

Remote Sensing Change Detection

The remote sensing analysis was actually done quite simply (one I figured out how to) using QGIS. I will go through each of the steps of the analysis and the accompanying files in the folder.

1. First I used the SA-TIED data (your data) to detect known mining areas. I did this in Google Earth Enginge.

- (a) Load in the datapoints from the datafile.
- (b) add a raster layer (the newest with respect to the given time-series you are looking at), in order to actually see the mines on a satellite image.
- (c) From here I actually just zoomed in on the mines and manually draw polygons around them, giving each of the a name and lastly saving them all in one shapefile.

Earth Engine script: <https://code.earthengine.google.com/?scriptPath=users%2Fannabeckthelin%2Ftest%3ACreate%20mine-polygons>

Output folder: "01 Mine Polygons - Bojanala Platinum District"

- (d) Lastly, to visually see if the mine changed whithin the polygons over time, I created a new script with a raster-layer for each year I was considering and added the polygons on top. This was just a visual "test" and not something I used for the analysis.

Earth Engine script: <https://code.earthengine.google.com/?scriptPath=users%2Fannabeckthelin%2Ftest%3ALandsat8%20Mine%20Bands>

2. Next I created the albedo calculated satellite images.

- (a) I downloaded the relevant top of atmosphere (TOA) reflectance corrected satellite images via United States Geological Surveys (USGS) EarthExplorer (descriptions in thesis).
- (b) The output from USGS is a folder containing each of the bands from the given image.

Output folder (one example): "02 USGS TOA corrected images (2014)"

(c) I uploaded the relevant rasters (band 2,3 and 4) into QGIS and simply used the raster calculator to calculate the diffuse visible albedo layers (equation in thesis).

Output file: "03 alb. 2014 image.tif"

3. As a last step in data process, I used R to extract and evaluate the pixelvalues within the mine-polygons.

R script: "04 R_{extract_pixelvalues}.R"