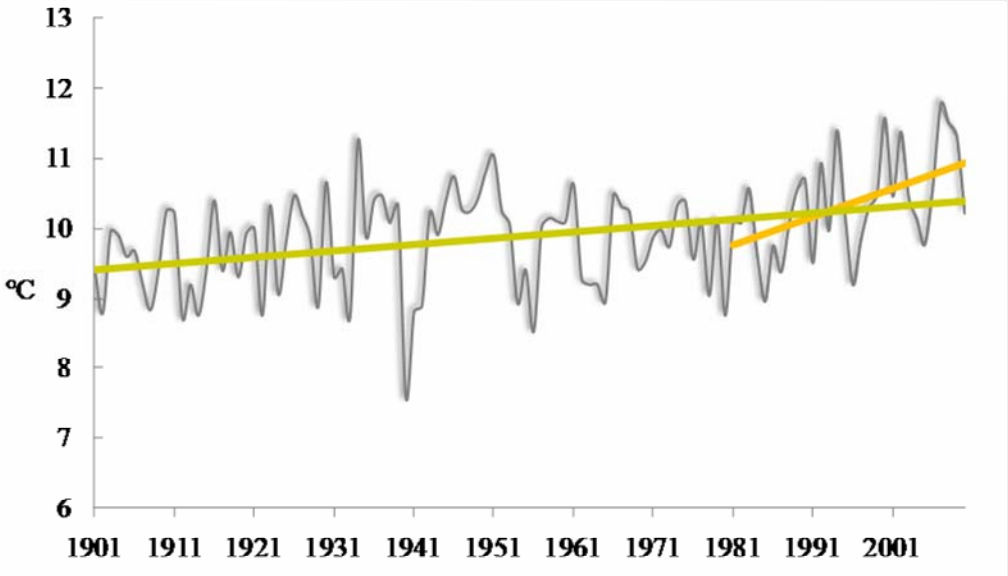
Research and development in connection with climate change at Hungarian Meteorological Service

Zoltán Dunkel dr.
President of Hungarian Meteorological Service
dunkel.z@met.hu

Analysis of observed tendencies

- - On the base of homogenized daily data series for temperature and precipitation: 1901-2010
- - Analysis of mean parameters and climate extremes

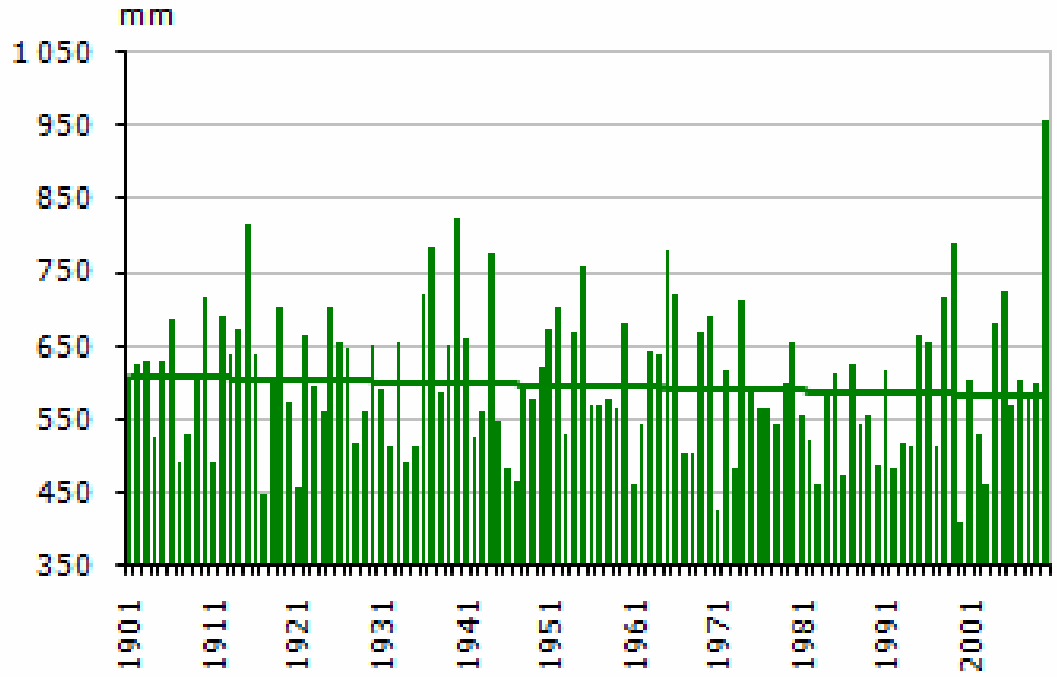
Annual temperature averages and the fitted trends to the period 1901-2010 and 1981-2010



Observed temperature changes °C					
	year	spring	summer	autumn	winter
1901-2010	**0.98**	**1.1**	**1.2**	**0.65**	**0.64**
1981-2010	**1.17**	**1.3**	**1.7**	0.66	0.8

Sinificant changes are bolded

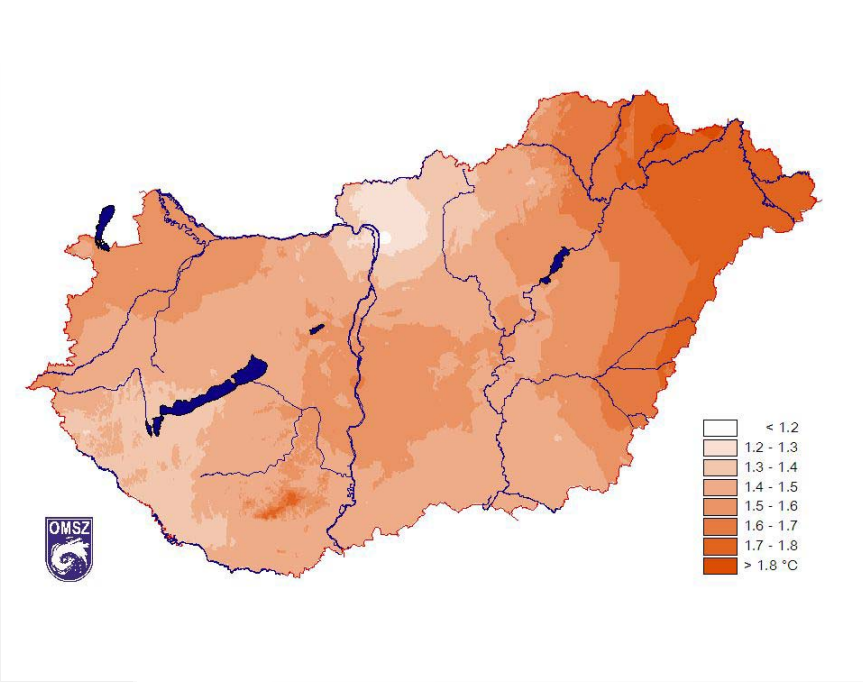
Annual precipitation sum and the fitted trends to the period 1901-2010

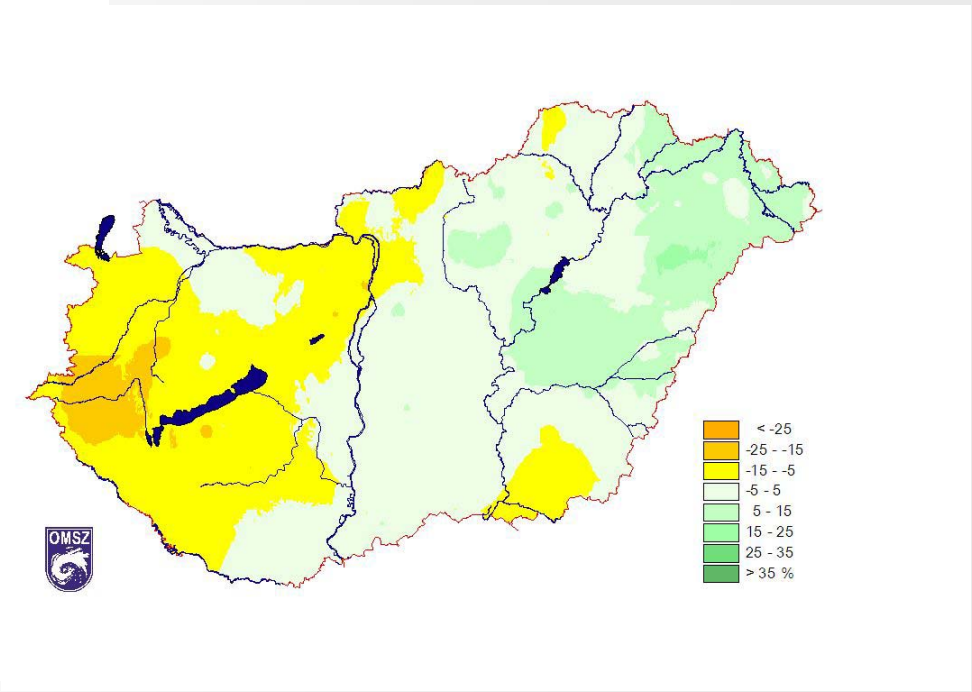


Observed precipitation changes %					
	year	spring	summer	autumn	winter
1901-2010	-5%	**-17%**	11%	-14%	1%
1981-2010	**25%**	13%	**36%**	30%	12%

Sinificant changes are bolded

Change of the annual temperature and precipitation





Change of the temperature, 1980-2009

1.06°C	1.52°C	2.07°C
min	mean	max

Change of the precipitation, 1960-2009

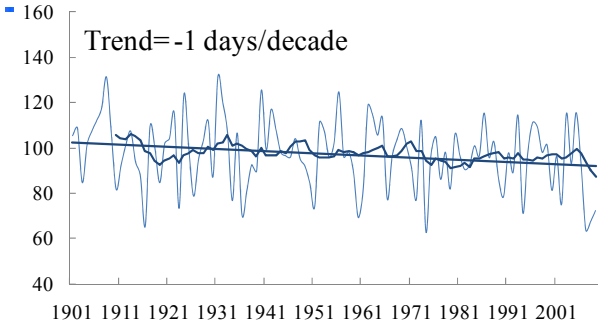
-22.00%	-1.70%	21.00%
min	mean	max

Extreme climate indices: observed changes 1901-2009

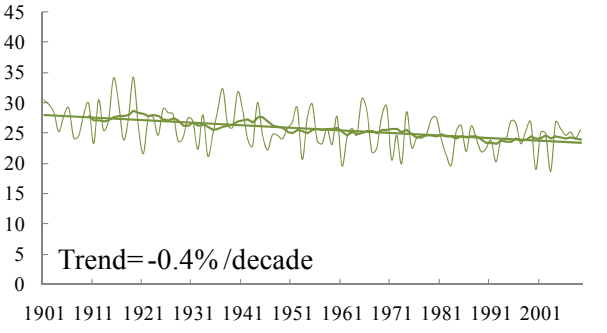
Temperature

Precipitation

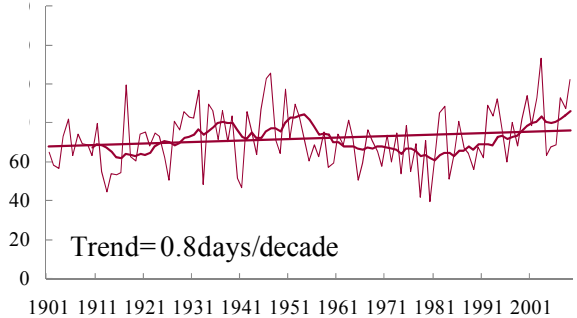
Frost days:
Tmin < 0 °C



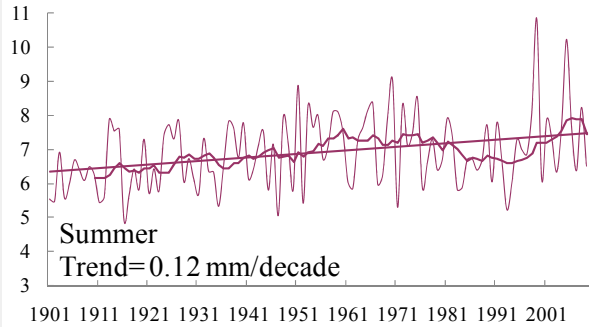
% of wet days:
daily precipitation > 1 mm



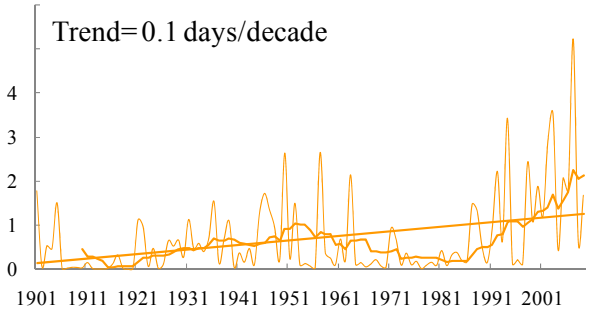
Summer days:
Tmax > 25 °C



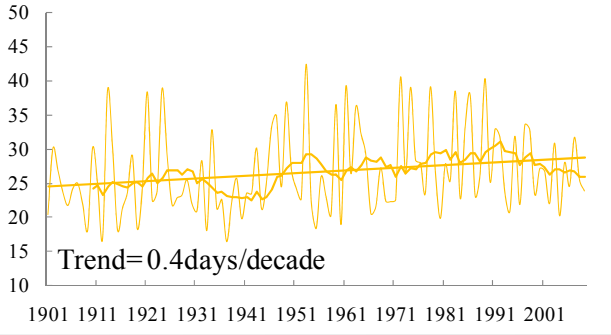
Simple daily intensity:
precipitation sum/number of wet days



Warm nights:
Tmin > 20 °C



Maximum number of consecutive days when the daily precipitation < 1 mm



Climate modelling

- Two models:

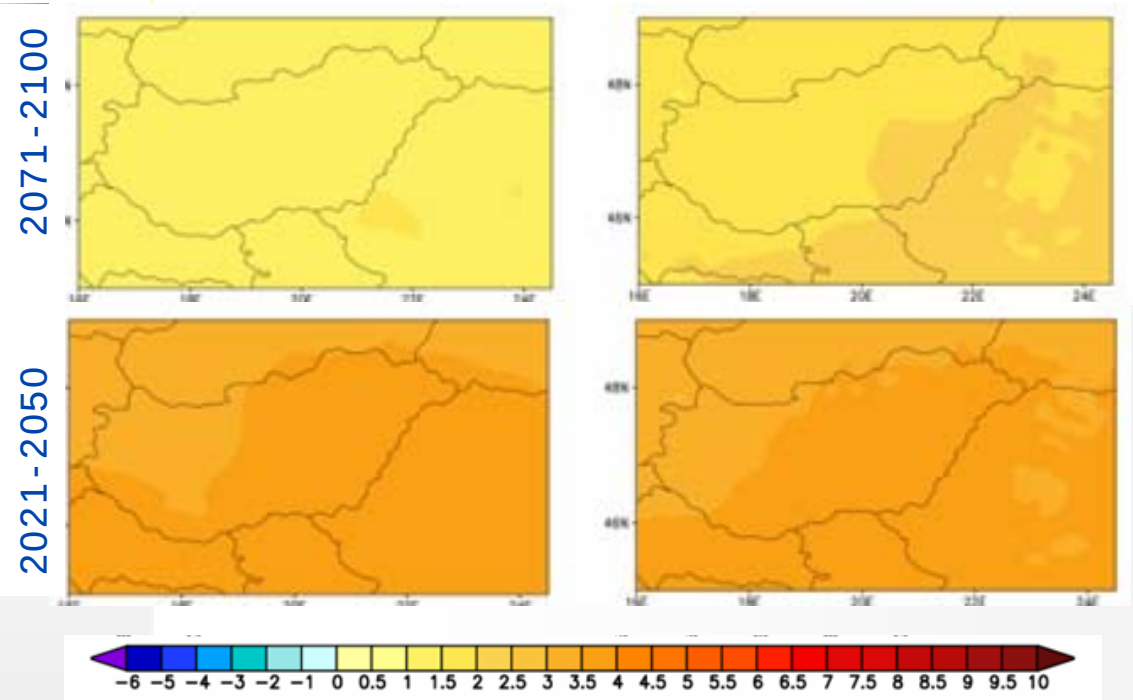
	ALADIN-Climate	REMO
Period	1961–2100	1951–2100
Resolution	10 km and 31 levels	25 km and 20 levels
Scenario	A1B	A1B

Changes in temperature
Annual mean, reference period 1961-1990

ALADIN-Climate REMO

2071-2100

2021-2050



1.4-1.9°C

3.5-3.9°C

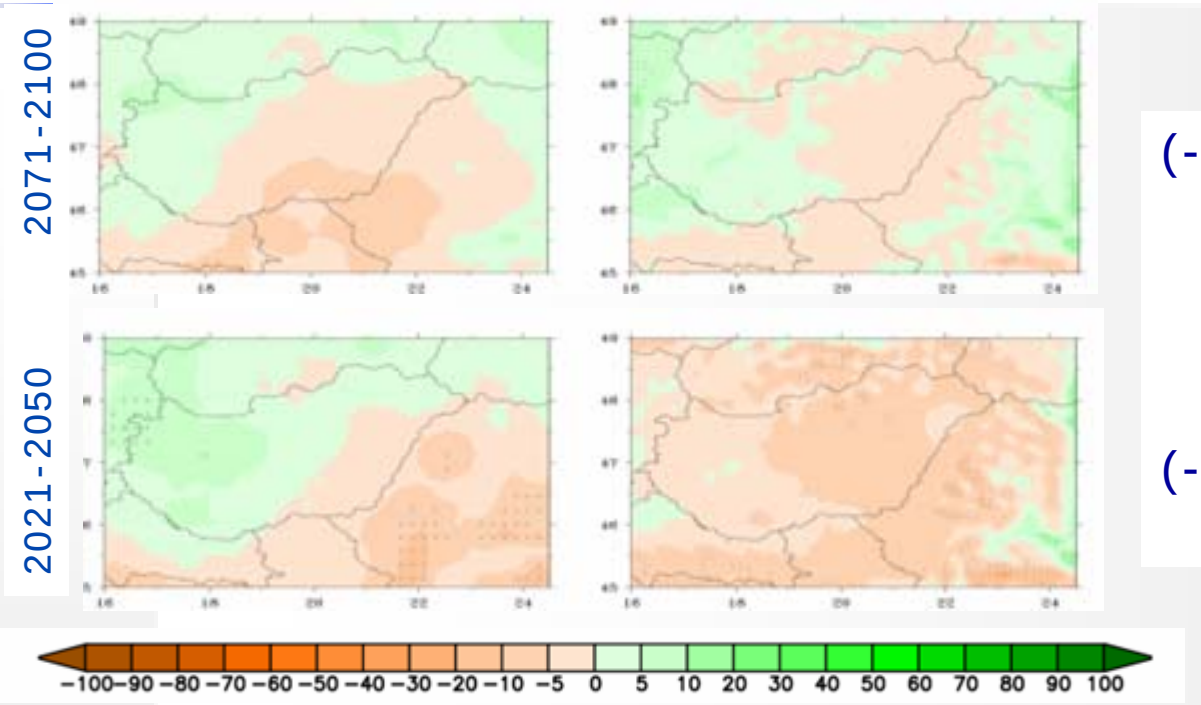
Significant changes:

Warming in each seasons, most effective in summer and autumn

Increasing number of heat days, hot days and heat waves

Changes in precipitation
Annual sum, reference period 1961-1990

ALADIN-Climate REMO



(-1)-0%

(-5)-(+3)%

Not significant changes in general
Greater uncertainty than at the temperature
Change within the year
Summer: increacing, other seasons: depend on the models
Increasing intensity (significant for 2071–2100)
Increasing number of the consecutive dry days for 2071-2100

Thank you for your attention!