



# Future climate conditions for summer roads in Lithuania

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# Presentation outline

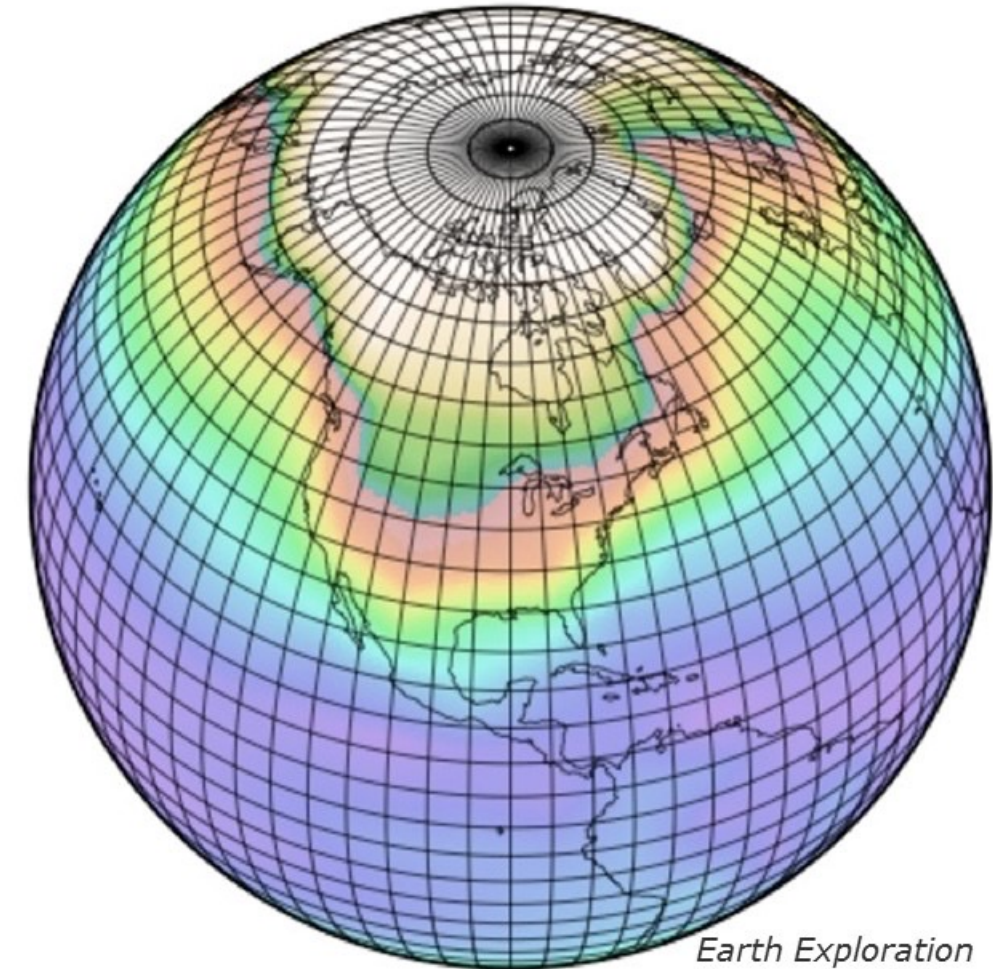
- Introduction – why summer and why future?
- Summer road indices
- Research methodology
- Projections of summer road conditions – Lithuania study
- Conclusions and perspectives

# Introduction – why summer

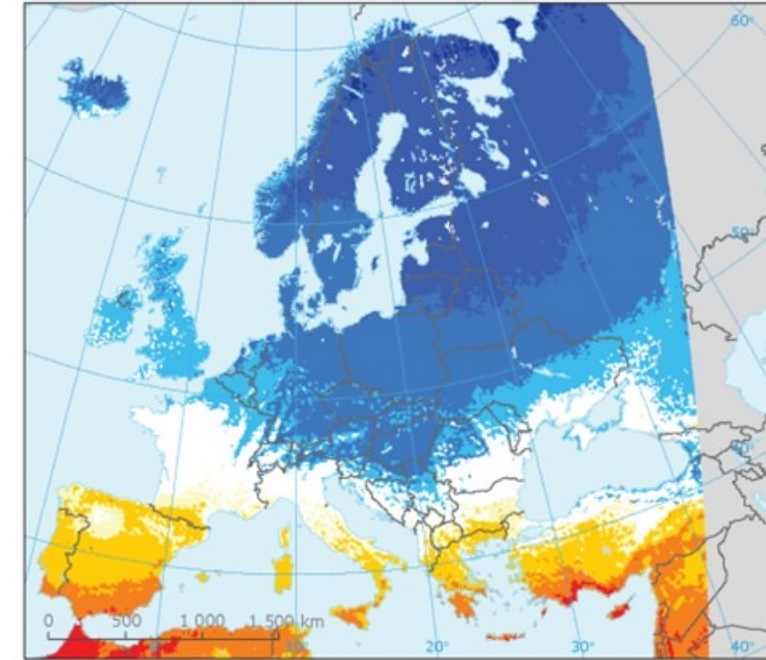
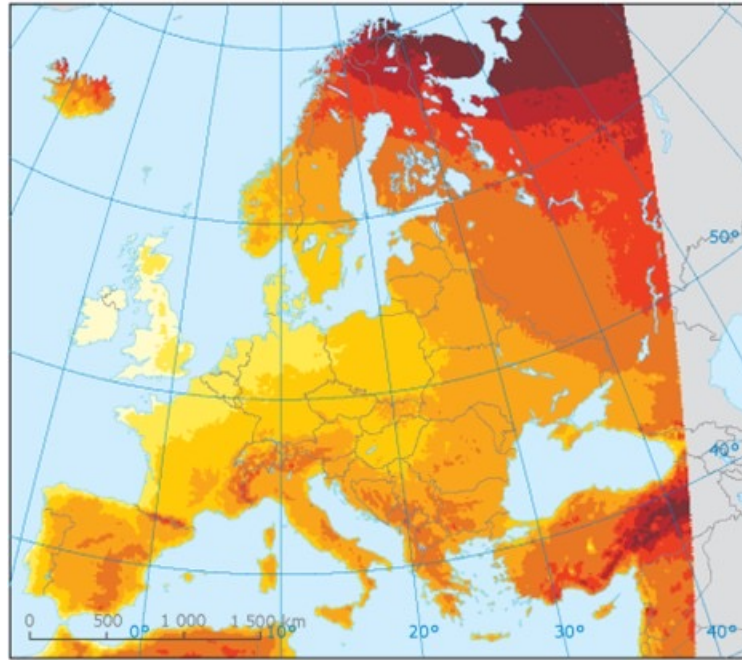




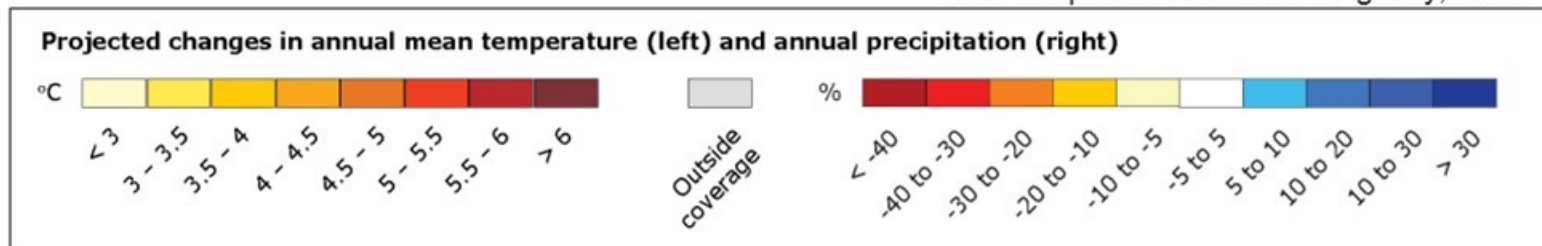
# Introduction – why future



Earth Exploration  
Toolbook 2016



The European Environment Agency, 2015



# Summer road indices (1)

- **HD** (Hot Dry days)
  - maximum air temperature is  $>28\text{ }^{\circ}\text{C}$ ,
  - atmospheric pressure  $>1018\text{ hPa}$
  - no precipitation recorded (0.0 mm).
- It can be the reason for road pavement (asphalt) deformation. The rutting of asphalt could affect driving comfortability and safety, and rise the costs of road maintenance and reconstruction.



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## Summer road indices (2)

- **FW** (Fine Weather days)
  - atmospheric pressure is  $>1018$  hPa,
  - no precipitation recorded (0.0 mm)
  - maximum air temperature stay between 20 and 30 °C.
- It could be a reason of more busy traffic on roads and more relaxation of drivers, etc. which could be a reason for traffic accidents.



## Summer road indices (3)

- **SSW** (Severe Summer Weather days)
  - maximum air temperature is above 18 °C,
  - maximum wind speed exceeds 10 m/s
  - at least 5 mm of precipitation.
- These conditions describe a situation when there's a high chance of having a front or a squall line passing through and significantly worsening driving conditions. During summers, at the second half of a hot day there's a high chance for local thunderstorms forming too, therefore, this parameter provides an insight in averaged frequency changes of such stormy days in the future.



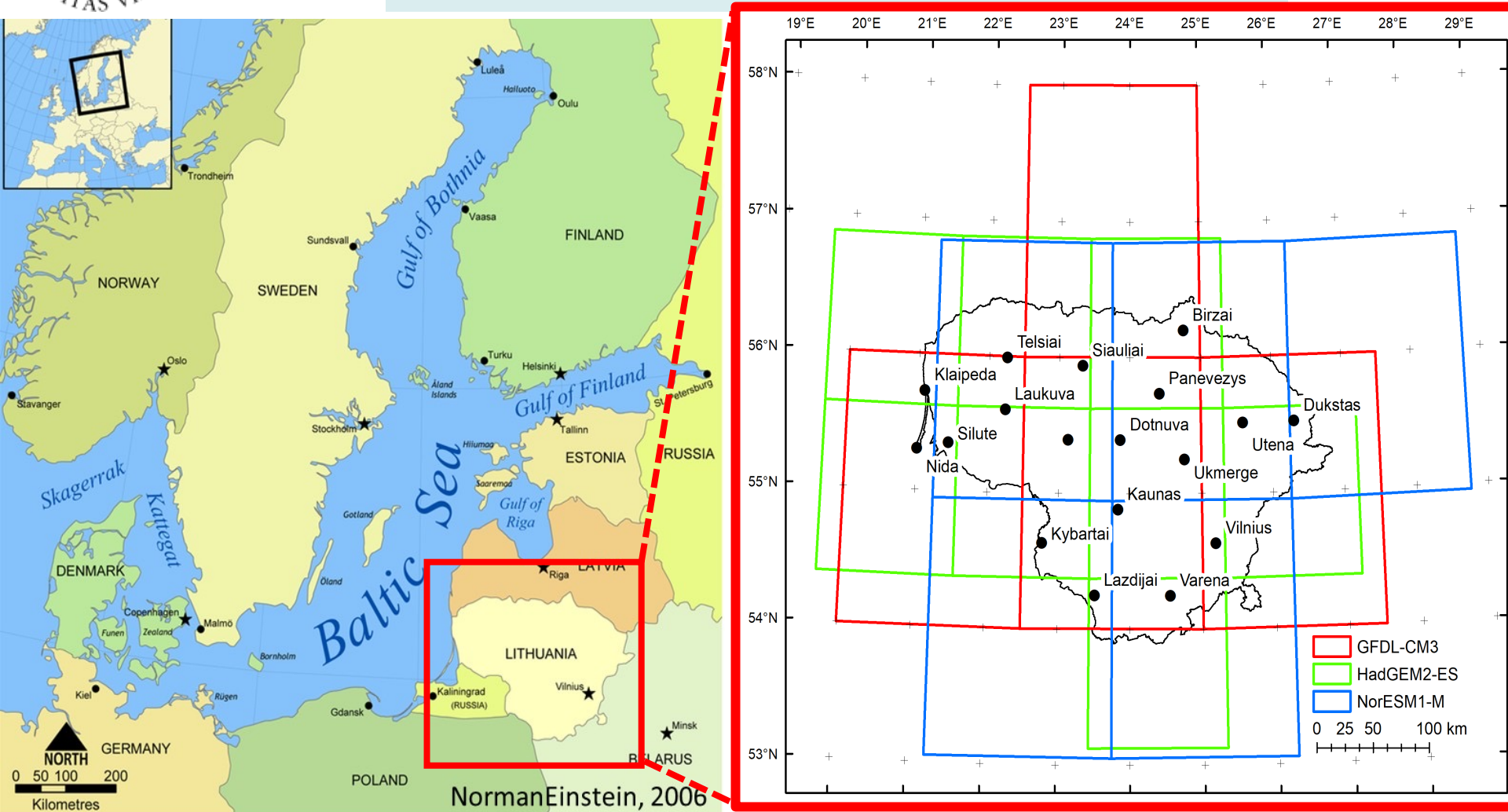


# Research methodology (1)

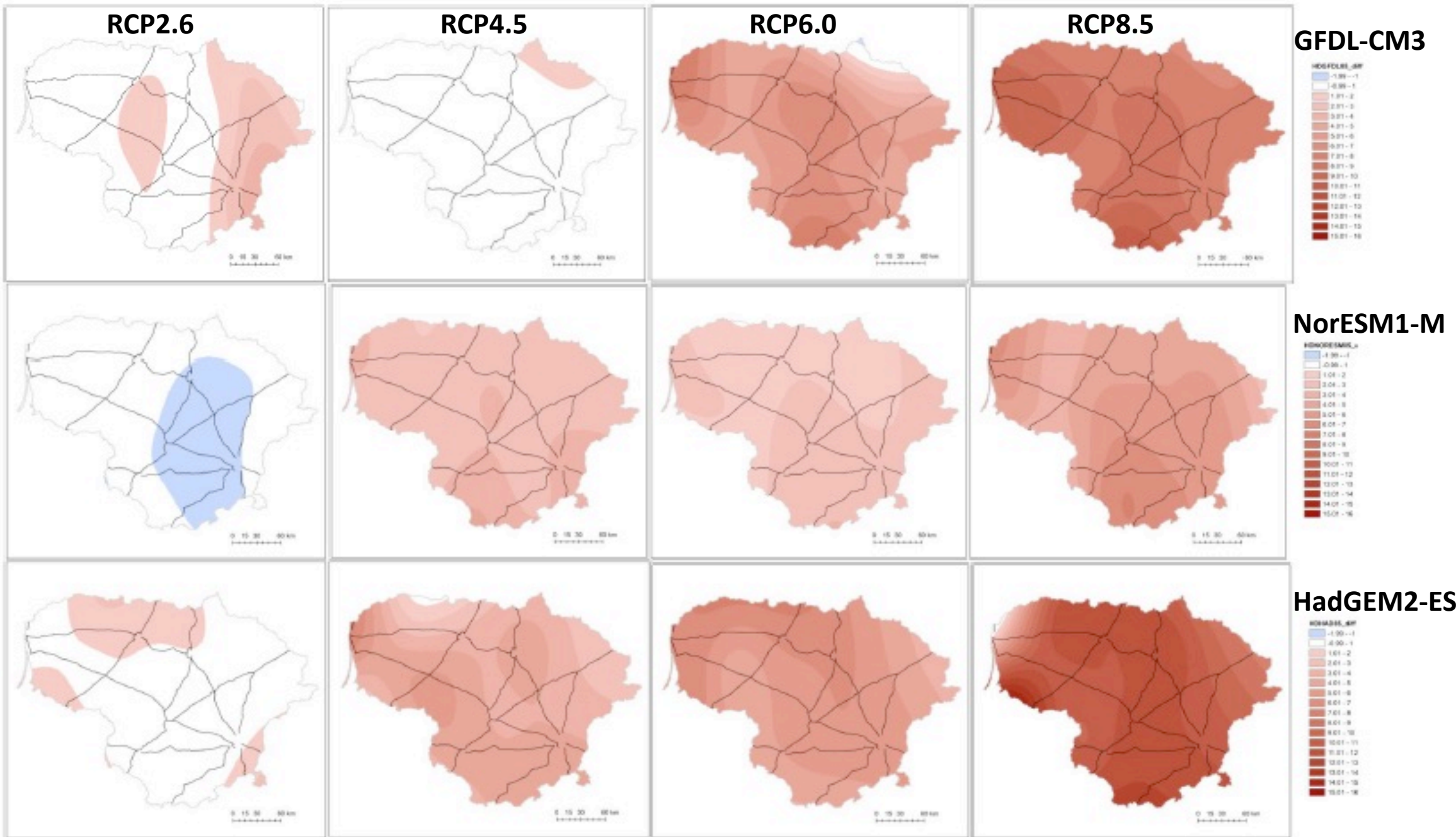
- CMIP5 project outputs of daily meteorological variables were downloaded from *NOAA GFDL* and *World Data Center for Climate / CERA at DKRZ*;
- Daily values obtained for reference period (*1986-2005*), near-term (*2016-2035*) and long-term (*2081-2100*) futures;
- Projections were made using 4 RCPs (Representative Concentration Pathway): *RCP2.6*, *RCP4.5*, *RCP6.0*, and *RCP8.5*;
- The value of grid cells assimilated to nearest MS using *statistical downscaling methods* for the reference period (*1986-2005*).



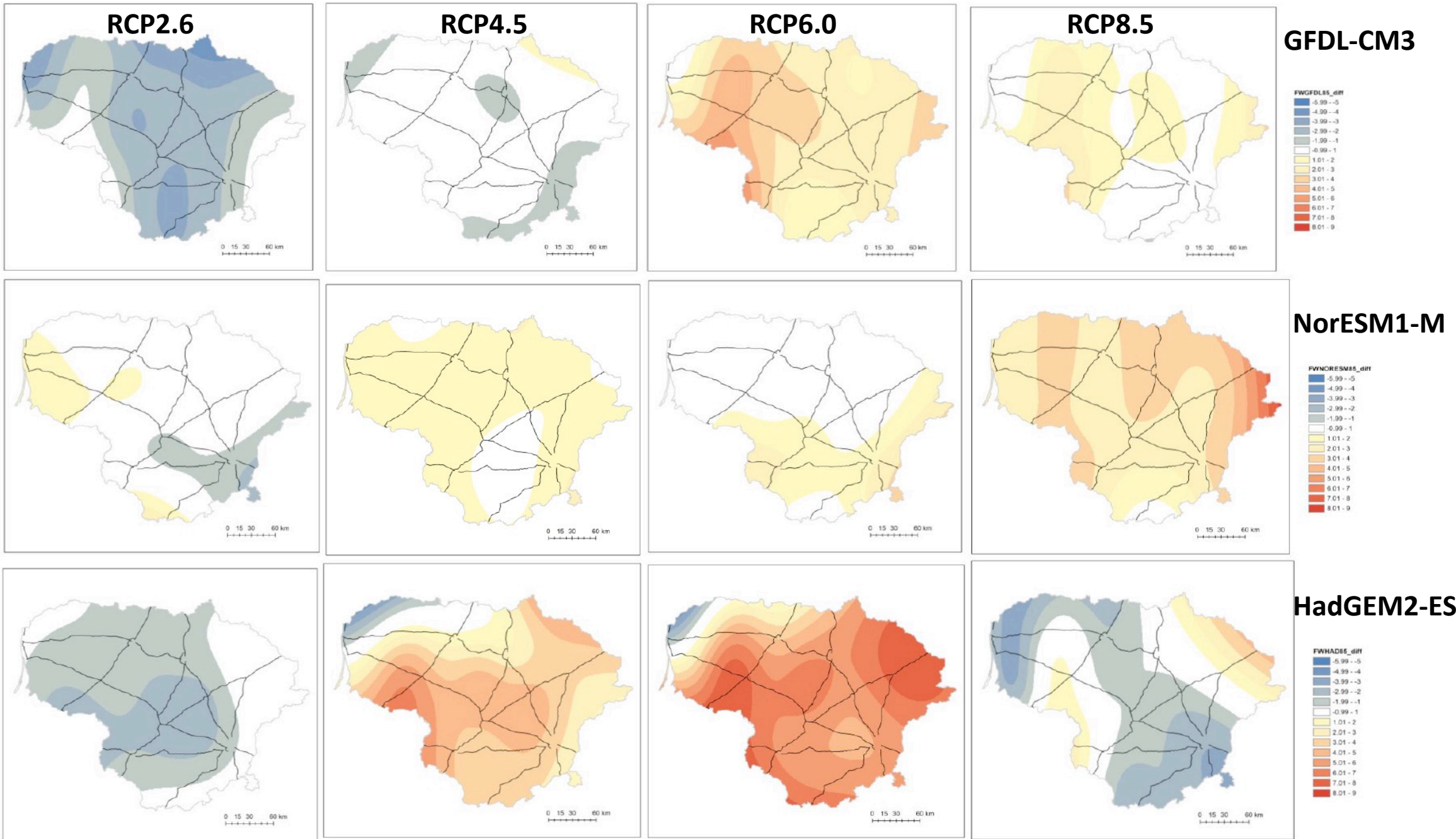
# Research methodology (2)



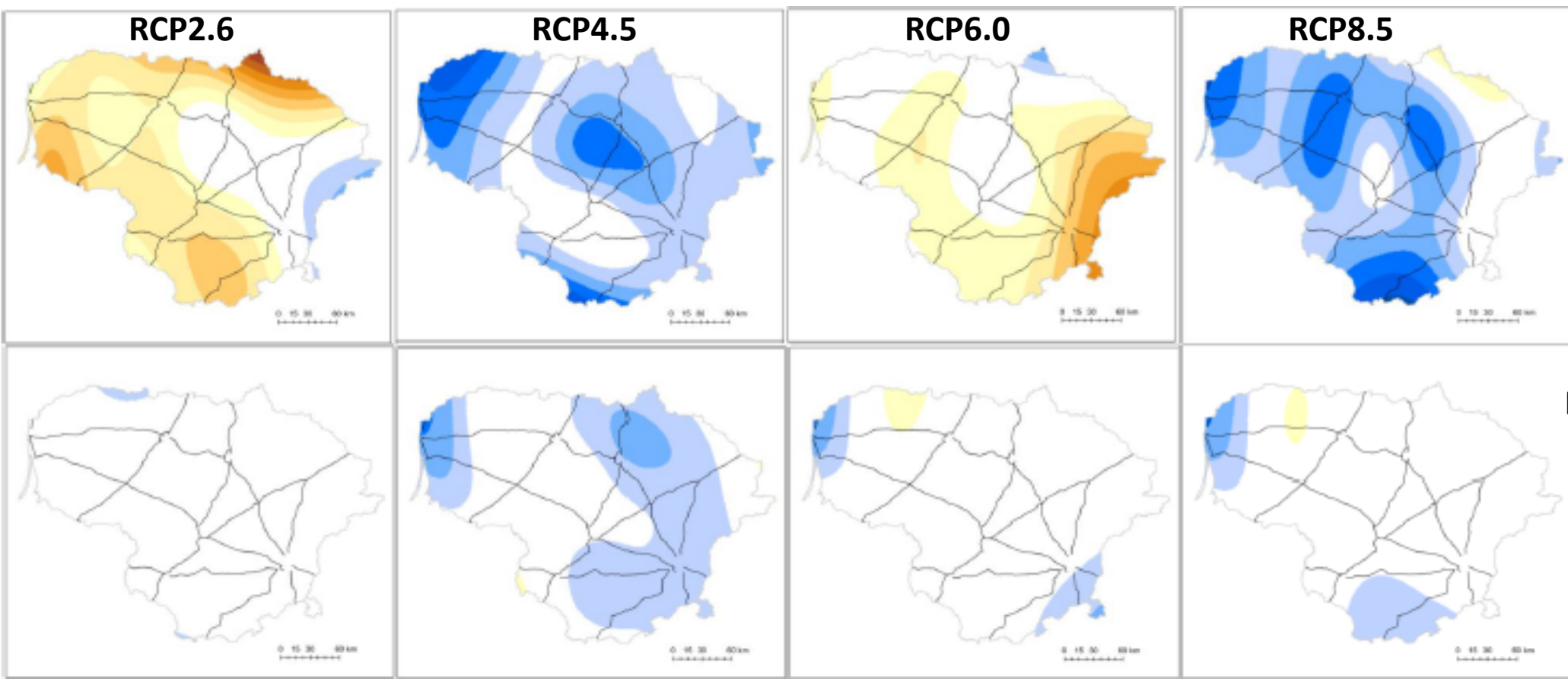
- Meteorological stations in the territory of Lithuania and grid cells of 3 GCMs:
- **GFDL-CM3**
- **NorESM1-M**
- **HadGEM2-ES**













# Conclusions and perspectives

- In Lithuania, the number of **Hot Days** will rise from 2 to 4 times and the impact will depend of climate forcing intensity (RCPs);
- In the future, number of **Fine Days** will be more even across Lithuanian territory, e.g. local weather conditions will overcome climate forcing effect;
- **Severe Summer Weather** days will persist and its changes in number ( $\pm 2$  times) will mostly depend on GCM initial conditions;
- **Summer road indices** need to be developed constantly. Moreover, the complex evaluation of all summer road conditions could ensure sustainable road maintenance strategy in the future

# Thank you for the attention!

