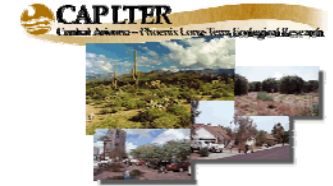


Annual Patterns of Below Ground Thermodynamics and Surface Temperatures at the North Desert Village Experiment site

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North Desert Village landscape design treatments



Methods

Above and below ground microclimate conditions are continuously being monitored at the North Desert Village (NDV) long-term experiment at the center of each treatment site by solar-powered micrometeorological stations. The four treatment sites at NDV (see above image plate) are called mesic (spray irrigated turf grass, trees and shrubs), oasis (a mixture of spray irrigated turf and drip irrigated trees and shrubs), xeric (drip irrigated trees and shrubs), and native (non-irrigated trees and shrubs). All landscape surfaces without turf grass are covered with 5 cm of light beige-colored decomposing granite (DG) mulch. In this report, annual patterns for the year 2007 of surface temperatures, and soil temperatures and soil heat fluxes at 30-cm depth are shown. Surface temperatures are continuously recorded using IRR-PN infrared radiometer sensors (www.apogeeinstruments.com) mounted at a 45° angle from perpendicular to the surface at 2 m height. The sensor angle of view is 18°. Soil temperatures are continuously recorded using paired copper constantan thermocouples. Soil heat flux measurements are made continuously using paired HFP01SC-L Hukseflux self-calibrating soil heat flux plates (www.campbellsci.com). All sensors to record data every 5 minutes. Data were averaged hourly by a CR1000 datalogger (www.campbellsci.com). The pairs of soil thermocouple and heat flux plate sensors at the mixed oasis treatment were positioned under both turf and DG surface covers.



NDV micrometeorological stations were installed during spring 2006.

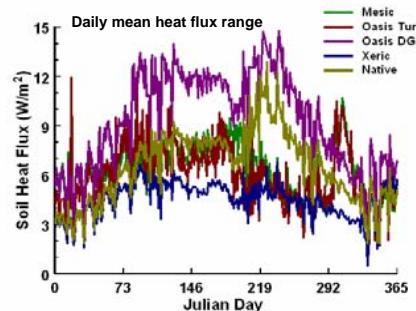
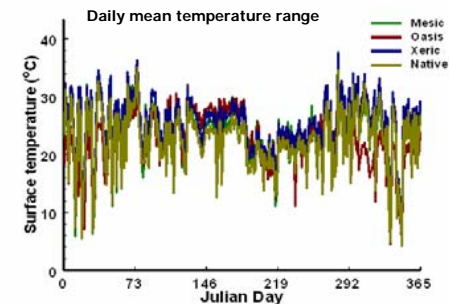
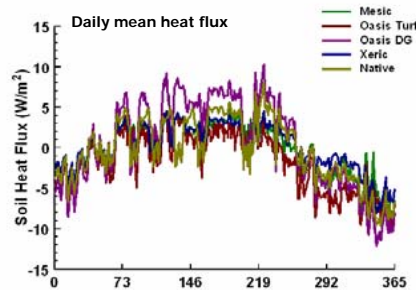
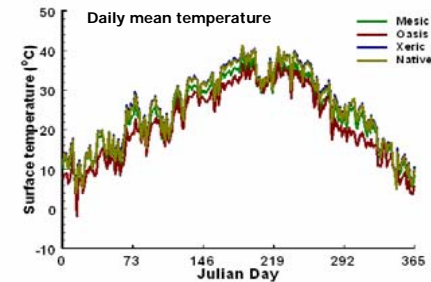
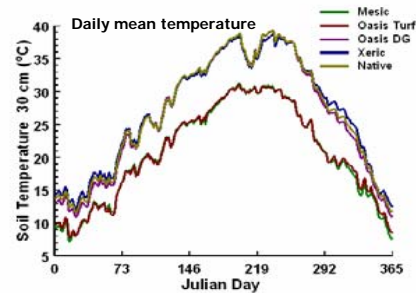
Introduction

Residential landscape cover characteristics and ensuing microclimates created by the interactions of landscape surfaces with local atmospheres are predicated upon the designed arrangement of landscape elements, principally vegetation and ornamental hardscape features. In Phoenix there exists a wide range in the proportion of vegetation and ornamental hardscape features for any given residential landscape. At the CAP LTER North Desert Village experiment site on the ASU Polytechnic campus, I am studying the long-term effects of residential landscape design and ensuing above ground microclimates on below ground thermodynamics. Here I present a summary of landscape surface and below ground thermodynamics for the year 2007.

Acknowledgments

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IPA: Climate Ecosystem Interactions



Summary of Results

Throughout the year 2007, the soils underneath turf covered surfaces were generally cooler. DG covered surfaces at the oasis treatment generally had the highest soil heat flux (downward movement of heat) and highest mean daily range in soil heat flux during summer months. Mean surface temperatures patterns were similar for all treatments throughout the year. Mean diel surface temperature ranges were least variable during summer for all treatments, but overall were most variable in the native and oasis treatments. Increases in the daily mean heat flux range for mesic and oasis turf areas ca. Julian Day 290 reflects the effect of increased irrigation during germination of overseeded winter rye grass. In summary, these data show the importance of immediate landscape surface cover type on annual patterns of soil thermodynamics at NDV.