

# **environMENTAL – Characterisation of urbanisation by atmosphere and Earth observations**

**Kerstin Schepanski<sup>1</sup> and Sören Hese<sup>2</sup>**

<sup>1</sup>Institute of Meteorology, Freie Universität Berlin

<sup>2</sup>Friedrich Schiller Universität Jena

# Living planet: Environment

Urbanicity in the light of  
atmosphere and Earth  
observations

Part 1: Atmosphere

Part 2: Earth observations

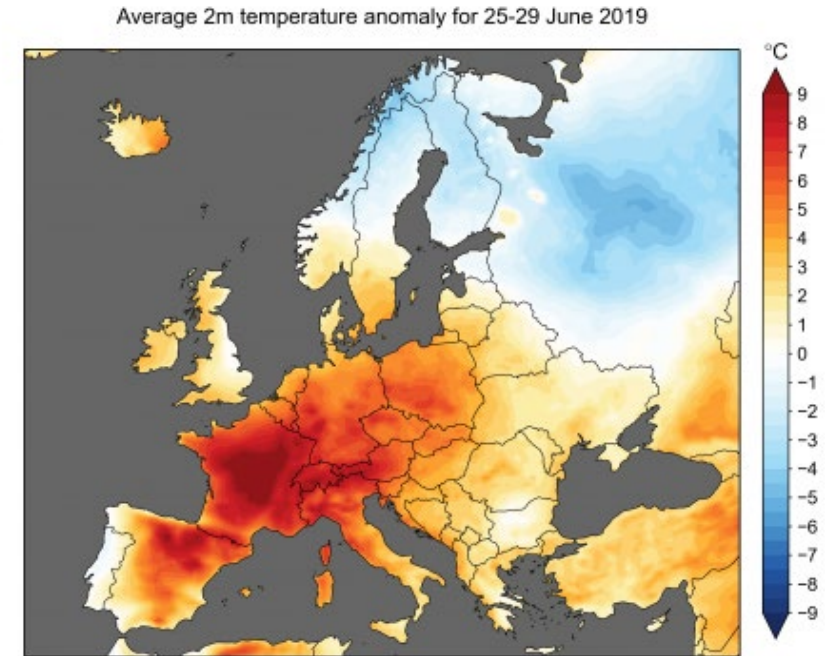


Credit: Carl Conway/Springer Nature Limited

# Atmospheric environment

Weather and weather extremes impact human well-being.

Heat waves are posing a major threat to peoples' health, agriculture and the environment.



# Atmospheric environment



Flooding in east  
Australia,  
Feb 2022

*Picture: Fraser Coast Regional  
Council, dpa*

# Air Pollution

Pollution haze over London, Jan 2017.

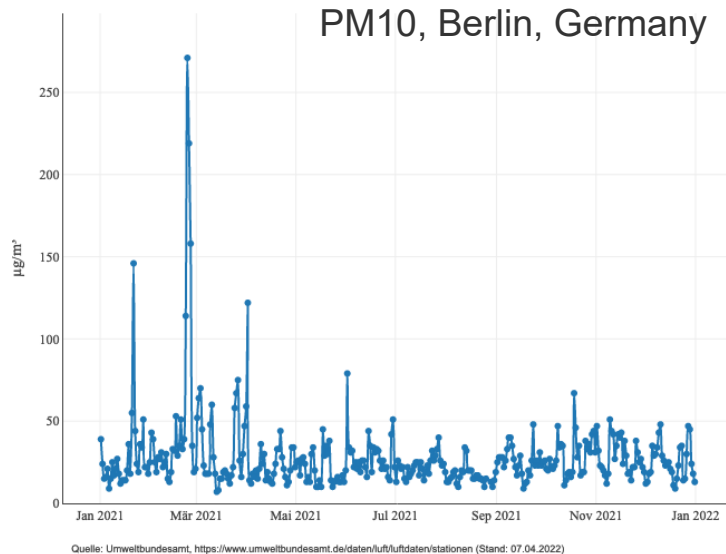
In particular large cities suffer from high air pollution levels.

The New York Times



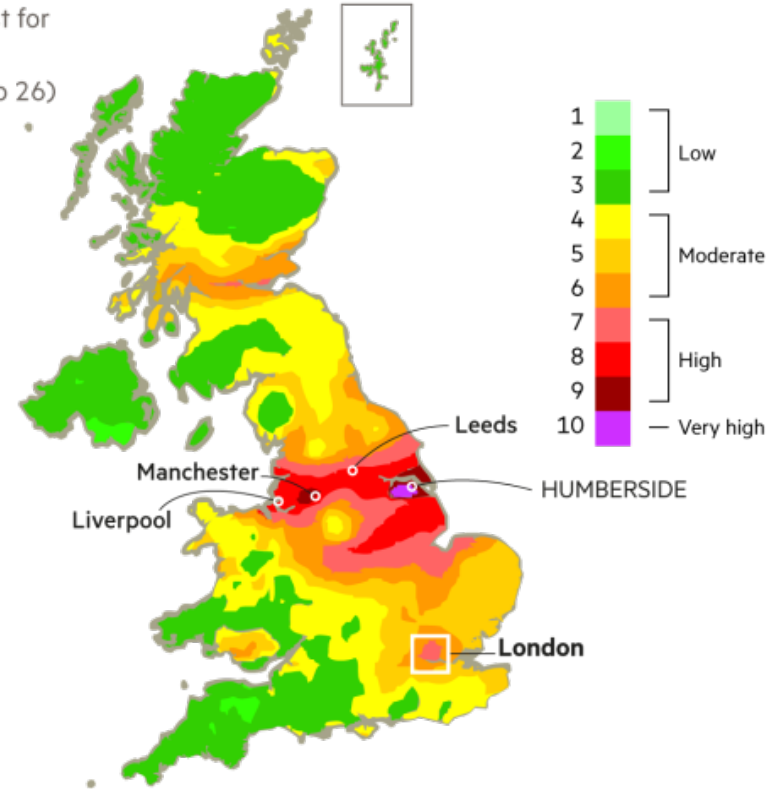
# Air Pollution

Levels of air pollution varies across regions and time.



## Unhealthy atmosphere

Air pollution forecast for  
February 27  
(as at 1pm GMT, Feb 26)



Source: Department for Environment, Food and Rural Affairs: UK Air  
© FT



# Urban Heat Island (UHI)

- Temp. gradient between rural and urban area
- Larger during night
- Most apparent when calm
- Cause: modification of land surfaces

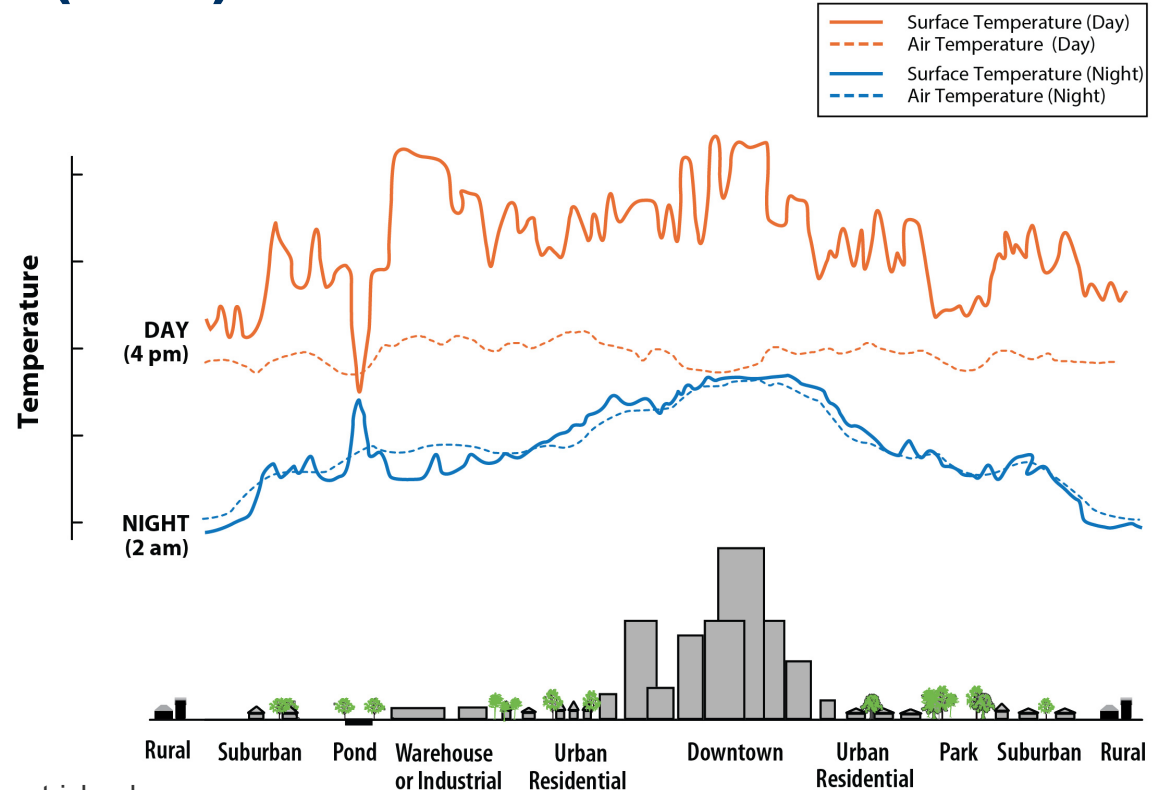
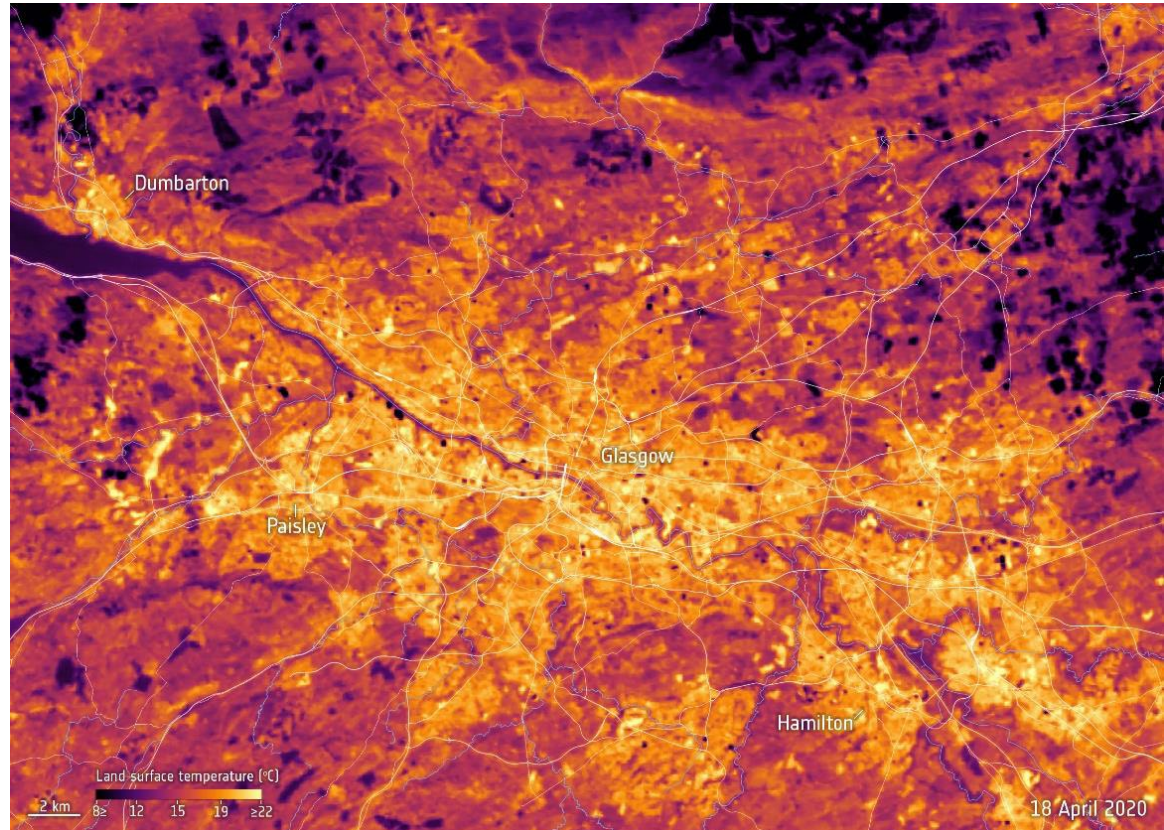


Figure: <https://www.usgs.gov/media/images/urban-heat-islands>

# Link to urbanicity: Urban heat island

High-resolution land  
surface temperature,  
LST\_cci data set, 18 April  
2020, Landsat-8





# Summary Atmosphere

Extreme weather conditions impact human wellbeing:

- Flooding and heat waves may be experienced as exhaustive or even life threatening.
- High levels of air pollution reduce quality of life.
- Metropolitan regions show enhanced levels of air pollution and heat island effect supposedly enhances the risk for heat waves.