



Information system for adaptation to climate change in Hungary

G. Szépszó, A. Csorvási, T. Illy, M. Lakatos, Z. Bihari, Á. Németh
Hungarian Meteorological Service, Budapest

J. Bartholy, R. Pongrácz
Department of Meteorology, Eötvös Loránd University, Budapest

A. Kovács
Department of Climatology and Landscape Ecology, University of Szeged

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OUTLINE

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- 2. Adaptation to climate change in Hungary**
- 3. Adaptation information system**
- 4. Summary**

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

Adaptation to climate change in Hungary

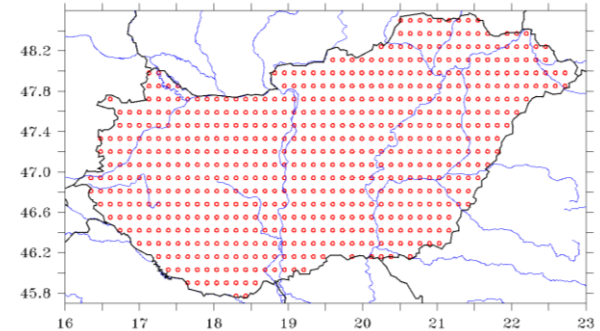
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Information system for adaptation

- 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

NAGiS prototype

- Homogenized gridded dataset from meteorological observations for 1961–2010
- 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:
 - Hydrology: ground water, drinking water
 - Natural ecosystems
 - Agriculture, forestry



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



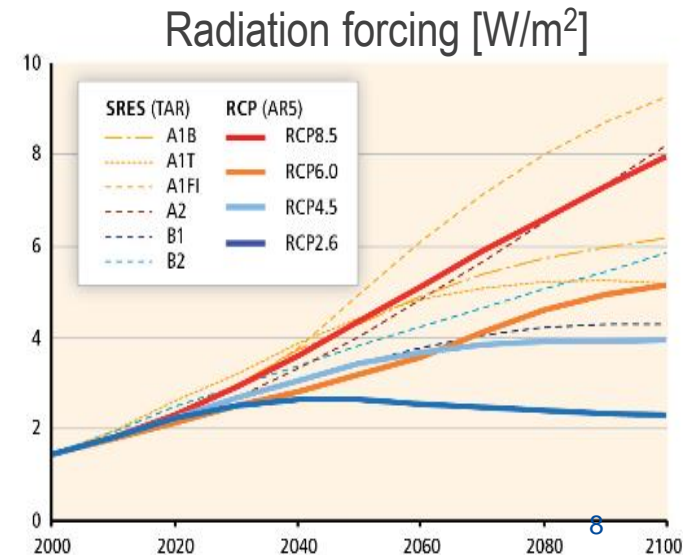
Improvement of climate scenarios

- 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)

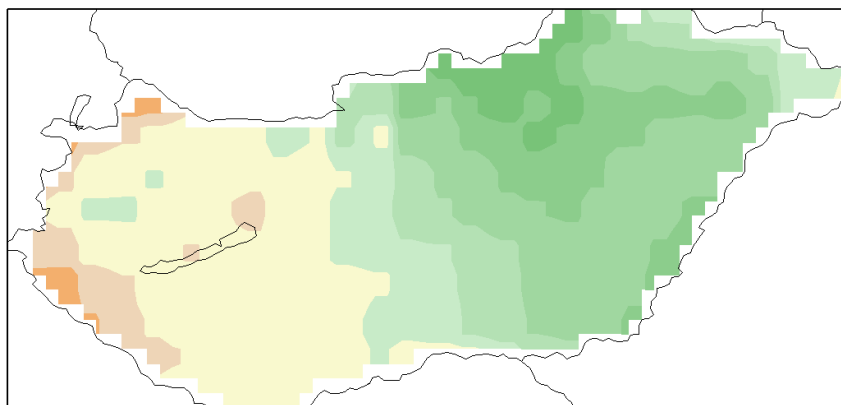
RCM	ALADIN	RegCM
LBC	ARPEGE → ALADIN	HadGEM → RegCM
Resolution	10 km	
Scenario	RCP8.5	RCP4.5



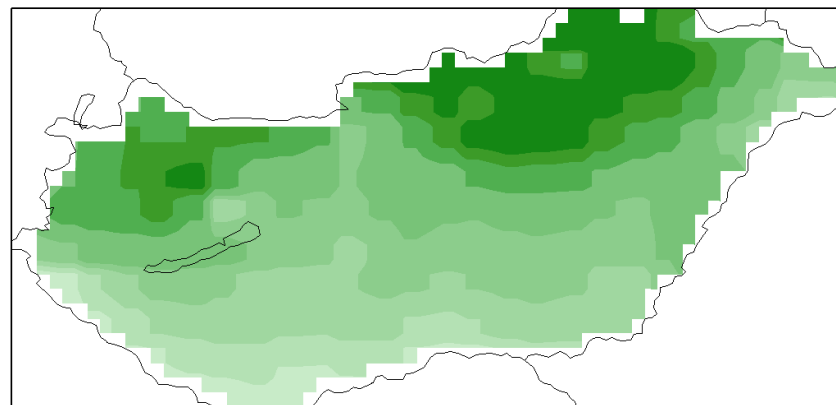
Preliminary results

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

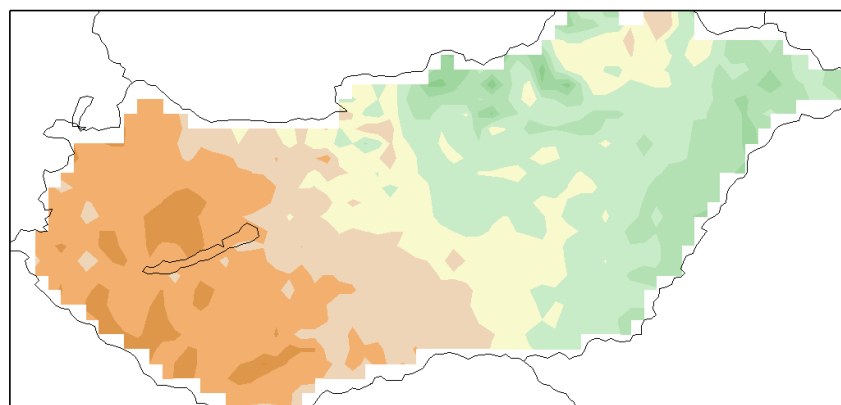
ALADIN – E-OBS



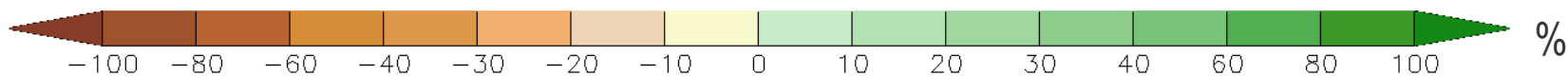
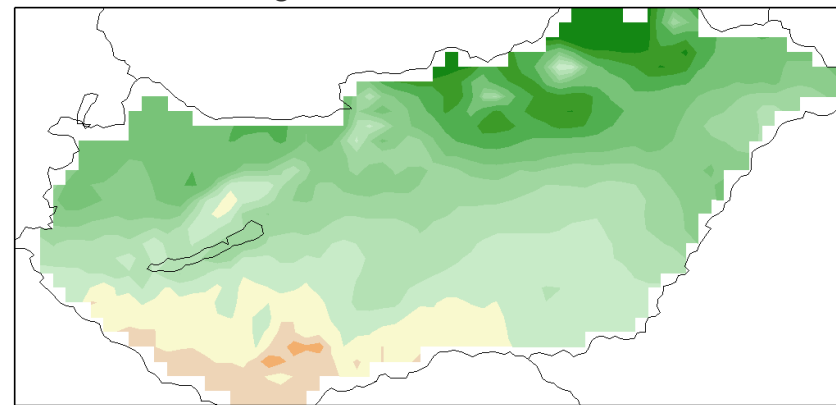
RegCM – E-OBS



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



Extension of NAGiS to further sectors

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

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Main objectives

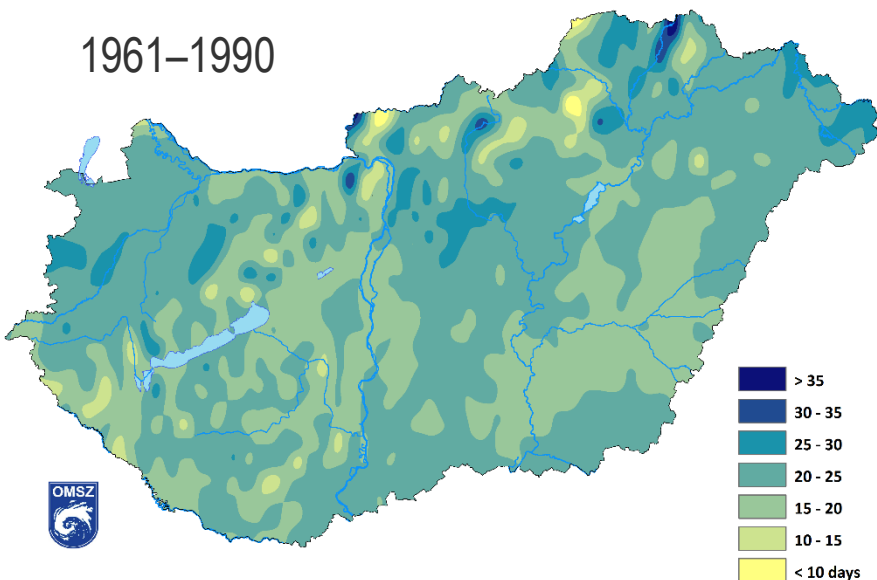
- To assess the vulnerability due to climate change which will foster the development of adaptation strategies and objective decision making
- Focus on three sectors:
 1. Heatwave-induced excess mortality
 2. Impacts of extreme weather events on road accidents
 3. Climatic conditions on tourism
- To prepare indicators based on observations and model projections

Main objectives

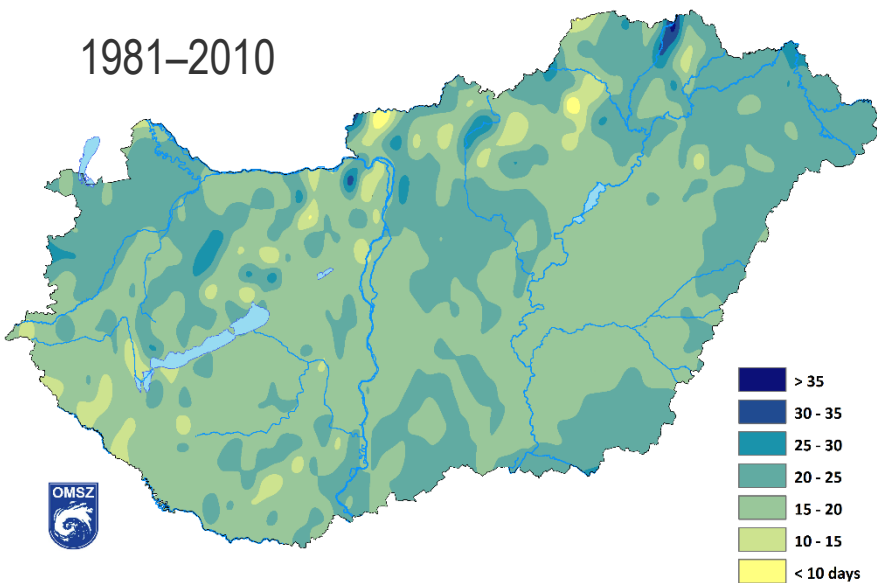
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Preliminary results

1961–1990



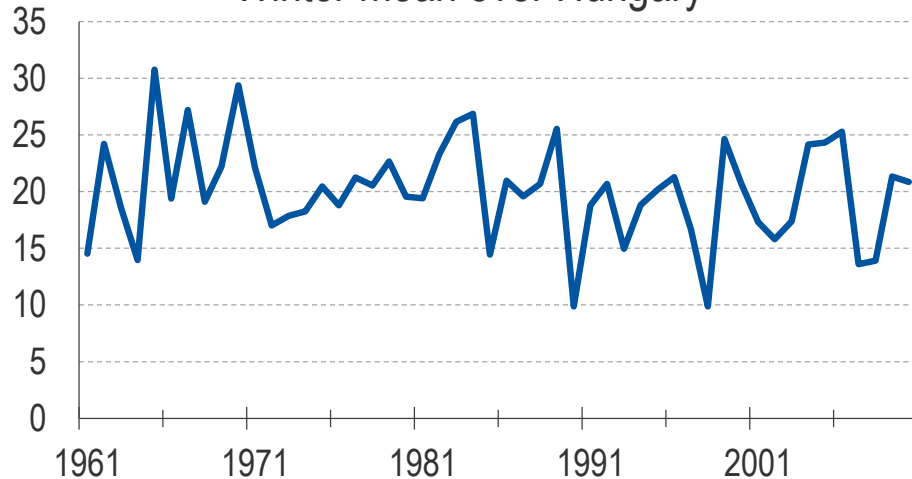
1981–2010



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

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

Winter mean over Hungary



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!

E-mail: szepszo.g@met.hu

Web: nater.mfgi.hu, rcmter.met.hu, kriter.met.hu