Using OGRIP Ohio LiDAR Data

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Introduction

This very brief "how to" guide to using OGRIP's (Ohio Geographically Referenced Information Program) airborne LiDAR (light detection and ranging) data is intended to give an enough information to permit UC faculty and students to use the data. It does not discuss the mechanics of LiDAR in any detail. Folks wishing to know how LiDAR works will find many online sources of information; I have found this pdf prepared by NOAA to be a nice overview.

Before using the data it is helpful to understand that airborne LiDAR "images" are scans of the surface with a pulsed ranging laser. Data are collected as a "point cloud" of x,y,z positions of reflections from the surface. All reflections are recorded including those from trees, bushes, cars, houses, people, etc. It is assumed that the lowest point scanned at a particular x,y position is a reflection from the ground (i.e., the pulse that penetrated the tree canopy was reflected back to the sensor from the ground). Penetration to the ground can't happen, of course,

PRODUCTS AVAILABLE FOR DOWNLOAD

IMAGERY:

1FT Color County Mosaic MrSID format ~30:1 compression
6IN Color County Mosaic MrSID format ~100-150:1 compression

DIGITAL ELEVATION MODEL (DEM)
TILED 2.5 Foot Grid DEM - ESRI GRID Format Archived by County
TILED 2.5 Foot Grid DEM - ASCII Format Archived by County

LiDAR
TILED ~2 Meter LiDAR 1st and Last returns LAS Format Archived by County

DOWNLOAD OSIP PRODUCTS BY COUNTY

DOWNLOAD OSIP PRODUCTS BY Tile (Map Viewer)

TILE LAYOUTS BY STATEPLANE ZONE:

State Plane North 1FT products (5000' x 5000')
State Plane North 6IN products (2500' x 2500')

State Plane South 1FT products (5000' x 5000')
State Plane South 6IN products (2500' x 2500')

Statewide CIR products (15000' x 15000')

OSIP WEB SERVICES

ArcIMS Web Service connection information:
Server Name =http://gis1.oit.ohio.gov
Service Name=osip
Service Type=image

OGC WMS Service connection string (Note: This is not a clickable link):
http://gis1.oit.ohio.gov:80/wmsconnector/com.esri.wms.Esrimap/osip?

WEB SERVICES CONNECTION DOCUMENTATION

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Web: http://www.ohio.gov/ogrip

Figure 1

through buildings.

OGRIP has LiDAR for the entire state in several formats including point clouds of ground reflections, and DEMs in various formats readable by ESRI products and Global Mapper. Because I much prefer Global Mapper, I use it here but the same thing can be done with ESRI products.

Getting the data

The data may be downloaded either for an entire county or as individual "tiles" from the OGRIP website (Figure 1). Tiles are 5,000 feet by 5,000 feet. Shapefiles for the "footprints" of the tiles are available for northern and southern Ohio. Data for northern and southern Ohio are projected in NAD 1983, StatePlane Ohio North, FIPS 3401, Feet and NAD 1983, StatePlane Ohio South, FIPS 3402, Feet respectively. The data for counties are enormous (several GB) zipped files of tiles for that county. In most cases, it's easier to download the individual tiles of the area of interest. This is done with OGRIP's interactive OSIP Imagery and Elevation Data viewer (Figure 2). Use the *zoom in* tool, 

, to enlarge the area of interest (individual tiles will not be available until the area is "zoomed in" sufficiently). Once the tile outlines and labels are visible (Figure 3), select the tile using the *add to selection* tool, 

, to select it for download. Use the the *add to selection* uto add all of the tiles you wish to download (they'll appear in the *Downloads* box to the right of the map).

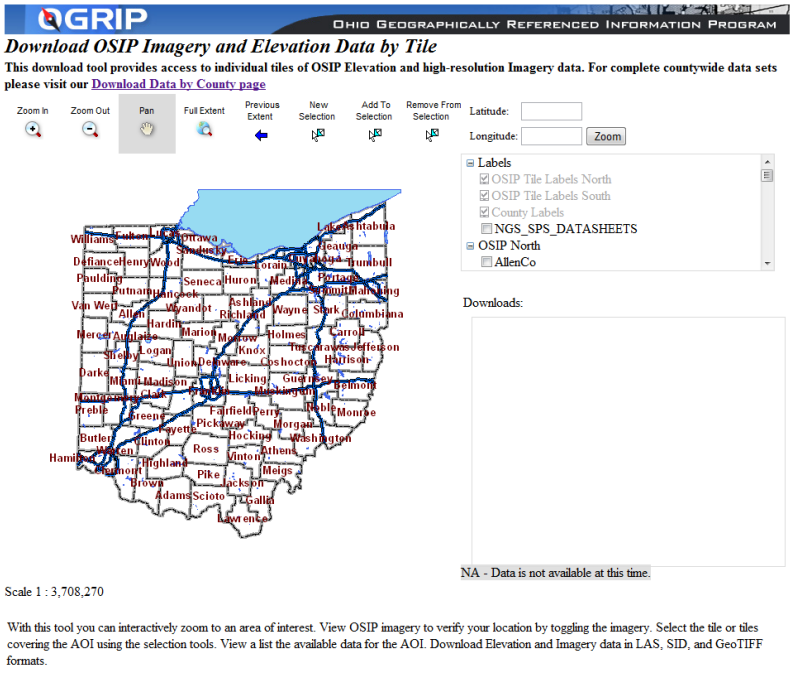

Figure 2

The ID number of the tile is listed in the Downloads box along with all of the datasets that are available for download. TIFF is a very large, high resolution color photograph in uncompressed GEOTIFF format. SID is the same image in LizardTech's MrSID format (both formats are readable by Global Mapper or ESRI products but the MrSID image is much smaller, downloads much faster, and, as far as I can tell, causes little or no loss of information… at least as far as my eyes can tell). LIDAR is the raw ground return point cloud of x,y,z triplets. GRID is a processed DEM of ~1m^2 IFOV in ESRI grid format and ASCII is the same thing in ESRI ASCII grid format. Click the appropriate hyperlink in the *Downloads* box to download the data.

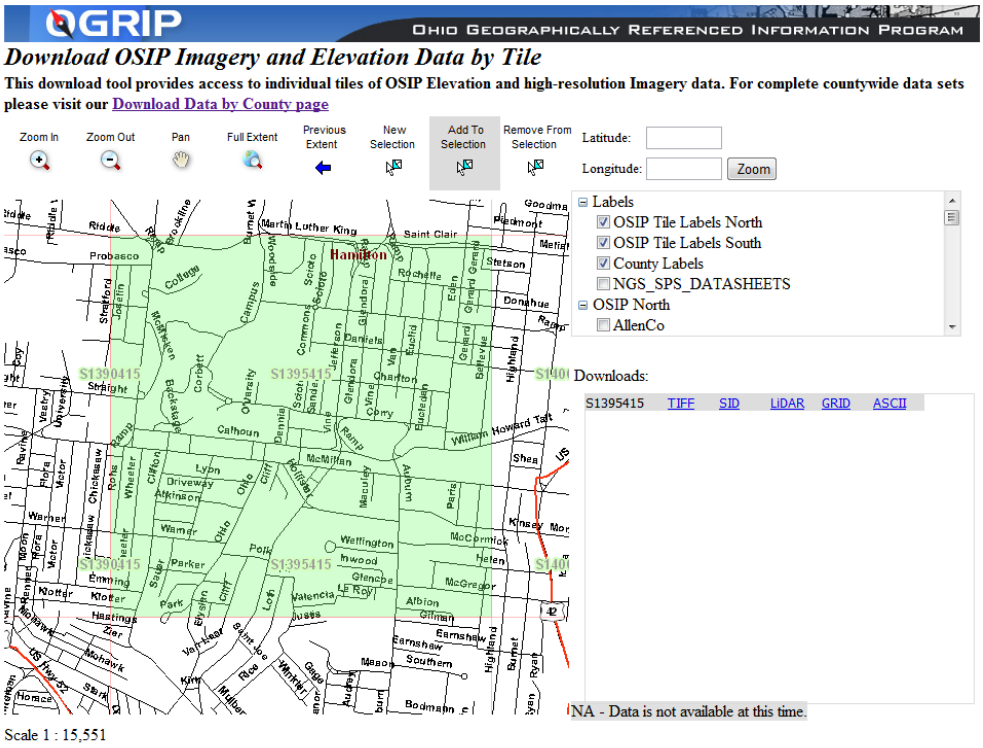

Figure 3

Reading the data

Working with Geotiff or MrSID formatted images will not be discussed here. Suffice it to say, both formats are easily ready by either Global Mapper or ESRI Products although you probably will need to specify the projection (NAD 83, SP Ohio north or south, feet). **Figure 3** shows the tile image for the UC West Campus.

If we add the LIDAR dataset (the point cloud), Global Mapper realizes it's a point cloud and queries whether it should convert the dataset to a 3D format similar to an ESRU TIN (triangulated irregular network) (**Figure 5**). Let's say "No" so we can look at the actual point cloud (**Figure 6**).

If we know reload the LIDAR point cloud specifying that Global Mapper should generate the TIN, we get a fascinating "uncorrected" image(**Figure 7**). Note we can see cars on Clifton

avenues and details of the roof of DAAP. Tree trunks are also visible.. The barely visible blue dots are the position of the individual ranged ground reflections in the LiDAR point cloud. Note that they are irregularly but closely spaced and are located all over the place.

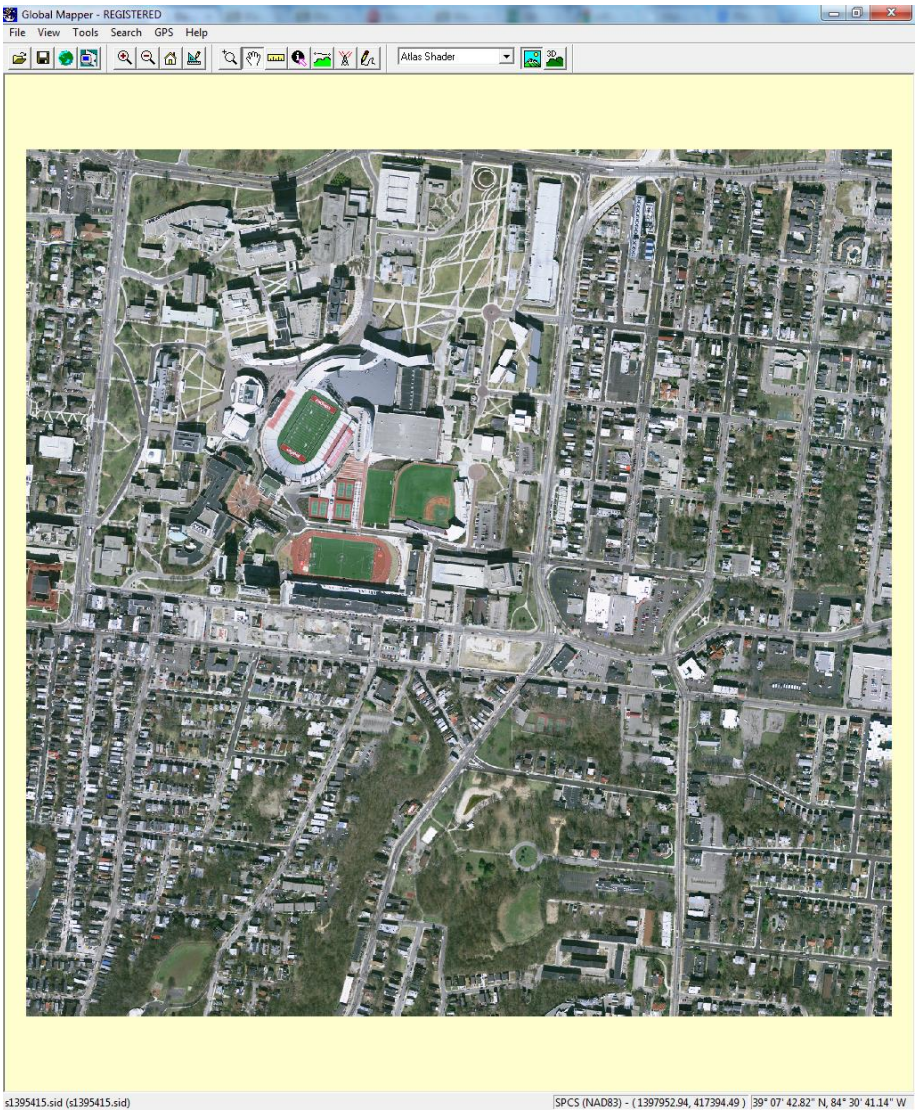

Figure 4

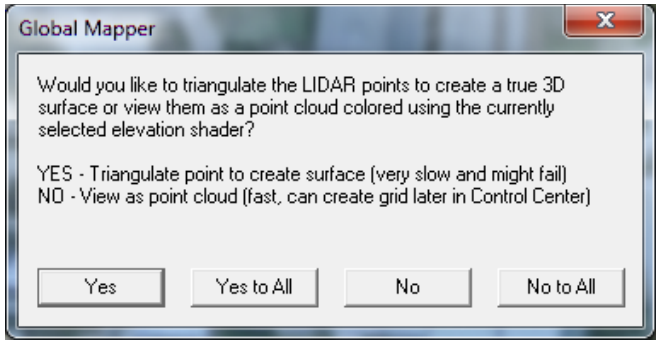

Figure 5


Global Mapper - REGISTERED
File View Tools Search GPS Help
Atlas Shader
<NO LABEL> Unknown Point Feature
SPCS (NAD83) - (1396098.76, 418585.18)
39° 07' 54.18" N, 84° 31' 05.00" W

Figure 6

If we know reload the LIDAR point cloud specifying that Global Mapper should generate the TIN, we get a fascinating “uncorrected” image(**Figure 7**). Note we can see cars on Clifton avenues and details of the roof of DAAP. Tree trunks are also visible.

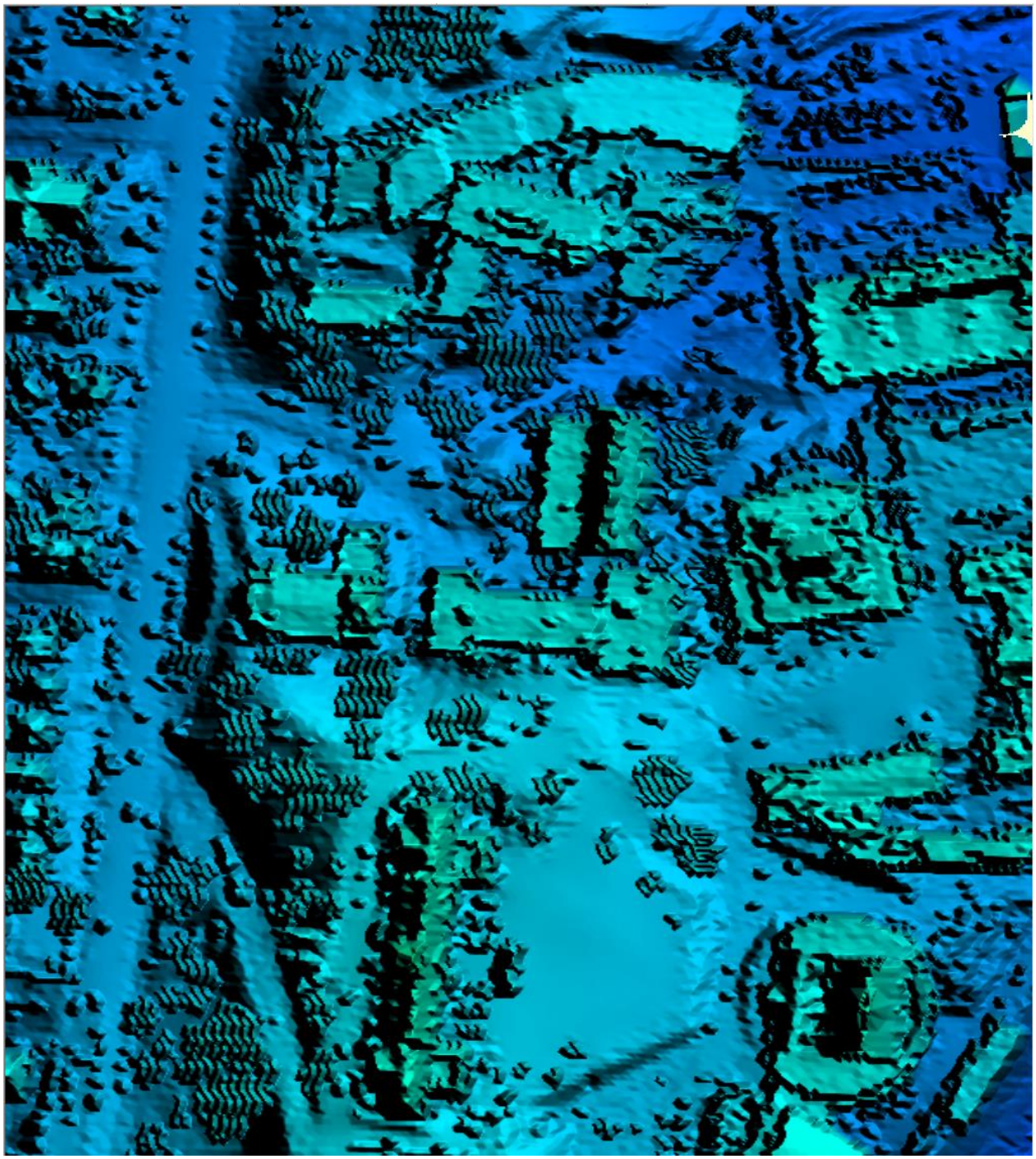

Figure 7

Figure 8 is the same area in the GRID or ASCII datasets. Compare it with Figure 7and notice that many of the cars and trees are removed. Also note that many of the building have been

removed (after a fashion). I speculate that the processing computer has no difficulty recognizing returns from a roof and projects the adjacent ground surface under the building. Although this appear to work well for small buildings (houses), the ground below large buildings looks odd.

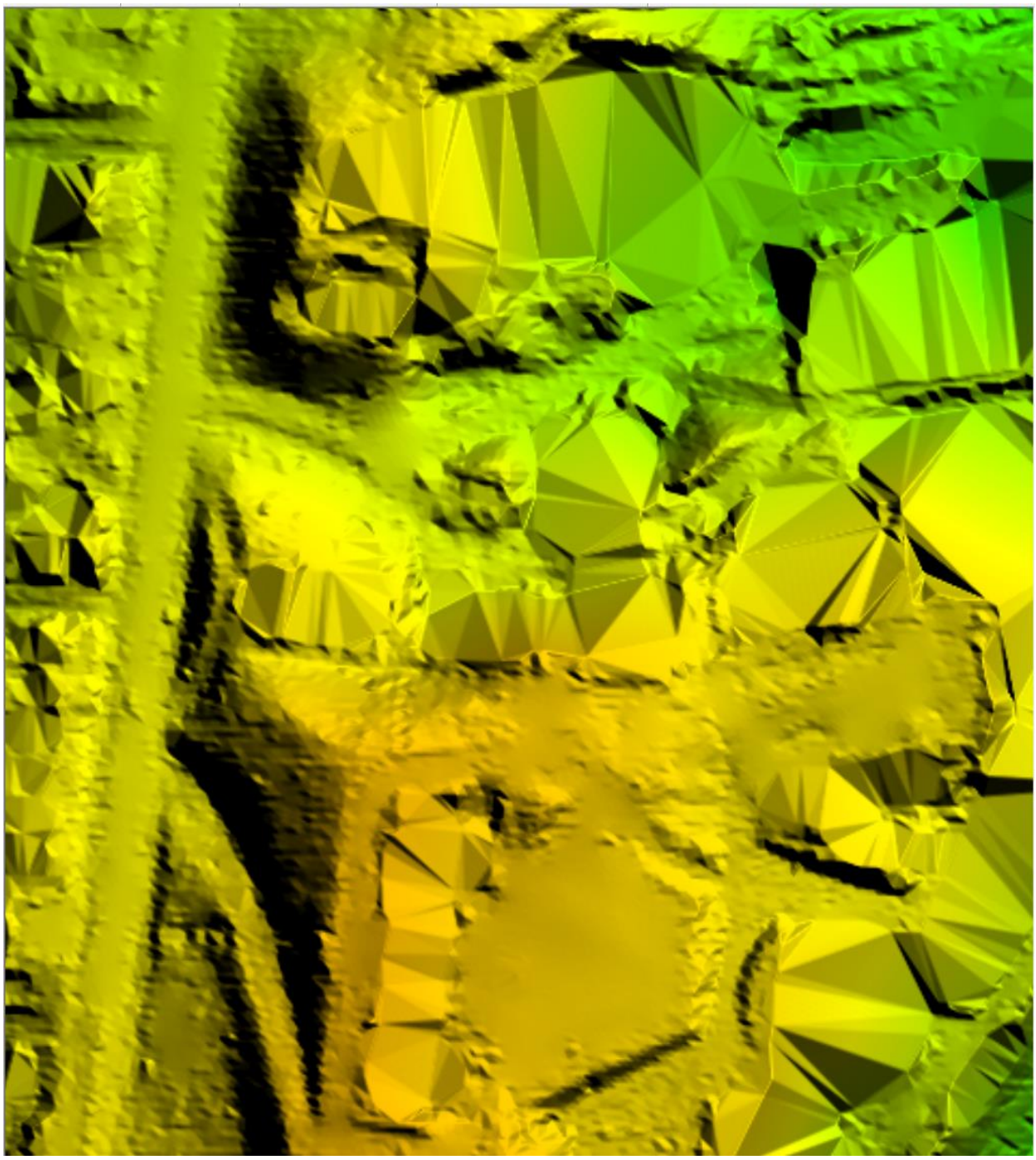

Figure 8

Let's take a look at the peculiar conical, art earthform indicated by the white arrow in **Figure 9**. I must confess I never have understood this particular art piece (although I generally like

earthform art and really like the wave field by DAAP). Let's excise that part of the corrected LiDAR dataset and work with it in ArcMAP.

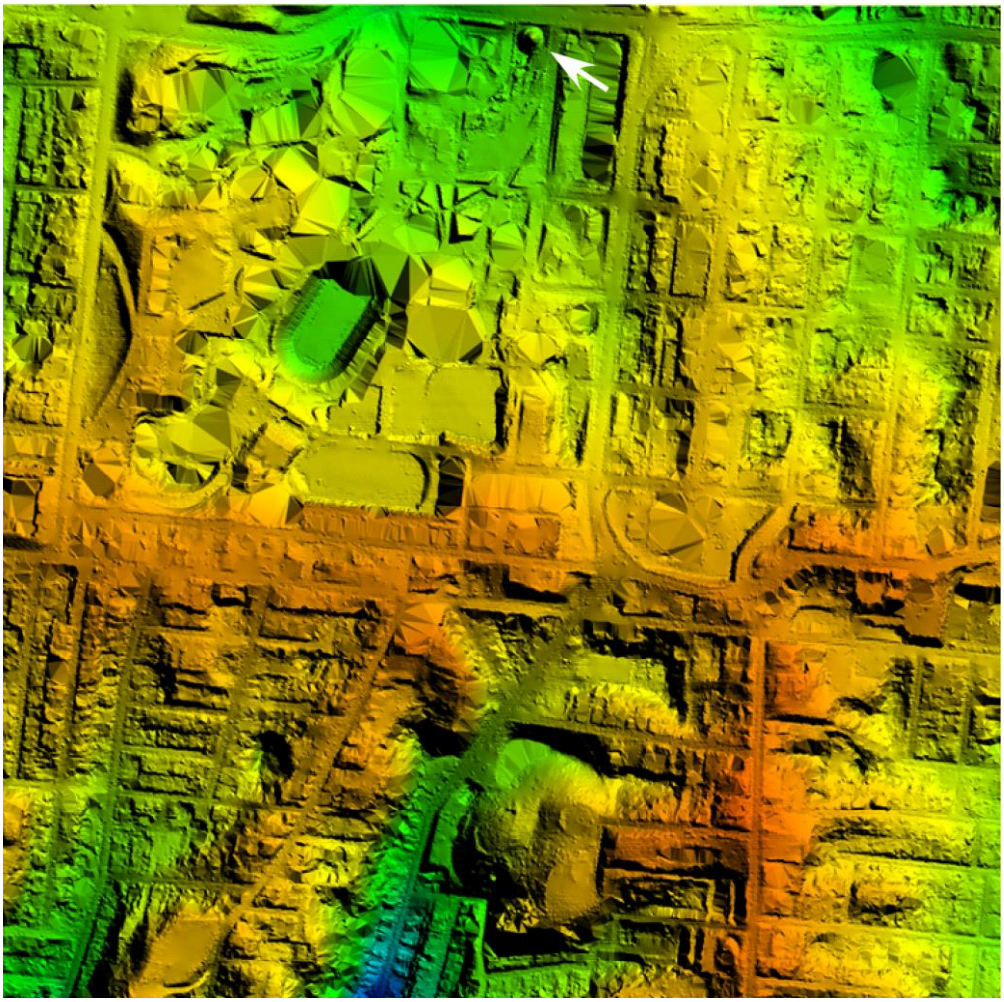

Figure 9

Zoom in on the cone (Figure 10) and in Global Mapper pulldown ***File>Export Raster and Elevation Data>Export Arc ASCII Grid***. Click the Export Bounds tab on the resulting dialog box (**Figure 11**). In the resulting dialog box (**Figure 12**), click the Draw Box button and click and drag over the cone in the resulting image to select the area to export (**Figure 13**).

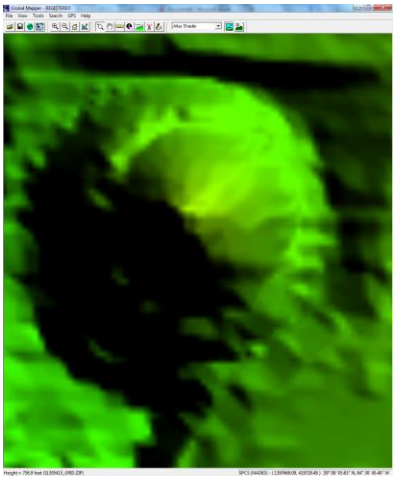

Figure 10

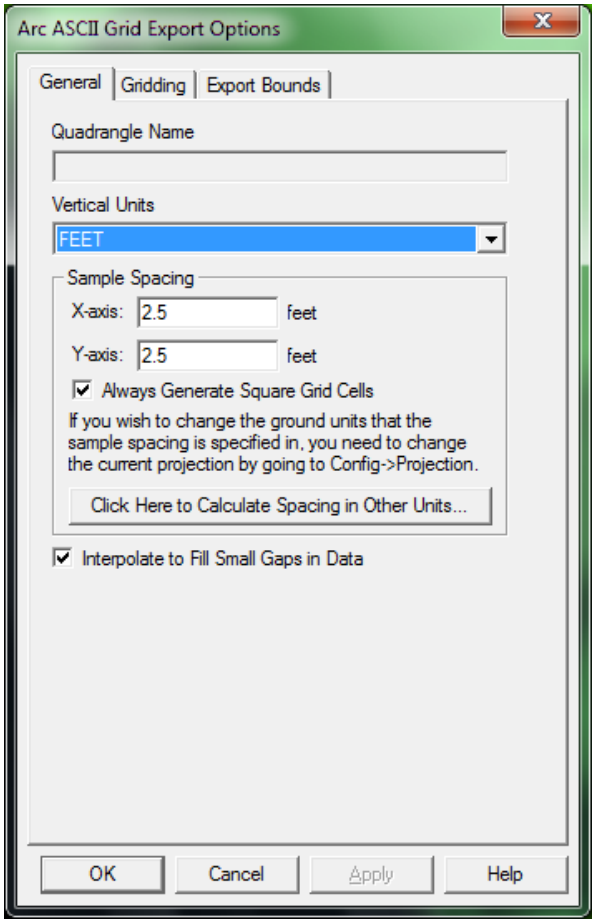

Figure 11

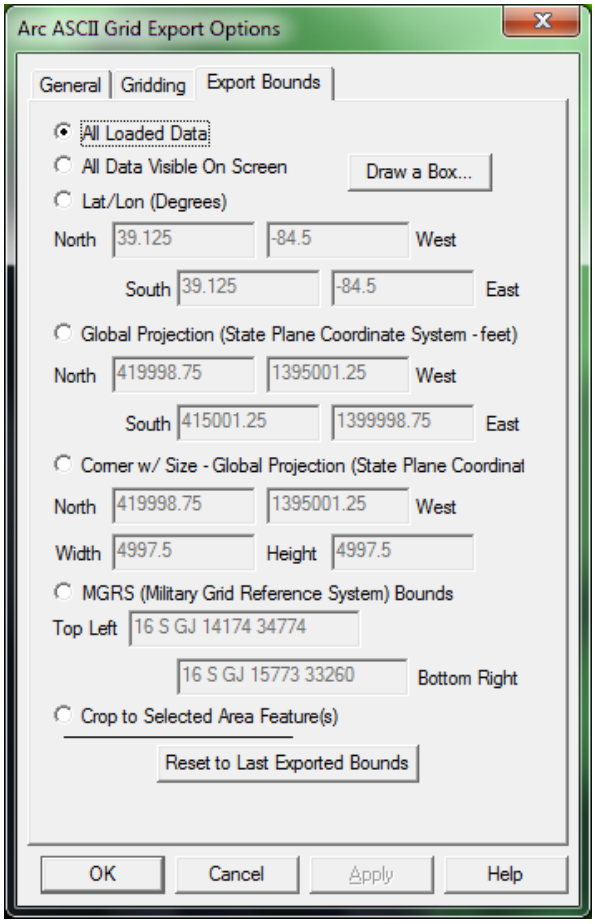

Figure 12

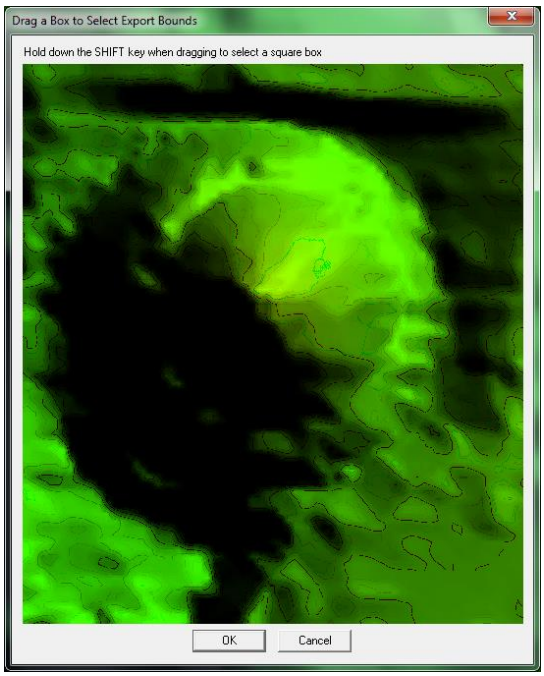

Figure 13

Add the extracted data to ArcMAP and use Surface Analysis in Spatial Analyst or 3D Analyst to create a hillshade image (Figure 14).

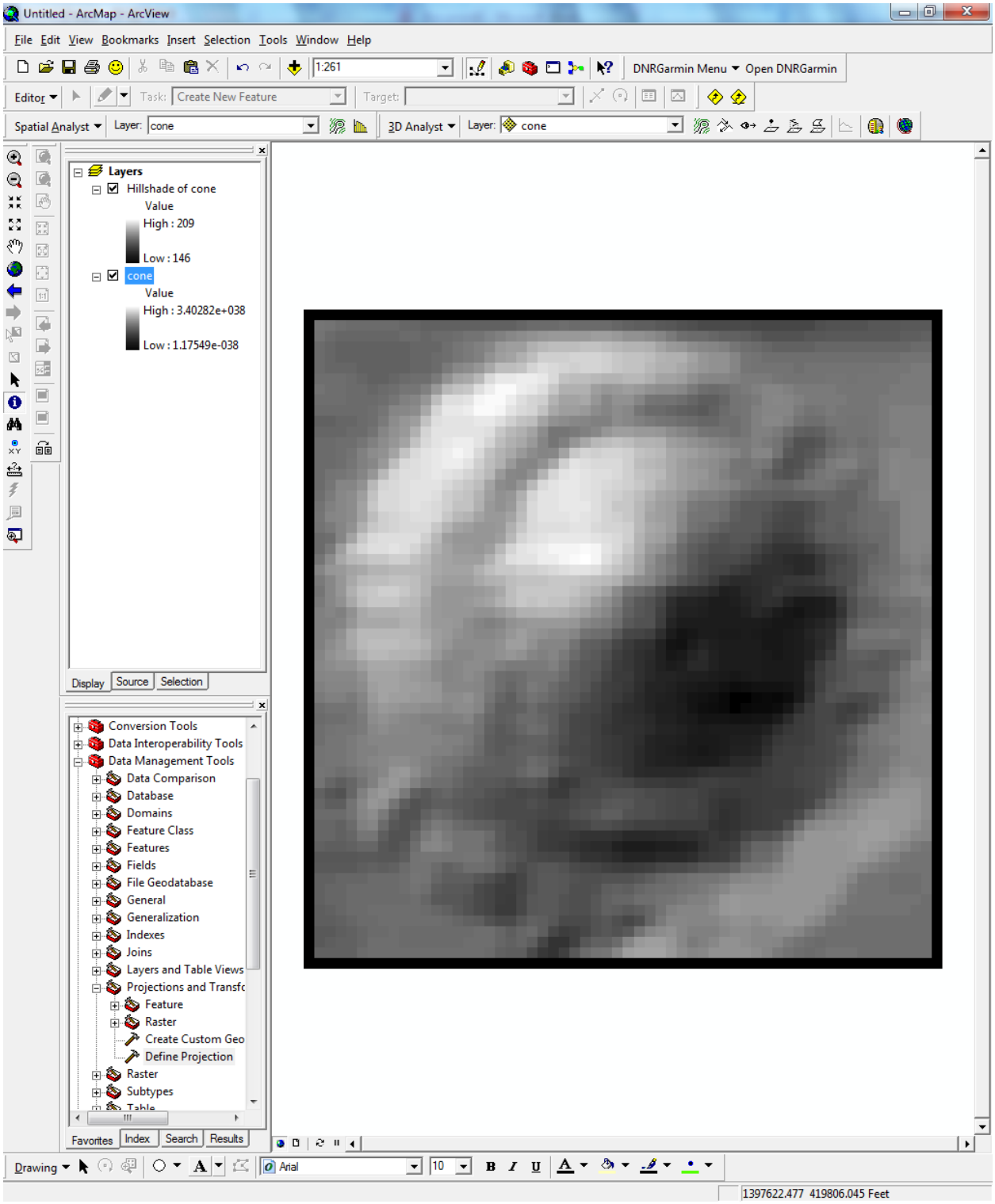

Figure 14

Use Surface Analysis in Spatial Analyst or 3D Analyst to create a contour shapefile of the object (**Figure 15**Figure 14).

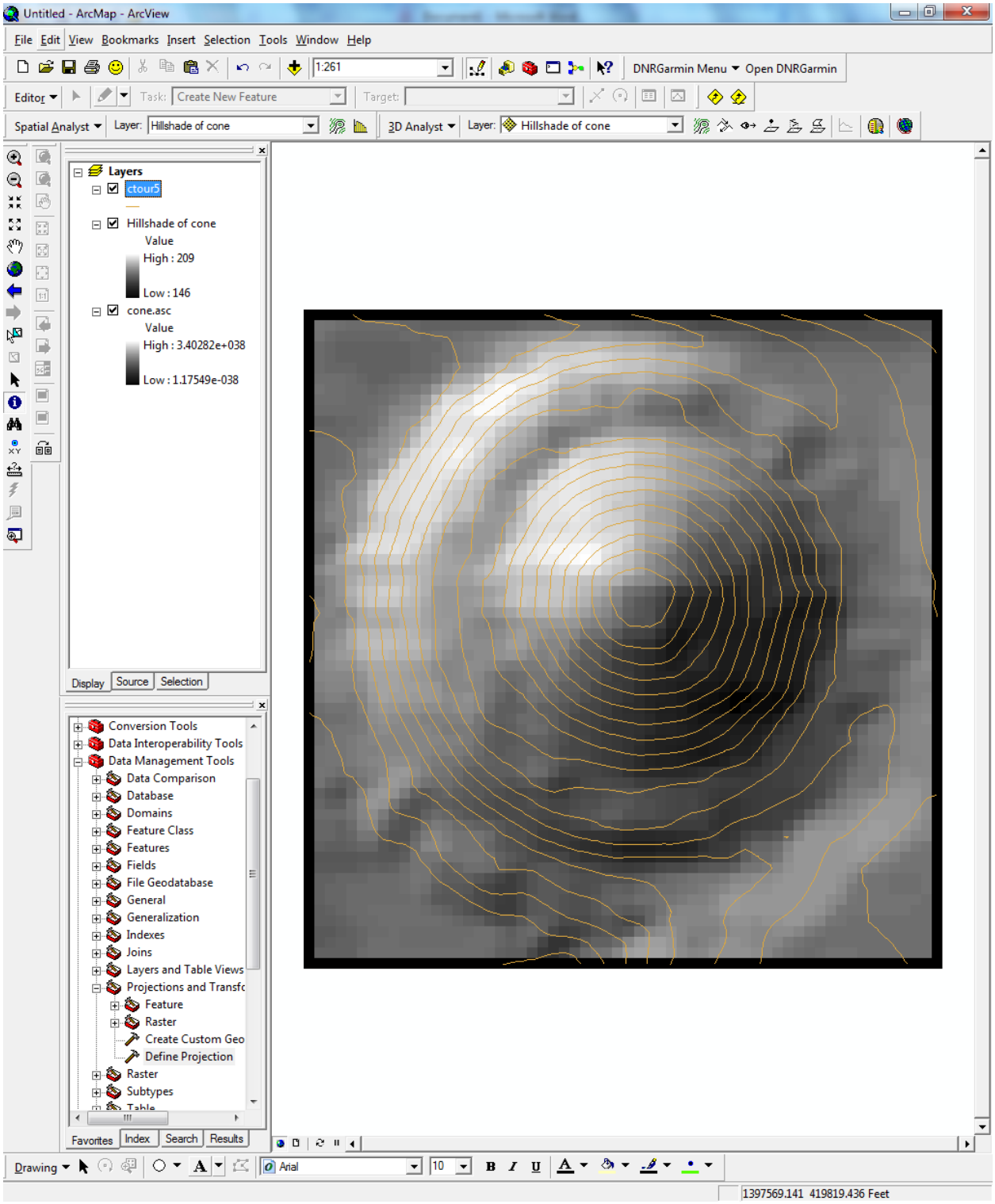

Figure 15

Spin it around in ArcScene (Figure 16).

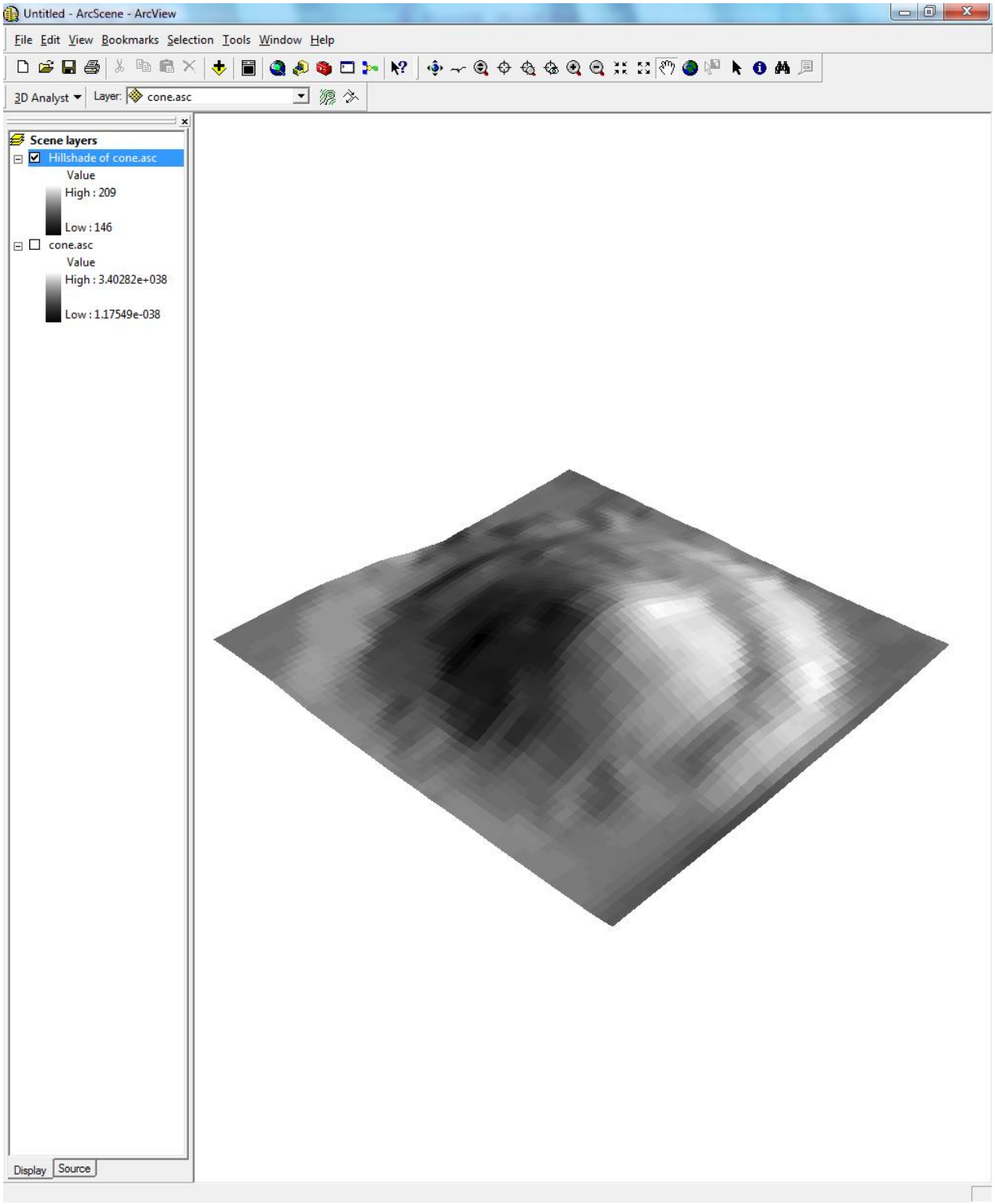

Figure 16

You can even drape the Geotiff over it (Figure 17)!

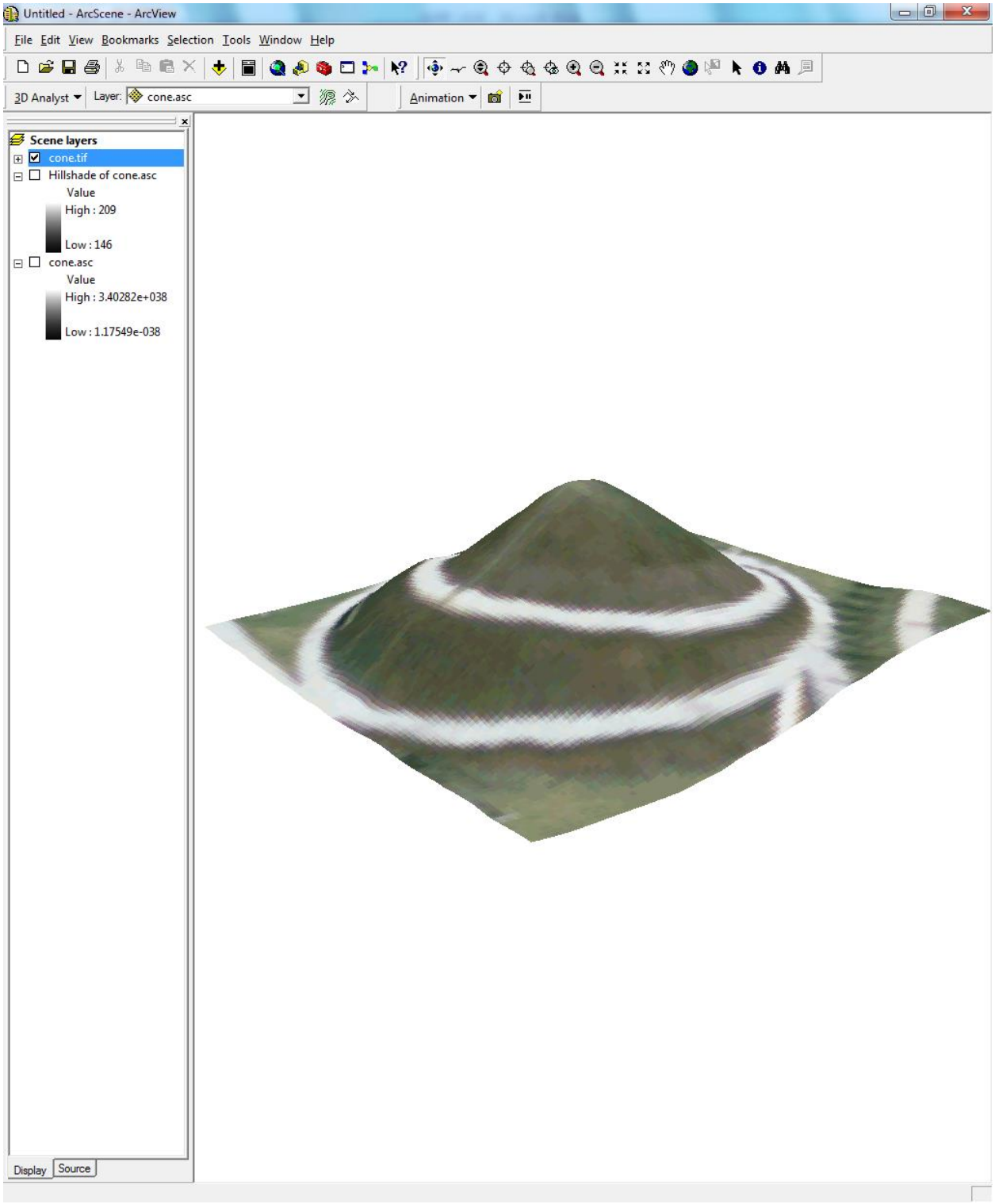

Figure 17