



REPUBLIC OF SLOVENIA  
MINISTRY OF THE ENVIRONMENT AND SPATIAL PLANNING  
SLOVENIAN ENVIRONMENT AGENCY

# Estimation of the extreme meteorological and hydrological conditions in Slovenia in the future

Renato Bertalanič

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# Outline

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- Conclusion

# Introduction

- Climate in the future
- Frequency, duration and intensity of extreme weather events in the future
- Project „Estimation of climate change to the end of 21<sup>st</sup> century“
- Started in April 2016
- End in 2017
- Collaboration of 2 offices: Meteo office, Hydrology and state of environment office

# Introduction 2

- Results foundation for:
  - strategic documents for adaptation and mitigation of future climate change
  - the risk assessment for natural disasters in the future
  - planning the larger projects funded by European Commission
  - every other planning in sectors of tourism, health, energy, transport, insurance, forestry, building industry etc.

# Objectives

- Two time periods in the future: 2021–50 and 2071–2100
- Two greenhouse gas concentration projections:
  - moderately optimistic RCP 4.5
  - pessimistic RCP 8.5
- Estimation of changes in:
  - temperature

# Objectives 2

- precipitation
- soil temperature
- temperature of surface water
- temperature of sea
- groundwater temperature
- soil water content
- watercourse level or discharges
- aquifers level
- plant phenological development

# Objectives 3

- Estimation of changes in frequency, duration and intensity of:
  - heat waves
  - agricultural drought
  - drought condition of surface water
  - drought conditions of aquifers
  - high level condition of surface water (floods)
  - frost

# Methodology

- Two representative concentration pathways (RCP 4.5 and 8.5) on a daily models data
- Ensembles of the EuroCordex models simulations to estimate uncertainties
- Resolution 11 km
- Variables: temperature, precipitation, global solar radiation, humidity, wind speed

# Methodology 2

- Comparison with gridded observation historic data for temperature and precipitation
- Bias correction
- Corrected data basis for further analysis and input data for hydrology and agro meteorology

# Tasks

- 16 tasks:
  - preparing database of future daily data
  - preparing gridded observation data for precipitation and temperature for the period 1981-2010
  - estimation of return periods for the past extreme precipitation events
  - impacts of the climate change on the agricultural drought

# Tasks 2

- estimation of heat waves frequency
- estimation of cold and freezing days frequency
- impact of the future climate conditions on the soil conditions
- impacts of the future climate conditions on the vegetation status

# Tasks 3

- finding the methodology for the analysis of the future surface water conditions
- tuning of the hydrological model of Slovenian surface water
- analysis of the future high level surface water conditions
- analysis of the future low level (drought) surface waters conditions

# Tasks 4

- preparing database of temperature and it's trend for surface water, groundwater and sea
- estimation of the future climate conditions on water temperature
- estimation of the future climate conditions on aquifers' level
- introduction of the indices for hydrological groundwater drought and use them operatively

# What has been done

- Climatology:
  - database of future daily models data
  - 14 combinations of the global climate model/regional climate model
  - database of the daily gridded observation historic data in period 1981-2010
- Hydrology: preparation of the model MIKE for daily gridded data

# Conclusion

- Next:
  - comparison model results with past measured data
  - bias correction
  - analyse extreme events
  - tuning hydrological model
  - running hydrological model on future data

**Thank you for your attention!**