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Effect of wall heating on street canyon ventilation

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Understanding the dynamics of mass and heat exchange between a street canyon and the overlying atmosphere is crucial to predict air quality and microclimatic conditions within dense urban areas. Previous studies have demonstrated that the bulk transfer between the street and the overlying flow is entirely governed by the intensity of turbulent fluctuations within the street. The aim of this experimental study is to evaluate how the geometry of the street canyon and the solar radiation on building façades influence the turbulent velocity field within a two-dimensional street canyon and thus the global street canyon ventilation. The study was carried in a wind tunnel. The boundary conditions inside the canyon were modified by heating its windward and leeward walls and by changing the cavity aspect-ratio. The flow field in a cross-section of the street canyon was measured with particle image velocimetry. Temperatures were measured by means of thermocouples. The velocity and vorticity fields are analysed and discussed.