

# Regional climate modelling and coordinated policy responses

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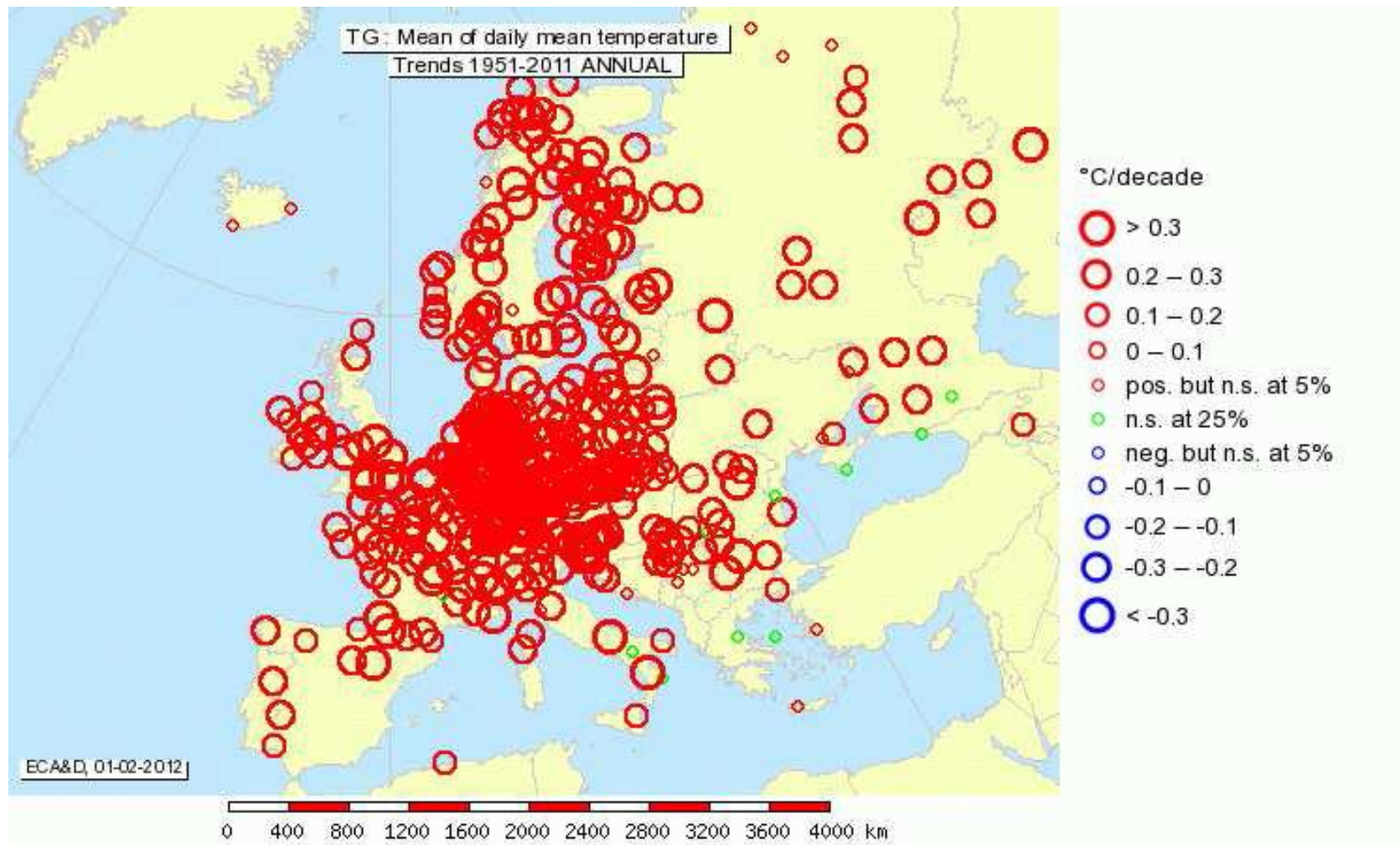
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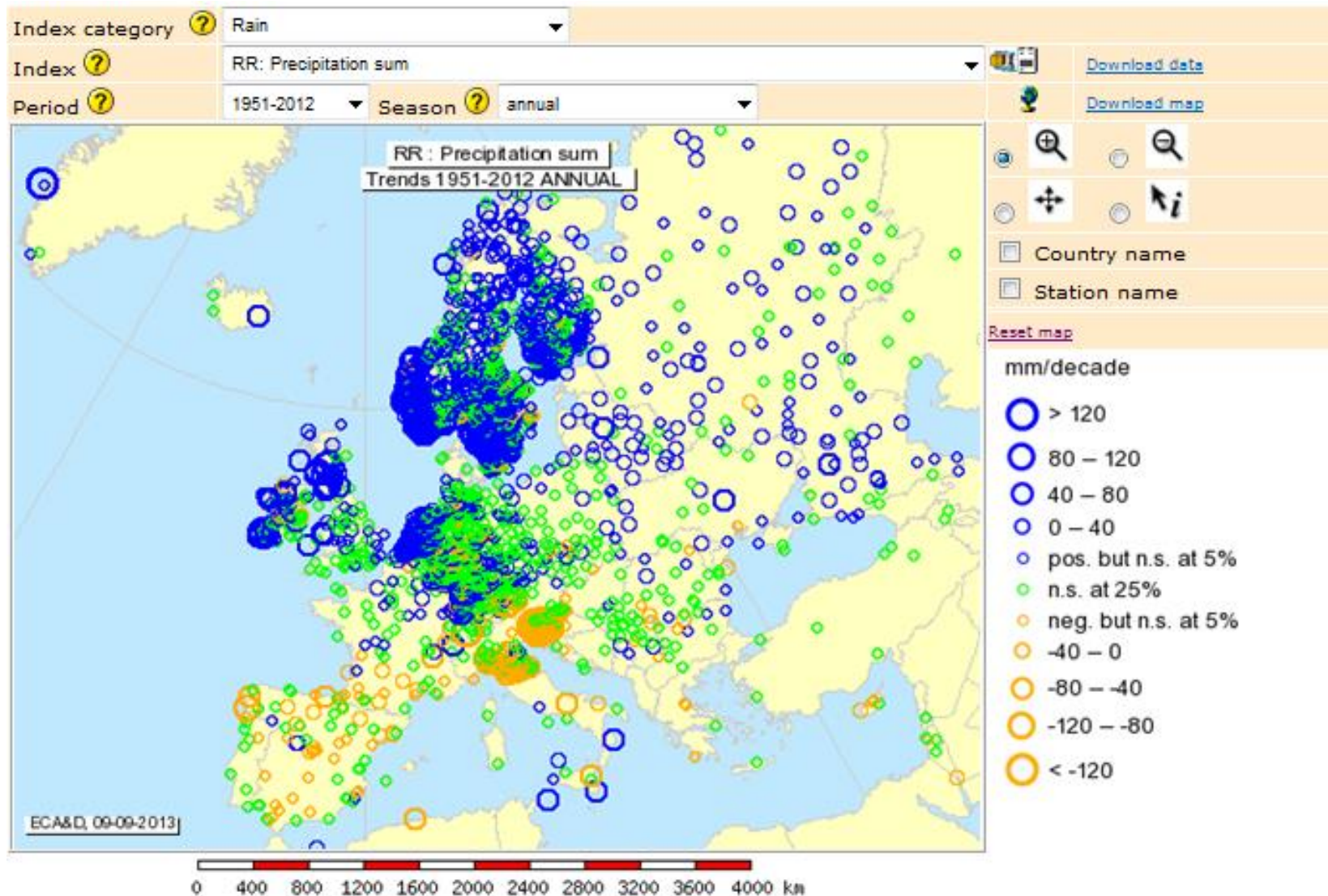
# Content

- Ongoing climate change
- Adaptation strategies of DRB
- Basis of the Adaptation strategies, modelling
- Uncertainties
- Improvement of the climatological knowledge
- Measurements and modelling, the synergetic effect
- Conclusions

# Temperature tendencies (ECA)

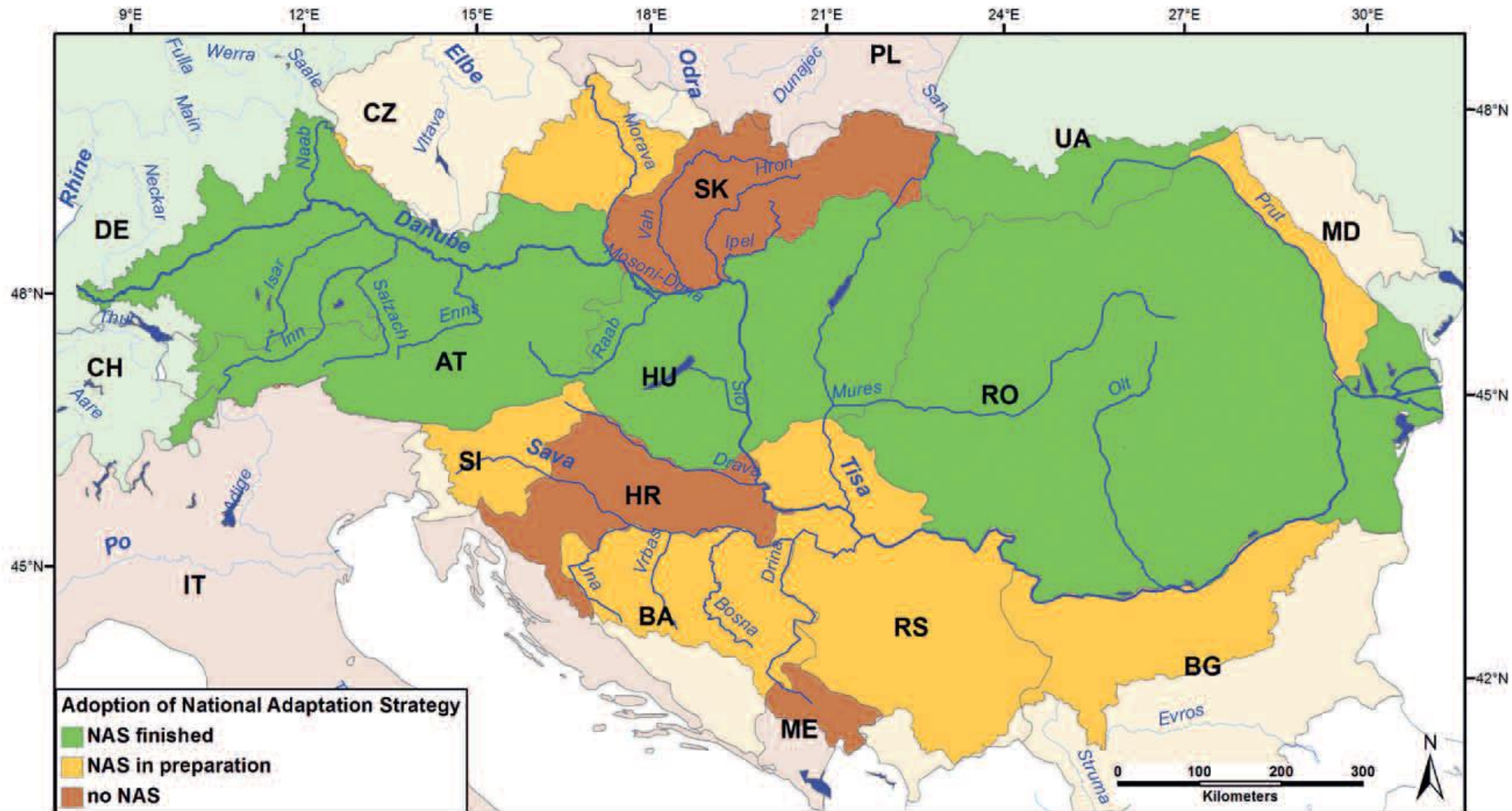


# Annual precipitation tendencies (ECA)

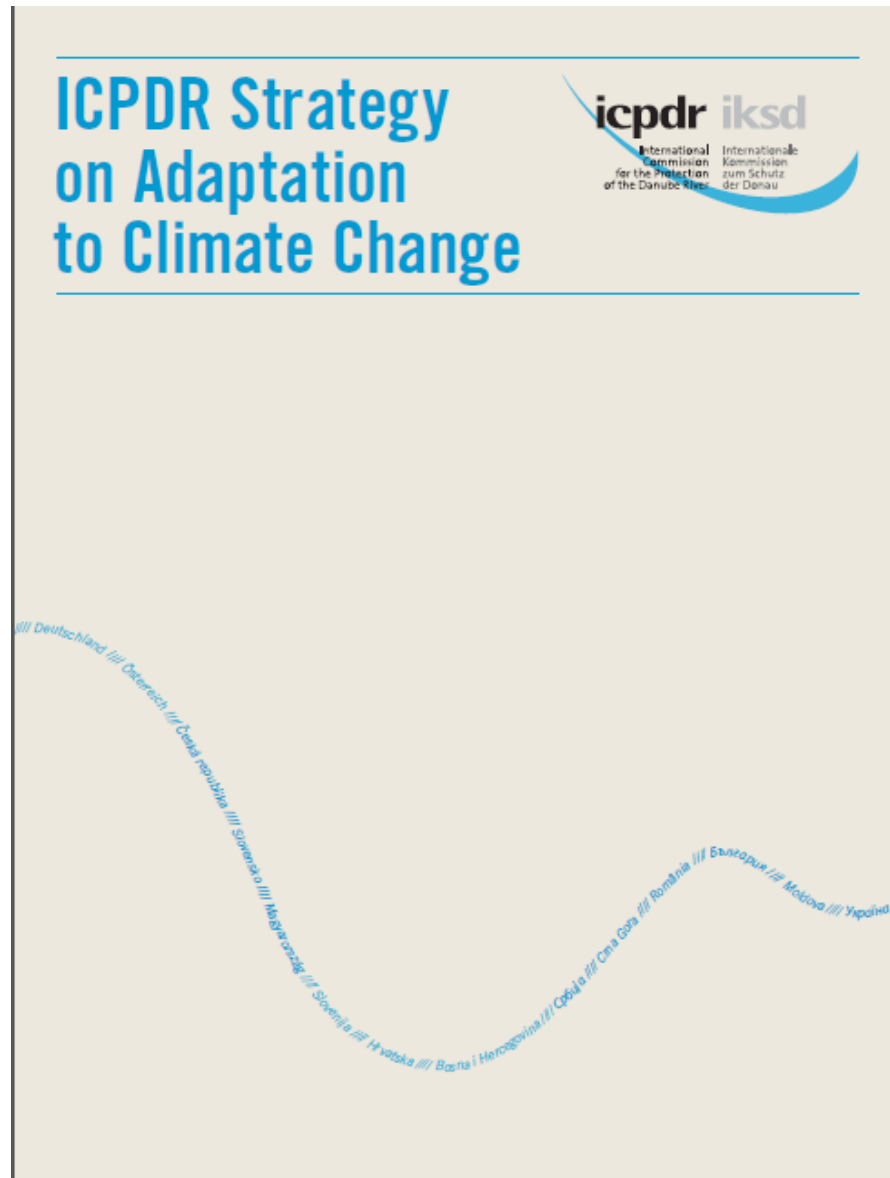




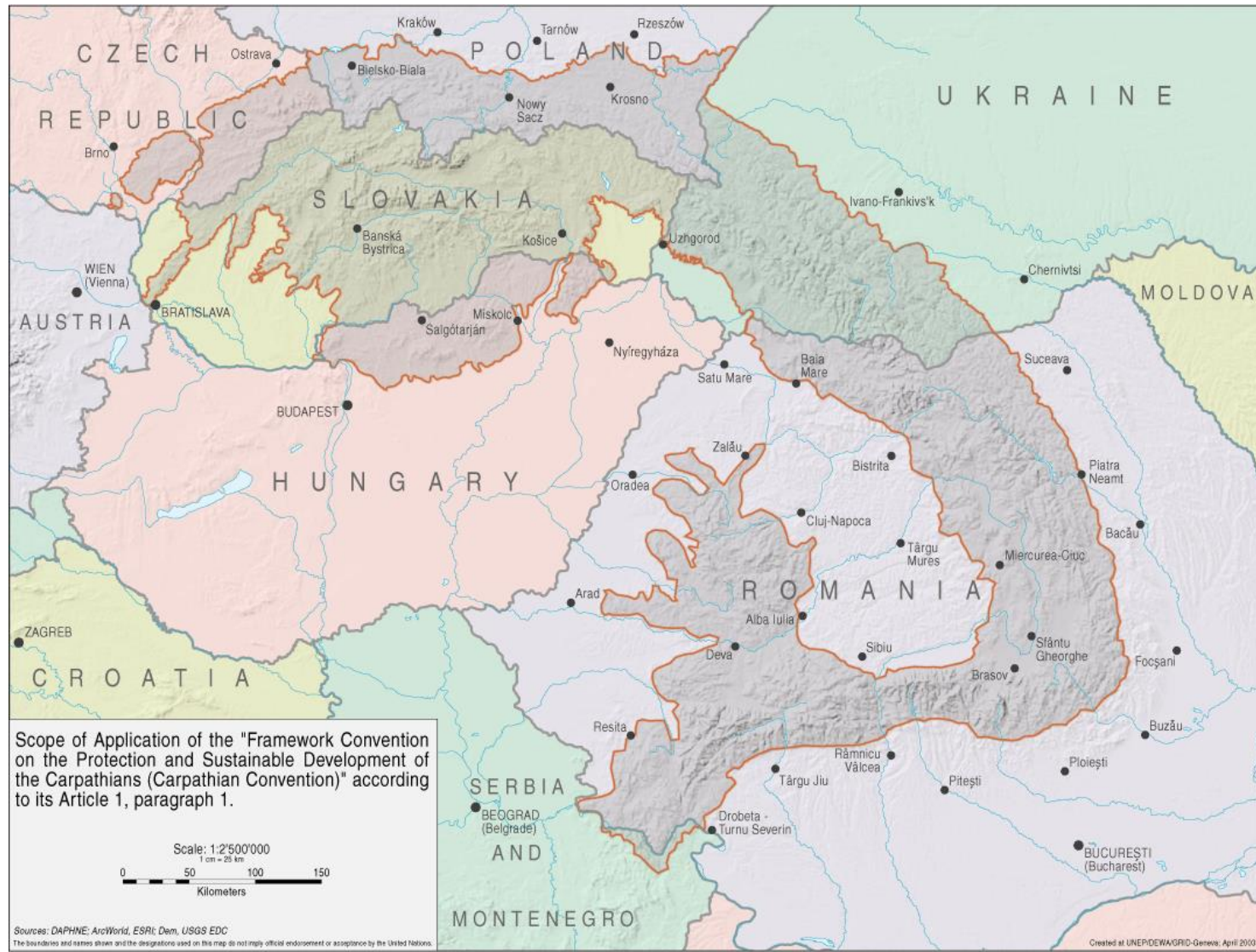
# National adaptation strategies in the region (DAS, 2012)



# Danube Adaptation Strategy (ICPDR, 2012)



# Adaptation activities of the Carpathian Convention



# The Convention as an institution



**Conference of the Parties**

**Carpathian Convention  
Implementation Committee  
CCIC**



**WG  
Biodiversity**

**WG Spatial  
Development**

**WG  
SARD**

**WG Forest  
Management**

**WG Industry,  
Energy,  
Transport,  
Infrastructure**

**WG Tourism**

**WG Cultural  
Heritage and  
Traditional  
Knowledge**

**WG  
Climate  
Change**

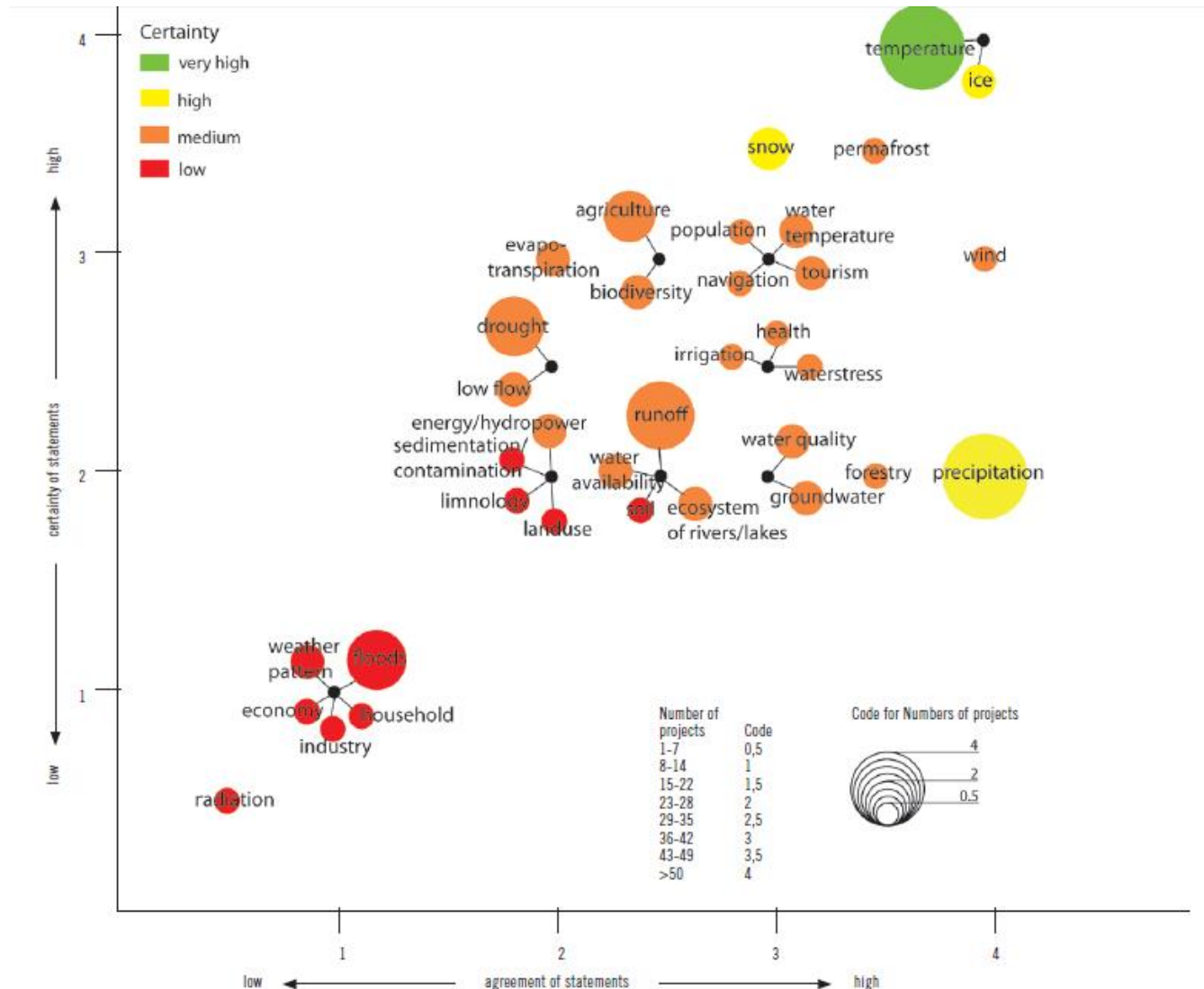
**Carpathian  
Network of  
Protected  
Areas  
(CNPA)  
Steering  
Committee**



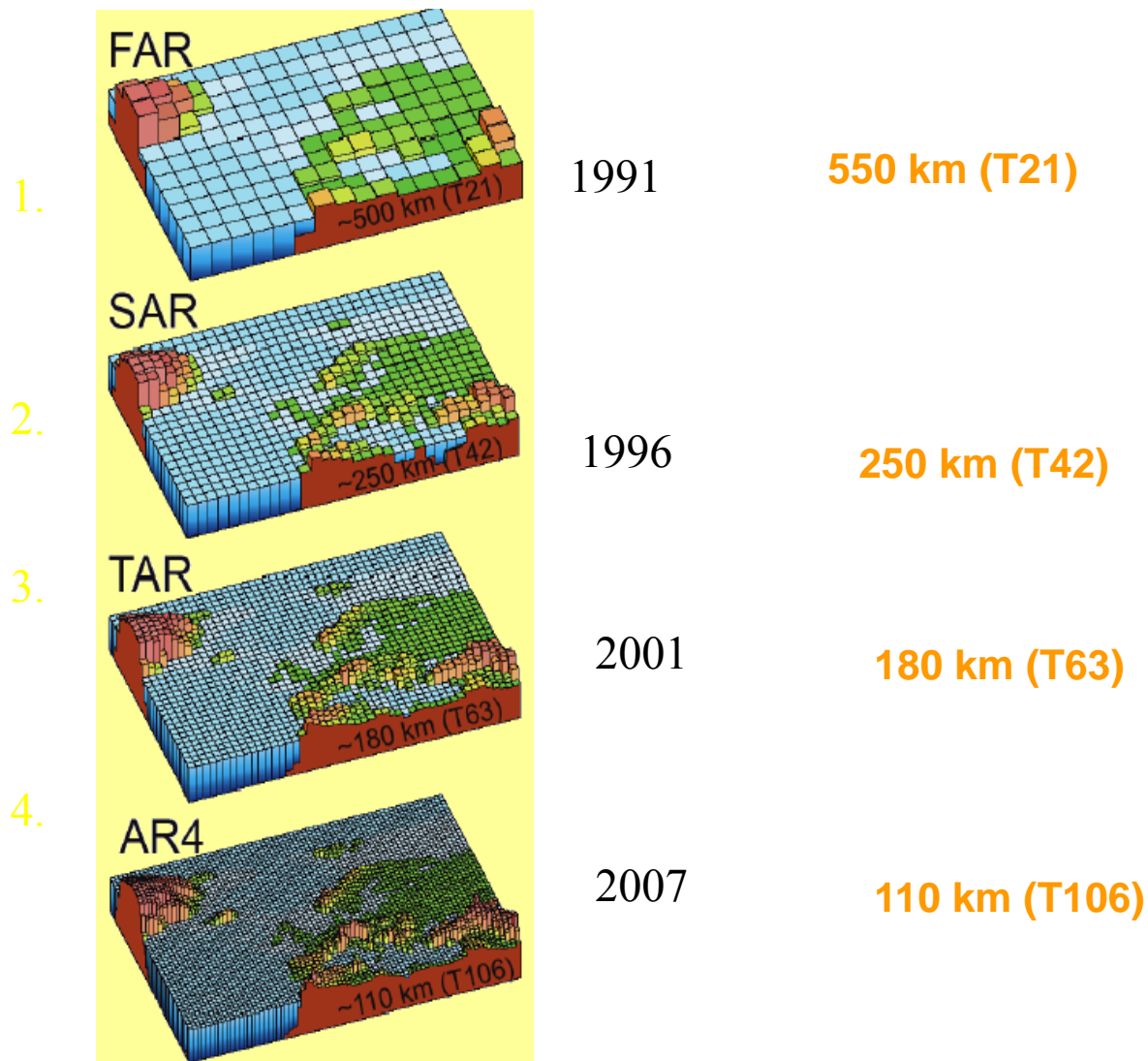
# Strategic Agenda of Adaptation of the Carpathian Convention (CARPIVIA, 2012, not accepted yet)

- Background: Climate Change in the Carpathians , and What does Adaptation Mean?
- The Issues: Impacts of Climate Change in the Carpathians
- Priorities for the Signatories: Policy Responses to create a Path to a Climate-Proofed Carpathian Economy
- Carpathian Space: Naturally Adapting to Changes in the Heart of Europe
- Improving the Information Base and Monitoring
- Coordination with the Danube, Tisza, Dniester processes
- Cross-Cutting Opportunities
- Opportunity for the EU Funds from 2014-2020: Steer the Region's Development Towards a Climate-Proofed Carpathian Space
- Actions

# Overview of uncertainties (Moser et al, 2011)



# Development of global models, spatial resolutions



# Scaling problems

Spatial scale (classification)	Longitudinal spatial extent [m]
Microhabitat (local)	$10^{-1} - 10^0$
Habitat (or site, local)	$10^0 - 10^1$
Reach (or stretch, local)	$10^1 - 10^2$
Segment (or buffer, intermediate)	$10^2 - 10^3$
River network (broad)	$10^3 - 10^4$
Catchment (watershed, broad)	$10^4 - 10^5$

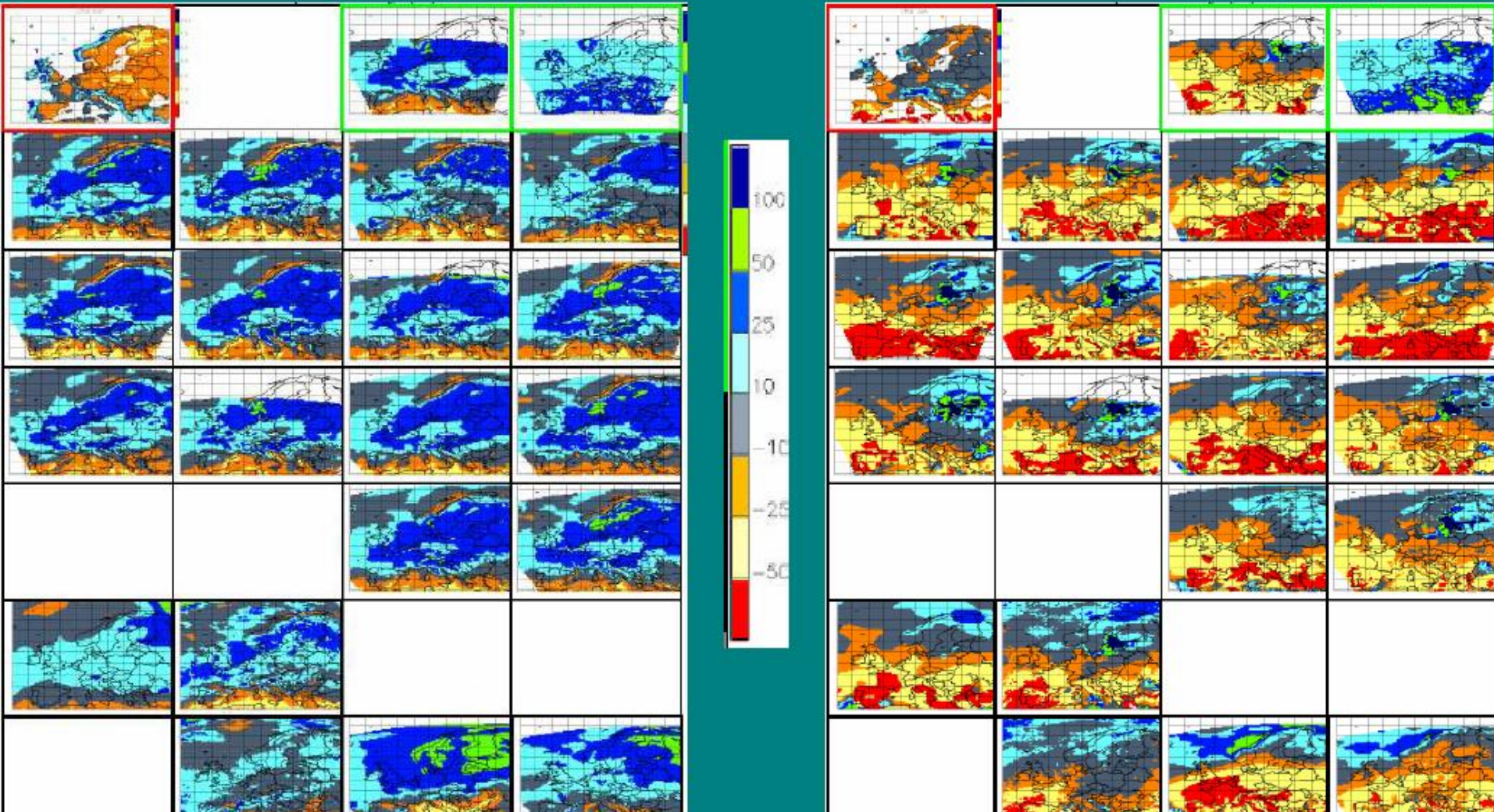


# Expected precipitation changes for 2071-2100 A2 scenario, PRUDENCE (19 model runs)

Bartholy et al, 2007)

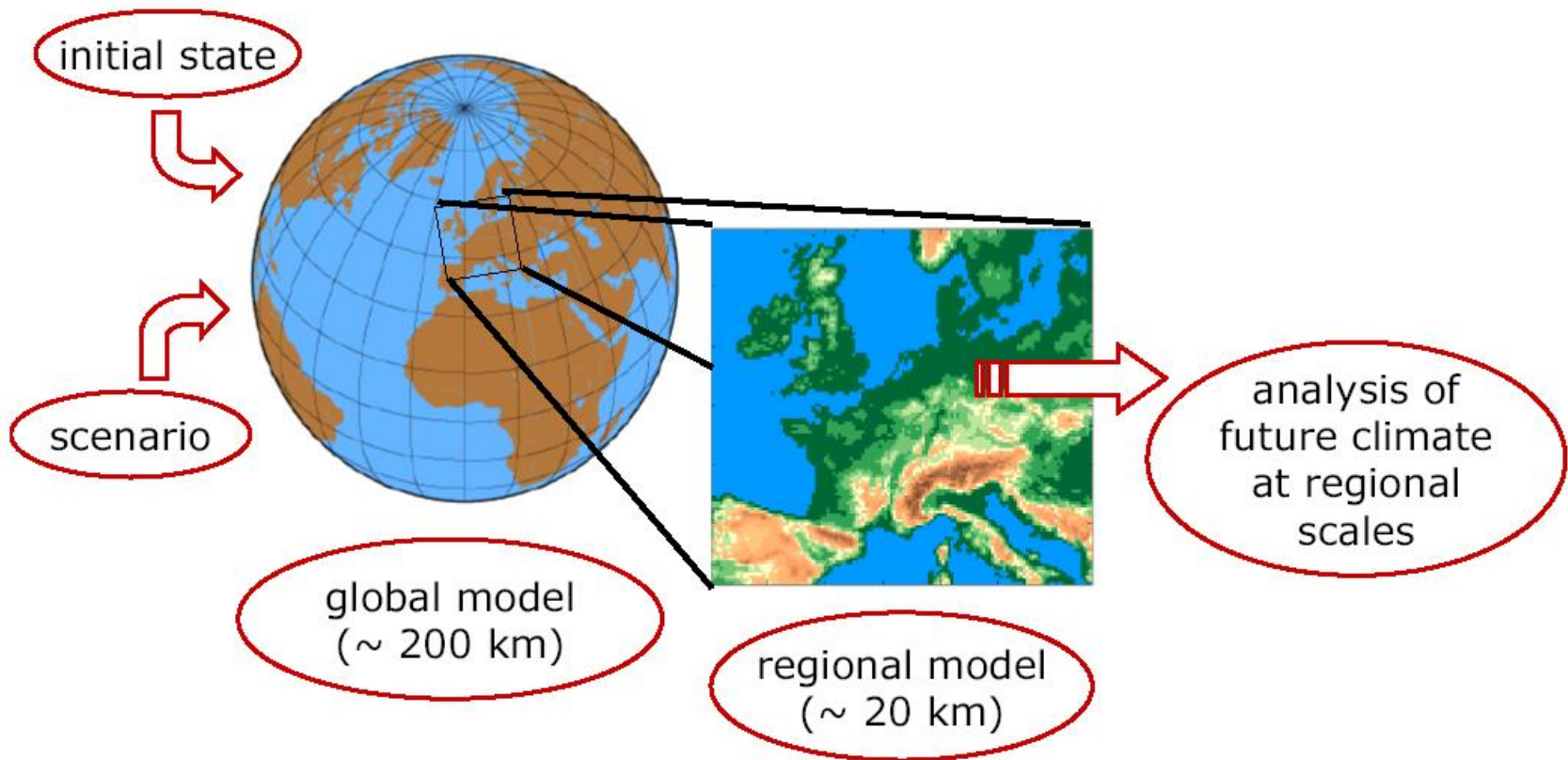
## WINTER (DJF)

## SUMMER (JJA)

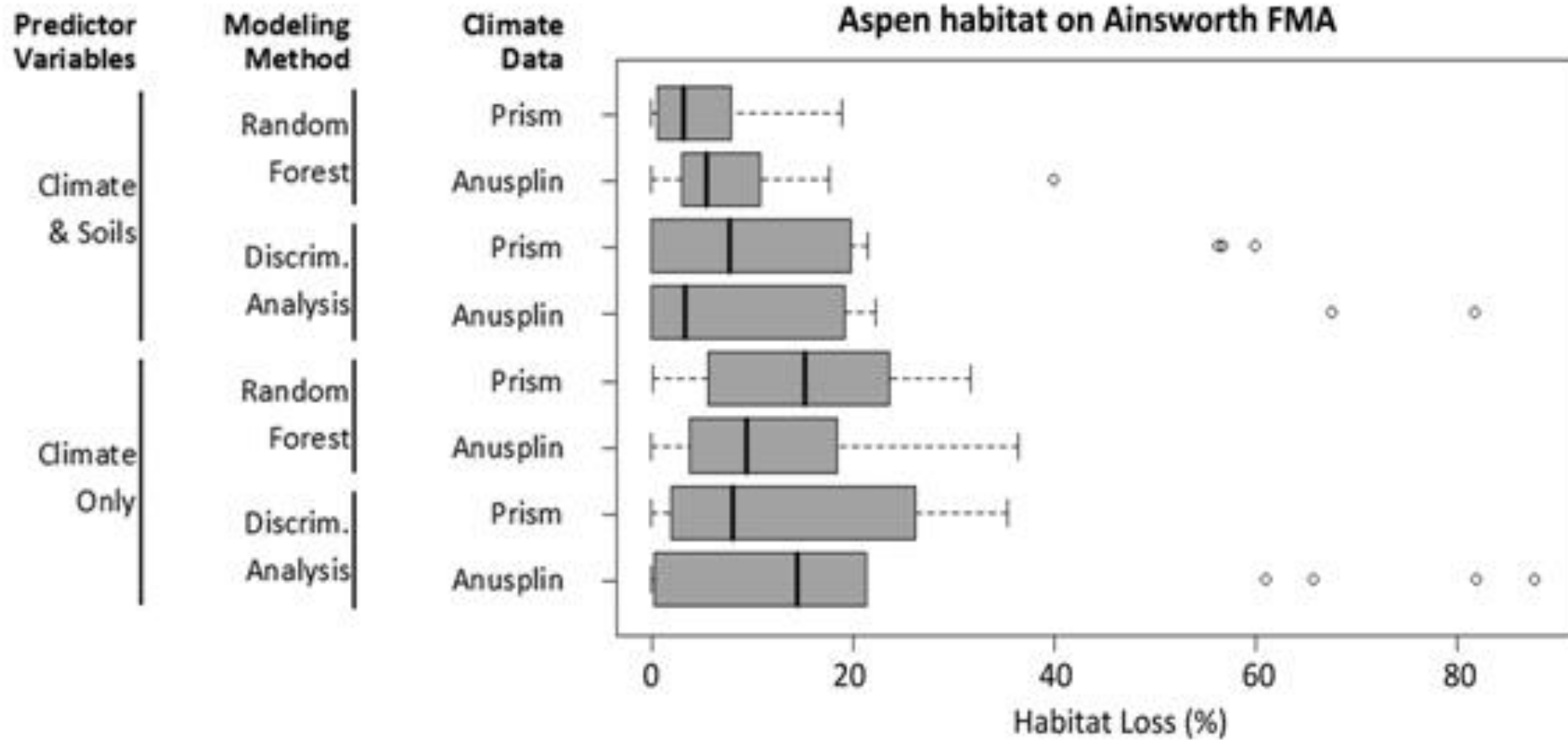




# Uncertainties of climate modeling



# Effect of interpolation (Mbogga, 2010)



# River Basin

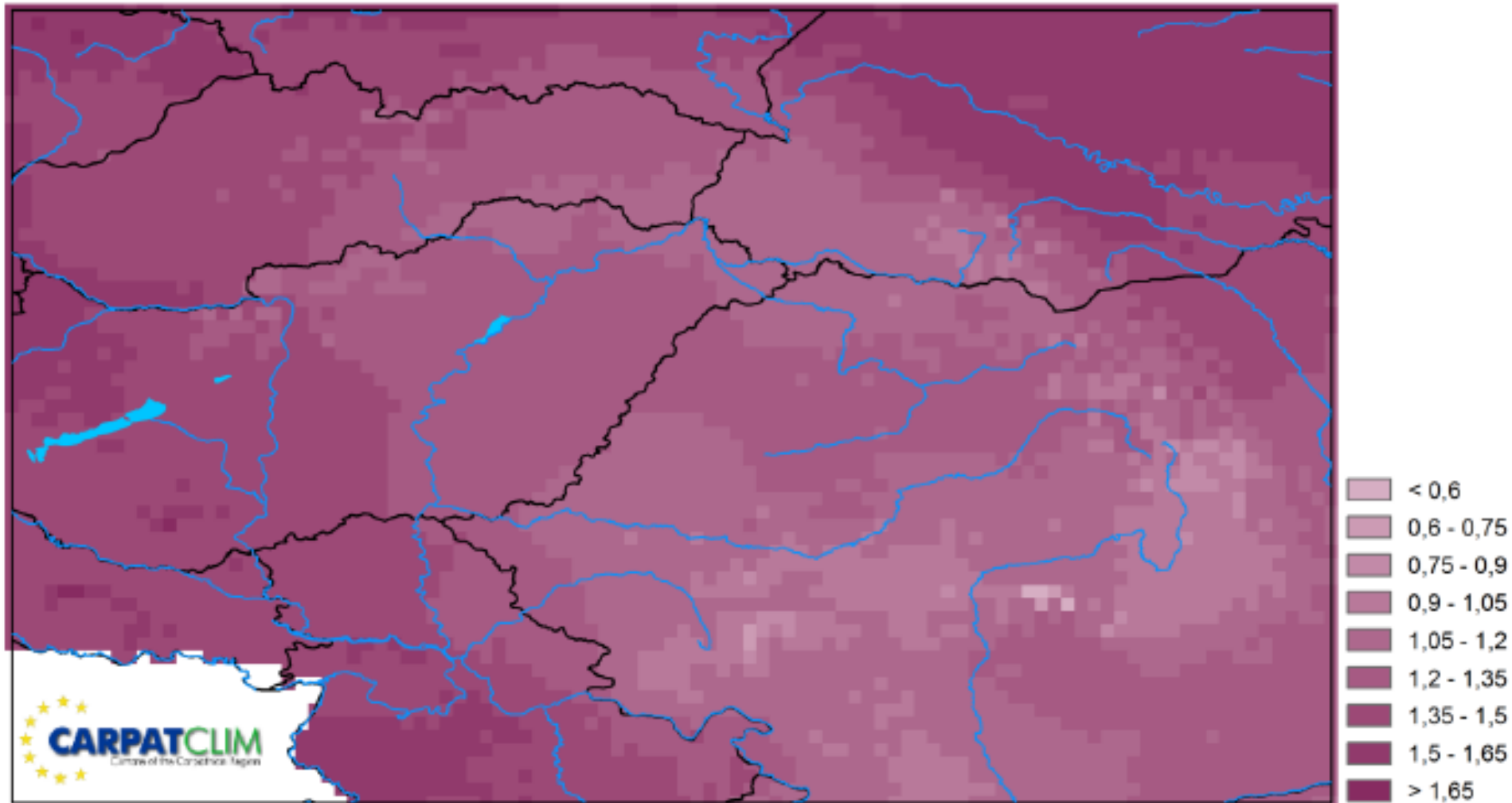
- The Danube River Basin is Europe's second largest river basin, with a total area of 801,463 km<sup>2</sup> and includes the territories of 19 countries. It means 19 different measuring networks, data management methods, etc.



# CARPATCLIM project

- Involvement of data owners (maximizing of available data)
- International consistency, near border data exchange (no common database, minimizing of exchanged data)
- Common softwares
- Gridded data published only (no raw data)
- Data freely available from the internet

# Temperature changes, 1961-2010

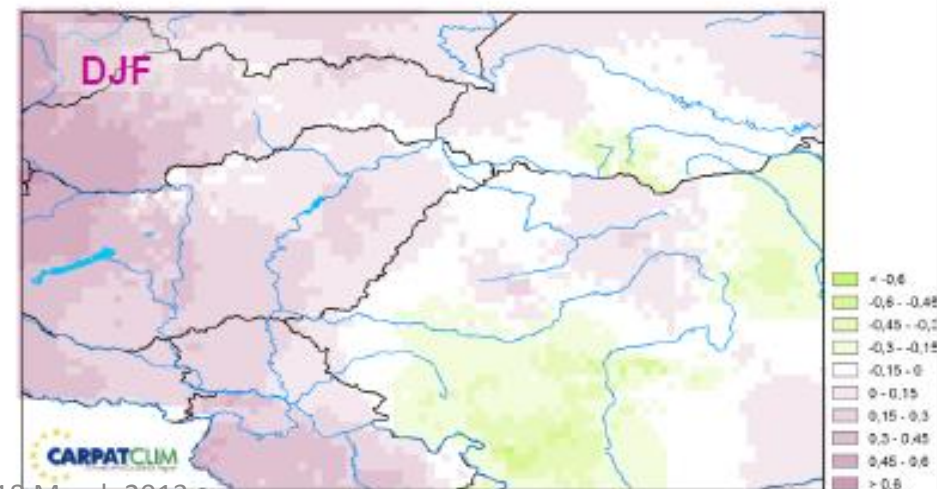
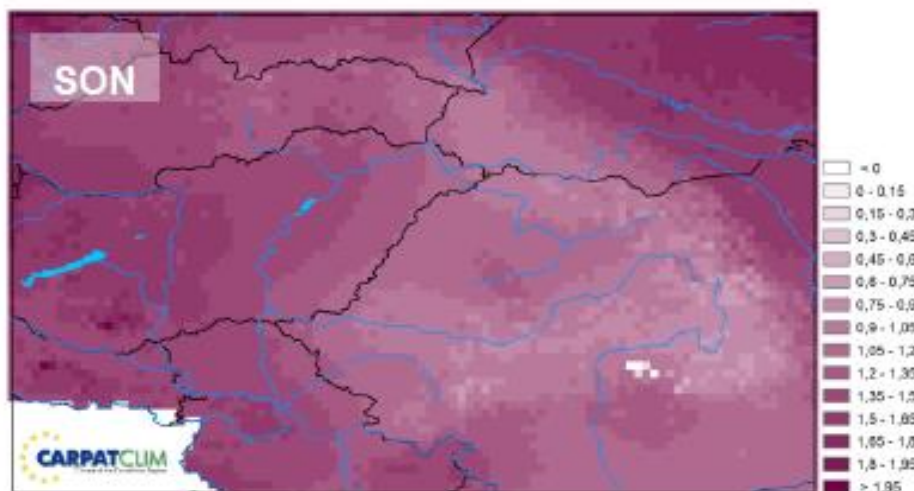
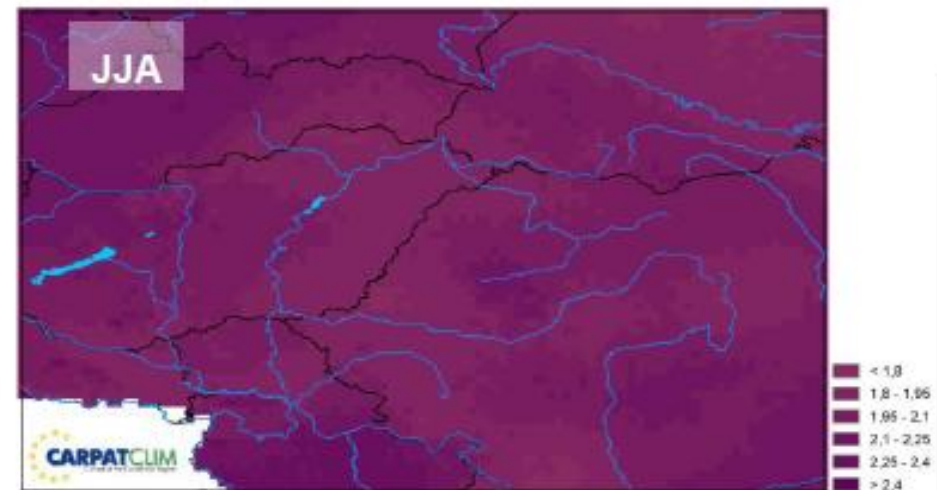
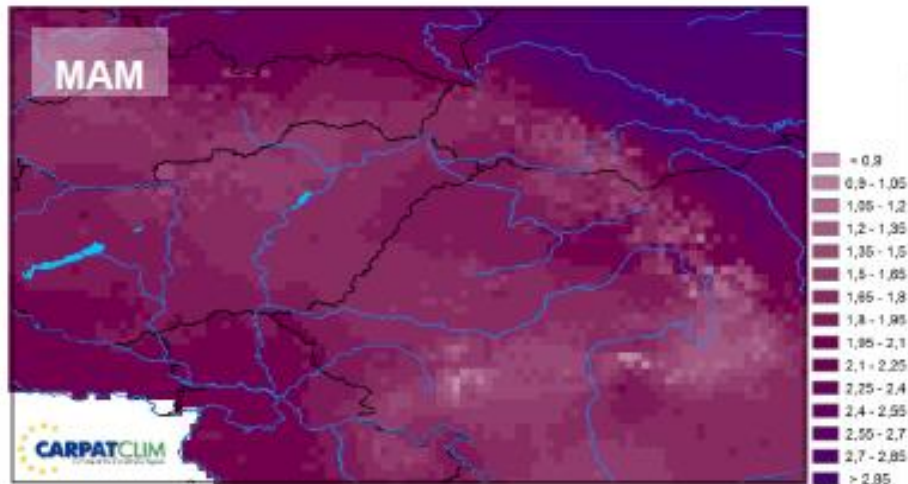


ECCA, Hamburg, 18 March 2013

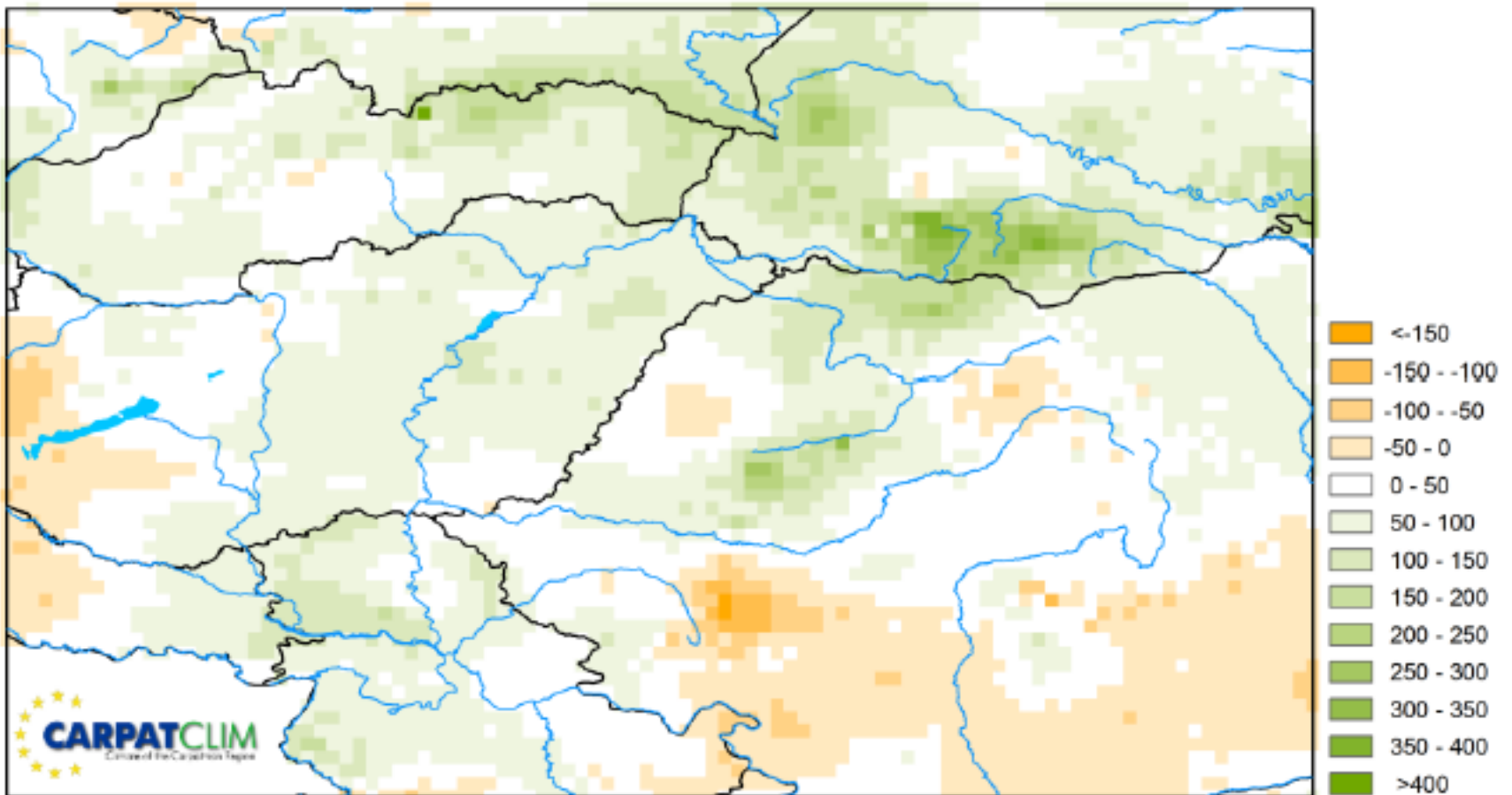
(Lakatos et al., 2013)

# Seasonal temperature changes, 1961-2010

(Lakatos et al., 2013)



# Change of the annual precipitation sum 1961-2010

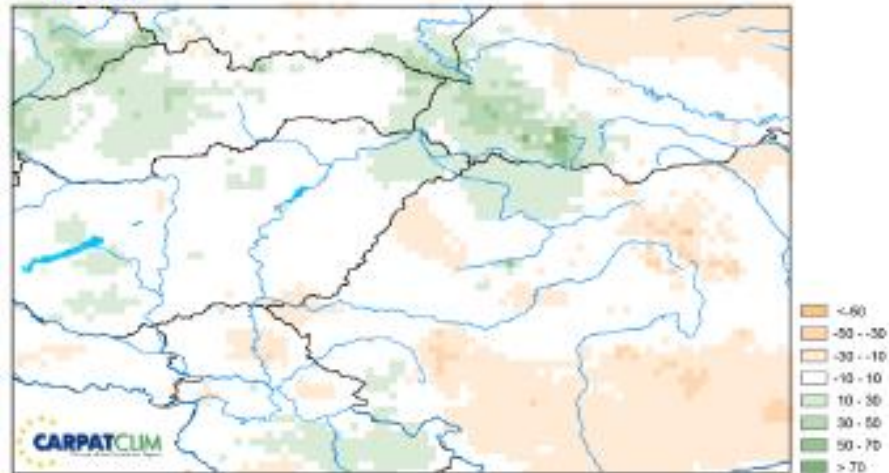


ECCA, Hamburg, 18 March 2013

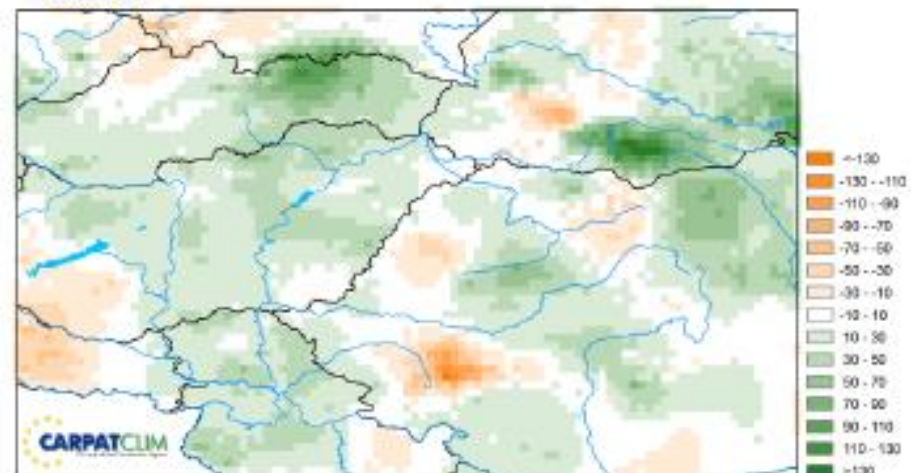


# Change of the seasonal precipitation sums 1961-2010

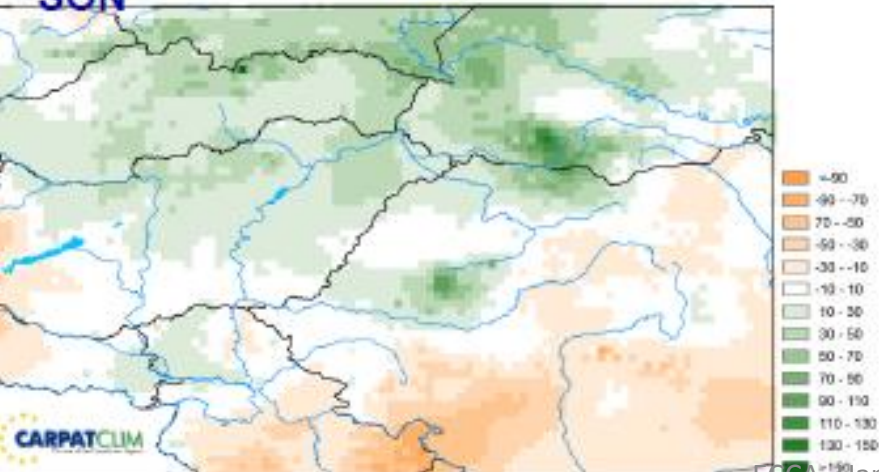
MAM



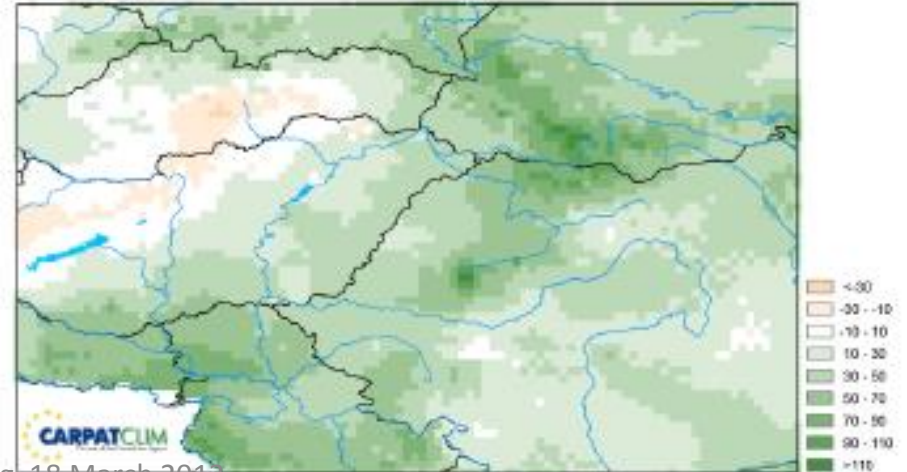
JJA



SON



DJF



# Conclusions

- Basic and applied transboundary work need harmonized (unified) datasets.
- Appropriate temporal and spatial scaling are possible with the common use of measurements and models. Model outcomes do not fit the water quality scaling requirements
- Models (especially applied models) are not able to give the necessary accuracy in climate projections. Observations are not competitors of modelling but supporters for synergetic effects. The changes show very mosaic pictures, therefore, could produce opposite impacts as expected, locally.

## Conclusions (2)

- Adaptation strategies need to be established not on the model results only, but on the observations, managing the uncertainties. This is valid especially for the activities in the next years and couple of decades.
- Stronger harmonisation (unification) procedure is needed in the region to improve the comparability of national data on each fields.

Thank you for your attention!