

Uchimizu: A cool(ing) tradition to locally mitigate the urban heat island

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Urban heat island was first described 200 years ago but ways to mitigate heat in urban areas reach much further into the past. Uchimizu is a 17th century Japanese tradition, in which water is sprinkled around houses to cool the ground surface and the air by evaporation. Unfortunately, the number of published studies that have quantified the cooling effects of uchimizu is limited, and only use measurements of the surface temperature, or air temperature at a single height, as a measure of the cooling effect. In this research, a dense three-dimensional Distributed Temperature Sensing (DTS) setup was used to measure air temperature with high spatial and temporal resolution within once cubic meter of air above an urban surface. Six experiments were performed to systematically study the effect of (1) applied water amount, (2) initial surface temperature, and (3) shading on the cooling effect of uchimizu. The measurements showed a decrease in air temperature up to 1.5 K at 2 m height, and up to 6 K for near-ground temperature. Strongest cooling was measured for the experiment performed in the shade. For an amount of water applied of 1 mm and 2 mm, there was no clear difference in cooling effect, but after application of a large amount of water (>5 mm), the strong near-ground cooling effect was approximately twice as high as when only 1 mm of water was applied. The dense measurement grid used in this research also enabled us to detect the rising turbulent eddies created by the heated surface.