**Drivers of urban land surface temperature: diurnal and nocturnal**

Tom Logan, Ben Zaitchik, Seth Guikema, others?

Potential Target Journals: Remote Sensing of Environment,?

**Abstract**

Understanding the drivers of urban land surface temperature can assist in ameliorating the severity of the urban heat island and risk from heat waves. Of all the natural events, heat waves are among the deadliest and are likely to become longer and more frequent. These changes, coupled with demographic shifts towards urban living, put significant impetus on reducing community exposure to heat waves. An understudied aspect of urban land surface temperature is factors related to nocturnal surface temperature. Nocturnal land surface temperature is important in heat wave mitigation given the urban heat island effect is most apparent during the night and the minimum nocturnal temperature is linked with heat stress and mortality. In this study, we examine the day and night urban land surface temperature (with Landsat) in seven cities across the United States. We test a series of hypotheses regarding the effect of greenspace, water bodies, and impervious surfaces on land surface temperature using advanced statistical methods. The robustness of these results is tested using different cities and satellite imagery and the results of diurnal and nocturnal analysis are compared to determine if the expected relationships hold throughout the day and night. Understanding whether the factors related to high urban temperatures are consistent across US cities is important for climate adaptation planning and capable predictive models suggest the potential for analysing the effect of potential biophysical changes might have on land surface temperature.

**Previous work**

To my knowledge, previous studies which have looked at nocturnal land surface temperature include:

* Echevarría Icaza, L., Van Den Dobbelsteen, A., & Van der Hoeven, F. (2016). Using satellite imagery analysis to classify and redesign provincial parks for a better cooling effect on cities. The case study of South Holland. *Research In Urbanism Series*, 4(1), 157-184. doi:10.7480/rius.4.904

This study uses Modis imagery for night land surface temperature and studies a single region in the Netherlands. The paper’s focus is more on the province, rather than only urban areas, and are looking at provincial parks with land cover including forest, cropland, water, grassland. The analysis is primarily linear correlation based.

* Wicki, Andreas, and Eberhard Parlow. 2017. “Multiple Regression Analysis for Unmixing of Surface Temperature Data in an Urban Environment.” *Remote Sensing* 9 (7). Multidisciplinary Digital Publishing Institute:684.

Analyse city of Basel, Switzerland, using day and night Landsat 8 scenes. They use multiple linear regression to create predicted LST images. Their predictive images I think are in-sample (that is, there is no holdout/cross-validation). Also, it is not apparent to me how they use the night landsat images or distinguish between day and night results.