Kent School of Architecture | Centre for Architecture & Sustainable Environment (CASE)

Brunel University London

Loughborough University

URBAN ALBEDO COMPUTATION IN HIGH LATITUDE LOCATIONS: AN EXPERIMENTAL APPROACH

Urban albedo -capacity of urban surfaces to reflect solar radiation- is one of the most important contributors to changes in outdoor temperature, intensifying the urban heat island phenomenon. The Greater London Authority has identified urban albedo as one of the most significant parameters for mitigating the Urban Heat Island in London.

The project proposes a novel experimental study for the computation of urban albedo in high latitude locations using London as a representative urban environment in the UK and employing laboratory /field measurements and computational methods to construct an urban albedo calculation tool.

Aims

- Provide underpinning data and tools to support incorporation of accurate calculation and prediction of urban albedo in planning and design processes for high latitude cities.
- Investigate experimentally the impact of urban fabric on urban albedo, using on London as a case-study.
- Develop a construction materials catalogue of urban albedo for various materials and geometrical configurations.
- Develop an urban albedo calculator, an empirical model to predict changes in urban albedo in relation to changes in urban fabric and solar altitude.

Objectives

1. For London
    a. Identify the critical building block typologies, canyon geometries and surface characteristics of the urban fabric so that representative models can be developed.
    b. Identify experimentally the seasonal and diurnal changes in albedo level and investigate the effect of these changes on the micro climate.
    c. Identify experimentally the most influential factors that change the urban albedo and investigate the influence of vegetation and water in altering the albedo of urban surfaces in these settings.
2. Carry out reflectivity measurements on building materials under investigation independently as a bench marking exercise before and after in the experimental model.
3. Carry out accelerated ageing of these materials and subject them to a controlled weather chamber to mimic climatic variations and re-measure all the optical characteristics of these materials as a function of time/temperature/humidity.
4. Develop an empirical model to predict urban albedo in high latitude cities such as London based on the catalogue of materials. This calculator will be linked to freeware urban analysis programmes.
5. Carry out parametric analysis to investigate how the parameters/materials identified in the empirical model can be manipulated to enhance outdoor comfort and reduce energy consumption in the case study location.

Consortium

This project consortium, led by the University of Kent, along with the organisations involved in the Advisory group are listed below:

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If you have any questions about this project, or would like to express interest in being involved, please email M.Nikolopouou@kent.ac.uk

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