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Exploring the impact of Local Climate Zones to the efficacy of cooling materials at the urban scale

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The Mediterranean region is an exceptionally thermally vulnerable area, projected to suffer from frequent and severe heatwaves in the coming decades. Numerical simulations enable a comparative assessment of different heat adaptation strategies. Additionally, the Local Climate Zone (LCZ) scheme allows a standardized classification of urban neighbourhoods depending on their urban form. In this work, high resolution microscale simulations using ENVI-met are conducted for Athens, Greece, under typical summer conditions (simulated by the Weather Research and Forecasting model) and idealized configurations of high density LCZs 2 and 3. For each LCZ, a total of four simulations are performed, starting from the base situation and three additional scenarios where cooling materials are applied on ground surfaces and/or rooftops. Each scenario is assessed in terms of the reduction in air temperature within the simulation area. Findings indicate that the efficacy of cooling materials varies depending on LCZ characteristics. Understanding these differences is necessary for implementing targeted strategies to mitigate urban overheating for specific urban settings.