Evaluating Urban Agriculture's NDVI Signature
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Urban agriculture is the growing of food and non-food products, for consumption or sale, within an urban or peri-urban area. Worldwide, support is growing for urban agriculture because of its ability to assist in alleviating food insecurity. Researchers also point out that urban agriculture contributes to urban sustainability by increasing greenspaces, reducing stormwater runoff, regulating air temperatures, and increasing groundwater recharge. Substantial research is now underway to assess quality of food using non-potable water for irrigation, and raised in or near contaminated soils. Yet, analyses of environmental improvements associated with urban agriculture have often focused on narrowly-defined benefits, such as documentation of increases in biodiversity. Broader-scale impacts can be investigated using sequential satellite imagery to assess environmental changes associated with urban agriculture. This paper reports use of the USGS Surface Reflectance NDVI product from Landsats 5, 7 and 8 to assess changes in NDVI relative to urban agriculture, considered on a site-specific basis. More specifically, we conducted a temporal analysis of four urban farms in three different eastern U.S. cities – Roanoke Virginia, Pittsburgh Pennsylvania, and Buffalo New York. In each instance, we analyzed sequential NDVI images to assess vegetation status before, during and after establishment of urban agriculture sites. Our results show that NDVI declines initially as sites are first established and cultivation begins, then NDVI becomes very dynamic as plant diversity increases and as the farm becomes more established.