Monitoring Annual Urban Growth in Northwest Arkansas with A 20-year Landsat Record
Ryan Reynolds¹, Lu Liang¹
¹School of Forestry and Natural Resources, University of Arkansas Monticello
Northwest Arkansas has been through a significant urban transformation in the past several decades, and is witnessed as one of the fastest growing regions in the nation. The urban area expansion and the associated demographic increases bring unprecedented pressure to the environment and natural resources. To better understand its consequences, accurate and long-term depiction on urban dynamics is critical. Remote sensing is a powerful tool to monitor land use and land cover change at large spatial and temporal scales, and various approaches have been proposed for urban area extraction. Although many studies cover a long time period, urban growth mapping at an annual pace is relatively rare, and the low accuracy over changed areas remains a challenge. In this study, we will use time series Landsat stack covering the period of 1995 to present, to detect the urban dynamics in Benton and Washington counties, where the cities of Fayetteville, Springdale, Rogers, and Bentonville are located. Annual mapping will be conducted via a two-stage classification approach. A set of spectral indices that have been proved to be useful in urban area extraction, including normalized difference vegetation index, principal components, brightness, greenness, wetness, normalized difference built up index, and built up index, together with the original Landsat spectral bands will be used in a supervised classifier to distinguish urban from non-urban pixels for each year. A temporal consistency inspection involving temporal filtering and heuristic reasoning will then be applied to the annual outputs for improvement over changed areas. The final annual urban maps will be assessed based on a stratified random sampling scheme, and the percent urban growth in Northwest Arkansas over the last two decades will be reported.