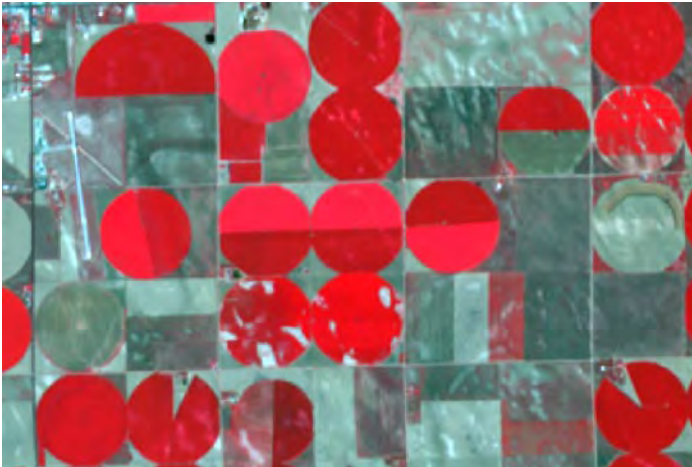# Object Finding in Grayscale Images

The OBJECT geospatial script in the *Scripts by Jack™* series is designed to segment an image into areas of relatively uniform properties and to create vector polygons outlining these areas. The script operates on a single grayscale raster, such as a selected band of a multispectral satellite or aerial image. For even better results, choose an index raster computed by the GRUVI or TASCAP scripts in the *Scripts by Jack* series, which captures properties computed from two or more calibrated multispectral satellite image bands (see the *Scripts by Jack* color plates entitled *Mapping Vegetation/Soil Bio-*

Color-infrared display of visible and near-infrared ASTER bands (15-m spatial resolution) for an agricultural area near Yuma, Colorado. Red colors (high near-infrared brightness) indicate fields with good crop cover; the most extensive cover at time of image is in circular fields with center-pivot irrigation. Width of area is 5.7 kilometers.
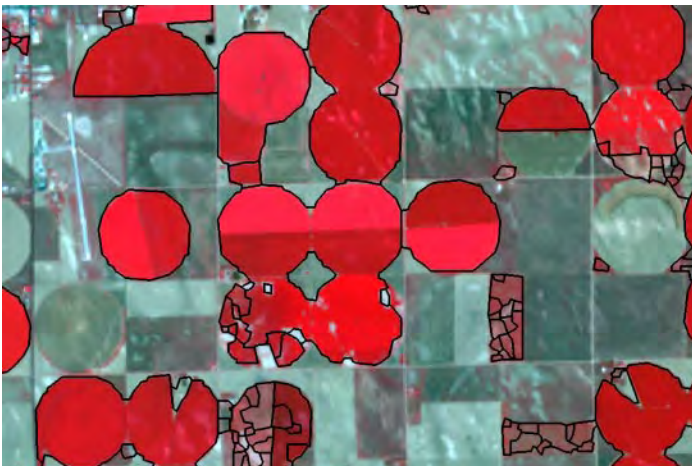
Raw scene object polygons (black borders; no manual editing performed) created by the OBJECT script from the GRUVI raster, overlaid on the ASTER color-infrared display.   Script settings were tuned to omit areas of low biomass, to ignore biomass variations in areas of high biomass, and to reject polygons with areas less than 500 square meters.

physical Properties and *Generalized Mapping of Biophysical Properties* for more information).
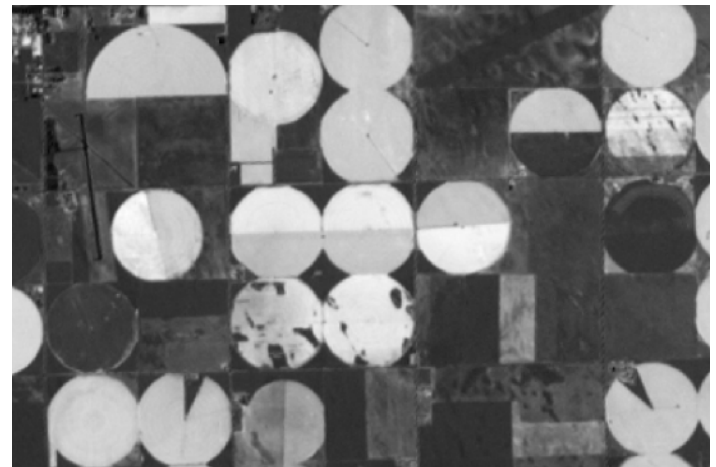
Parameter settings in the OBJECT script allow you to restrict the image segmentation to a particular range of grayscale values. In the example analysis of an agricultural area illustrated here, a GRUVI vegetation index raster was processed using a floor value that omitted cells with little or no vegetative cover and a ceiling value that ignored variations in high biomass areas, resulting in discrete large polygons outlining the fields with full or nearly full crop cover and

GRand Unified Vegetation Index (GRUVI) raster object computed from SRFI-calibrated ASTER near-infrared and red bands using the GRUVI script in the *Scripts by Jack* series of geospatial scripts. Brighter tones indicate higher vegetation biomass. This grayscale index raster was input to the OBJECT script to delineate fields with moderate to high plant biomass.

a series of smaller polygons segmenting fields with moderate but spatially variable crop cover.

Using the specified input value range, the script computes the probability that individual cells lie on connected edges between more uniform areas, and saves the result as an Edge Probability raster. Weak boundaries can be eliminated in this procedure by setting a minimum allowed probability value, and smoothing can also be applied. The remaining edges are then vectorized using watershed functions. Additional settings can be used to filter the resulting vector object, including deleting lines separating the most similar areas, eliminating small polygons, and thinning (smoothing) the polygon boundaries. The set of vector polygons produced by the script can then be refined manually in the TNTmips Editor (not used in producing the illustrations shown here).

The final scene-object polygons can be used in TNTmips to process or analyze other spatial data objects; for example, collect statistical information by polygon from other raster or vector objects and store it in the database attached to the polygons.