Usage of climate data in the NAGiS project – links to the users

Emese Homolya

László Orosz – Teodóra Szőcs – Gábor Turczi – Tamás Pálvölgyi Tamás Czira – Attila Kovács – Ágnes Rotárné Szalkai – Zsolt Mattányi – Pál Selmeczi and other colleagues of MFGI

RCMGiS Project closing event
Budapest, HMS
29 February 2016

Contents

- Climate data in the frames of the NAGiS Project
- Derived climate data – Climate maps in NAGiS
- Climate data for impact studies
- Examples from the results of MFGI
  - Predictive water table modelling in the NAGiS
  - Climate impact on drinking water protected areas
  - Climate impact on flash flood risk
- Conclusions

Climate data in the frames of the NAGiS Project

- Climate database (10 km x 10 km)
  - CarpatClim (1961–2010)
  - Climate modell projections: ALADIN-Climate, RegCM (1961–1990, 2021–2050, 2071–2100)
- Homogenization – data structure

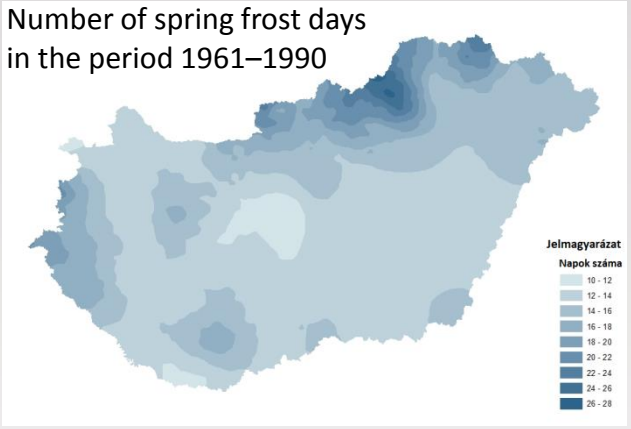
Parameter	Temporal resolution
Temperature	Daily
Precipitation	Daily
Global radiation	Daily
Relative humidity	Monthly/3-month averages
SPI	Monthly
Wind speed	Daily/annual

Calculation of derived climate data – Climate maps in NAGiS

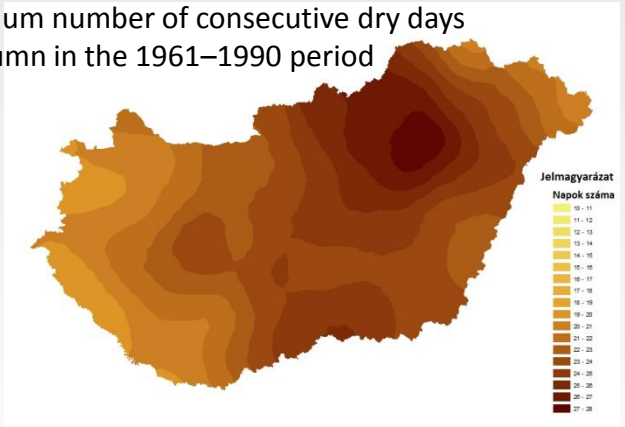
Derived data contain:

- Aridity indices
- Climate days
- Consecutive dry days
- Precipitation intensity
- Extreme precipitation
- Potential evapotranspiration
- Climatic water balance

Number of spring frost days in the period 1961–1990



Maximum number of consecutive dry days in autumn in the 1961–1990 period



Averages have been calculated for 30-year periods

Projected differences compared to the reference period

Impact studies – Climate data requirements

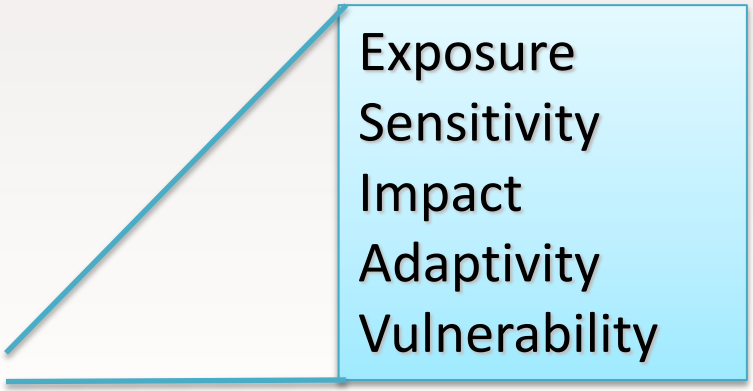
The impact of climate change on

- Groundwater table
- Flash flood risk
- Drinking water supplies
- Natural habitats
- Forestry and agriculture
- The water balance of Lake Balaton
- Society and economy

Vulnerabiliy analyses according to the CIVAS modell

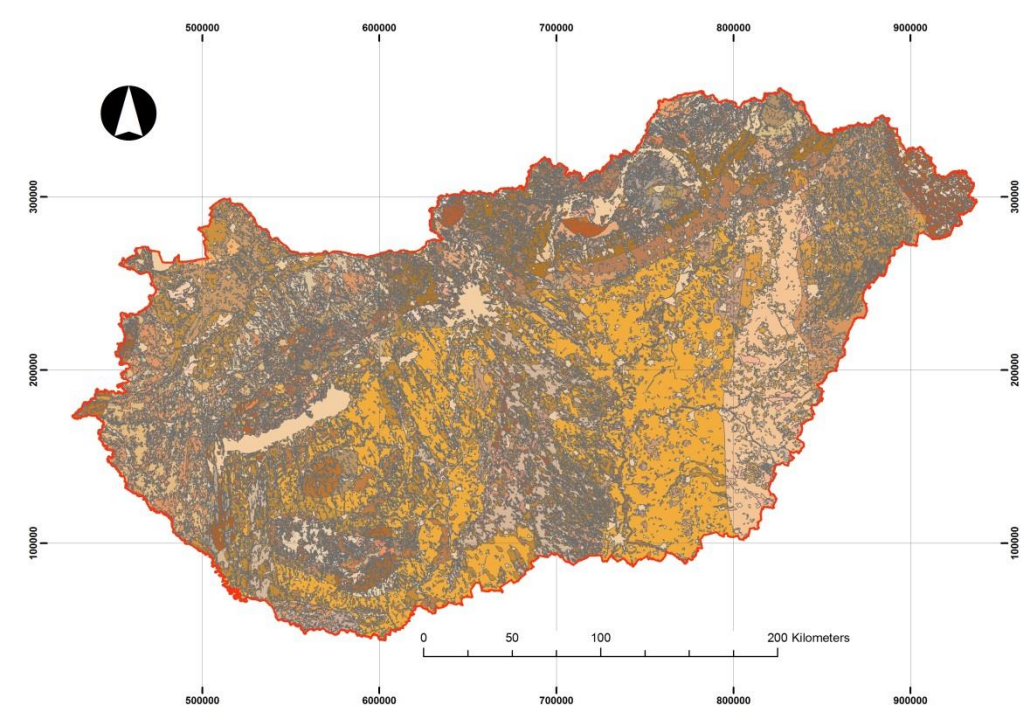
Climate data in impact studies

- Mostly used: temperature and precipitation
- Spatial and temporal coverage
- Downscaling



Predictive water table modelling in the NAGiS

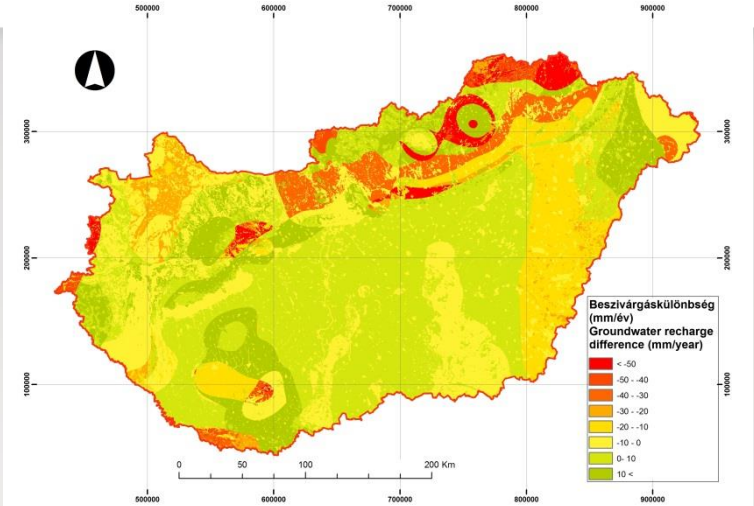
- Infiltration according to climate conditions using a 1D hydrological model
- Climate data in a daily resolution
- Numerical groundwater modelling
  → actual and projected changes in the level of the groundwater table



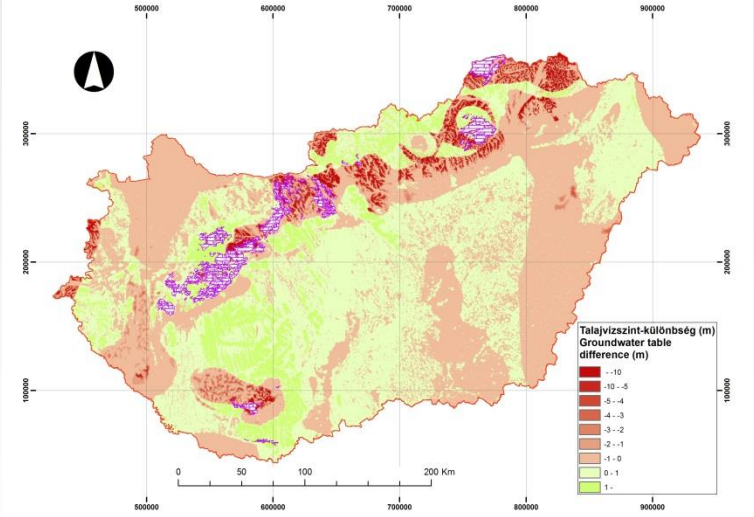
Infiltration zones in the NAGiS Project

Predictive water table modelling in the NAGiS

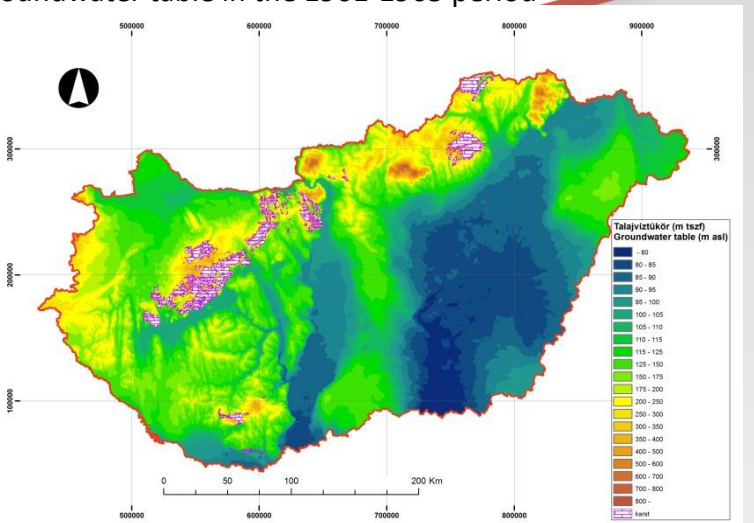
Projected changes in infiltration for the 2021-2050 period



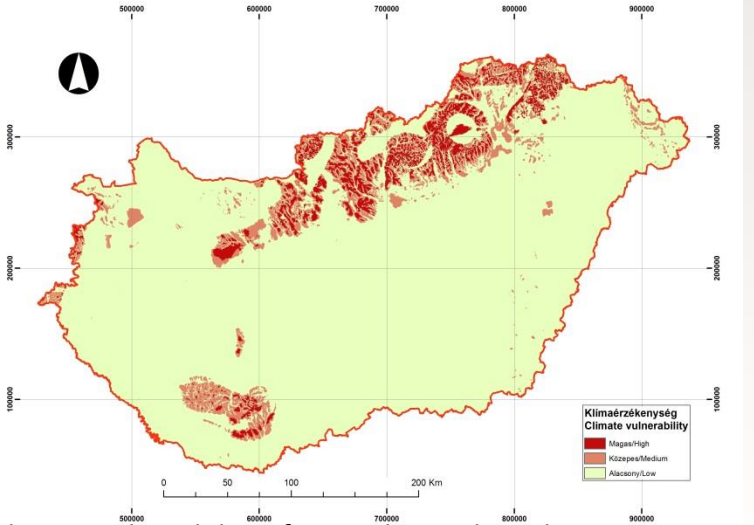
Projected changes in the groundwater table for the 2021-2050 period



Groundwater table in the 1961-1965 period

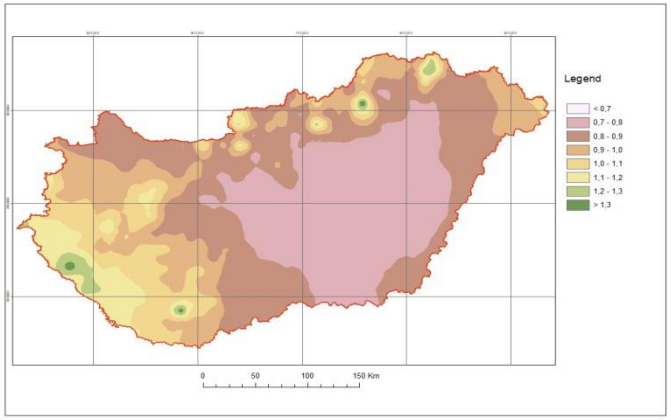


Climate vulnerability of groundwater based on ALADIN projections

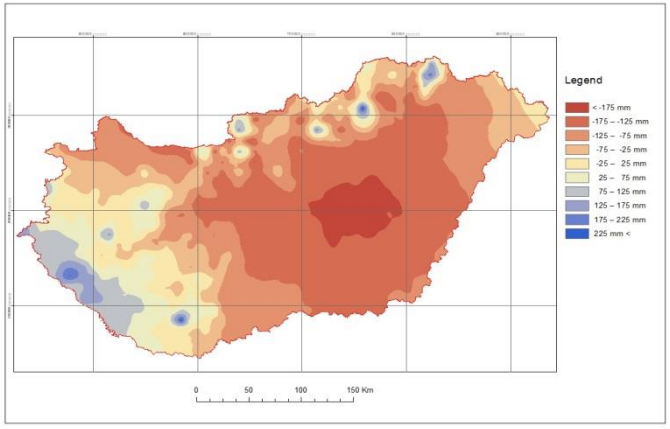


Climate impact on drinking water protected areas

- Analysis of climate parameters to characterize exposure
- Climate sensitivity depends on geological and hydrological characteristics
- Adaptivity according to societal and economical response together with technical factors
- A complex indicator to describe vulnerability



Spatial distribution of the UNEP aridity index in the 1961–1990 period based on CarpatClim data



Spatial distribution of the annual mean climatic water balance in the reference period based on CarpatClim data

Climate impact on drinking water protected areas

MFGI Magyar Földtani és Geofizikai Intézet

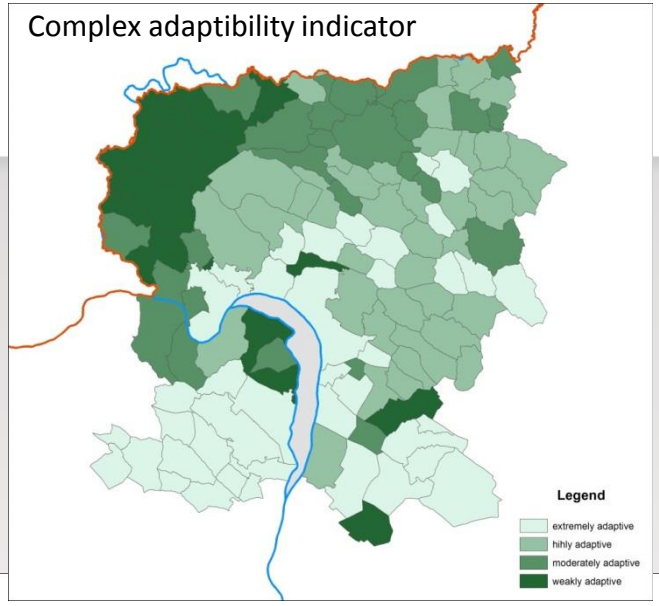
NATéR Nemzeti Alkalmazkodási Térinformatikai Rendszer

NAK Nemzeti Alkalmazkodási Központ Magyar Földtani és Geofizikai Intézet

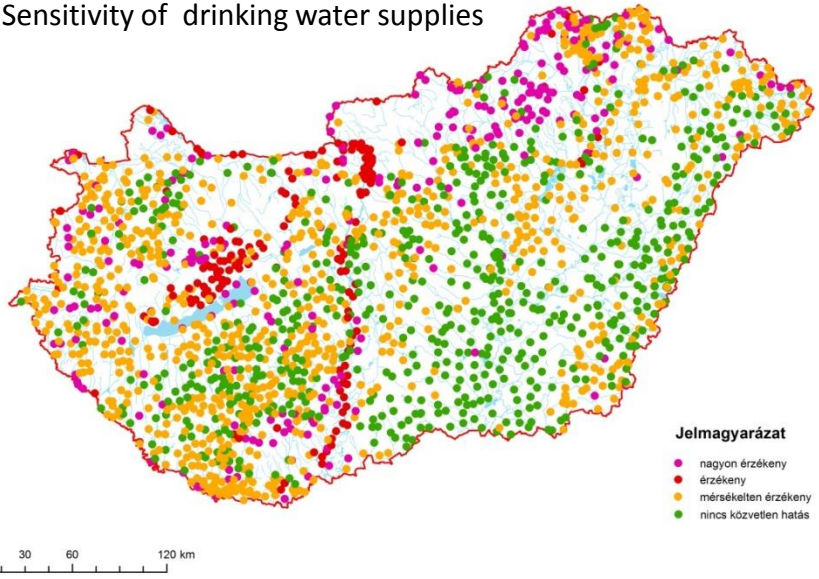
Iceland Liechtenstein Norway eea grants

Regional Environmental Center

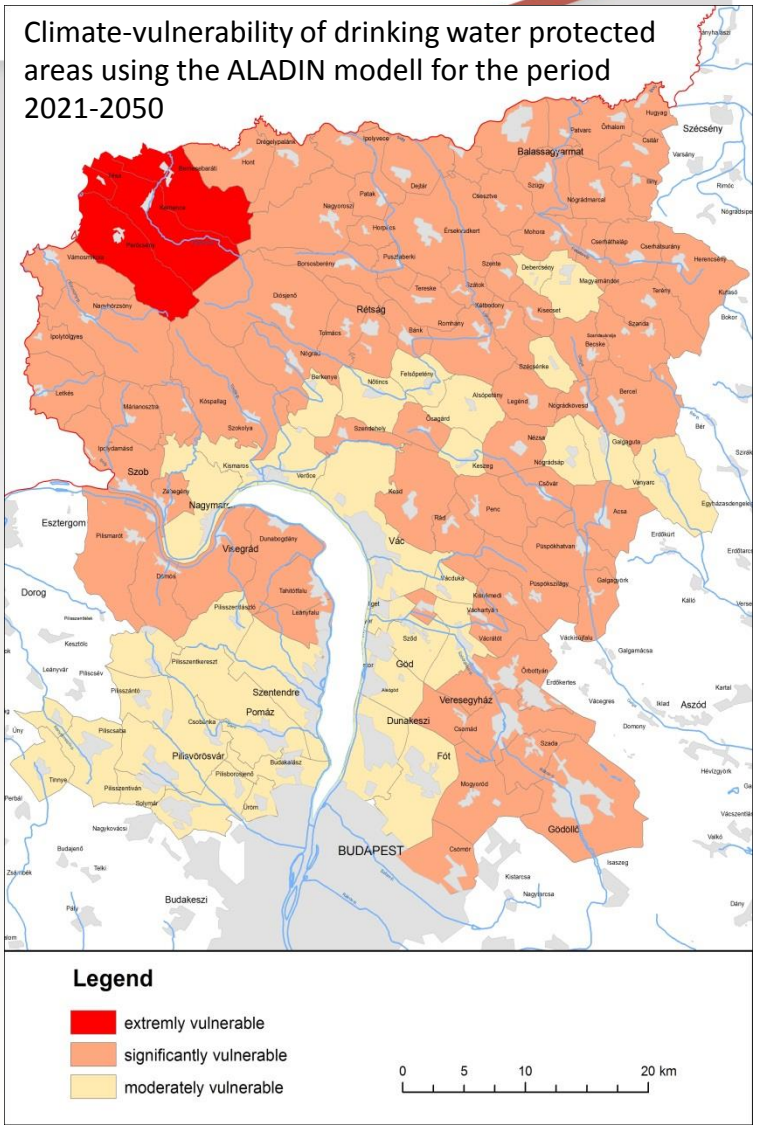
Complex adaptibility indicator



Sensitivity of drinking water supplies

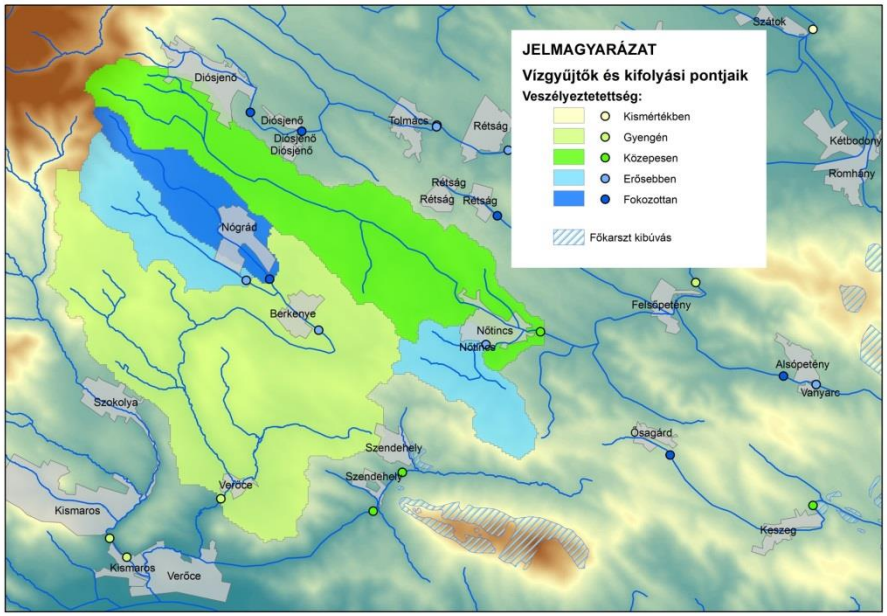


Climate-vulnerability of drinking water protected areas using the ALADIN modell for the period 2021-2050

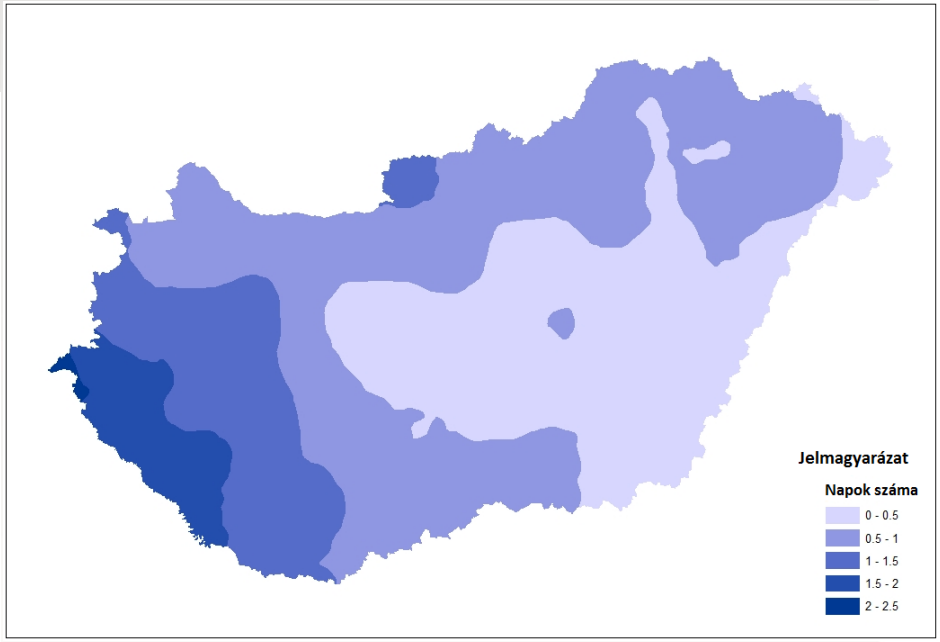


Climate impact on flash flood risk

- Characterization of drainage basins
  (size, shape, slope, max height, forest cover)
- Excessive precipitation in a short time (> 30mm/day)
- Categorization → risk index



Classification of vulnerability of settlements based on characteristics of drainage basins



Number of days with precipitation above 30 mm in the period 1961–1990

Conclusions

- All impact studies are based on a range of climate data
- Methods of use are diverse
- Communication between users and meteorologists is crucial
- A need for quantifying uncertainty
- Extending the avalability of climate projections is necessary

MFGI
Magyar Földtani és Geofizikai Intézet

NATéR
Nemzeti Alkalmazkodási Térinformatikai Rendszer

NAK
Nemzeti Alkalmazkodási Központ
Magyar Földtani és Geofizikai Intézet

ICELAND LIECHTENSTEIN NORWAY
eea grants

REGIONAL ENVIRONMENTAL CENTER

Thank you for the attention!