NATIONAL CONSORTIUM FOR REMOTE SENSING EDUCATION, RESEARCH, AND APPLICATIONS

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PROJECT FACT SHEET

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Estimating surface moisture in urban areas

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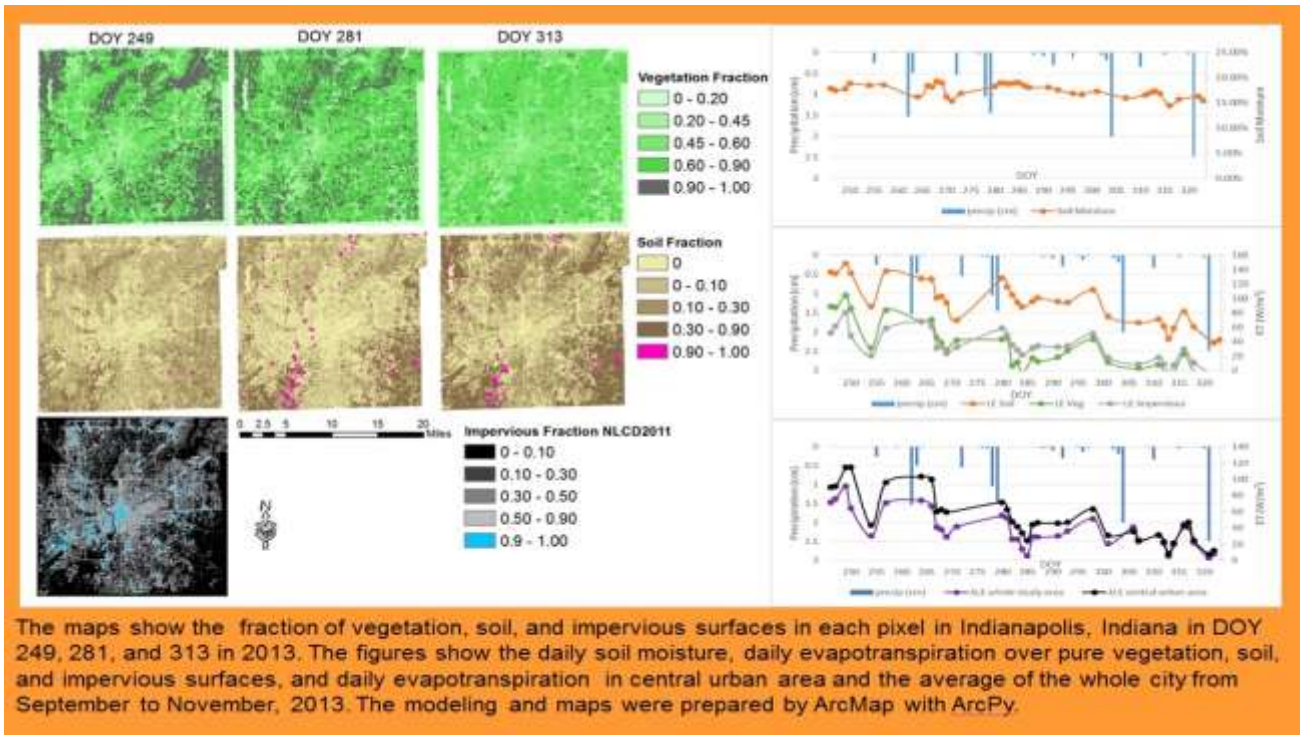

The maps show the fraction of vegetation, soil, and impervious surfaces in each pixel in Indianapolis, Indiana in DOY 249, 281, and 313 in 2013. The figures show the daily soil moisture, daily evapotranspiration over pure vegetation, soil, and impervious surfaces, and daily evapotranspiration in central urban area and the average of the whole city from September to November, 2013. The modeling and maps were prepared by ArcMap with ArcPy.

Overview: Daily soil moisture and evapotranspiration were estimated for Indianapolis, IN over various urban surfaces, such as vegetation, soil, and impervious surfaces. The estimation of soil moisture and evapotranspiration has not been studied intensively in urban areas; most of the previous studies were conducted in rural areas. How to apply the models that developed in rural areas to urban areas is a scientific question that has not been addressed. The heterogeneity of urban surfaces, the surface roughness from buildings and trees, and capturing the spatial and temporal variation of surface moisture are the major challenges in urban micro-meteorology.

Methods:

- Fractional vegetation, soil, and impervious surfaces cover in each pixel
- Deriving surface roughness from Terrestrial LiDAR
- Downscaled Land Surface Temperature is used to increase the spatial and temporal resolution

Conclusions:

- The proposed method successfully estimated soil moisture and evapotranspiration over different land surfaces.
- Terrestrial LiDAR is a good source to capture the vertical complex structure of urban trees.
- Thermal downscaling technique is an effective way to increase the spatial and temporal resolution of surface temperature, which is an important input to energy balance model for surface moisture estimations.

The funds provided by the IndianaView consortium scholarship were used to support this project during summer 2015. The results of this research has been presented at AAG annual conference and submitted to GIScience & Remote Sensing.