



Envi Met Model Studies of Urbanization Impact on Climate Change

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Aim: Sustainable urban planning and the impact of urbanization on climate change indicators

Introduction:

Climate change and land use pattern leads to environmental degradation. It has been realized that urbanization would be increasing heat wave combined with poor dispersion conditions. Rapid urbanization causes surface characteristic modification on local climate is an interesting phenomenon to study. Heat wave consider as important climate change extreme event in our study.

Factors effecting the Climate Change:

Meteorological variables:

Temperature	Wind Speed
Relative Humidity	Clouds
Mean Radiant Temperature (MRT)	Precipitation
Vapor Pressure	

Methodology:

Envi-Met model is used to study the effect of land use pattern on local meteorological conditions.

Three study regions have been selected based on variation in percentage of land use patterns, named as Central Business District (CBD), Residential Area (RA) and Urban Base Line (UBL).

Model selection is based on the advances in calculating the air, water, and soil interactions.

Thermo physical properties and physical parameters like building height and number of buildings.

Three velocity conditions 1 m/s, 2 m/s, and 5 m/s have been used to study the effect of change in meteorology on thermal comfort.

48 hours Simulations has been done for three different velocity conditions for three study regions.

Parameters specified for UTCI calculations are as follows. A male person of age 35 years, 1.75 meters height and 75 kg's weight. Static clothing insulation 0.9 and metabolic rate (walking @ 1.21 m/s) 164.49 W.

Results:

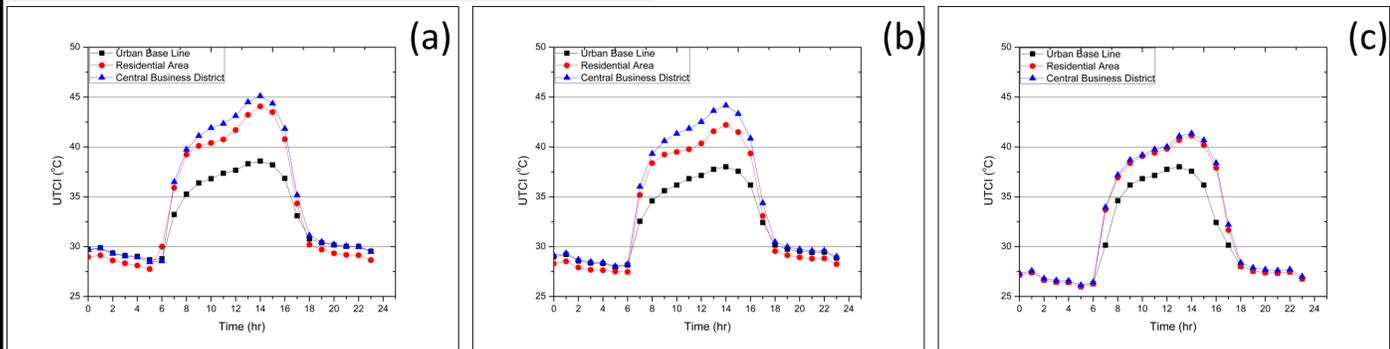


Fig 1: Comparison of UTCI profiles at velocity (a) 1 m/s (b) 2 m/s and (c) 5 m/s at study regions.

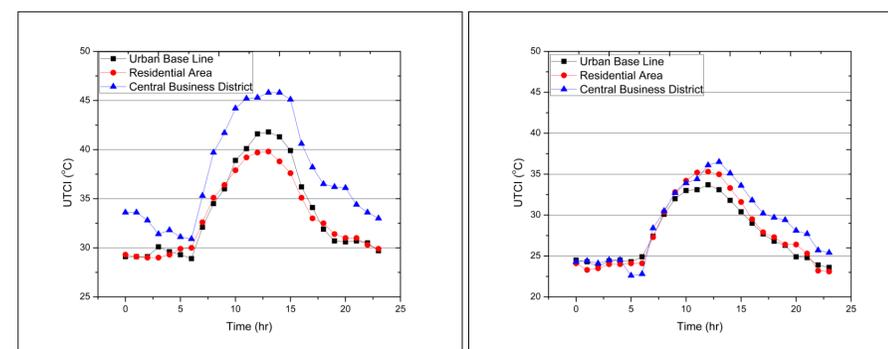


Fig 2: Seasonal variations of UTCI profiles at study regions.

Conclusions:

- The UTCI intensity is high in CBD compared with other two sites.
- The effect of land use pattern plays an important role in determining the local thermal comfort parameter.
- Model and measured results are in good agreement
- SVF is also one of the key parameter for thermal comfort parameter determination.
- These results are important in correlating land use patter on climate change

References:

1. Andreou, E. (2013). Thermal comfort in outdoor spaces and urban canyon microclimate. *Renewable energy*, 55, 182-188.
2. Chen, L., & Ng, E. (2012). Outdoor thermal comfort and outdoor activities: A review of research in the past decade. *Cities*, 29(2), 118-125.