

Mapping Turf Grasses in Select Cities of the Southern United States.



PRESENTER:
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BACKGROUND: Understanding turf extent and location can enable us to model water use, fertilizer and water quality issues as well as benefits to the urban environment such as water infiltration and urban cooling.

ENVIRONMENTAL SAVINGS FROM LOW INPUT TURF VARIETIES CAN REALLY ADD UP!

The city of Atlanta could save over 845 million gallons of water over the course of the year by planting drought tolerant grasses!

METHODS:

1. 60cm NAIP aerial imagery
2. Initial labels created in eCognition
3. Models trained using rastervision framework for pytorch
4. Inference run on five urban areas
5. Resulting labels used to quantify vegetative and built areas

TOOLS:

- eCognition - use superpixel segmentation to create initial labels
- Rastervision - provides a framework for using PyTorch with geospatial data
- Groundwork - tools for creating and editing geospatial labels
- PEARL - Human in the loop model refinement and label transfer
- Microsoft Planetary Computer

FUTURE WORK

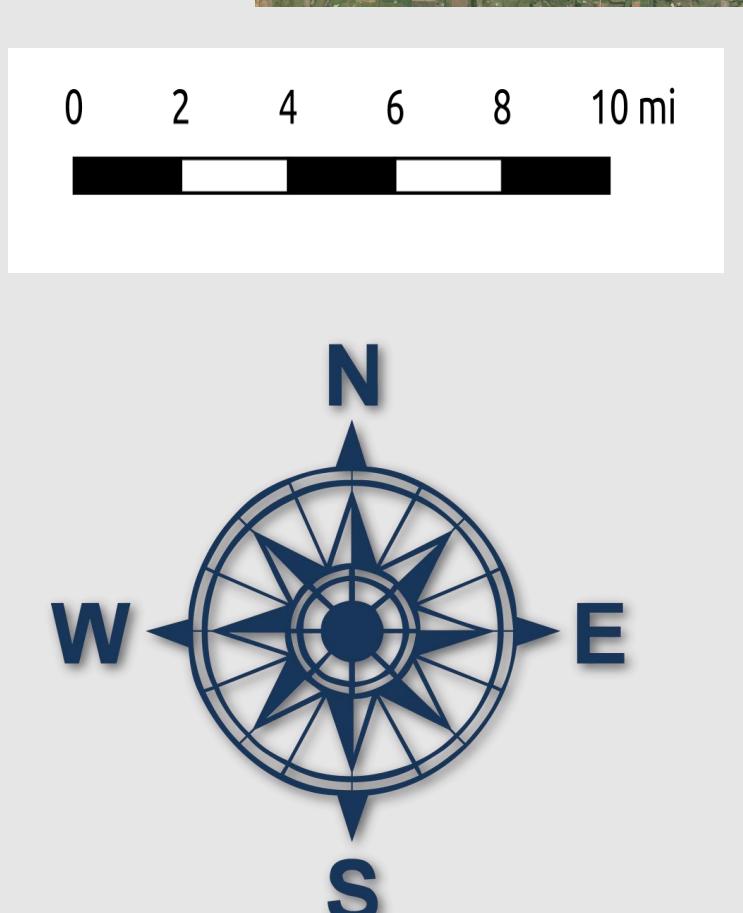
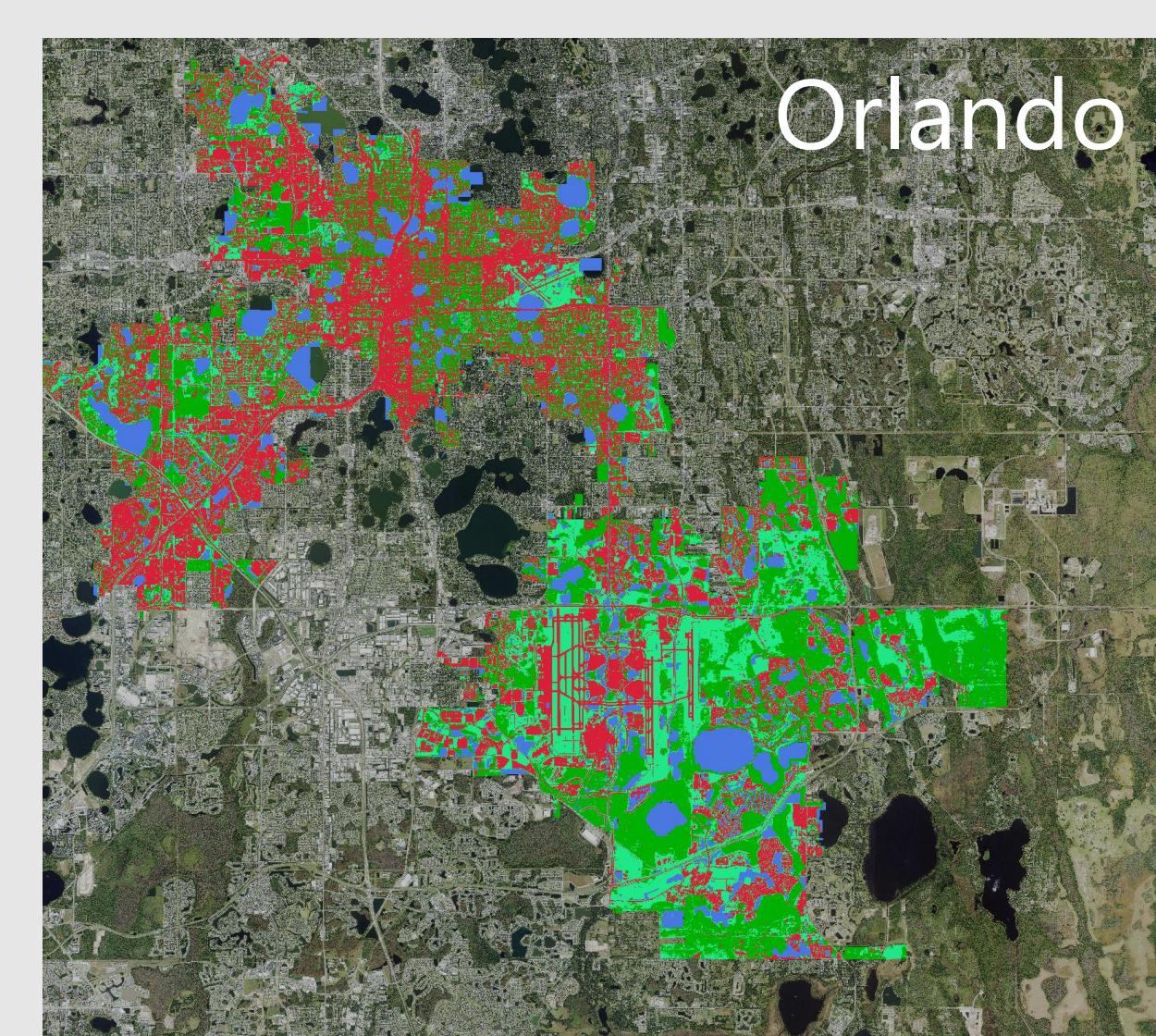
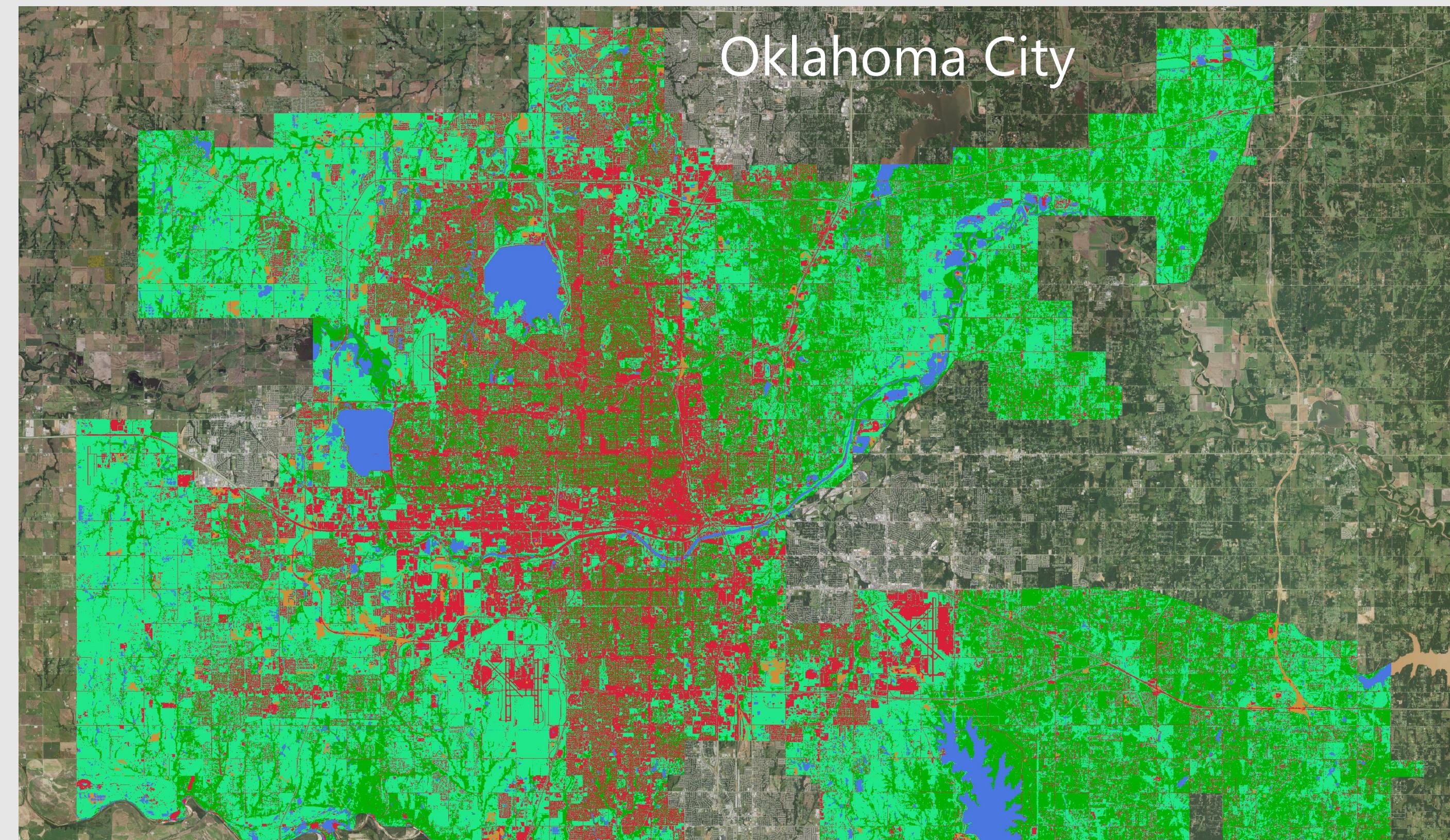
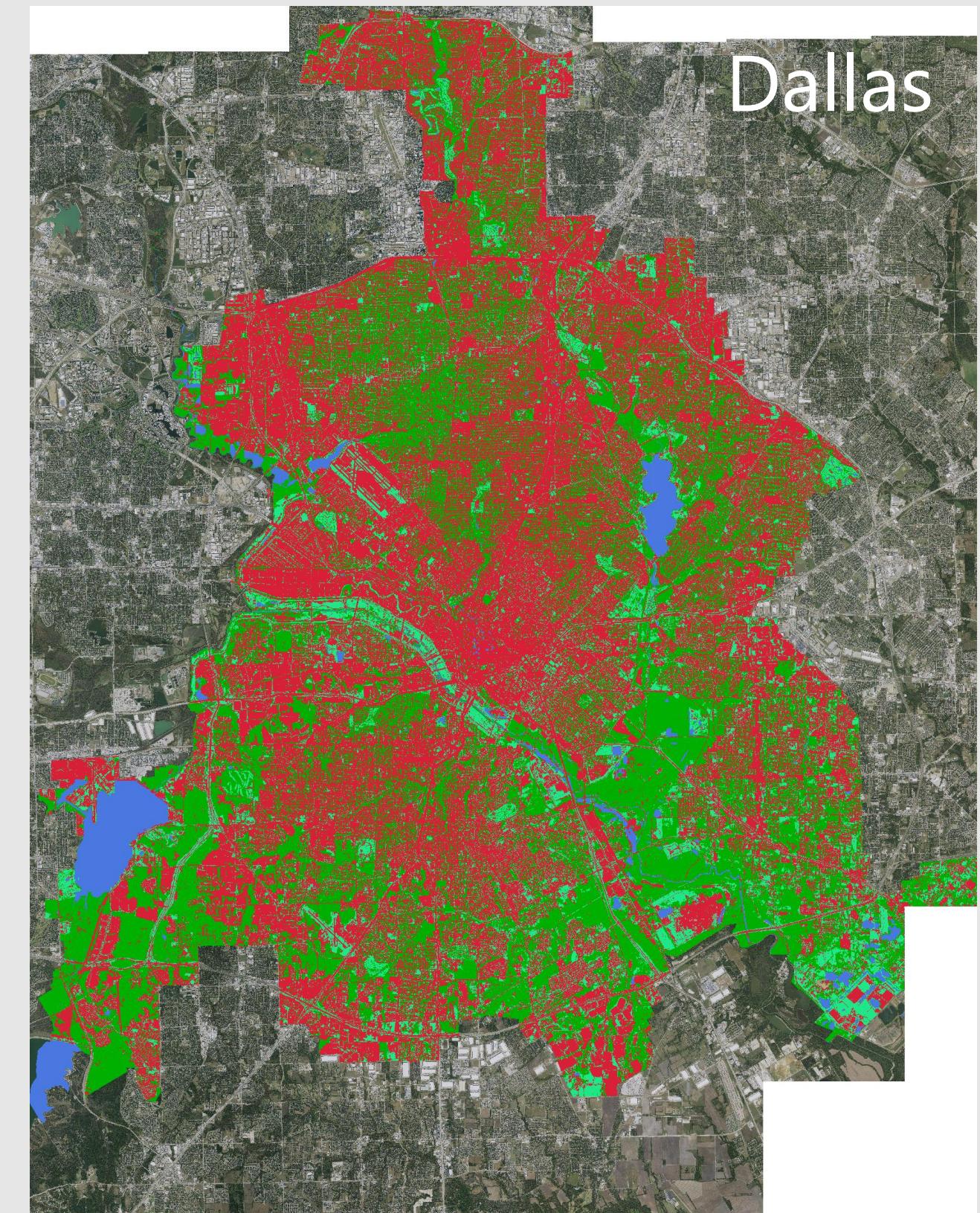
- Retrain models for location using PEARL
- Use Synthetic aperture radar (SAR) data to identify ground cover under tree canopy
- Refine model for speed
- Vegetation map for all urban area of the United States.

COLLABORATION

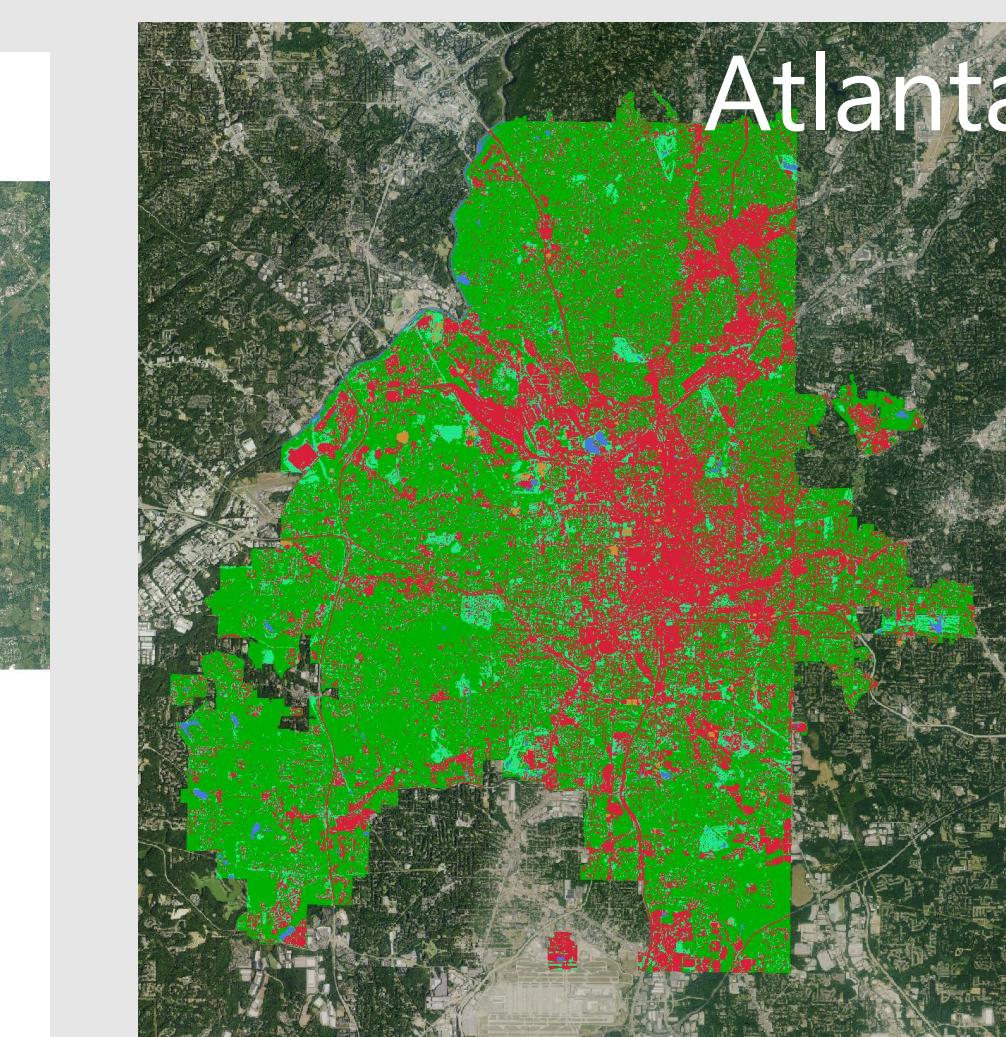
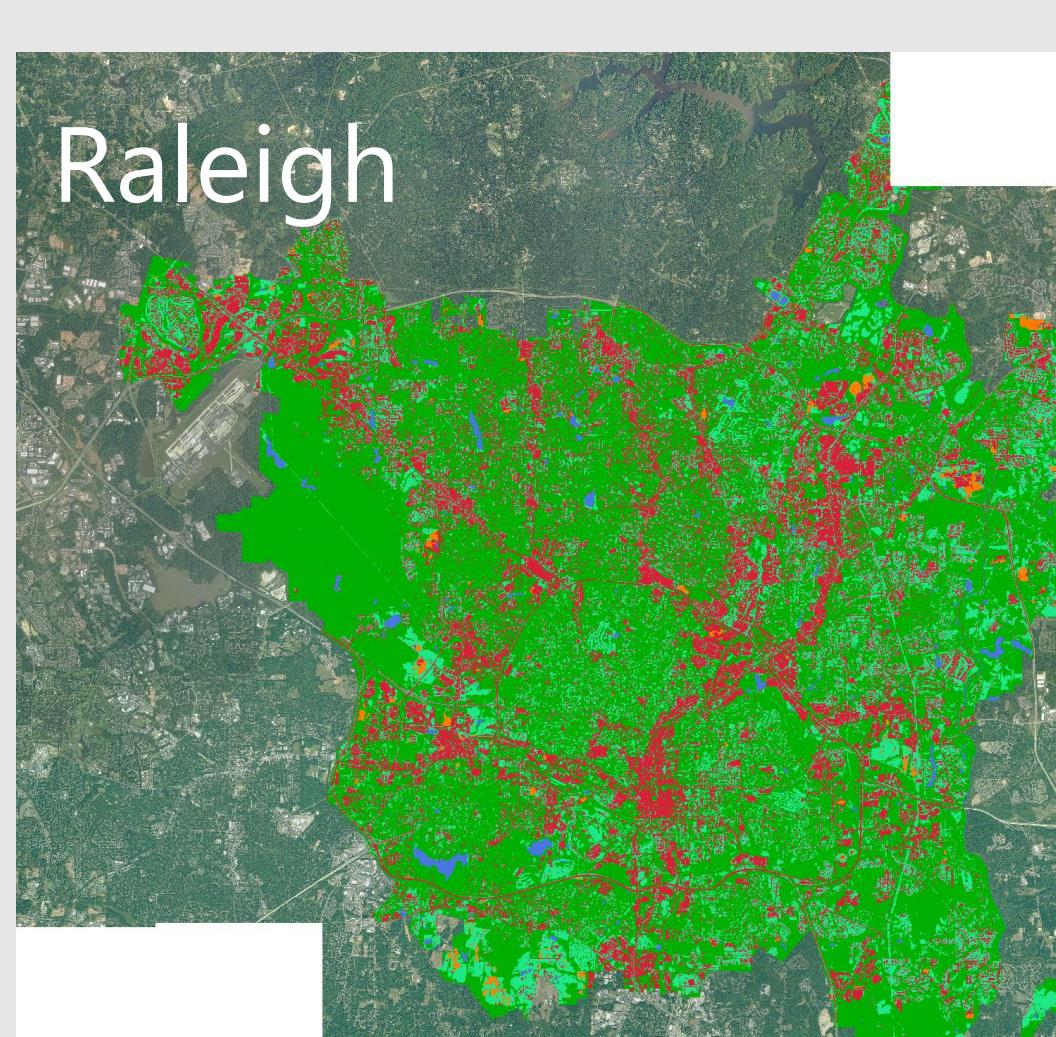
Please get in touch if you can use this data.
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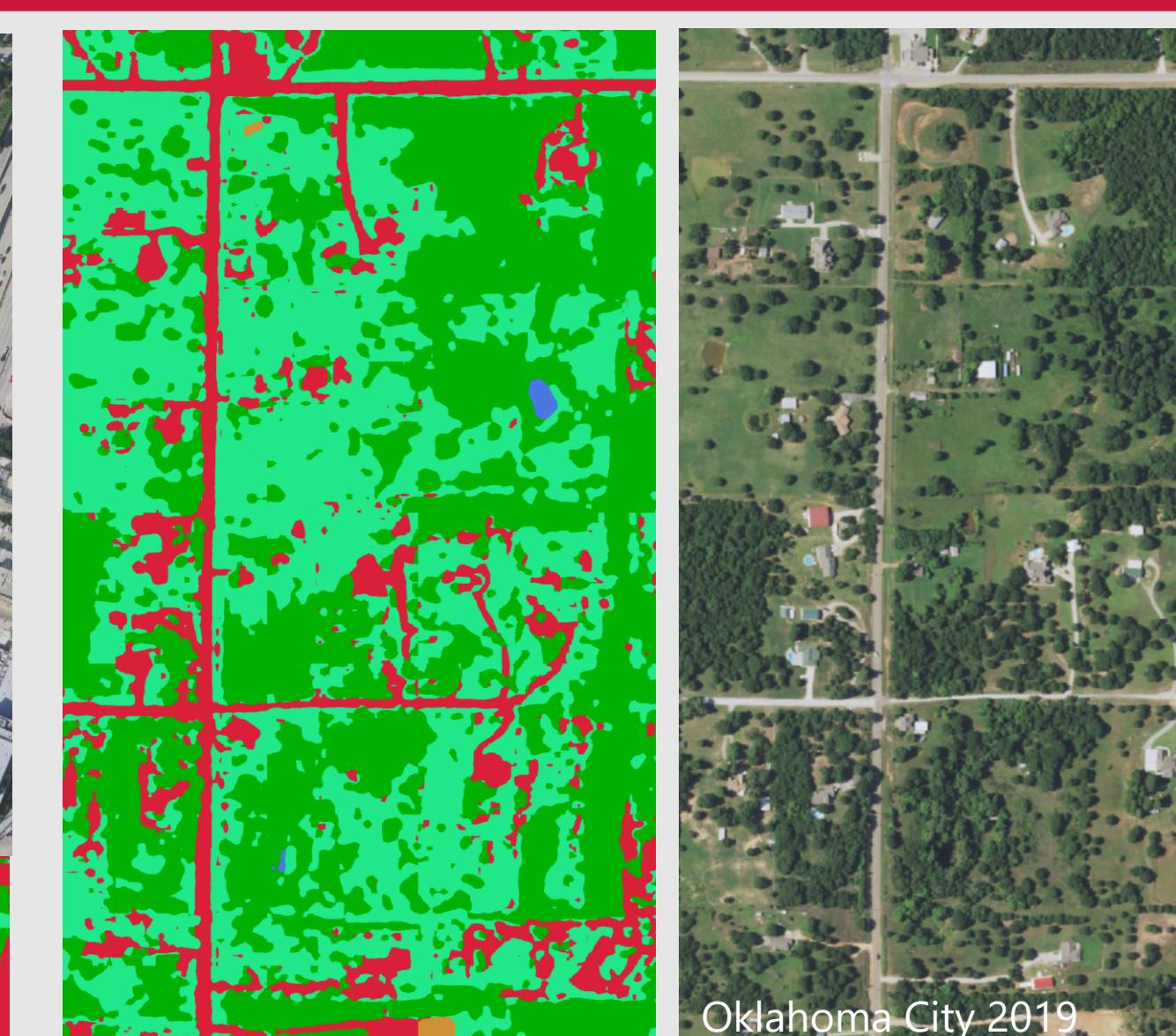
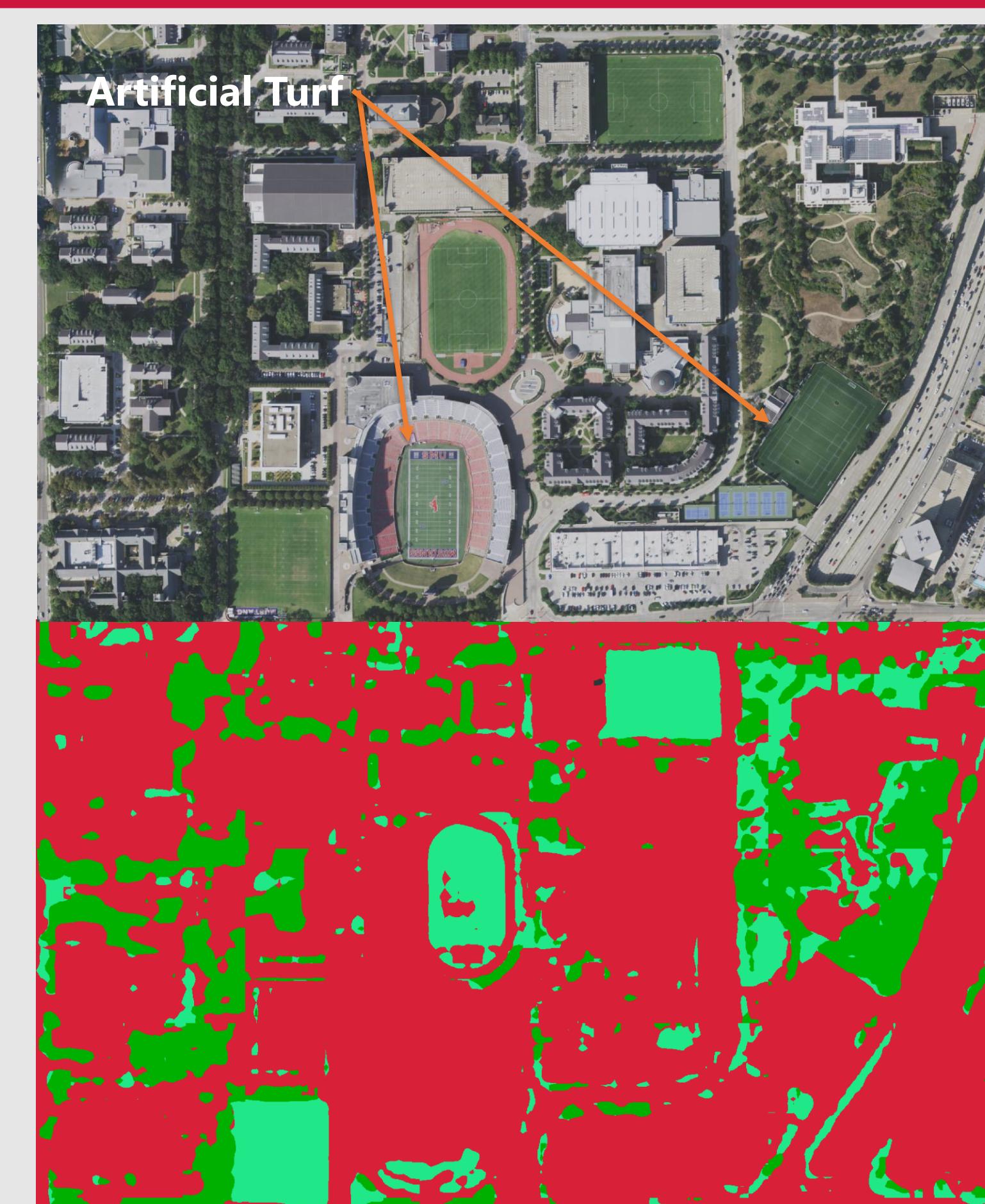
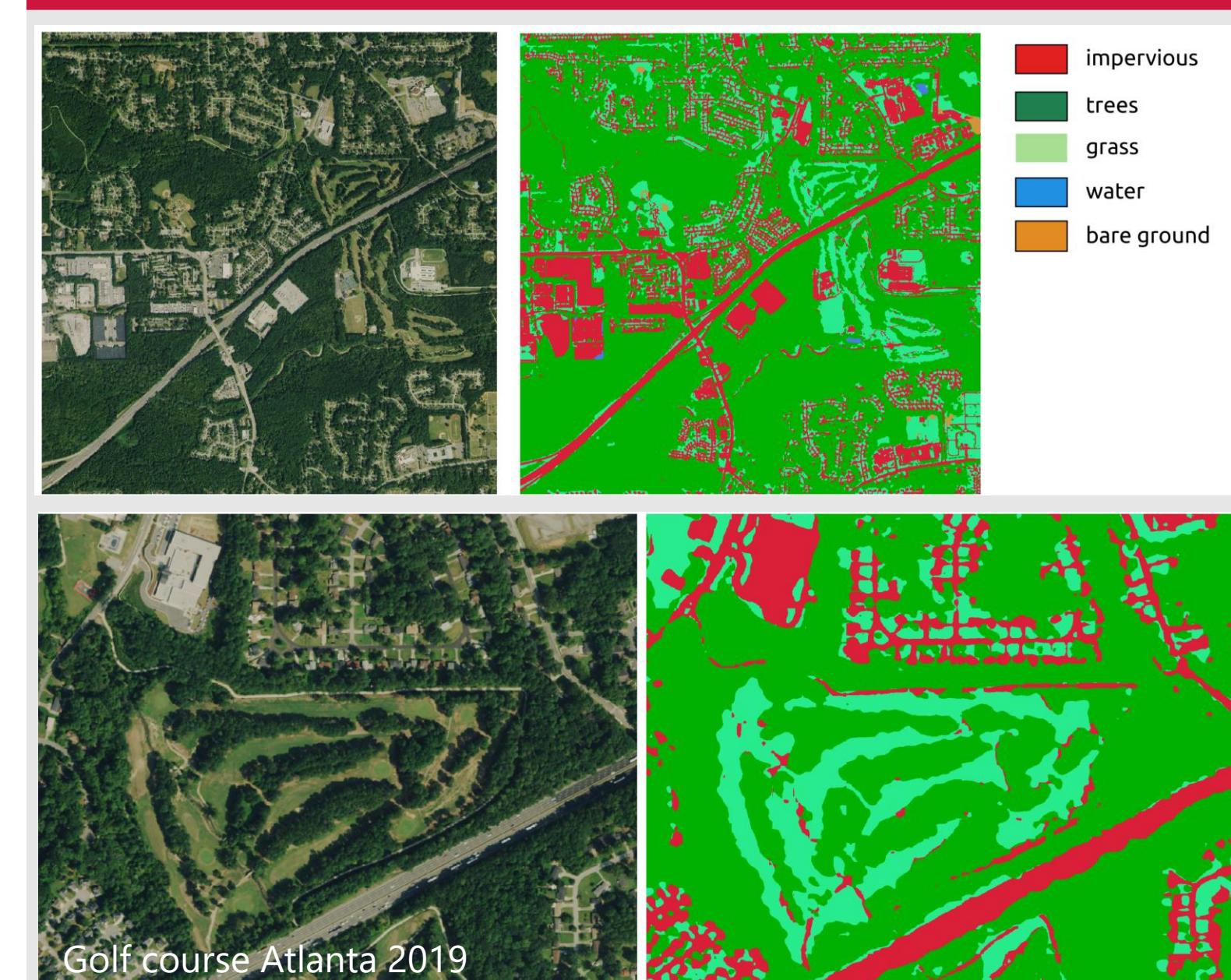
Deep Learning applied to aerial imagery quantifies and locates turf, trees and built area of urban environments



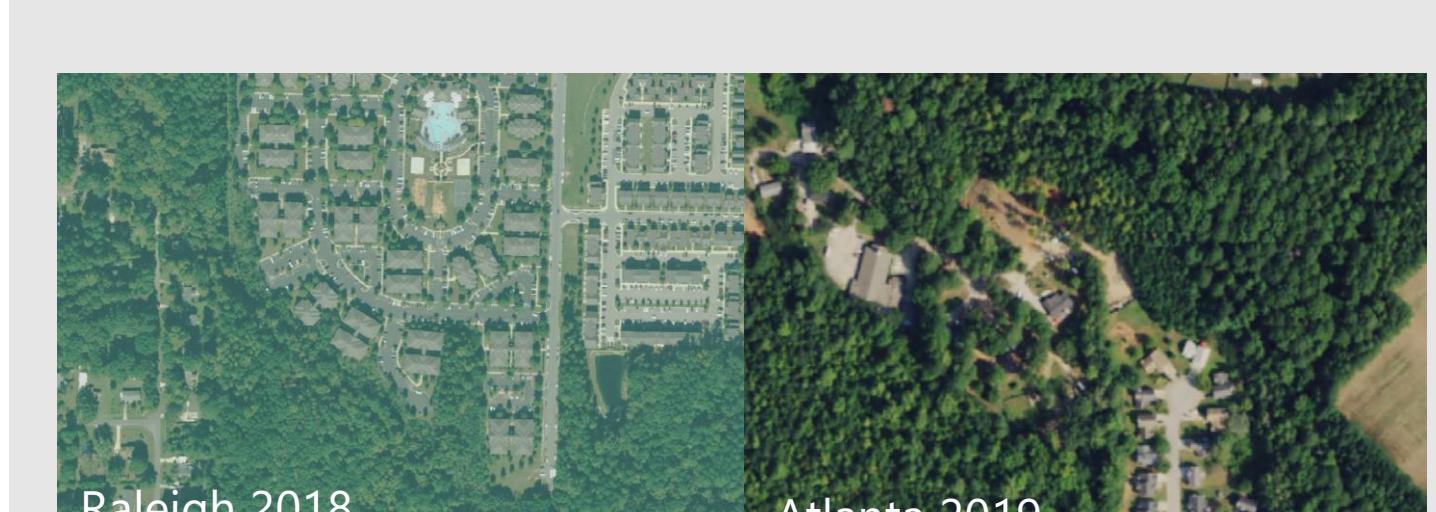
Cities to scale 1:250000



Map Details



Oklahoma City is unusual in incorporating large low density areas.



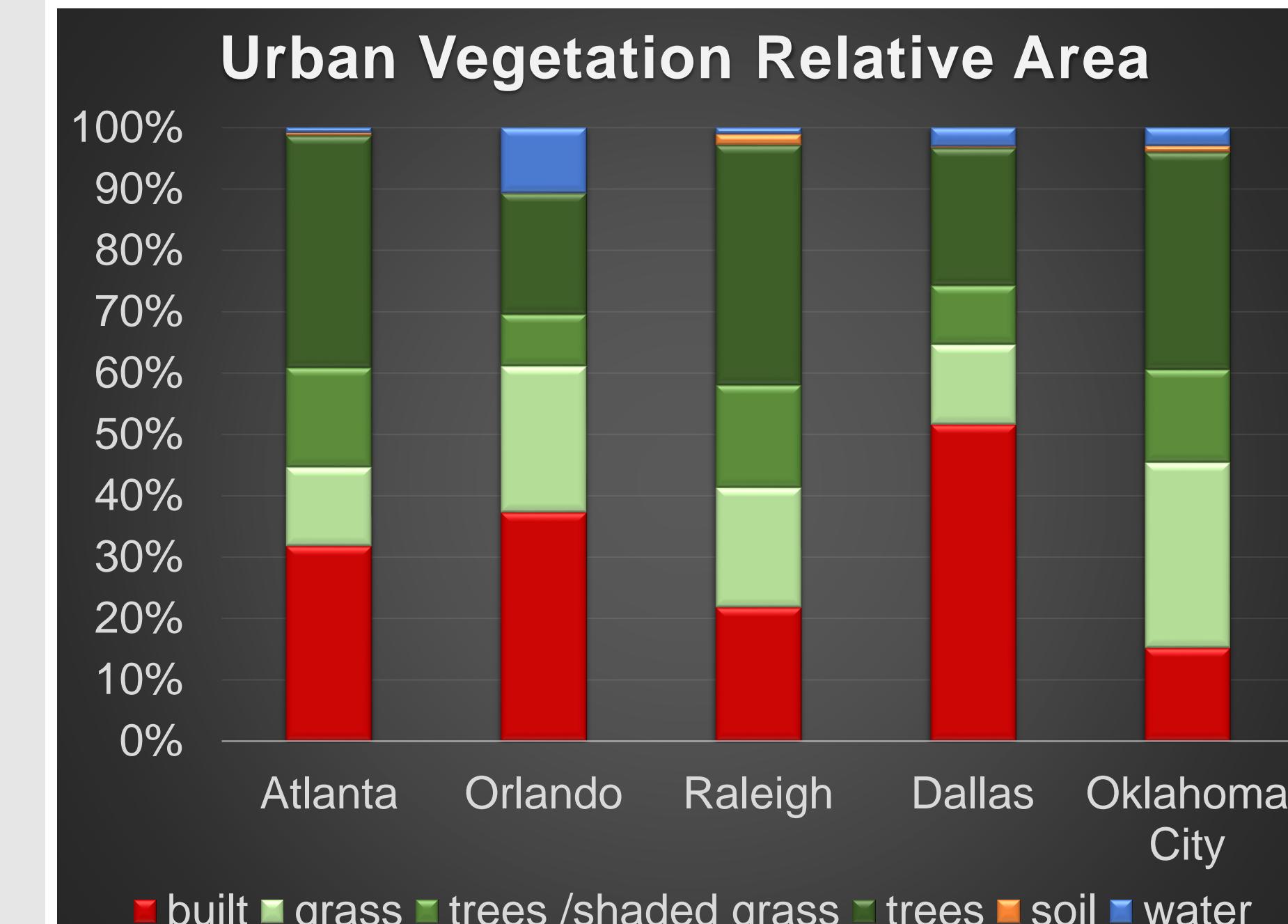
Dallas Sports Stadiums near SMU 2020



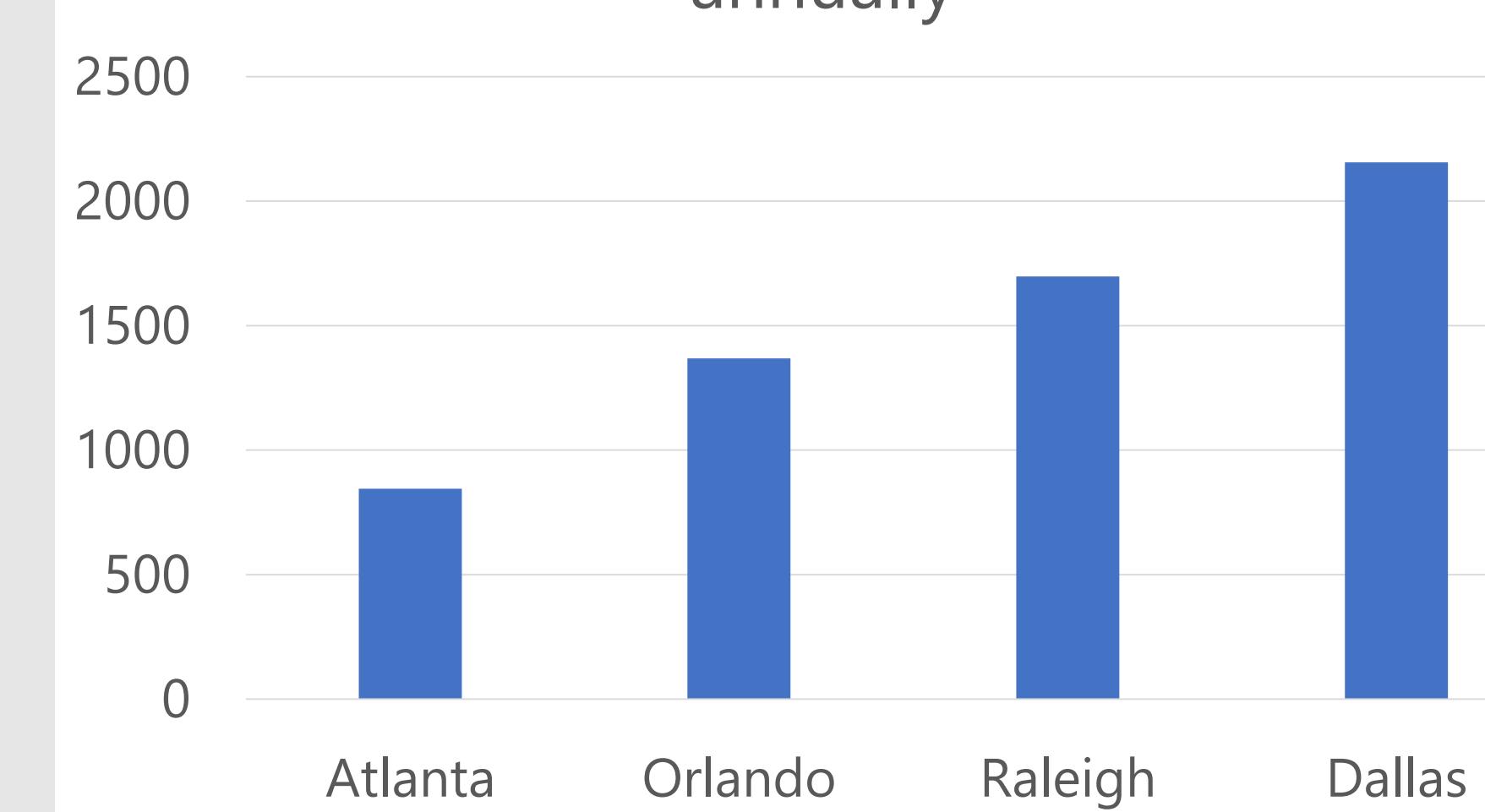
In the southern states trees did not lose enough canopy to directly image ground cover. We will attempt to use SAR imagery for indication of ground cover.

At high resolution models are not portable between regions. Year image was taken was particularly important to take into account. New labels and model retraining can be done in PEARL landcover mapping.

4 band imagery allows identification of artificial and natural turf.



Millions of gallons of water saved annually



Water savings estimated for city based on labeled grassy area and 2020 NTEP rainout trial water use where TifTuf averaged 1.47 inches added water vs. 4.21 inches added water for Tifway over the course of a year.

See Schwartz et al. (2018) 'DT-1', a Drought-tolerant Triploid Turf Bermudagrass, *HortScience* horts, 53(11), 1711-1714



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