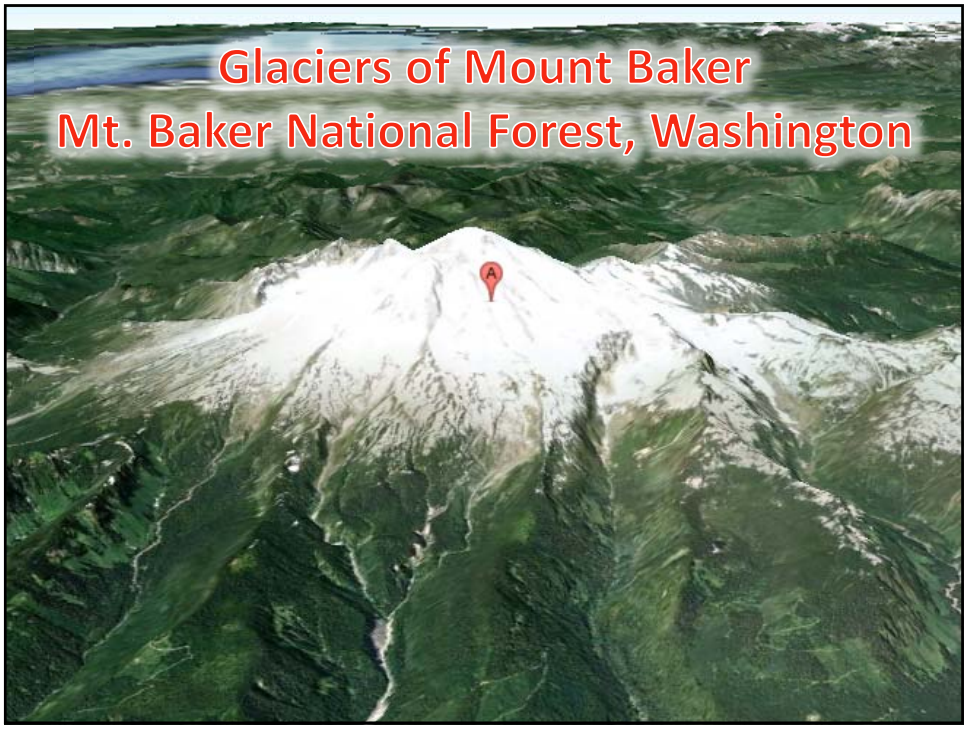
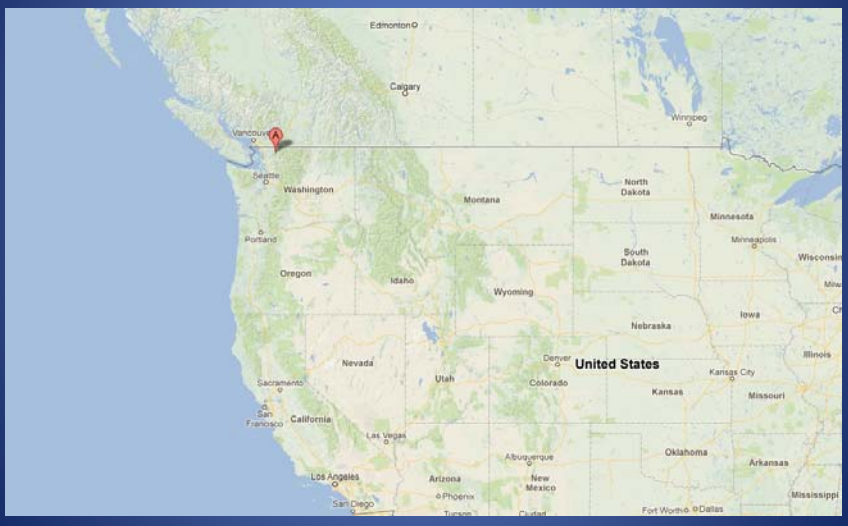
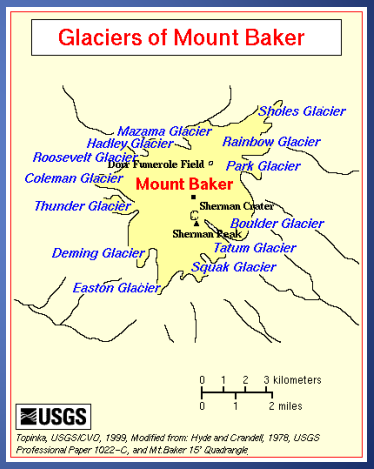


Area of Study



Mt. Baker Glaciers

- Bastile Glacier
- Boulder Glacier
- Coleman Glacier
- Deming Glacier
- Easton Glacier
- Hadley Glacier
- Mazama Glacier
- No Name Glacier
- Park Glacier
- Rainbow Glacier
- Roosevelt Glacier
- Sholes Glacier
- Squak Glacier
- Talum Glaciers
- Thunder Glacier



- Coleman Glacier is the largest of the glaciers.
- Boulder the most dramatic over the years.
- All retreated rapidly during early 1900's.
- Advanced from 1950-1975.
- Increasingly retreating since 1980.

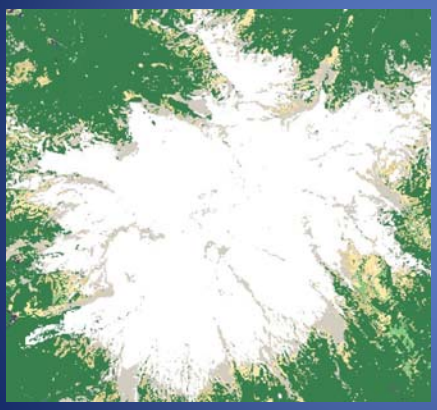
Objective

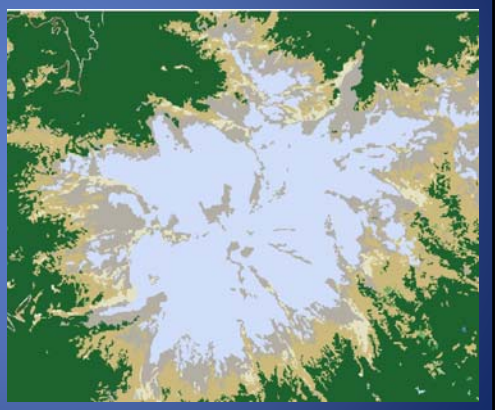
- Quantify and classify a landscape
- Use National Land Cover Data
- 2 different time periods
- Pin point areas of interest by clipping and reclassification
- Note changes in the areas
- Calculate area of difference

Data

- USGS Earth Explorer
- Land Cover from 1992 (Jan 01, 1986) & 2006 (Nov 02, 2005)
- 30m pixel size; Level 1; resampled to Nearest Neighbor; TIFF format
- Cropped Data using Data Management Tools > Raster > Raster Processing > Clip
- Calculated top/bottom y and left/right x coordinates from ArcMap status bar.
- Did this for both years.

1992 ←----------→ 2006





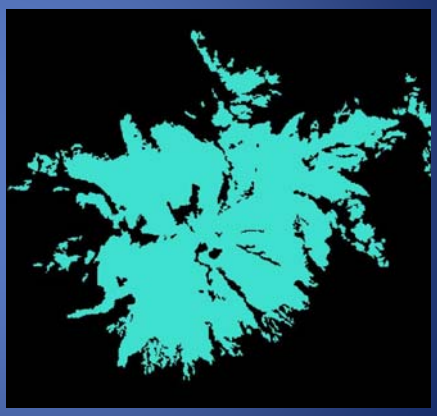
Reclassifying

- ArcGIS to reclassify
- Note changes in classification systems
- Properties > Symbology > Color map
  - Simplifying
- Spatial Analyst Tool > Reclass > Reclassify
  - Perennial Ice a value
  - All others no data
- Did the same process just doing the inverse

Reclassifying

- Also used ERDAS Imagine to reclassify the land cover data
- Then used the swipe feature to compare and validate
- Attempted to do layer stack, overlay, or mask but could not reduce data down to just the difference in ice melt

1992←----------→2006

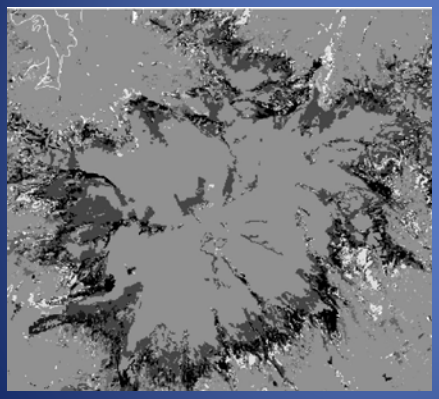


Analyzing

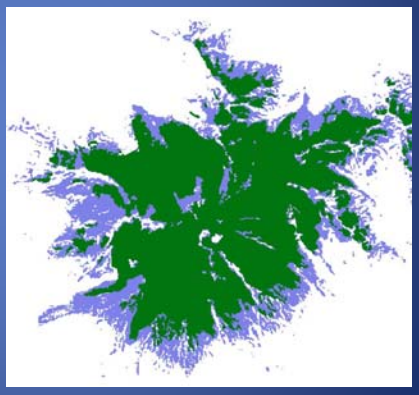
- Processing imagery to show ice melt
- Spatial Analyst Tool > Map Algebra > Raster Calculator
- Set a query using my simplified reclassified data
- outRast = “1992rc” – “2006rc”
- Produced stretched values into a color ramp
- Exported as IMAGINE format
- Unsupervised reclassification

Difference in Perennial Ice

Map Algebra Color Ramp



GIS Reclassified & Layered



Area Math

- 1992 Perennial Ice
- 30m x 30m pixel size
- 900m^2 pixel
- 84059 pixels
- 900 * 84059 = 75653100 m^2
- ~76 million square meters of ice
- ~29.21 square miles

- 2006 Perennial Ice
- 30m x 30m pixel size
- 900m^2 pixel
- 53348 pixels
- 900 * 53348 = 48,013,200 m^2
- ~48 million square meters of ice
- ~18.54 square miles

Difference Math

- 75653100 m^2 - 48,013,200 m^2 = 27639900 m^2 = ~28 million square meters
- 29.21 mi^2 – 18.54 mi^2 = 10.67 mi^2 = ~11 square miles
- 27639900 / 75653100 = 0.3654
- A decrease of about 37 % from 1986 to 2005

Considerations

- Time of year
- Amount of snowfall
- Size of glacier (thickness)
- Human error (classifying)
  - Self Anlalysing
  - Remotely sensed data itself

Conclusion

- Glacier loss are great indicators of climate change.
- Glaciers are noted to be rapidly melting throughout the world.
- Using Land Use data did not show to be consistent with these findings.
- Many glaciers I looked at had actually increased in size, though a lot of glaciers are non existent.
- Problems with remote sensing deciphering what is snow cover and what is glacial, or issues in the changing of the classification system?
- Hard to compare when there is a lack of data that is not gathered at the same time of year.

References

- Earth Explorer
- ArcGIS
- ERDAS Imagine