Special Issue

Sustainable Urban Heat Islands and Role of Urban CO_2-Offsetting Mechanisms

Message from the Guest Editor

Urban areas produce over 70% of global greenhouse gas emissions and are highly vulnerable to the **Urban Heat Island (UHI)** effect caused by dense human activity, limited greenery, and heat-retaining materials. These factors elevate local temperatures, increase energy use, and worsen air quality and public health. Effective UHI mitigation requires **integrated and sustainable planning** that reduces both thermal and carbon impacts. The **Sustainable Urban Heat Island (SUHI)** approach promotes cool and reflective materials, green and blue infrastructure, and optimized urban design to enhance ventilation and climate resilience. Nature-based and CO_2-offsetting solutions—such as urban forestry and high-albedo surfaces—offer co-benefits by lowering heat, capturing carbon, and improving air quality. Together, they form a framework for **sustainable and climate-resilient cities**. This **Special Issue** welcomes innovative studies, models, and experiments that advance understanding and mitigation of the UHI effect toward more **energy-efficient and adaptive urban environments**.

Guest Editor

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Message from the Editor-in-Chief

Continued developments in instrumentation and modeling have driven atmospheric science to become increasingly more complex with a deeper understanding of concepts, mechanisms, and interactions. This is the field that innovation built and it has led to a better appreciation for the complexity with atmosphere. Human life is intertwined in this complexity as we strive to better understand our atmosphere. Climate change is constantly stretching the limits of our thinking and forcing new ideas and concepts to be played out. Welcome to the Anthropocene!

Editor-in-Chief

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