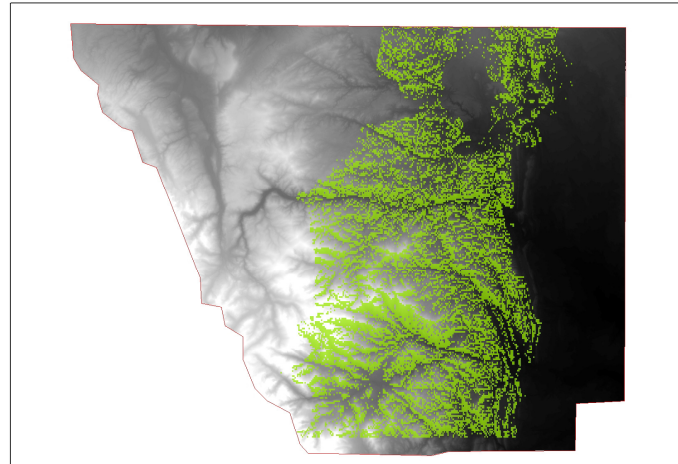
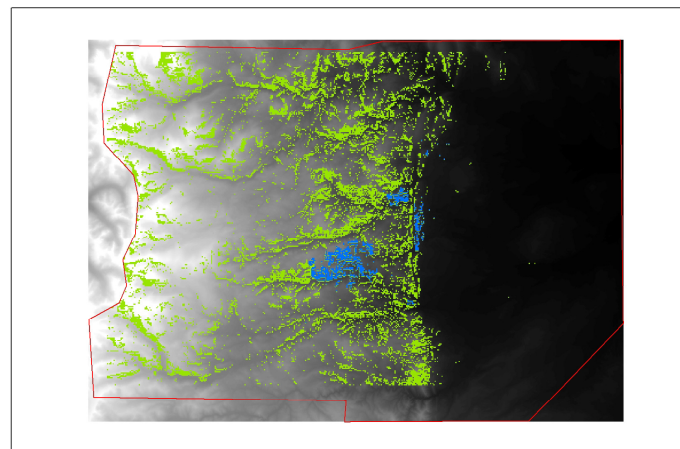


Possible Landslide Initiation Points in Boulder and Larimer County

Larimer County



Boulder County



Conclusion

After creating the two maps of Boulder and Larimer County, I went back into Google Earth to check my model. I checked Google Earth in areas of high concentration of green (from the maps I made) and saw that landslides had occurred, but I also checked areas with very low concentrations and saw none, so my model was relatively accurate. One problem I did face was that I did not have the timing at which the landslides occurred, so I can only assume that they happened after six inches of rain when they may have triggered with lesser amounts of rain.

Sources

- <http://viewer.nationalmap.gov/viewer/>
- <http://water.weather.gov/precip/download.php>
- Godt, J.W., Coe, J.A., Kean, J.W., Baum, R.L., Jones, E.S., Harp, E.L., Staley, D.M., and Barnhart, W.D., 2014, Landslides in the northern Colorado Front Range caused by rainfall, September 11-13, 2013: U.S. Geological Survey Fact Sheet 2013-3114, 6 p.
- <https://www.bouldercounty.org/dept/adminservices/pages/bouldercountygis.aspx>

Dr. Robert Jarrett: I was in contact with him; a scientist who lives and has worked in Colorado for years studying hydrology and other geological aspects in Colorado.

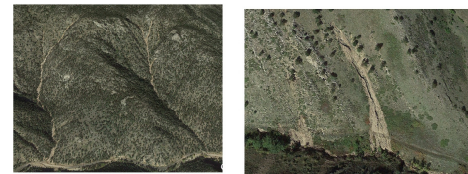
Shane Scoggin
South Lakes High School
shane.scoggin@gmail.com/703-597-0173

During the week of September 9th, a large rainstorm dropped many inches of rain over Colorado. Due to the amount of rain, landslides occurred and caused damage to much of the environment of the Colorado Front Range in Boulder and Larimer Counties. For this project, I used

- NWS precipitation data to assume total rainfall through that week
- Digital Elevation Models for Boulder and Larimer County (used for aspect and gradient maps)
- Land cover to determine which environments were susceptible to landslides and which were not
- Wildfire outlines to get critical values for precipitation, gradient, aspect and land cover for where landslides might occur
- Google Earth to observe the imagery over the Front Range (imagery was from October 6th, 2013). I saw four slides in a burnt area and used those values for a baseline
- The critical values I obtained were
 - Slope greater than 7%
 - Greater than 6 inches of rain(total)
 - Slope facing East, South, and West (67.5°-292.5°)
 - Land cover that was barren, evergreen forests, shrub/scrub, or grassy

I reclassified my maps into categories that were favorable or unfavorable for landslides to occur, and then multiplied them together to create my final maps which represent areas that are prone to landslides according to my model.

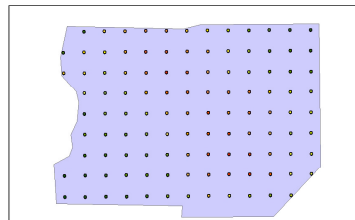
Landslides I observed in Google Earth after creating this model. I searched in areas that had a high concentration of green



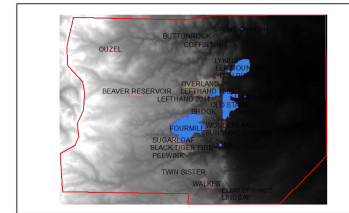
Blue Possible Initiation Points in Wildfire Areas
Green Possible Initiation Points



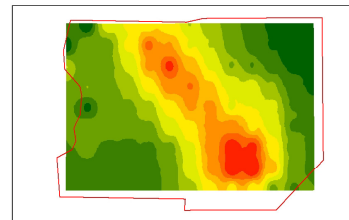
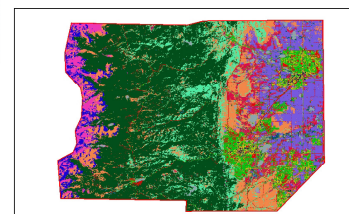
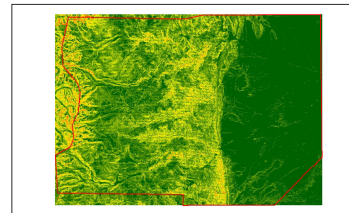
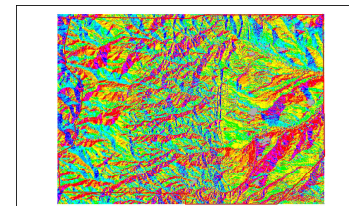
Dots represent precipitation, in inches



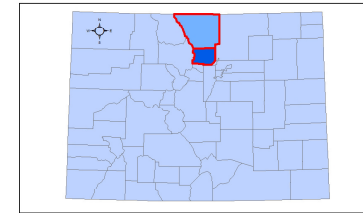
Wildfires



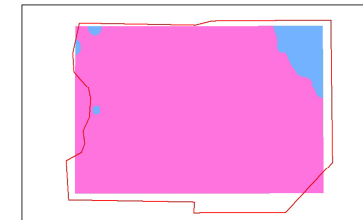
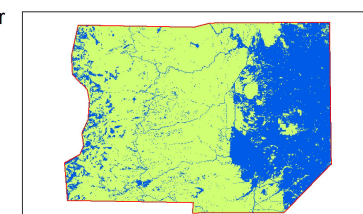
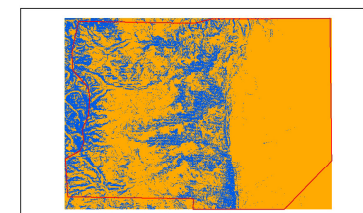
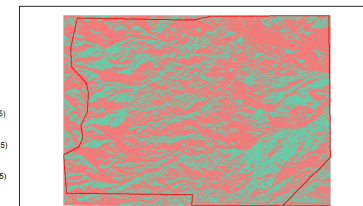
Pre-reclassification



Colorado



Post-reclassification



Aspect

- Flat (-1)
- North (0-22.5)
- Northeast (22.5-67.5)
- East (67.5-112.5)
- Southeast (112.5-157.5)
- South (157.5-202.5)
- Southwest (202.5-247.5)
- West (247.5-292.5)
- Northwest (292.5-337.5)
- North (337.5-360)

Gradient

- 30.1 - 77.7
- 36.3 - 96
- 20.2 - 26.2
- 15.9 - 20.1
- 10.6 - 15.8
- 9.46 - 12.5
- 6.71 - 9.45
- 3.07 - 6.7
- 1.53 - 3.96
- 0 - 1.52

Landcover

- 11
- 12
- 21
- 22
- 23
- 24
- 31
- 32
- 33
- 34
- 41
- 42
- 43
- 44
- 51
- 52
- 53
- 54
- 55
- 56

Rainfall

- 15.2 - 17.9
- 13.9 - 15.1
- 13 - 13.8
- 12.1 - 12.9
- 11 - 12
- 9.63 - 10.9
- 8.35 - 9.62
- 7.22 - 8.34
- 6.05 - 7.21
- 4.27 - 6.04