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The Influence of Roof Material on Diurnal Urban Canyon Breathing MOHAMED ABUHEGAZY, NEDA YAGHOOBIAN, Florida State University — Improvements in building energy use, air quality in urban canyons and in general urban microclimates require understanding the complex interaction between urban morphology, materials, climate, and inflow conditions. Review of the literature indicates that despite a long history of valuable urban microclimate studies, more comprehensive approaches are needed to address energy, and heat and flow transport in urban areas. In this study, a more comprehensive simulation of the diurnally varying street canyon flow and associated heat transport is numerically investigated, using Large-eddy Simulation (LES). We use computational modeling to examine the impact of diurnal variation of the heat fluxes from urban surfaces on the air flow and temperature distribution in street canyons with a focus on the role of roof materials and their temperature footprints. A detailed building energy model with a three-dimensional raster-type geometry provides urban surface heat fluxes as thermal boundary conditions for the LES to determine the key aero-thermodynamic factors that affect urban street ventilation.

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