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Modelling and analysis of the impact of urban irrigation on land surface fluxes in the Los Angeles metropolitan area

POUYA VAHMANI[1] **& TERRI S. HOGUE**[1,2]

1 Department of Civil and Environmental Engineering, University of California Los Angeles, California, USA
pvahmani@ucla.edu

2 Department of Civil and Environmental Engineering, Colorado School of Mines, Colorado, USA

Abstract The current work includes developing and integrating an irrigation module within the Noah LSM-SLUCM (Single Urban Canopy Model) modelling framework. The model is run over a 49-km^2 urban domain in the Los Angeles metropolitan area at a high resolution (30 m) to understand the temporal variability and spatial heterogeneity of urban energy and water fluxes. The irrigation scheme developed is calibrated using residential water-use data and estimates of outdoor water consumption. Our results indicate that updating soil moisture to 75% of field capacity at a 6-day interval reasonably represents irrigation over this study region. To validate the model performance, we introduce a systematic evaluation process using MODIS-Landsat ET and Land Surface Temperature (LST) products as well as CIMIS- (California Irrigation Management Information System) based landscape ET observations. We conclude that addition of an irrigation scheme is critical to adequately simulate urban hydrological cycles, especially in arid and semi-arid regions.

Key words Noah; UCM; modelling; urban irrigation; land surface temperature; evapotranspiration