Project SurChauffe: Overheating Indicator and Calculation Method for Walloon Buildings

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1. Project SurChauffe

Aims/Objectives

Increase the competitiveness of the Walloon building services sector.

- Provide an overview and database of important concepts relevant to the thermal discomfort.
- Select and develop different key performance indicators for the design of climate sensitive analysis thermal discomfort.
- Apply a climate change sensitive modeling framework and protocol with low input uncertainty and high-risk assessment.
- Develop low cost in-situ measurement method, monitoring protocol, and field measurement kit.

2. Thermal comfort parameters

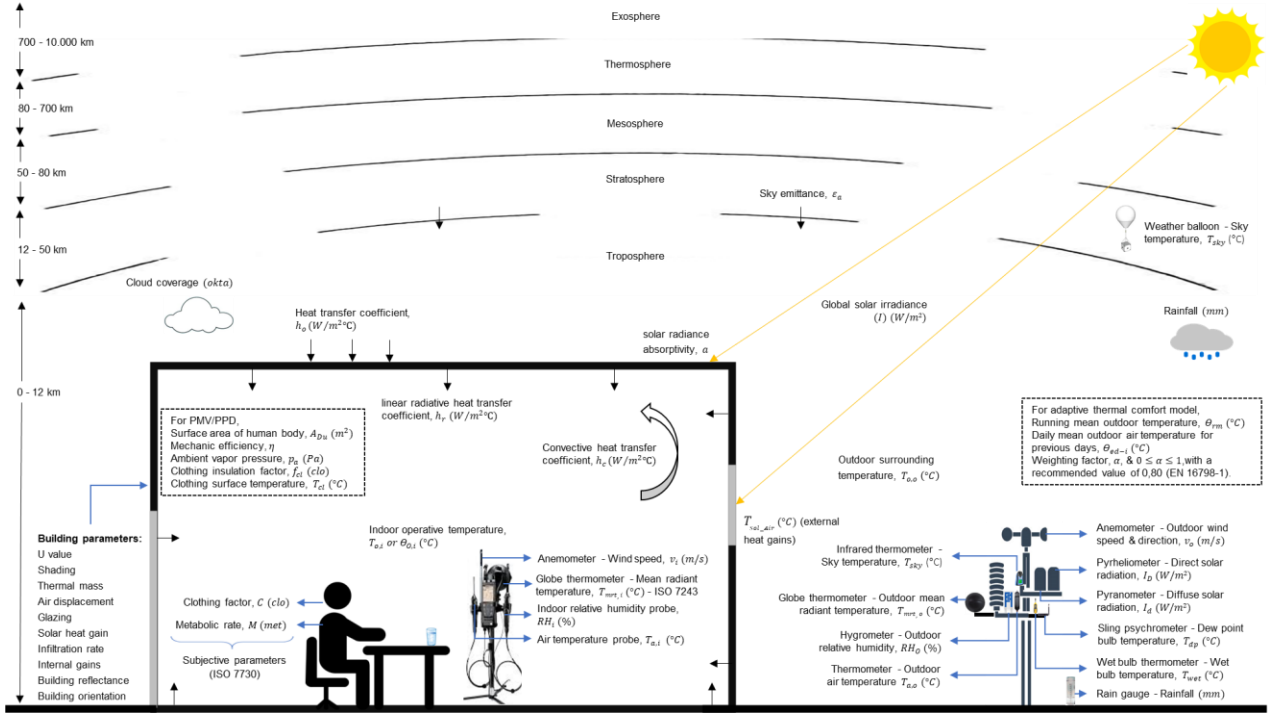


Fig. 1. Thermal comfort parameters.

3. Cooling degree days - Liège & Belgium - 1980 - 2020

- Cooling degree days (CDD) is an indicator, which is a measure of amplitude in degrees, and the duration, outside air temperature was higher than a specific base temperature.
- They are used to calculate the energy consumption required to cool the buildings.
- The graph represents CDD data for Liège and national average of Belgium from 1980 - 2020.

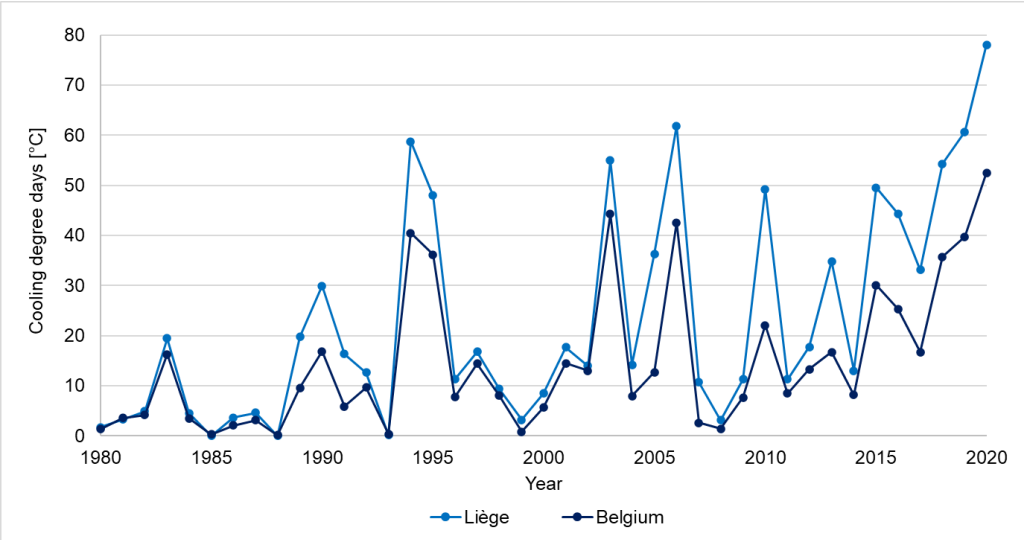


Fig. 2. Cooling degree days - Liège and Belgium (national average) from 1980 to 2020.

4. Heating degree days - Liège & Belgium - 1980 - 2020

- Heating degree days (HDD) is an indicator, which is a measure of amplitude in degrees, and the duration, outside air temperature was lower than a specific base temperature.
- They are used to calculate the energy consumption required to heat the buildings.
- The graph represents HDD data for Liège and national average of Belgium from 1980 - 2020.

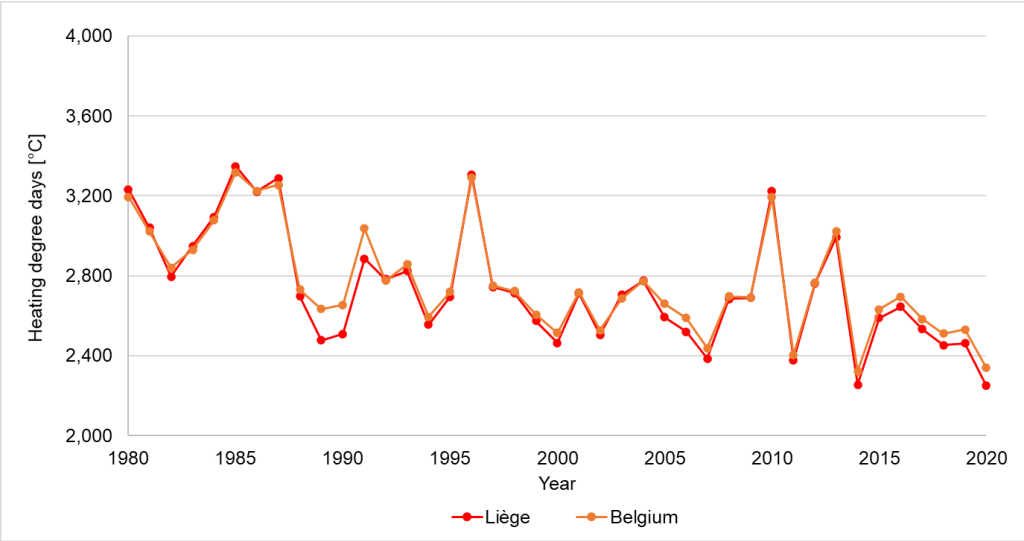
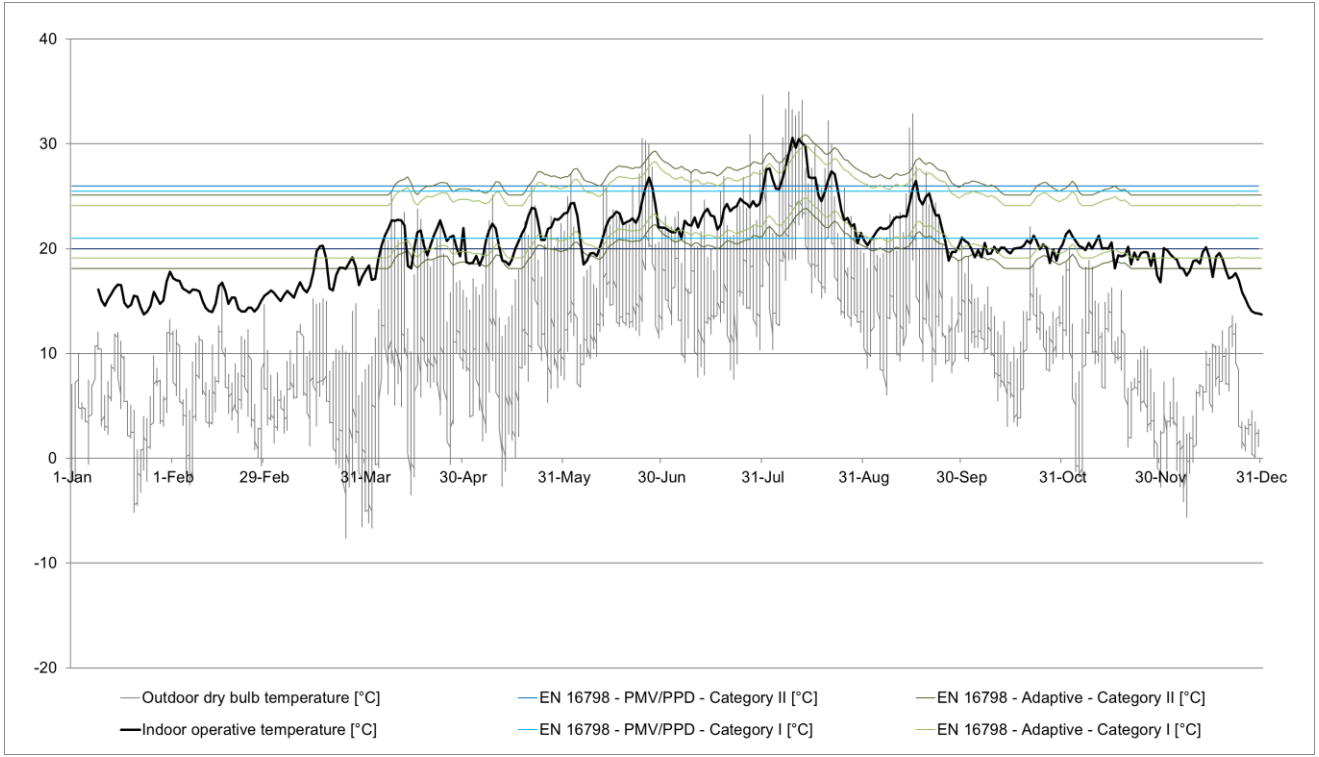


Fig. 3. Heating degree days - Liège and Belgium (national average) from 1980 to 2020.

5. Annual hourly temperature distribution - Liège - 2020



Weather file: MAR-ERA5, Climatology Lab, ULiège.

Apartment: Outremeuse, Liège

Coordinates: 50° 38’ 23.57” N, 5° 35’ 2.87” E

Building: Concrete construction with no insulation.

Year: 1960s

Heating: Gas fired heating system

Cooling: Free running building with windows

Measurement zone: Bedroom

Fig. 4. Annual outdoor air temperature - MAR-ERA5, Climatology Lab, ULiège, and observed indoor operative temperature from Outremeuse, Liège - 2020.

6. Findings and Recommendations

Main Findings:

- The HDD values from Liège has been decreasing for 40 years indicating warmer winters in the future.
- The CDD values from Liège has been increasing for 40 years indicating hotter summers in the future.
- EN 16798 category I & II limits are not met during summer, which makes sustainable cooling necessary.

Main Recommendations:

- The findings suggests that there will be lower heating demand & higher cooling demand in the future.
- The failure of existing residential buildings to achieve thermal comfort during the summer shows the need for sustainable cooling solutions.
- In addition, there is need for the implementation of sustainable & carbon-neutral cooling systems to ensure thermal comfort during extreme events like heatwaves.

For more details & results: https://orbi.uliege.be/handle/2268/263959

7. References

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- Ouzeau, G., et al. (2016). Heat waves analysis over France in present and future climate: Application of a new method on the EURO-CORDEX ensemble. *Climate Services, 4*, 1-12. https://doi.org/10.1016/j.cliser.2016.09.002
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We look forward to your feedback!!!

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