
# Google Earth and NITF Integration for PLY Files


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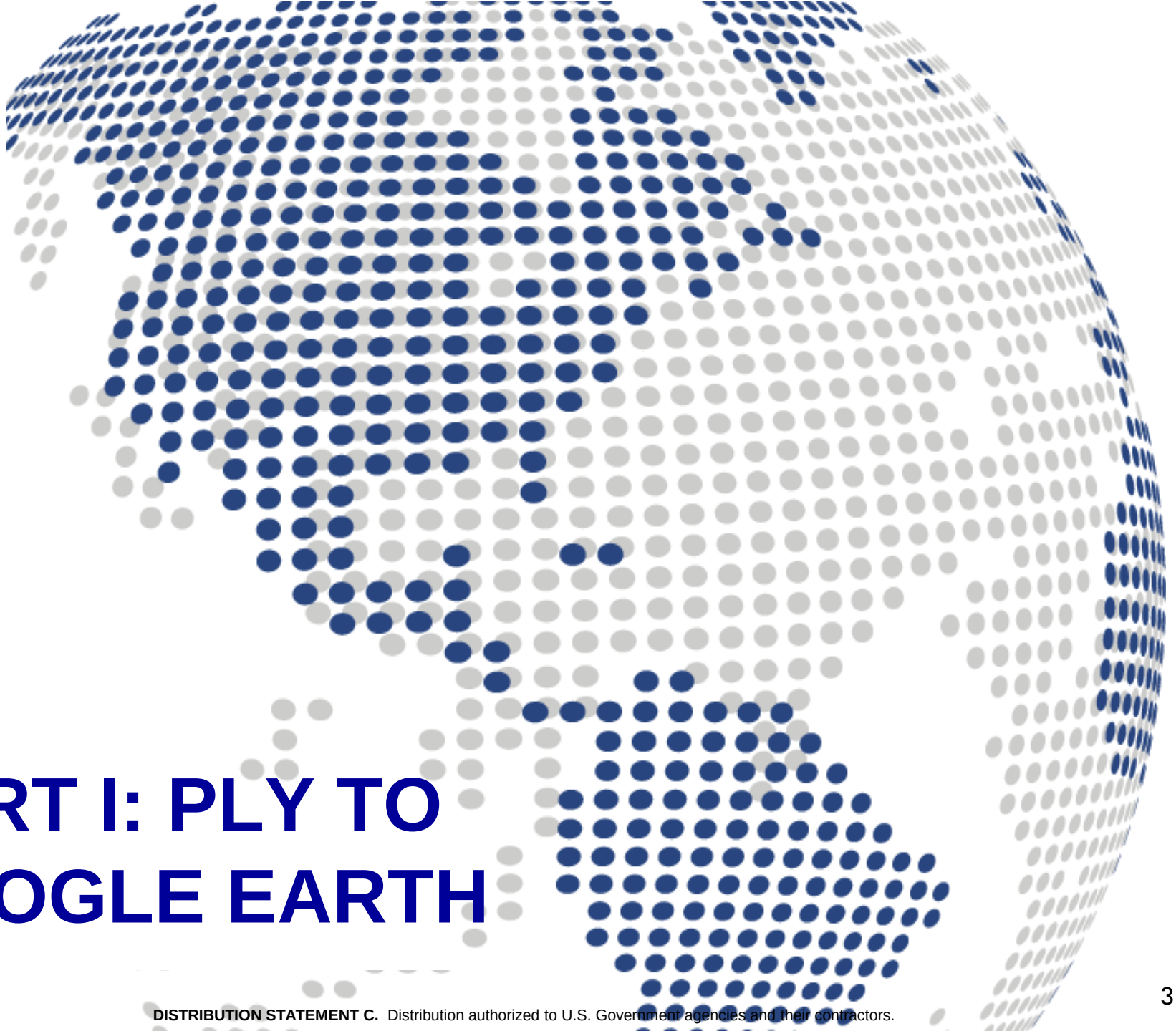
# Objective

- The main project centers around a UAV flying an orbit around a target while scanning the target with a camera and converting the scans into a full 3D model of the object.
- The main objective of this portion of the project is to interface that 3D file with a viewing tool like Google Earth.
- In addition to this goal, we would also like to convert the 3D model into a military format (like PRI or NITF) to make it more useful.



# PART I: PLY TO GOOGLE EARTH

# Approaches

I went through many approaches to get to the final process


TestA_0.ply

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format ascii 1.0
element vertex 4082571
property double x
property double y
property double z
property uchar red
property uchar green
property uchar blue
element face 1360857
property list uchar int vertex_index
end_header
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-1197.765676826414 1513.000279445262 239.928490626079 114 141 107
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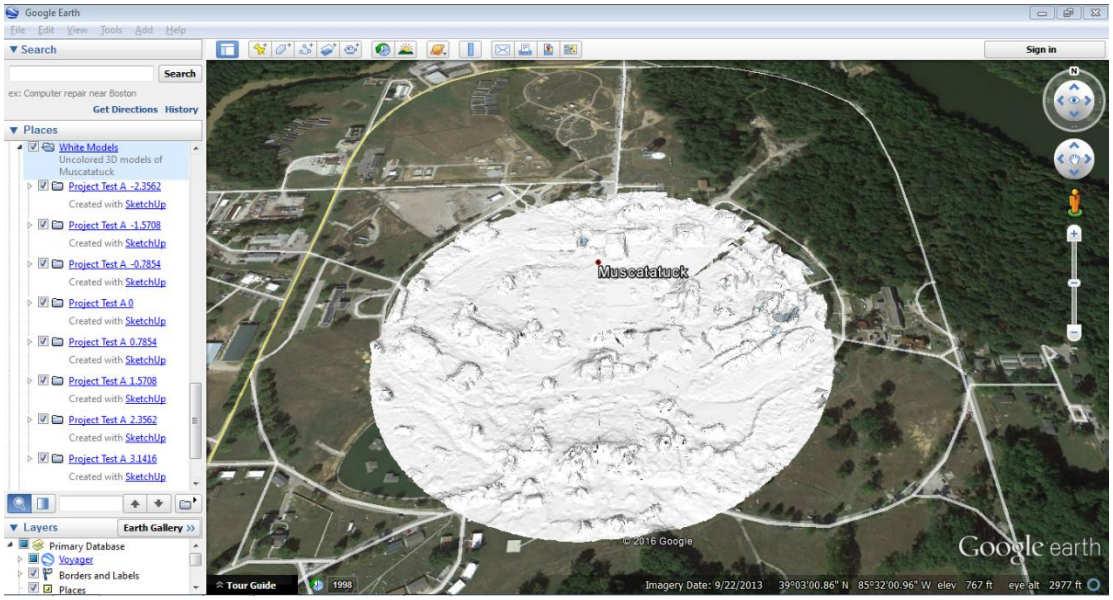



# Tools

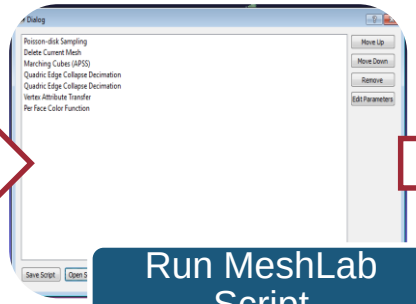



- Google Earth
- Notepad++
- MeshLab
- SketchUp Make 2016

# Final Process

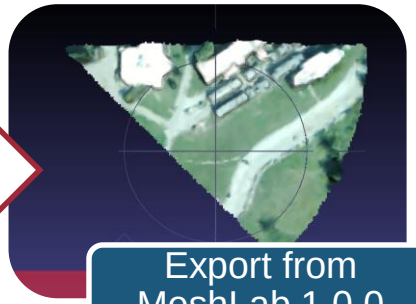
The final approach involves simplifying the PLY file, saving the color per face, exporting to SketchUp, and saving it as a KMZ file to view in Google Earth


Original PLY



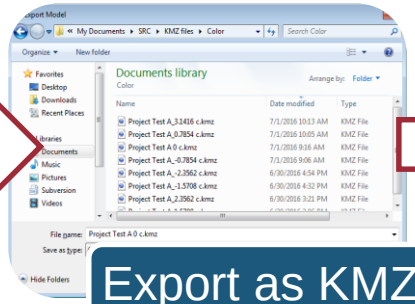
Run MeshLab Script


Simplified PLY


Export from MeshLab 1.0.0


Geo-locate in SketchUp


Import & Align Model

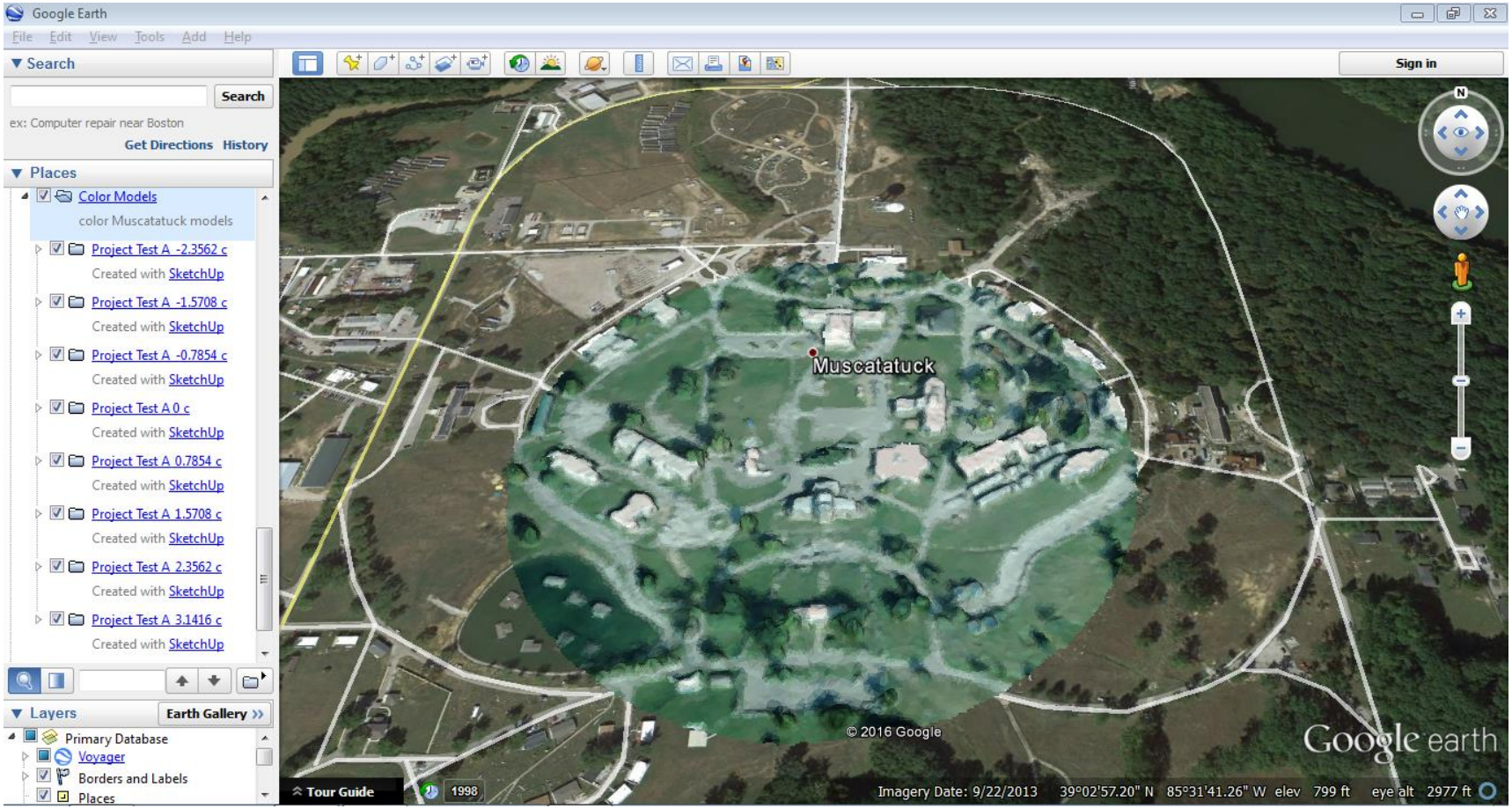


Export as KMZ


View in GE

# Final Result

All PLY files were converted to KMZ files and viewed in Google Earth



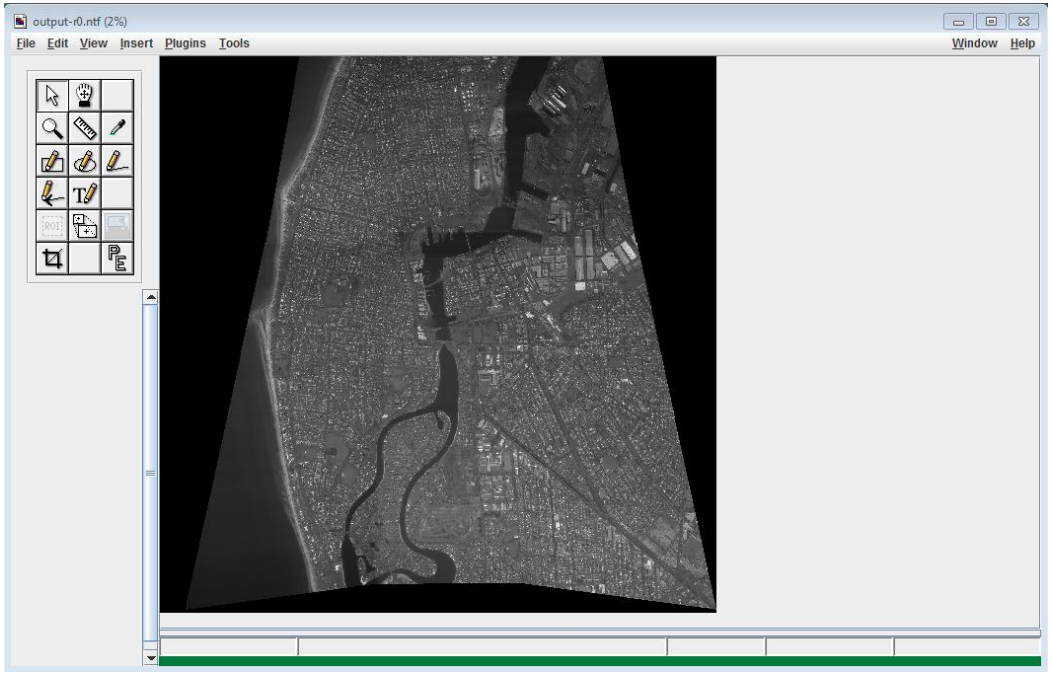
# PART II: PLY TO NITF

# NITF & PRI

- NITF is the National Imagery Transmission Format Standard, a DoD standard file format for the exchange and storage of digital images.
- PRI, or Portable Reference Image, is a type of NITF which saves an image with embedded elevation data.
- PRI files are used to support targeting.

# Approach

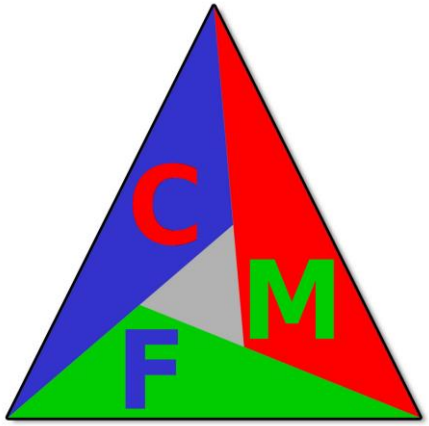
- Get DINGO PNG -> NITF conversion code working

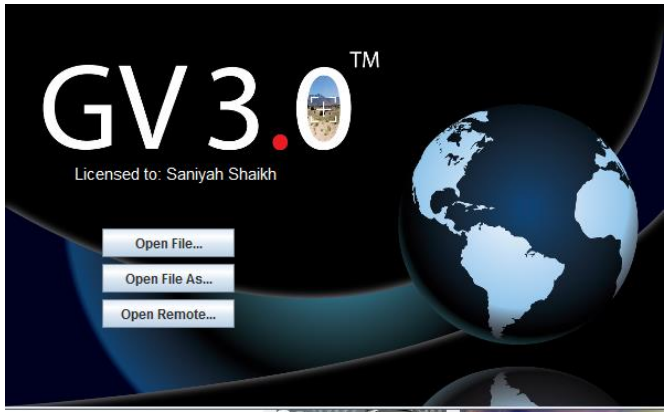



- Modify code and arguments to read color PNGs and output color NITF files
- Add elevation data to generated NITF to make PRI file

# Tools

- GV 3.0
- Cmake
- Visual Studio
- Notepad++

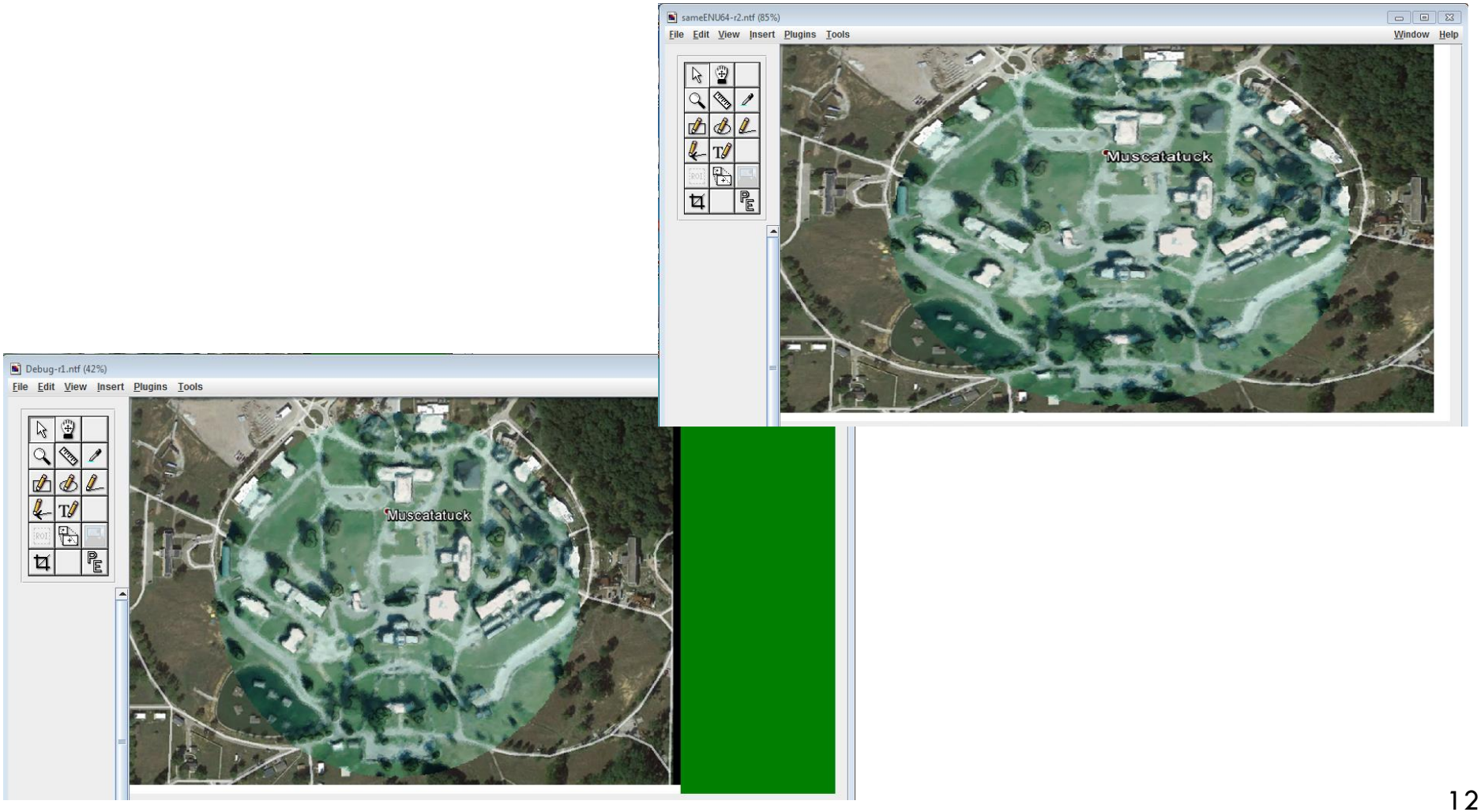




# Final Result

Color NITF files created from a PNG image of the PLY files in Google Earth



# Future Work

- Improve positioning of models in Google Earth
  - Clamp models to ground or terrain
- Improve NITF files
  - Increase resolution
- Turn the NITF files into PRI files
  - Read elevation data from PLY files
  - Map JPEG pixels to vertices in the PLY file
  - Add elevation data to NITF files
- Automate the process to create KML and NITF/PRI files directly from PLY files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