Brief Summary of Ground Weather Stations and Temperature Sensors Data– ATLAS Mission San Juan, Puerto Rico

To support the NASA ATLAS sensor data gathered over the San Juan metropolitan area and its surroundings, a number of ground based weather stations and temperature sensors where deployed. The weather stations and the temperature sensors were placed at strategic locations to observe variations across the urban and rural landscapes. Time series plot of the stations' data show that heavily urbanized commercial areas have higher air temperatures than urban and suburban residential areas, and much higher temperatures than rural areas. Temperature differences [dT(U-R)] were obtained by subtracting the values of several stations from a reference urban station, located in the commercial area of San Juan. dT(U-R) time series show that the UHI peaks during the morning between 10:00am and noon to an average of 4.5ºC, a temporal pattern not previously observed in similar studies for continental cities. It is also observed a high variability of the UHI with the precipitation patterns even for short events. These results may be a reflection of a large land use density by low level buildings with an apparent absence of significant heat storage effects in the urban areas, and the importance of the surrounding soil and vegetation moisture in controlling the urban tropical climate.

- The weather station and temperature sensor data show indications of the existence of an Urban Heat Island in the metropolitan area of San Juan, P.R.
- Temperatures variations during the day had a range of ~20ºC in the early morning hours, and ~35ºC at mid afternoon.
- Temperatures were on average 4.5ºC higher in the urban areas when compared to the observation of rural areas during the time period of 10:00 am to noon.
- The precipitation pattern and cloud coverage significantly affected the UHI of San Juan, PR.

Table 1. Ground Stations Covering the San Juan Urban Area and Rural Surroundings

Station	Location	Geographic Coordinates		Variables						
		Latitude	Longitude	Temp.	RH	Wind	Precip.	Solar Rad.	Press.	Soil Moist.
Polytechnic Station	Hato Rey	18º25'19"	66º03'19"	x	x	x	x	x	x	
Dorado Station	Dorado-Ecological House	18º27'55"	66º19'37"	x	x	x		x		
UPR Stations	Rio Piedras 1	18º24'08"	66º03'04"	x			x			x
Rio Grande Station	Rio Mar Beach Resort	18º22'44"	65º45'22"	x			x			

Table 2. HOBO Sensors		Latitude	Longitude	Temp.
Bayamón Sensor	Science Park – North Bayamón	18º24'41"	66º09'37"	x
Cupey Sensor	South Guaynabo	18º21'12"	66º05'13"	x
CUSC Station	Santurce – Central SJ	18º26'29"	66º03'31"	x

Guaynabo Sensor	North Guaynabo	18º24’23”	66º06’07”	x
Interamericana Sensor	South Bayamón	18º21’06”	66º11’00”	x
NWS Sensor	North Carolina	18º25’53”	65º59’29”	x
Toa Baja Sensor	Naval Base Sabana Seca	18º27’28”	66º11’47”	x
UPR Bayamón Sensor	East Bayamón	18º22’14”	66º08’36”	x

Figure 1 Location of all the weather stations and temperature sensors deployed in the San Juan Metropolitan Area and surrounding rural and residential areas. The solid black line represents the track of the cross-section presented in Figure 3

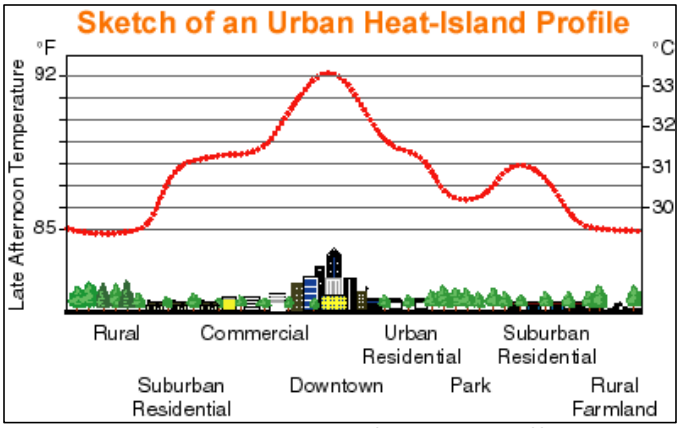

Figure 2 Sketch of an Urban Heat Island temperature profile over the different land covers found in a typical metropolitan area and its surroundings

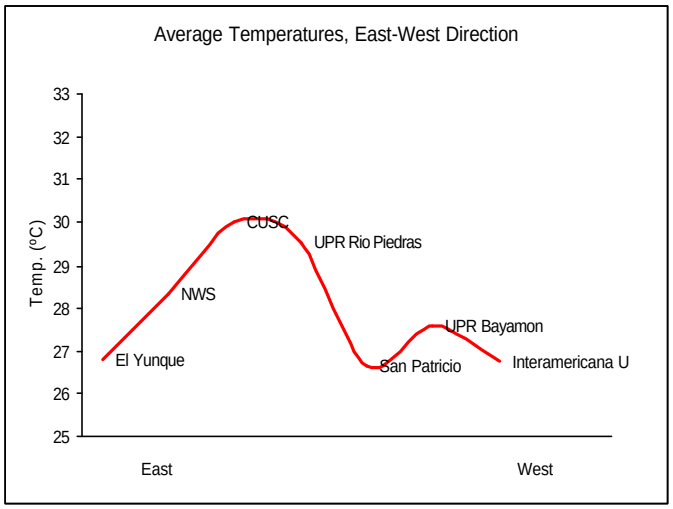

Figure 3 East-West cross-section of average noon temperature at selected locations in the San Juan Metropolitan Area and rural adjoining areas

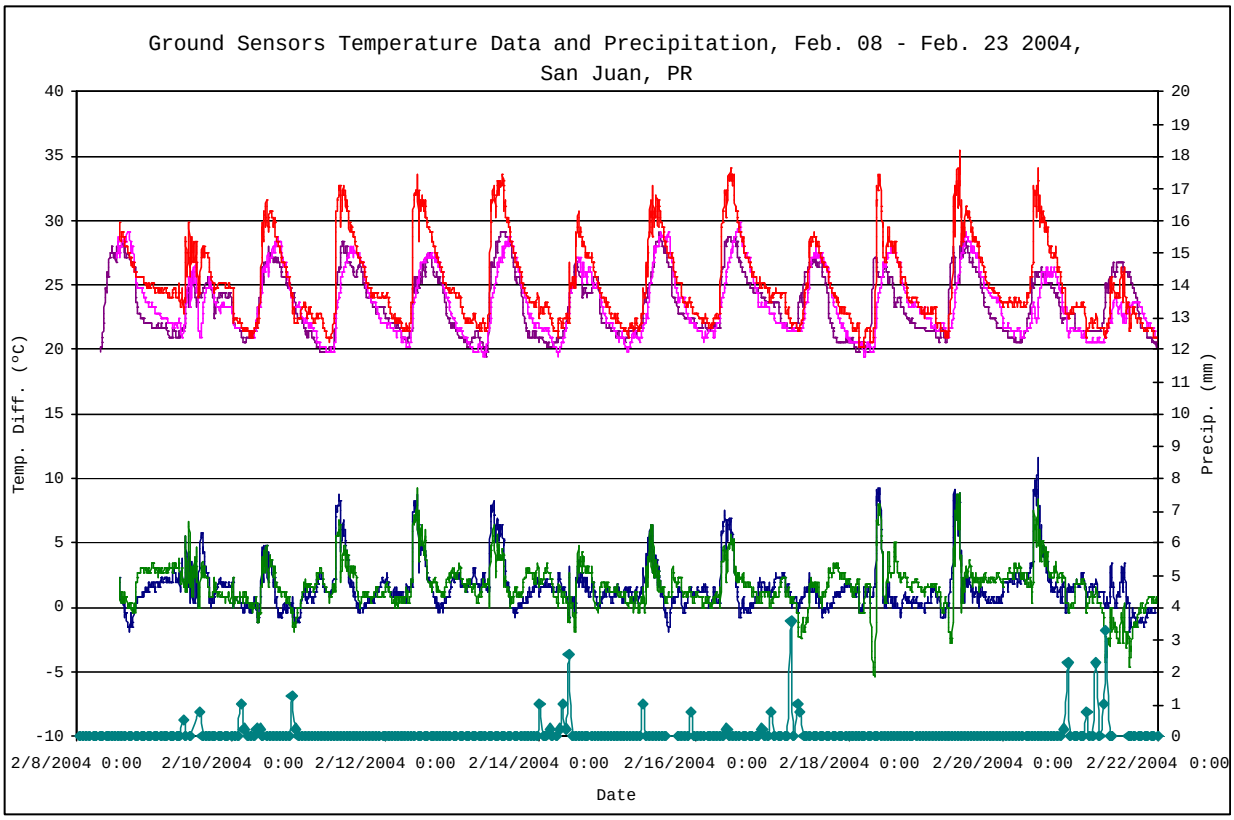

Figure 4 True temperature at a urban-commercial, urban-residential, and rural areas (top three series); temperature differences between the commercial area and the residential and rural areas (middle two series); precipitation total recorded every 5 minutes by the San Juan National Weather Service (bottom series)

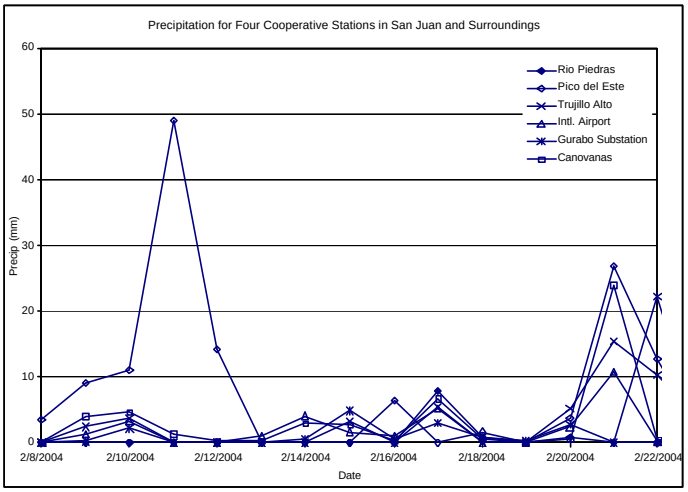

Figure 5 Daily precipitation accumulated for select locations in Puerto Rico as recorded by COOP stations and archived by the Southeast Regional Climate Center