



ICUC12-456, updated on 21 May 2025  
<https://doi-org.ezproxy.library.wur.nl/10.5194/icuc12-456>  
12th International Conference on Urban Climate  
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Oral | Thursday, 10 Jul, 11:00–11:15 (CEST)| Room Mees1

## Climate proof playing conditions on urban soccer fields

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Population growth has led to increased pressure on available urban sport facilities. As a result, natural grass fields are converted to artificial turf, to facilitate intensive use. Downsides of these artificial turf fields are decreased infiltration of rain and increased surface temperatures. Artificial turf can reach very high surface temperatures leading to unplayable conditions and health risks. In this study, a system to store precipitation below the fields and to enable evaporation to cool artificial turf was tested. The system consists of water-storing units below the field, a capillary shockpad that enables water transport to the artificial turf and a natural infill from where water can evaporate. We created test sites to quantify the effects on surface temperature and evaporation of the system, with natural grass, conventional artificial turf and the novel cooled artificial turf. During summer days with a maximum air temperature around 30°C, surface temperature reached 37°C at the cooled artificial grass, whereas it reached 62.5°C at conventional artificial turf. The measured surface temperature for the cooled turf was less than 2°C warmer than the surface temperature at the natural grass site (35.3°C). Evaporation from the cooled artificial turf reached maximum values around 4 mm/d during the summer, equal to about half of the evaporation from natural grass. These results show that the system is successful in lowering the surface temperatures by evaporation. This reduction in surface temperature is important to maintain playable conditions. In addition, the water storage below the fields reduces peak discharges during high-intensity precipitation. In addition to the above, we present novel research on measures to improve durability of natural turf, which is still to be preferred, and research on the effects on grass growth of energy abstraction by a shallow soil energy system for heating pavilions.

**How to cite:** Cirkel, D. G., Van Huijgevoort, M., and Voeten, J.: Climate proof playing conditions on urban soccer fields , 12th International Conference on Urban Climate, Rotterdam, Netherlands, 7–11 Jul 2025, ICUC12-456, <https://doi-org.ezproxy.library.wur.nl/10.5194/icuc12-456>, 2025.