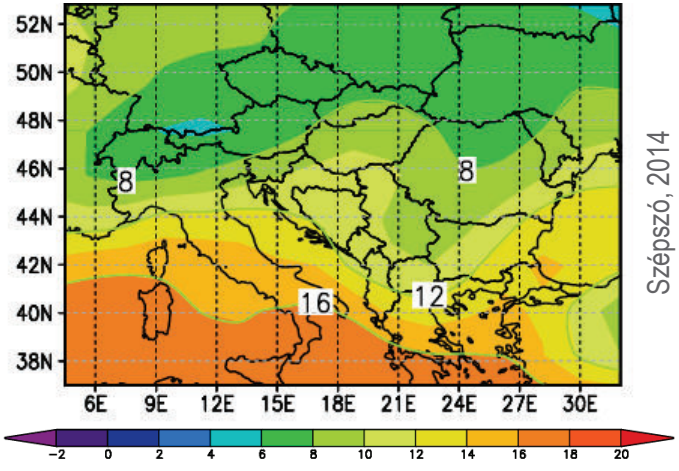


- Description of processes and interactions in climate system with modelling tools
- Physical laws – set of partial differential equations → numerical models

- Representation of anthropogenic activity
- Global climate models for simulation of Earth system
- Regional climate models for investigation of local changes

Mean temperature [°C]; 1961–1990

Global model, 200 km



Szépszó, 2014

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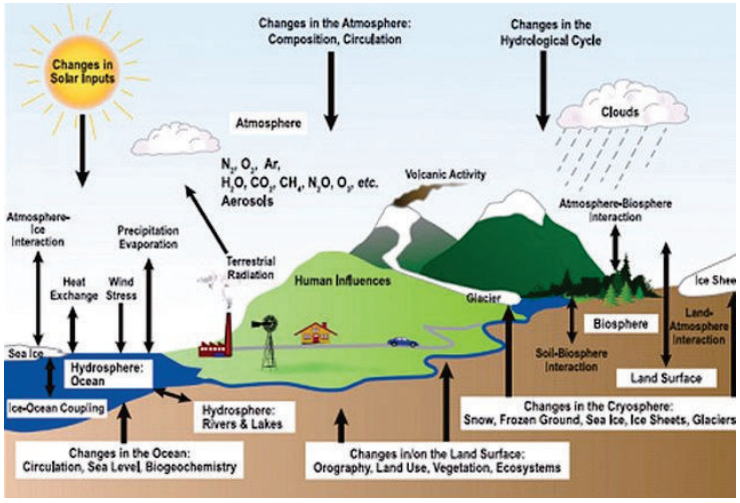

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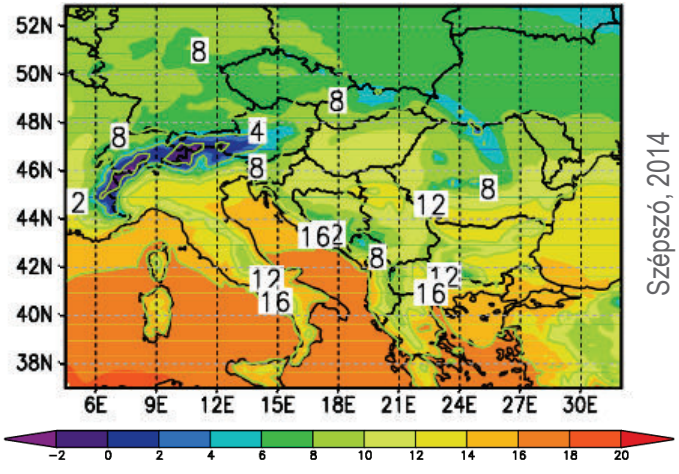
Mean temperature [°C]; 1961–1990

Regional model, 25 km



Szépszó, 2014

NAGiS prototype

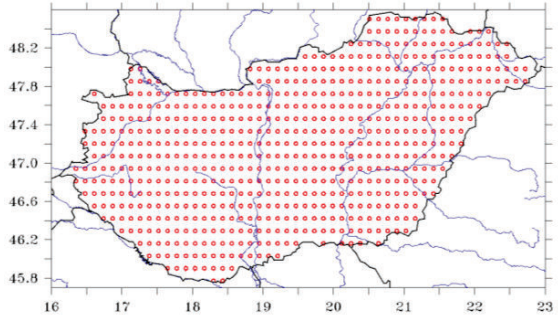
- Climate projections for 2 targets:

    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

Model	ALADIN	RegCM
LBC	ARPEGE	ECHAM
Resolution	10 km	
Scenario	SRES A1B	



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
- Web page: rcmter.met.hu

RCMGiS

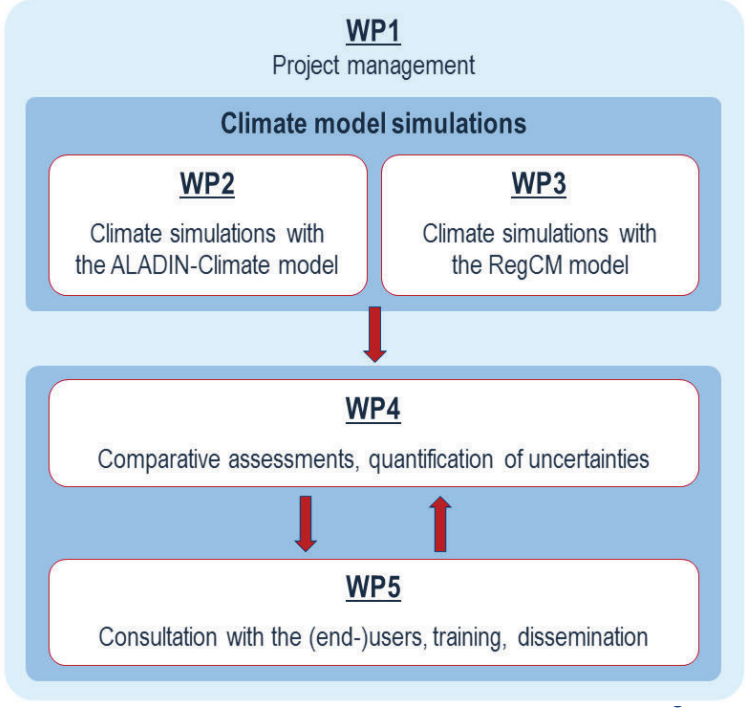
Main objectives

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

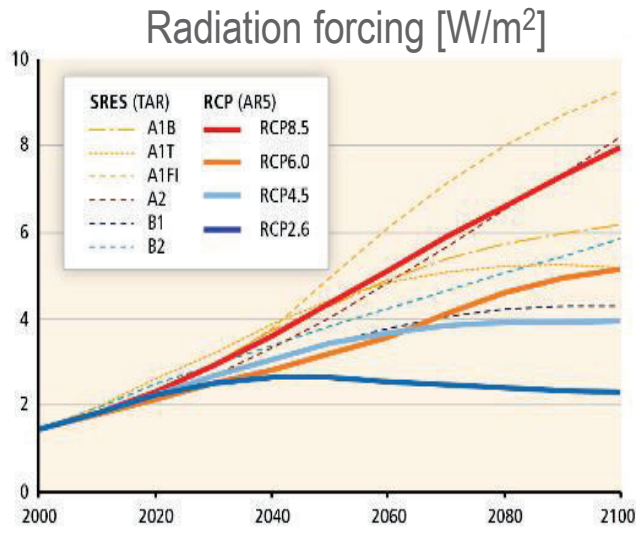
4. Training and support of the users to apply projection results and uncertainty information



Model simulations

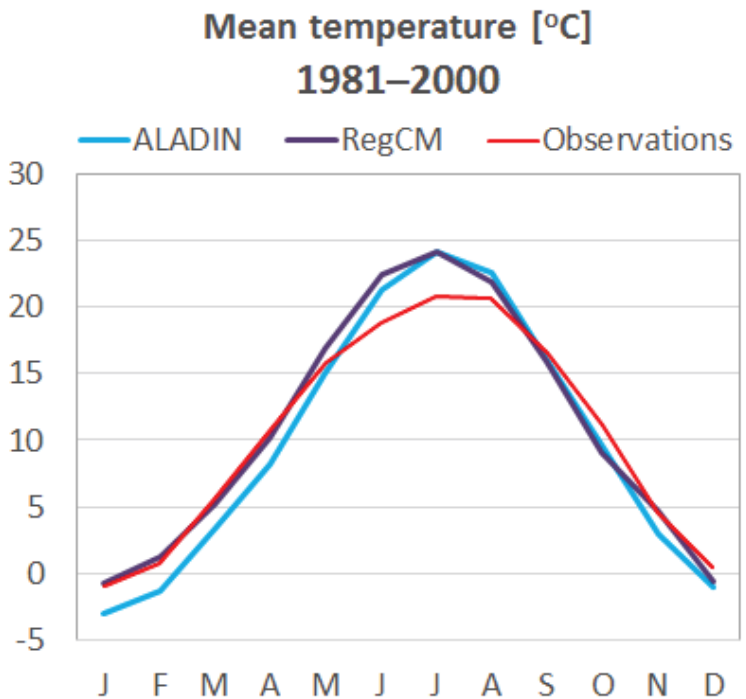
RCM	ALADIN	RegCM
LBC	ARPEGE→ ALADIN	HadGEM→ RegCM
Resolution	10 km	
Scenario	RCP8.5	RCP4.5

- 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

New and earlier simulation results



Courtesy: Bartholy J., Csorvási A., Pieczka I., Pongrácz R.

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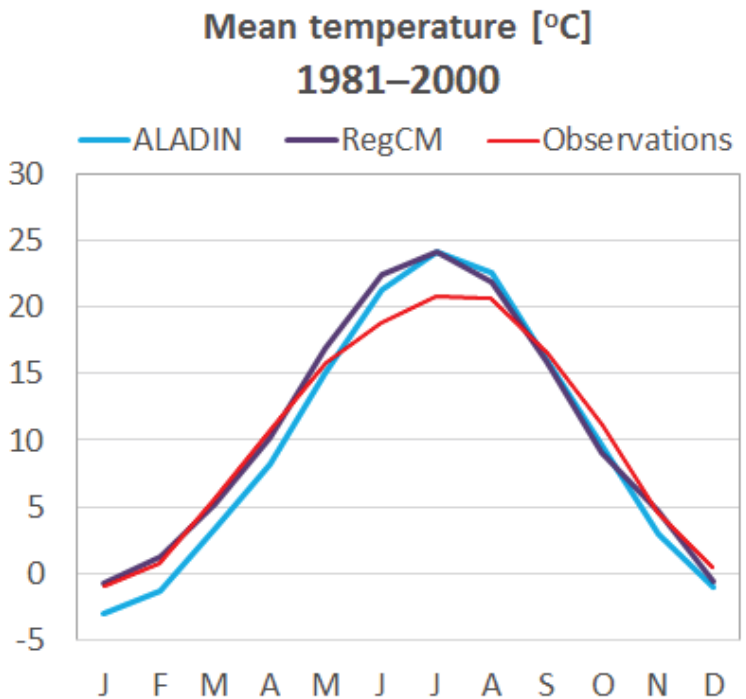

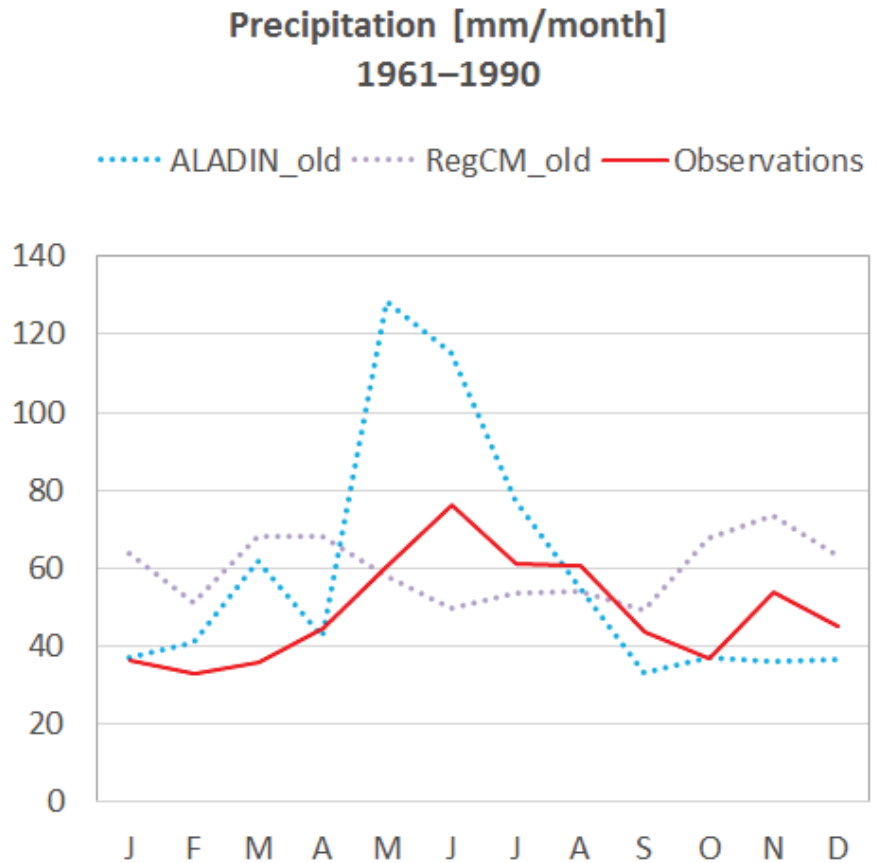

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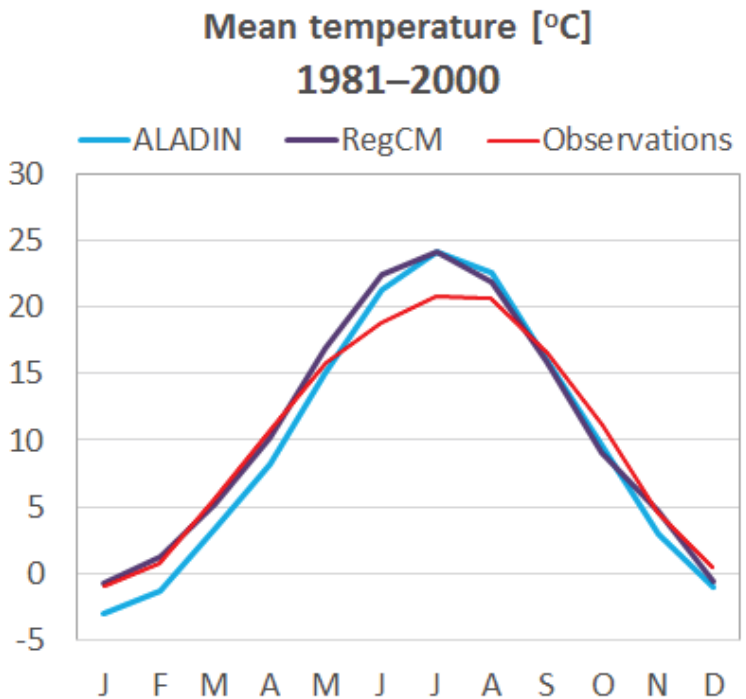

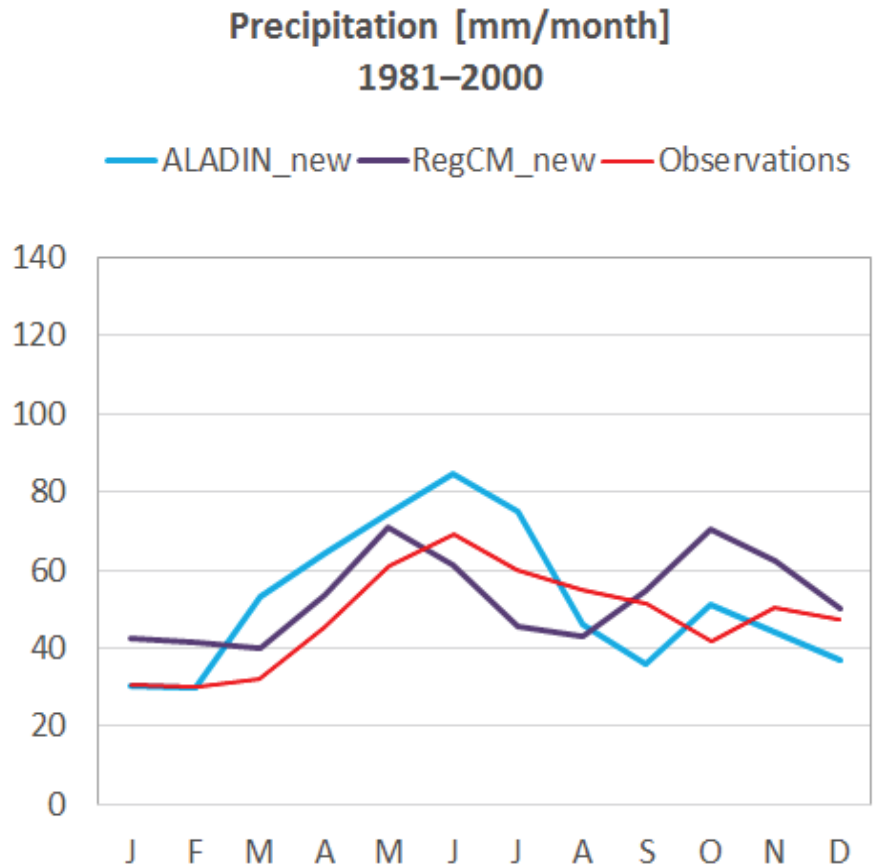

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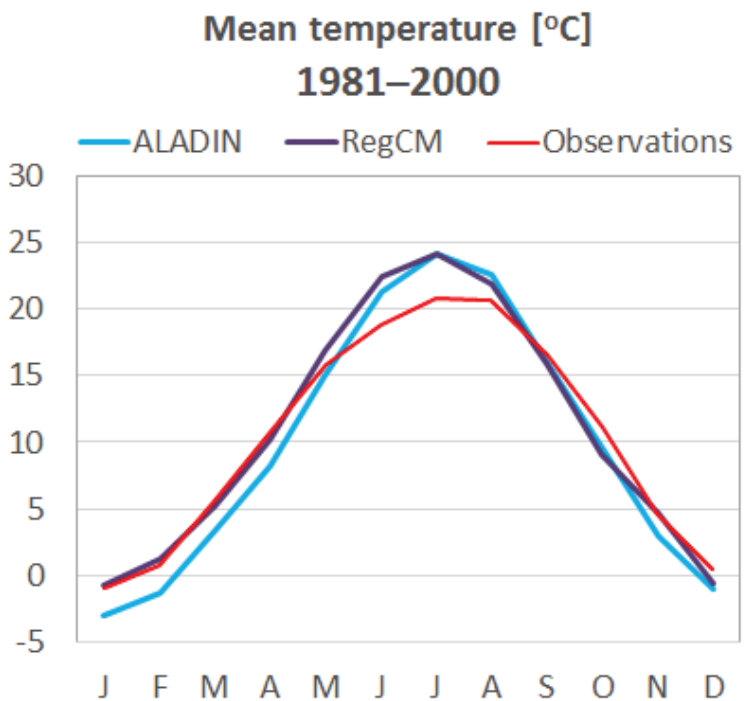

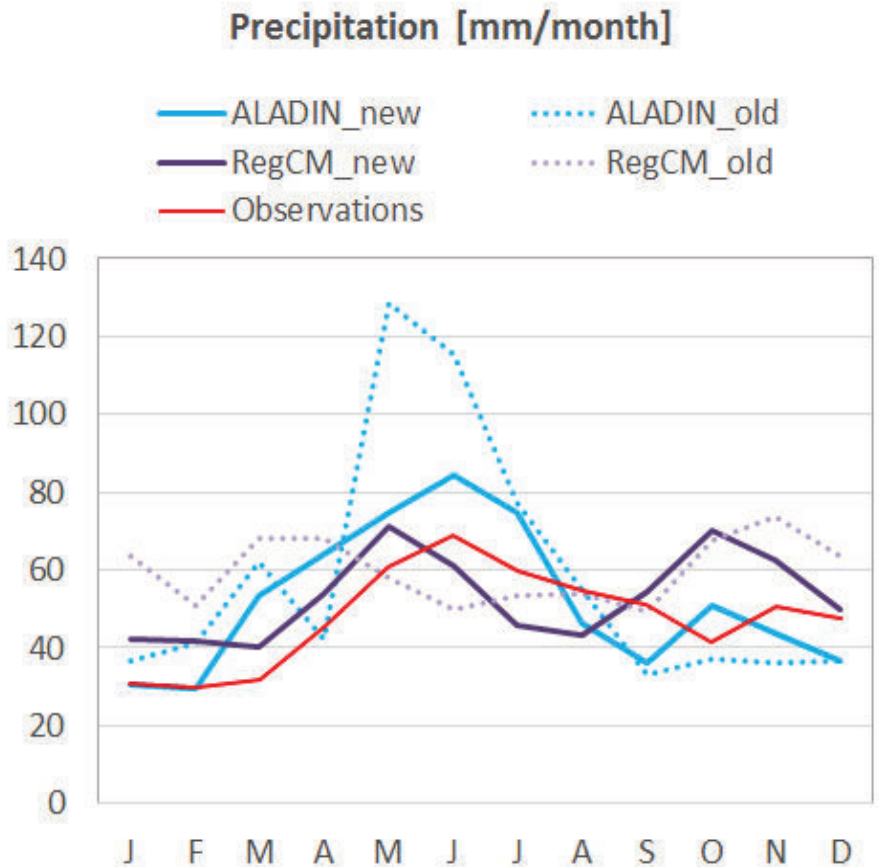

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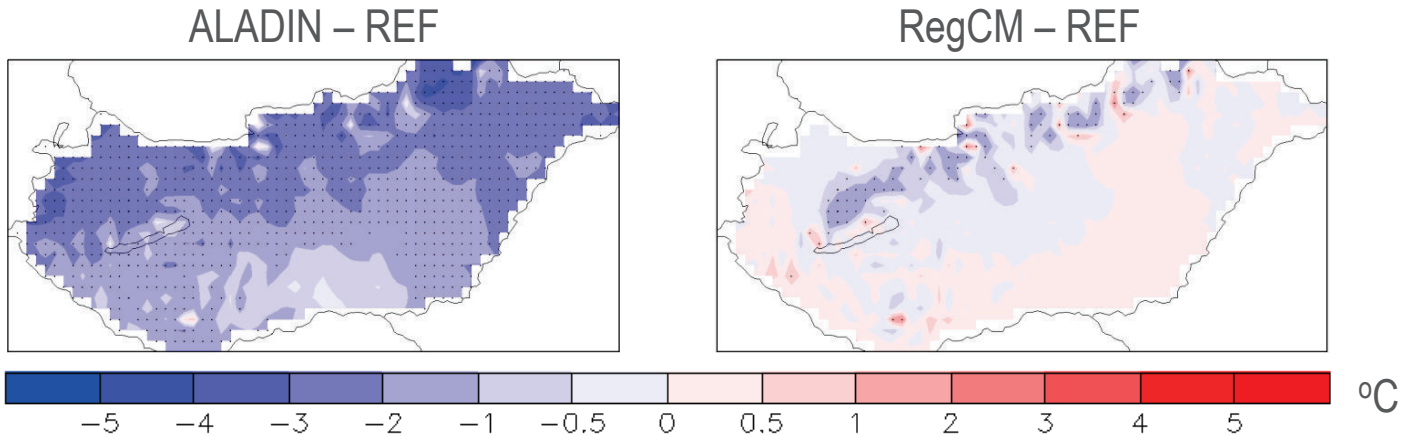
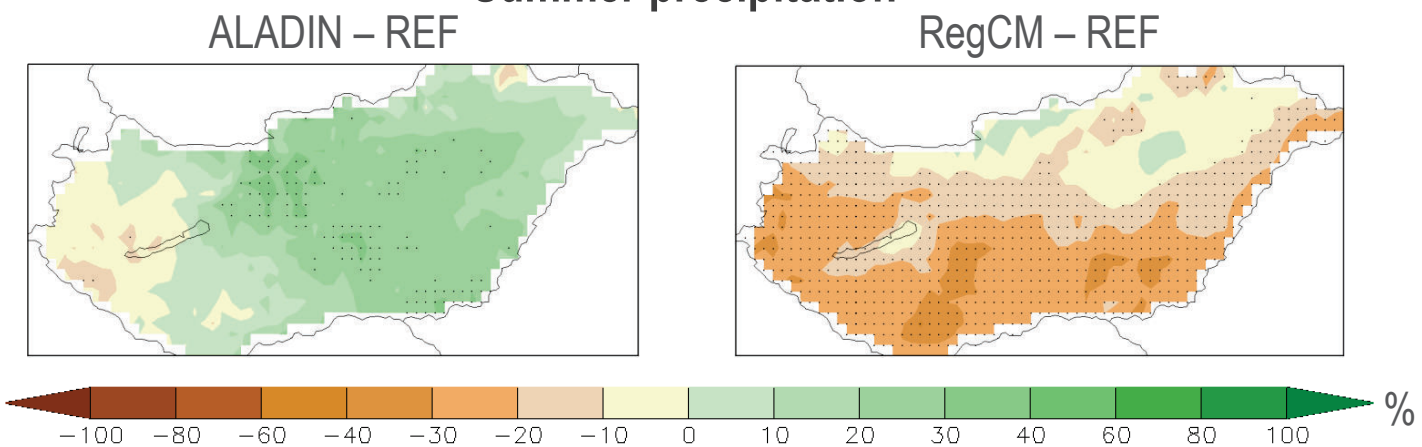
Preliminary results

Validation for 1981–2000

Winter temperature



Summer precipitation



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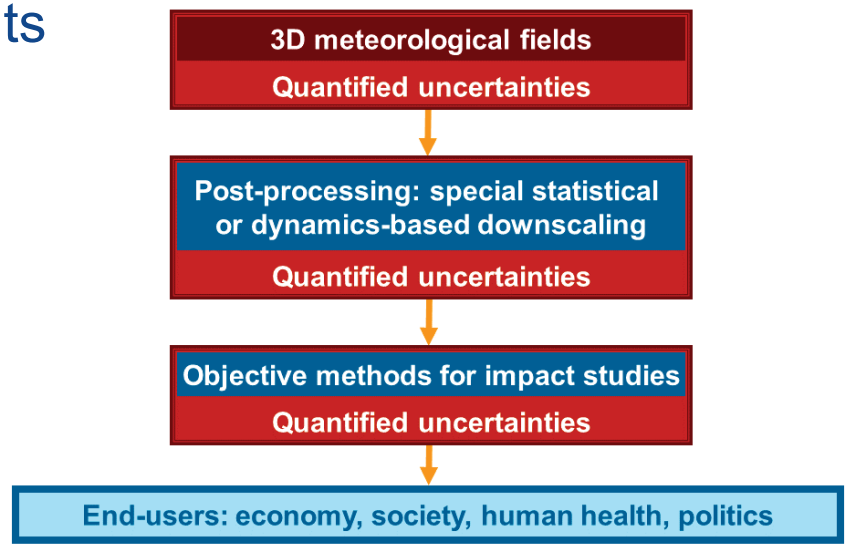
Application of model information

- 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

CRIGiS

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

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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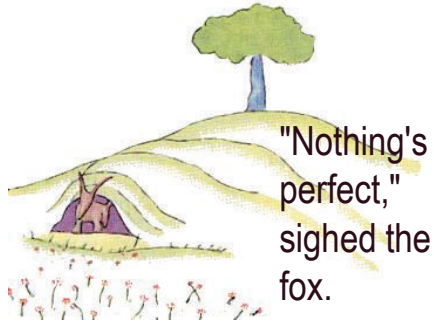

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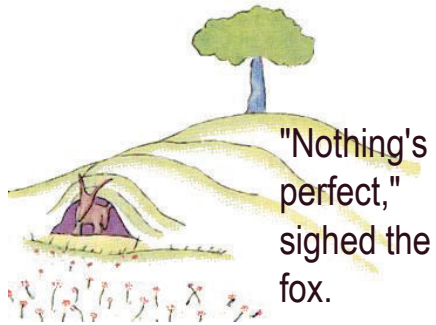

Thank you for your attention!

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