Towards a mini-ensemble of Regional Earth System Models for climate services over Belgium

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- Regional climate models provide a detailed view of the global warming effects at the regional scale, covering continent or country.
- Projections may vary between models, an ensemble of models is used to give outcome uncertainty.
- Models including more processes are expected to answer different types of questions related to regional climate change over Belgium.

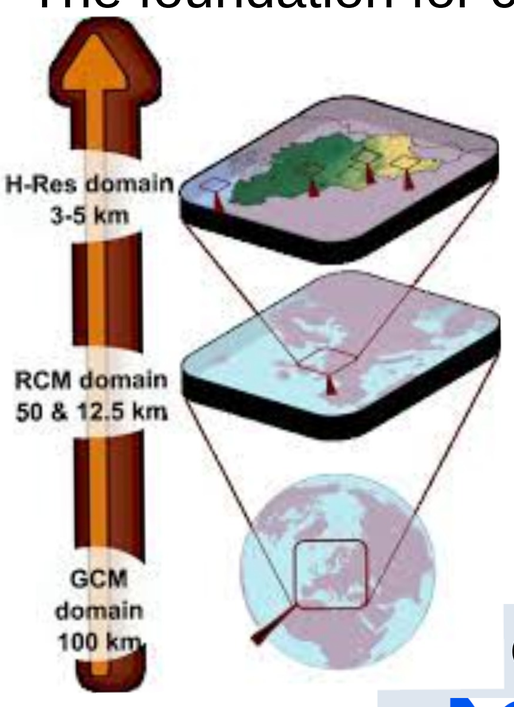
Climate projections & services over Belgium

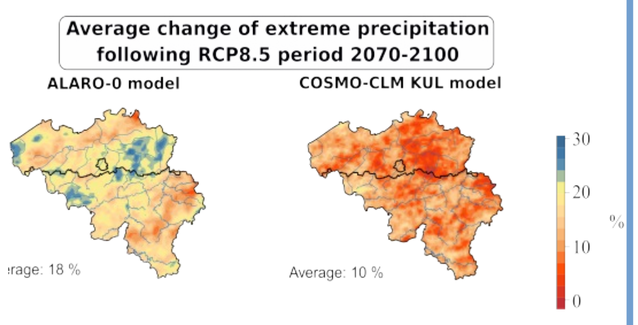
Will flooding occur more often?
Is it possible to mitigate locally by land management?
How will evolve the climate over cities?
FAQ
Is a specific the land management suitable on long term?
What is the impact of urbanization on belgian climate vs of global warming?

↳ Need for appropriate modeling tools !

Adaptation
future climate: average trends

Cordex.BE (Termonia et al, 2018a)
The foundation for climate services in Belgium





Projection: 2010-2100
Scenarios: RCP 2.6, 4.5, 8.5)
Resolution: 5km

Our tools: Climate models

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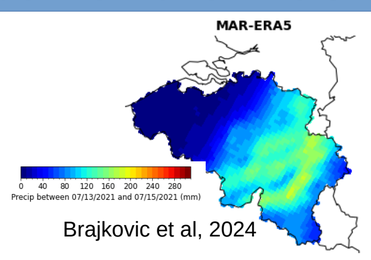
LIÈGE université — MAR
KU LEUVEN — COSMO

! Simplified surface
➡ Fixed land cover & fixed annual cycle vegetation

Update
CMIP6 (Shared SocioEconomic Pathways)
future climate: extremes (rain + heat)

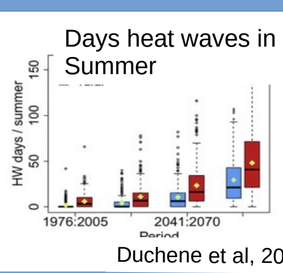
(see poster)

CORDEX.be II
GHENT UNIVERSITY · LIÈGE université · RMI · vito · KU LEUVEN



Brajkovic et al, 2024

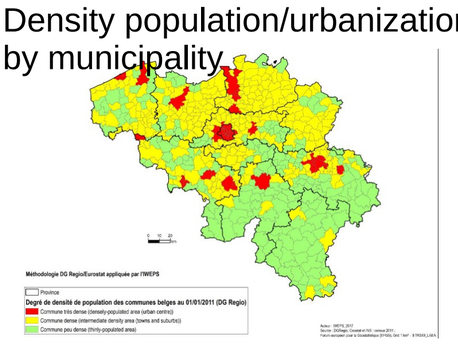
Days heat waves in Summer



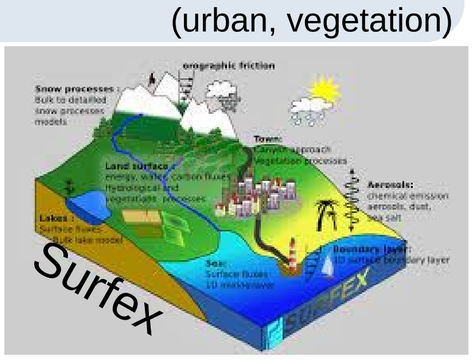
Duchene et al, 2022

Mitigation
Land use effect on local climate

Density population/urbanization by municipality



Our tools: Climate models + Land surface models (urban, vegetation)



! Improved surface:
Cities + change land cover

Test cases (on-going):

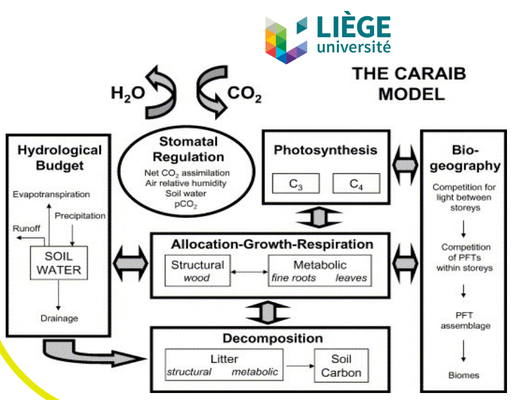
Land use scenario (SSP1-2.6, LUCAS-FPS Hoffman, 2022)
➡ Europe: Impact on precipitation & temperature

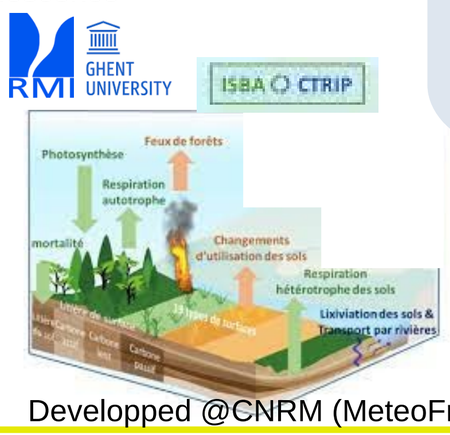
On-demand measure impact (white mulch on crops soils)
➡ S-W France: Impact on precipitation

Land use effect on local climate (and back ...)

Reaction of vegetation to environmental stress (droughts, Species dependent)

Vegetation model
Vegetation growth
Species competition
Carbon sequestration
Vegetation senescence





Developped @CNRM (MeteoFrance)

Our tools:
Climate models
urban models
hydrology models
vegetation models
UNDER CONSTRUCTION

Feedbacks better taken into account
➡ Better representation of drought expected!

References

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LUCA-FPS:
https://ms.hereon.de/cordex_fps_lucas/

EURO-CORDEX: https://www.euro-cordex.net/

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