# Review of: "Influence of a City Block on ES-CFD Coupled Analysis"

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Potential competing interests: No potential competing interests to declare.

Overall, I would rate this work highly for its innovative approach and detailed analysis of urban thermal environments using ES-CFD coupling. It effectively addresses real-world challenges like shading, heat transfer, and condensation risks, offering valuable insights for urban design and energy efficiency. However, the study relies entirely on simulations without experimental validation, and the simplified models omit critical factors like microclimate effects and dynamic weather variability. While it demonstrates strong potential, incorporating validation data and expanding the scope would greatly enhance its reliability and practical applicability.

1. **Incorporating Experimental Validation**:

- **On-Site Measurements**: Collect real-world data on temperature, humidity, wind velocity, and solar radiation from buildings located in similar urban blocks.
- **Validation with Sensor Networks**: Deploy a network of sensors to measure surface temperatures, convective heat transfer coefficients, and dew point temperatures on building surfaces for comparison with simulation outputs.
- **Wind Tunnel Experiments**: Use scaled-down physical models of the city blocks in a wind tunnel to study airflow patterns and heat transfer characteristics under controlled conditions.
- **Thermal Imaging**: Use thermal cameras to capture heat distribution on building surfaces under varying solar radiation and shading scenarios.
- **Comparison with Historical Data**: Validate simulation results against long-term historical meteorological data for the specific location.

2. **Microclimate Factors and Weather Variables to Include**:

- **Wind Patterns**: Incorporate dynamic wind speeds and directions at various heights to reflect the urban boundary layer's complexity.
- **Urban Heat Island Effects**: Factor in temperature anomalies caused by urban materials like asphalt and concrete.
- **Precipitation**: Include rain and snow effects, which can alter surface temperatures and humidity.
- **Solar Radiation Variability**: Consider diffuse and reflected solar radiation, especially accounting for seasonal and hourly variations.
- **Vegetation Influence**: Include the cooling effects of green spaces, evapotranspiration, and shading provided by trees.

- **Building Surface Properties**: Use detailed material properties like albedo, emissivity, and thermal inertia to simulate heat retention and release accurately.
- **Pollution and Particulates**: Account for air quality and particulate matter that can influence solar radiation penetration and heat absorption.