

Advancing climate change information system to foster adaptation in Hungary

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European Union
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OUTLINE

- 1. Different user needs**
- 2. From climate change information to decision making: the objective pathway**
- 3. The KlimAdat project**
- 4. Summary**

USER NEEDS

Who are the users and what are their needs?

- DECM C3S project launched a survey last year to find the answers:
 - 3 different types of users: data user, product user, non user
→ have very different needs



Data user (e.g. impact researcher)



Product user (e.g. decision maker)

DIFFERENT USER NEEDS

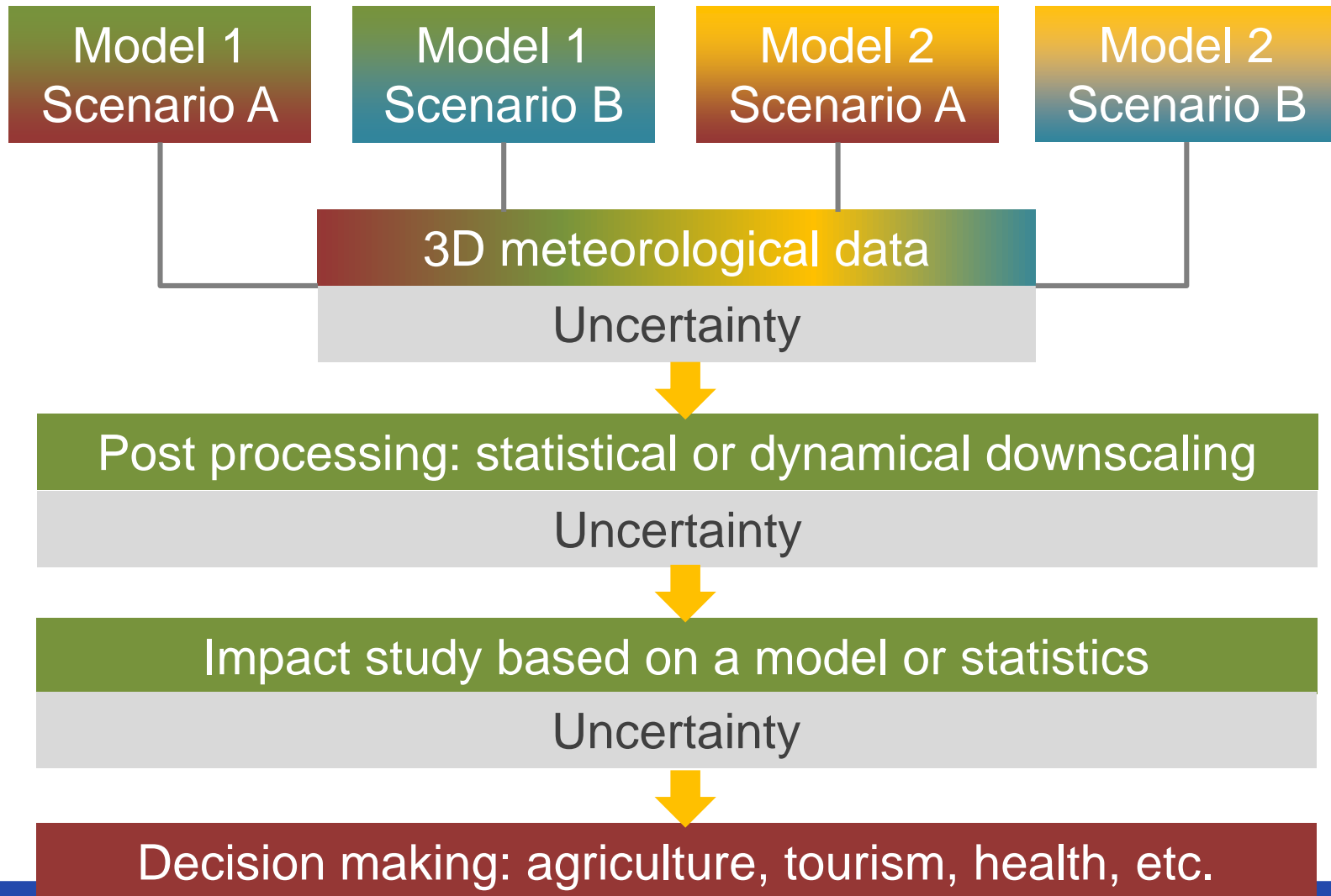


Data user

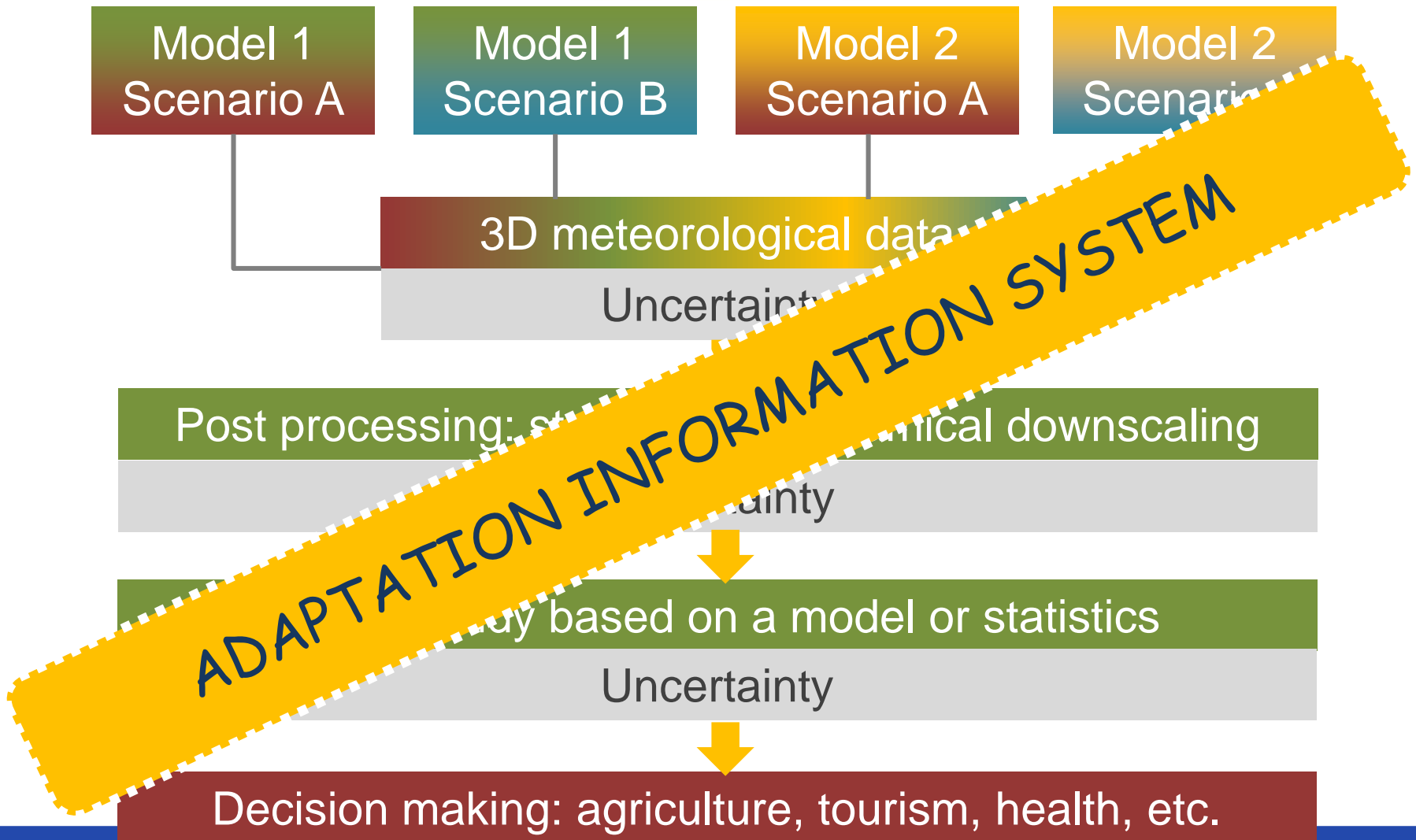
Product user

CMIP, CORDEX, in-house data	Source of data	Research institutes, national services
RCP4.5, RCP8.5	Scenarios	Idealised scenarios (e.g. 1.5 °C warming)
Low: Climate indices, bias adjustment, statistical downscaling	Post processing	High: maps, graphs, etc.
>61% satisfied, but some areas need higher	Model resolution	69% satisfied
Accessing and downloading data	Guidance	Visualising, accessing, interpreting information

CLIMATE CHANGE INFO → DECISION MAKING: THE OBJECTIVE PATHWAY



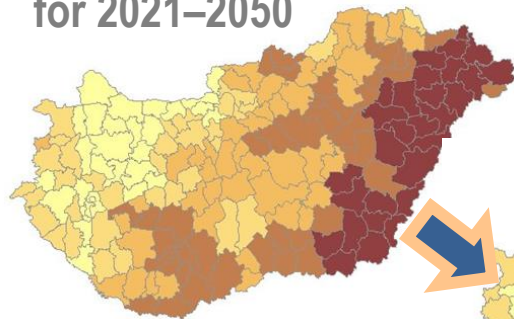
CLIMATE CHANGE INFO → DECISION MAKING: THE OBJECTIVE PATHWAY



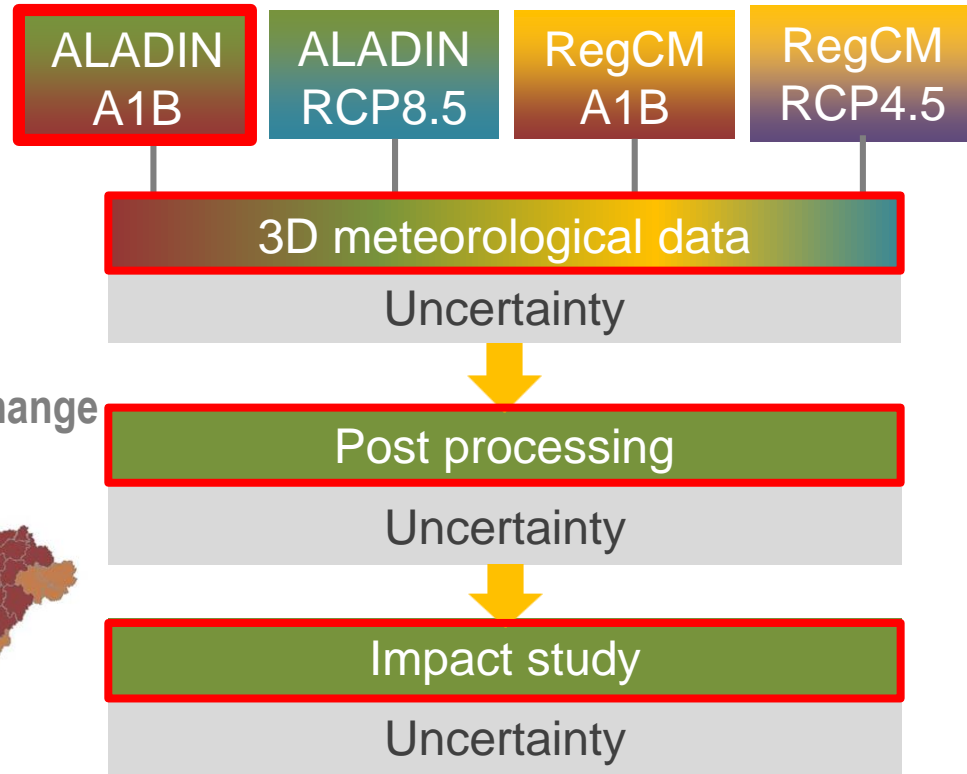
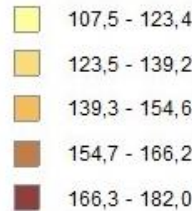
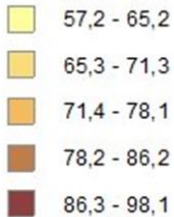
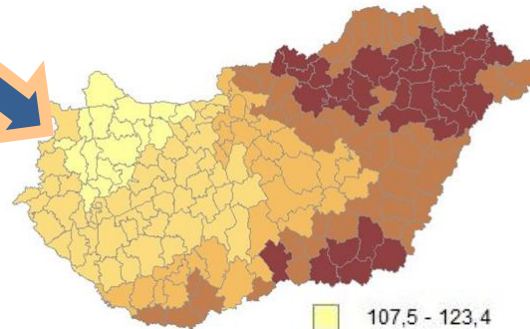
LET'S SEE IT IN PRACTICE FOR HUNGARY

Question: should the hospitals be equipped with air-conditions in the future?

Heat wave days change [%]
for 2021–2050



Excess mortality change [%]
for 2021–2050

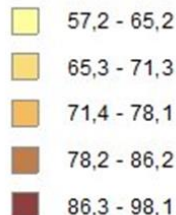
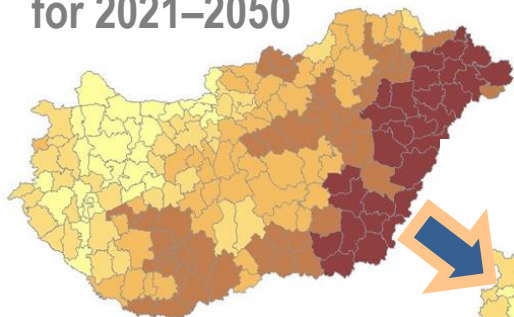


Excess mortality due to heat waves will increase dramatically, mostly in Eastern Hungary by 2021-2050.

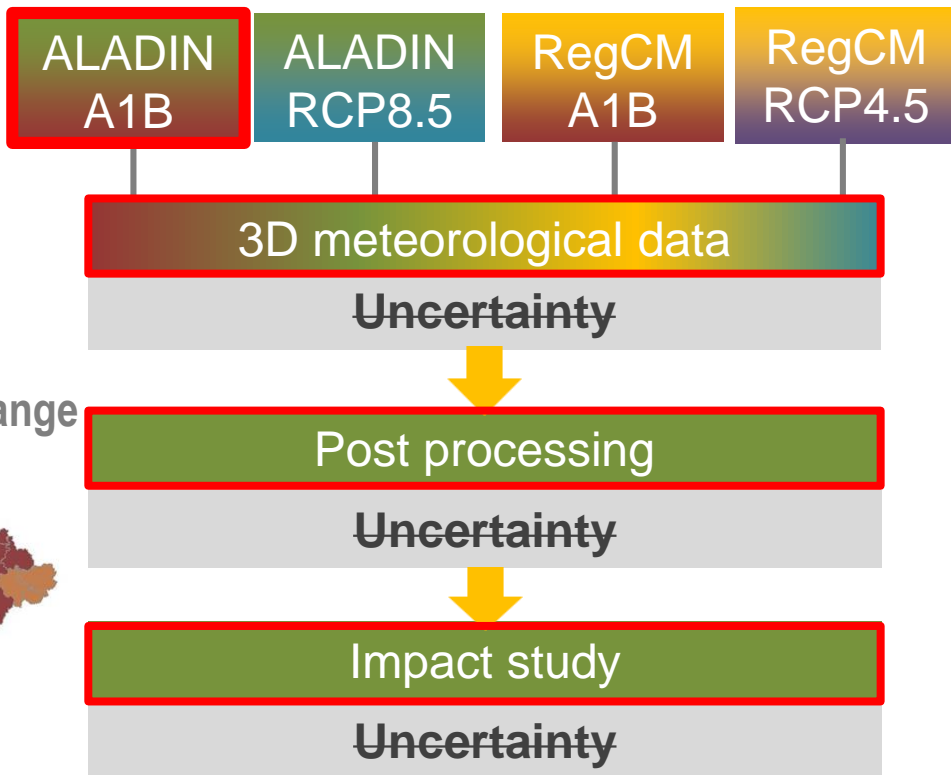
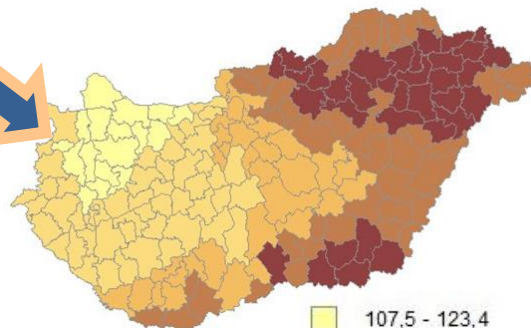
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HOW COULD IT BE IMPROVED?

From objectivity's side

- ✓ More RCM simulations to be taken account
- ✓ More sophisticated post processing (e.g. modelling urban climate)
- ✓ More methods to estimate impact



Uncertainty-based decision making

From users' side

- ✓ Data outside country borders (e.g. for hydrology)
- ✓ No fixed 30-year periods
- ✓ High spatial and temporal resolution (what is high depends on the impact area)

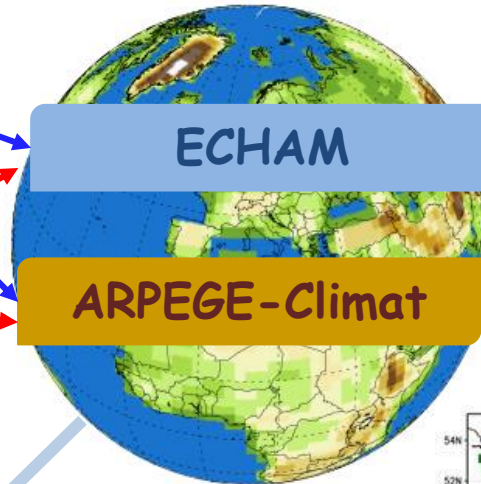
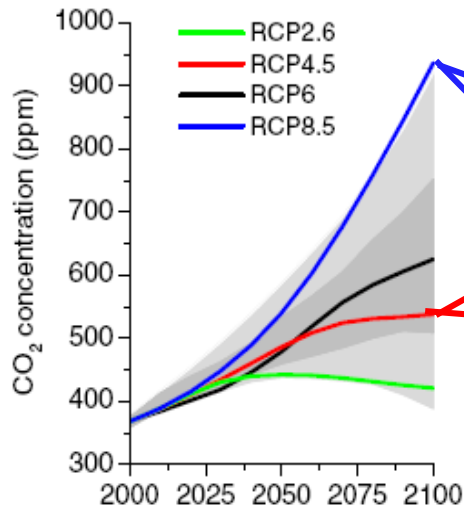
Information gained from user consultations, workshops

THE KLIMADAT PROJECT (2016–2020)

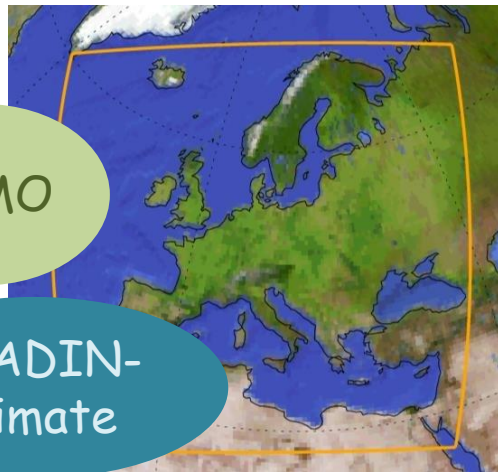
- **KlimAdat:** Assessment of climate change impacts in Hungary with regional climate model simulations and developments of a representative climate database
- Funded by the Hungarian Government and the European Union
- **Main goals:**
 - Developing **RCM mini ensemble** of OMSZ based on ALADIN-Climate and REMO, using RCP4.5 and RCP8.5
 - Creating a **GIS system** containing post-processed RCM data tailored to the user needs
 - Continuing **education** via workshops and publication



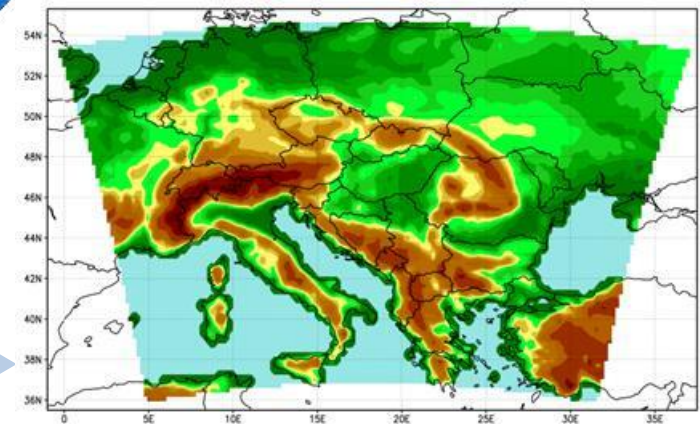
RCM SIMULATIONS IN KLIMADAT



LBCs: 2 different GCMs and 2 RCP scenarios



Downscaling on Euro-CORDEX 44° domain



Further downscaling to Central and South Europe on 10km resolution

FULFILLING USER NEEDS: DATA USER



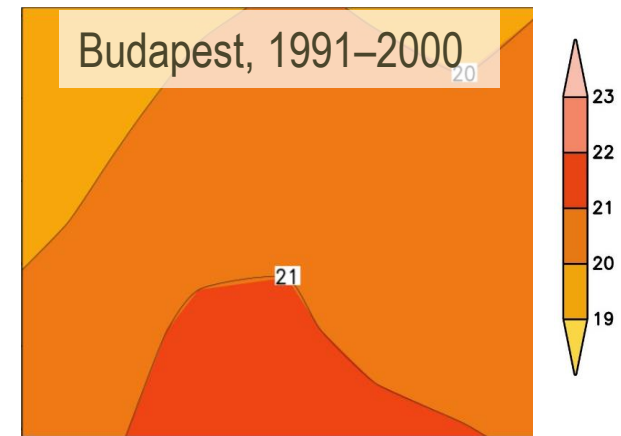
Ingredients for a dynamical impact model

- Gridded data
- Raw or bias corrected data
- High temporal resolution (e.g. daily, or hourly data)
- Individual ensemble members have to be used



RCM, 10 km resolution

Summer mean temperature [°C]



Requires lots of computation space, tailored guidance from the climate modelers to select, interpret and use RCM data.

FULFILLING USER NEEDS: DATA USER



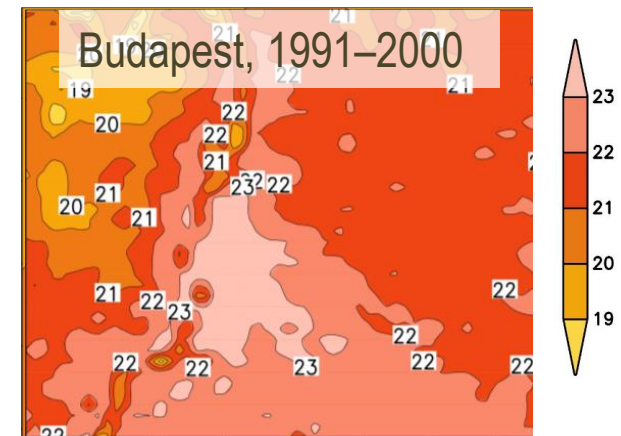
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Surface model, 1 km resolution

Summer mean temperature [°C]



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FULFILLING USER NEEDS: **PRODUCT USER**

Ingredients for statistical estimations on impacts, decision making:

- Gridded or spatially averaged data (e.g. for county-level)
- Information on 30-year mean change or bias corrected future data
- Period should be flexible (e.g. 2021-2050, 2031-2060, etc.)
- Climate indices
- Communicating uncertainty information, e.g.:

- Smallest and largest change
- Probability of certain scenarios (e.g. temperature change $> 1\text{ }^{\circ}\text{C}$)



Our GIS
design plans



SUMMARY

- For targeted and sustainable adaptation high quality observed and modelled information is needed
- Building an information system that meets these requirements started in 2013 in Hungary
- The aim of the ongoing KlimAdat project is to
 - further develop the RCM ensemble system
 - Develop an informative and user friendly GIS system, that serves certain impact users' and decision makers' needs
 - Train and educate users
- How these fit into the large European climate services (e.g. C3S)?
 - Large focus is on serving national needs + providing information that inseparably contains uncertainty

THANK YOU FOR YOUR ATTENTION!

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