# Long Term Land-Cover Mapping in the Phoenix Metropolitan Area

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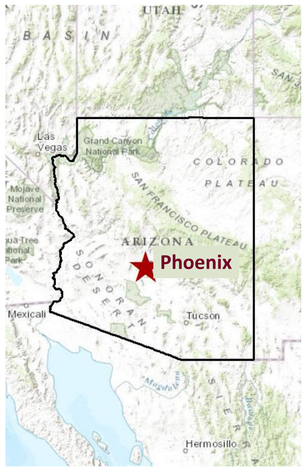
## Introduction




Located in a semi-arid desert region, the Phoenix metropolitan area confronts a number of sustainability challenges, including water scarcity and extreme heat in the context of urban growth and climate change. Long term land-cover mapping is fundamental in understanding urban development and associated changes in water use and local climate of this area. In this study, we created a series of land cover maps using the Landsat imageries from year 1985 to 2010. This product will be used for change trajectory analysis of the Phoenix metropolitan area.

## Methods

A series of the 30-meter Landsat images were obtained for this area from 1985 to 2010 with a time interval of five years. To avoid seasonal variation, all the images were selected from May to July. The spectral bands, normalized difference vegetation index, normalized difference water index, and results from principal components analysis were used as inputs for classification. We adopted the object-oriented classification method, in which the imagery was segmented into image objects based on spectral similarity and spatial contiguity. The input layers were segmented into two scales using the multi-resolution segmentation.

## Findings

The unique landscape makes it difficult to classify the developed area (in the urban fringe) and inactive agriculture from the surrounding desert because of their similar spectral signatures. Compared with existing maps of the area, our method minimized propagation of errors due to variations on data source and classification system. In addition, multi-date segmentation and use of existing road network greatly improved classification consistency among the six maps, which is critical to further change detection analysis. The result map series identified spatial and temporal changes in agriculture, desert and urban areas that result from natural and anthropogenic processes.

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## Land-Cover Maps