

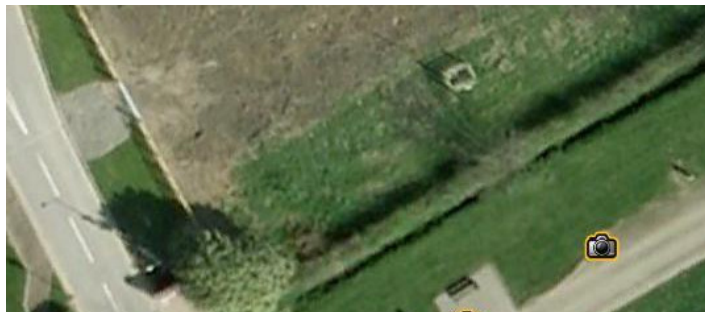
## Measuring the Urban Heat Island Effect in the East Midlands

### Introduction

As an Englishman I naturally have a mild obsession with the weather and as an economist I naturally enjoy measuring things and mucking about with data. In 2009 I managed to bring these together by purchasing a weather station which I installed in my back garden. This proceeded to generate vast amounts of data, most of which was interesting but didn't actually lead anywhere. After a while however, it struck me that I could actually use my data to estimate the magnitude of the Urban Heat Island (UHI) effect. This is because there is a Met Office weather station in Sutton Bonnington (only 4.9 miles from my house) which publishes regular temperature measurements. Unlike my weather station this is based in a rural setting. Therefore any systematic difference in recorded temperatures might reasonably be attributed to a UHI effect.

### Location

First consider the Met Office weather station. This is based at the University of Nottingham Sutton Bonnington campus. The following photographs (taken from Google Earth) establish that this is based in an essentially rural location. Although there are University buildings in the background, the station itself is set well away from them in an open field.





Next consider the following photographs of my weather station. The arial shot from Google Earth establishes that this is a much more suburban setting. In fact it is mounted on the side of my garage (as shown in the second photograph) and is, as far as possible, located away from any obvious heat sources such as central heating exhausts.





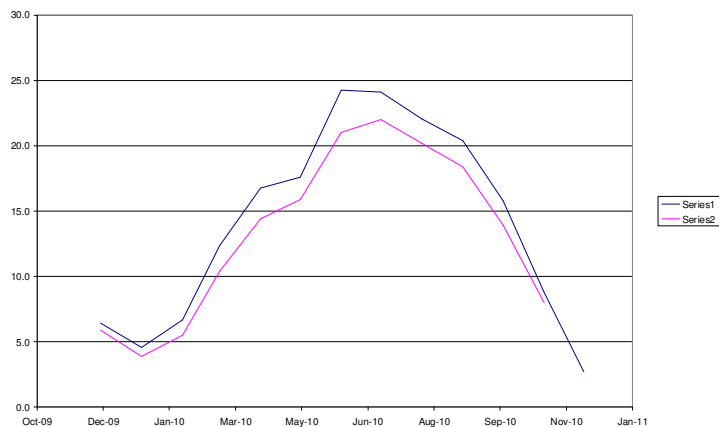
## Effects

So, what difference does the location of the two stations mean for average temperature measurements. Using the standard measure of average daily peak temperatures, I calculated the following estimates for my station and compared them with the published Met Office figures.

	My Data	Sutton Bonnington Data	Difference
Dec-09	6.4	5.9	0.5
Jan-10	4.6	3.9	0.7
Feb-10	6.7	5.5	1.2
Mar-10	12.3	10.4	1.9
Apr-10	16.8	14.4	2.4
May-10	17.6	15.9	1.7
Jun-10	24.3	21.0	3.3
Jul-10	24.1	22.0	2.1
Aug-10	22.1	20.2	1.9
Sep-10	20.4	18.4	2.0
Oct-10	15.8	13.9	1.9
Nov-10	8.8	8.0	0.8
Dec-10	2.7	NA	

Average Difference 1.7

*Average Daily Peak Temperatures Units = Degrees Celsius.*



Note that the two measures do move very closely together as illustrated by the above graph. However, my measurements (the blue line\_ are systematically higher than the

Met Office estimates (the purple line). On average my weather station is recording a monthly temperature 1.7C higher than that at Sutton Bonnington. This may or may not be an UHI effect, although I find it hard to think of what else it might be. What does make me doubt the UHI to some extent is that the difference seems to grow with the absolute level of the temperature. If it really was an UHI effect I would expect the opposite to hold as the extent of heat leakage from surrounding buildings increased as temperatures fell.

Paul Turner

January 2010