Building a digital terrain Model of Mt St Helens 1980

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Geog 493

Background of Mt St Helens

- Mount St. Helens, located in Washington State, is the most active volcano in the Cascade Range, and it is the most likely of the contiguous U.S. volcanoes to erupt in the future. The volcano is almost 53 km (33 mi) due west of Mount Adams and approximately 80 km (50 mi) northeast of the Vancouver, Washington—Portland, Oregon metropolitan area. (CVO)

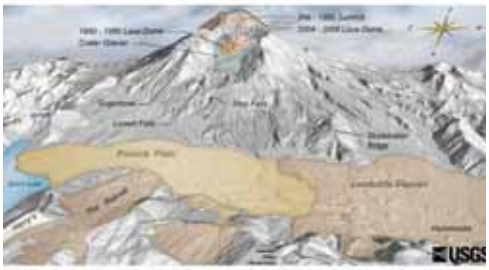
- On March 16, 1980, the first sign of activity at Mount St. Helens occurred as a series of small earthquakes. On March 27, after hundreds of additional earthquakes, the volcano produced its first eruption in over 100 years. Steam explosions blasted a 60- to 75-m (200- to 250-ft) wide crater through the volcano's summit ice cap and covered the snow-clad southeast sector with dark ash.

Mt St Helens Wakes up

Response:

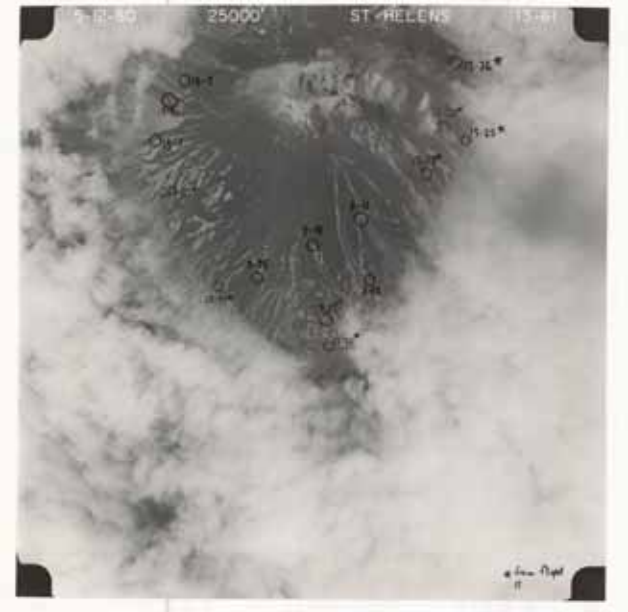
A series of aerial surveys is commissioned by the USGS, conducted by the Washington Department of Transportation between August 1979 and May 1980.

Steam-blast (phreatic) eruption from the summit crater of Mount St. Helens on April 6, 1980. Aerial view to the southwest.

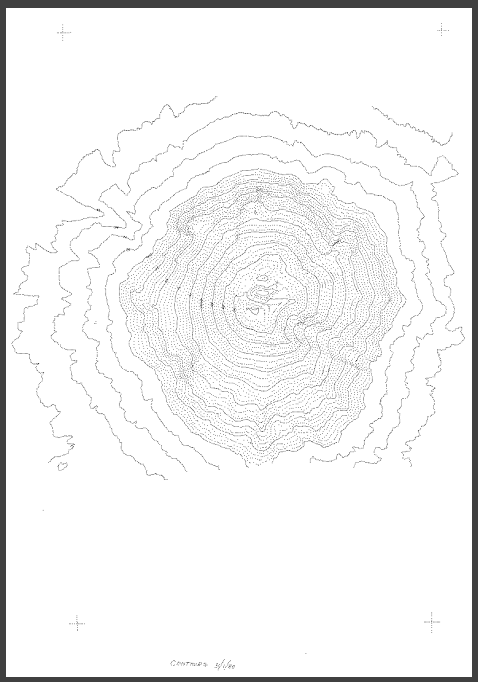


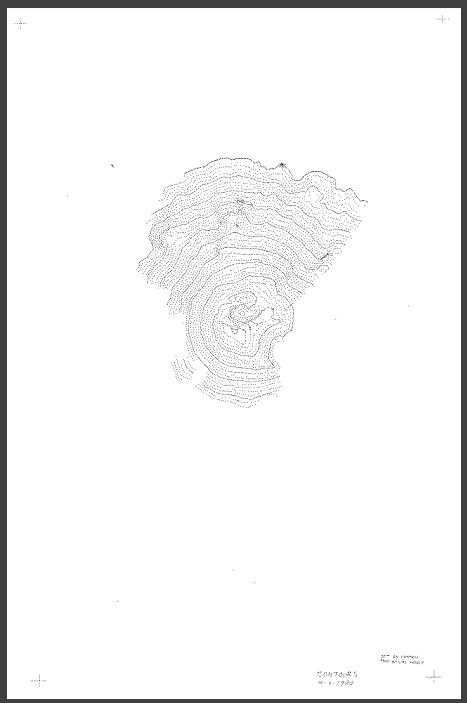
Aerial Surveys 1980

Aerial Surveys:

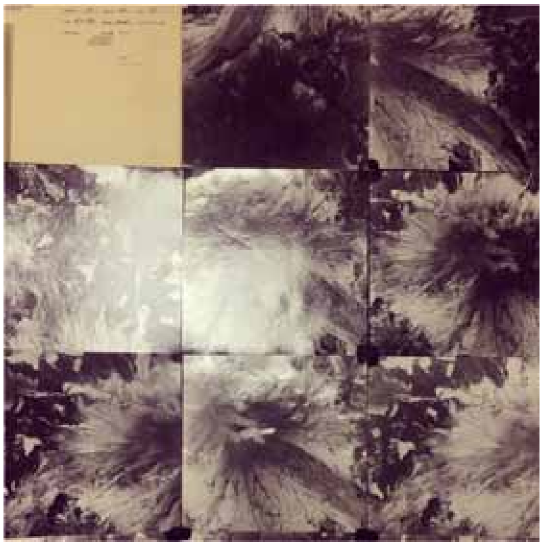


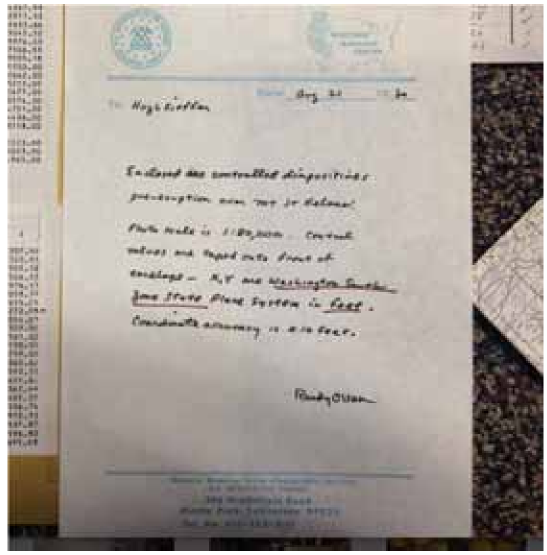
Contour Lines, scanned Mylar

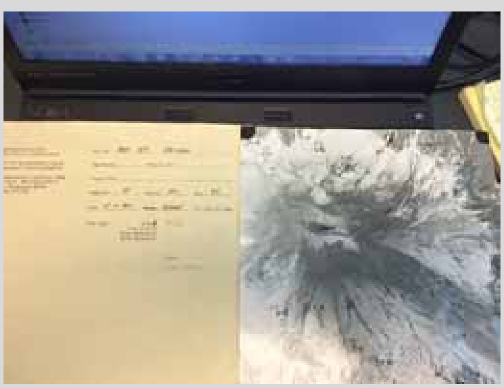


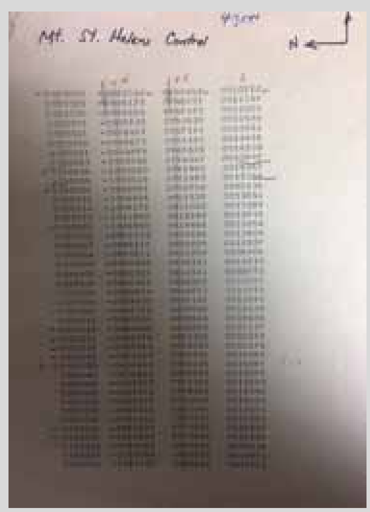


Archives, where is the data?

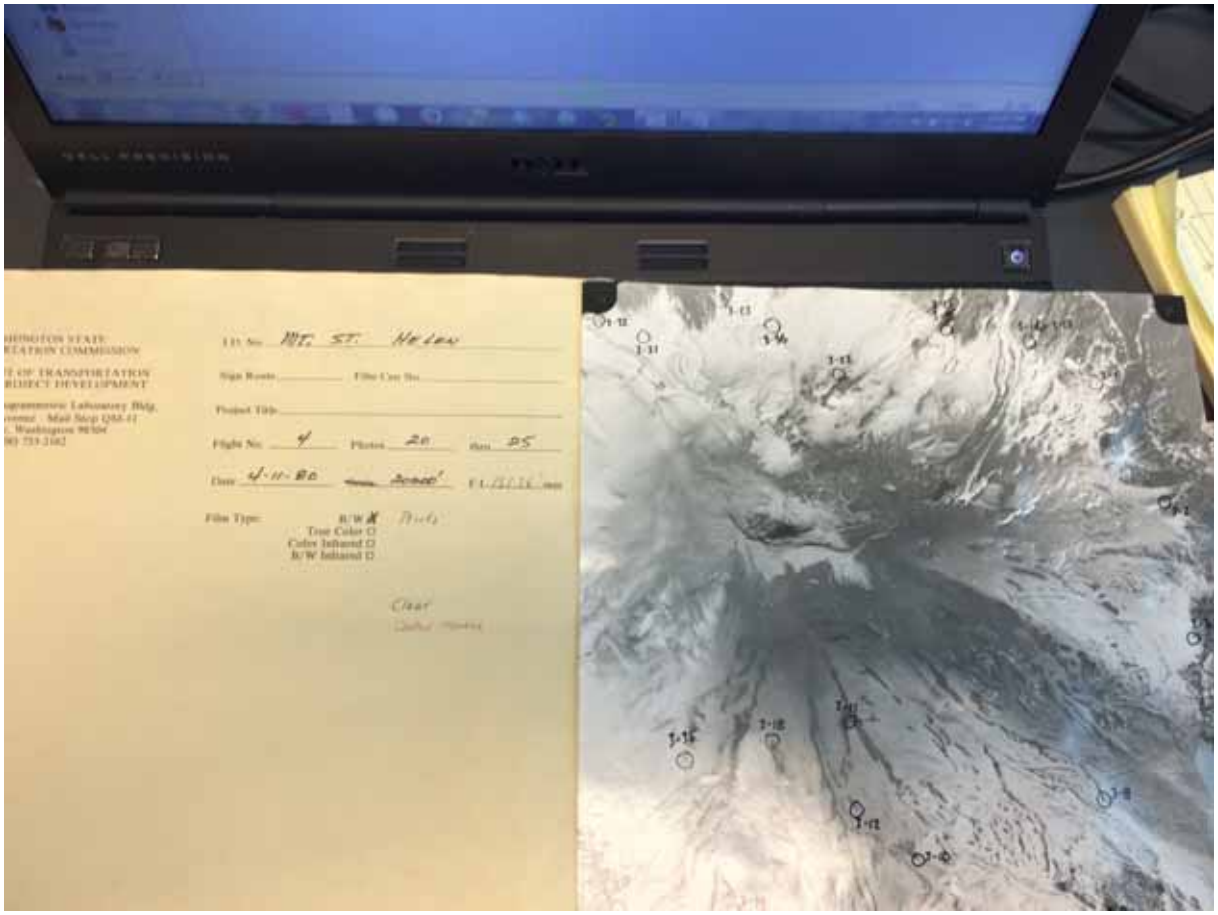








After weeks of shifting through files in the warehouse I found: information about the focal length of the camera being used, information about the height of the flown during the survey, and control point values (X,Y,Z) that otherwise have been lost due to the eruption.



Photogrammetry

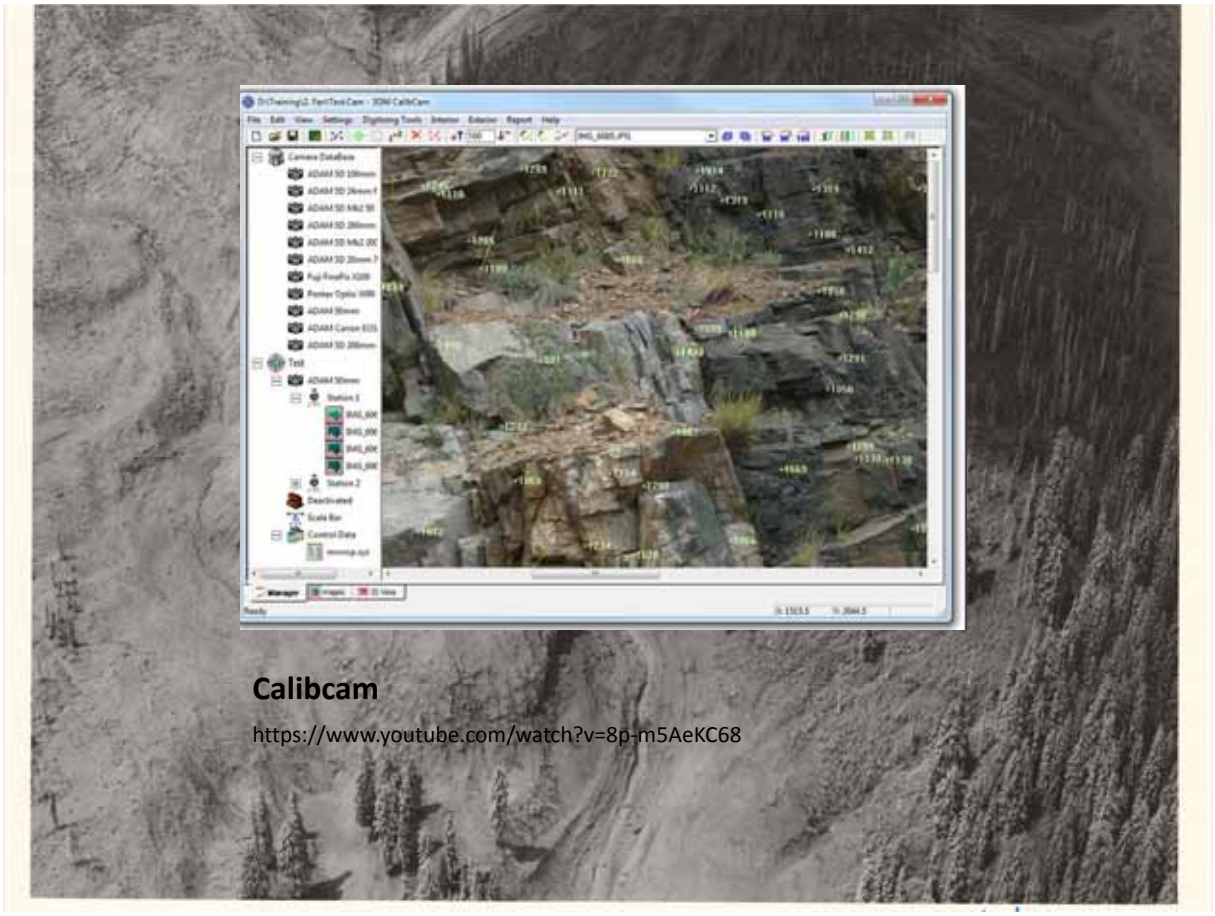
- Photogrammetry is the science of making measurements from photographs.

Portland State

Photogrammetry / Structure From Motion Software

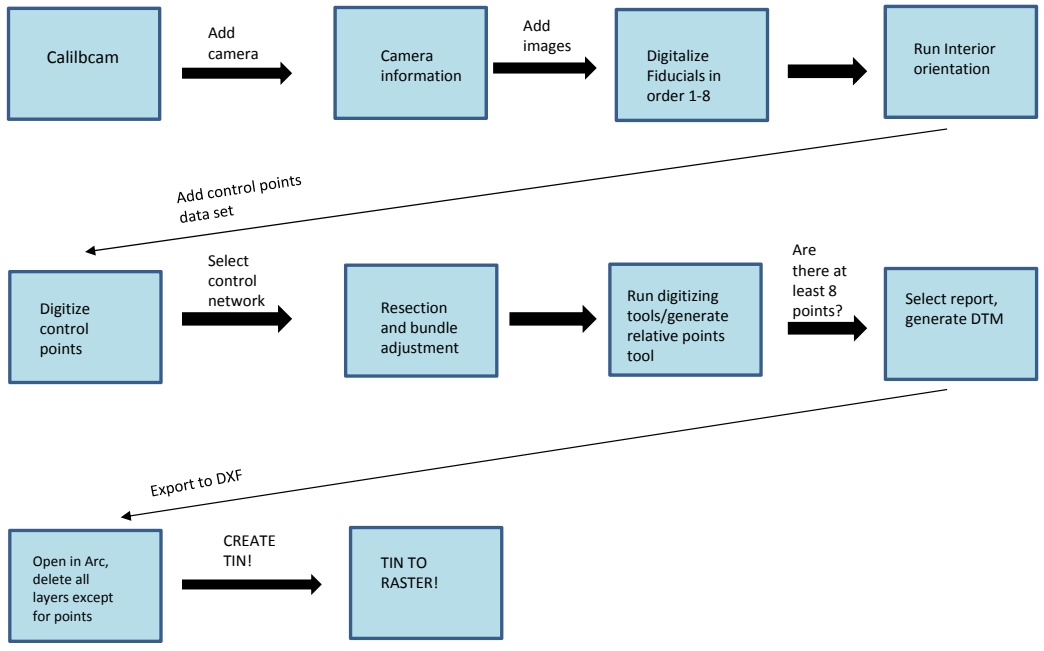
- VisualSFM (open source) (web)
- Agisoft PhotoScan (web)
  - Standard educational edition $59
  - Professional educational edition $549
- PhotoModeler (web)
  - PhotoModeler $1145
  - PhotoModeler Scanner $2495
  - PhotoModeler Motion $3495

Figure: Geog 493, Duh



Calibcam

https://www.youtube.com/watch?v=8p-m5AeKC68



DIGITAL ELEVATION MODEL
4.11.1980

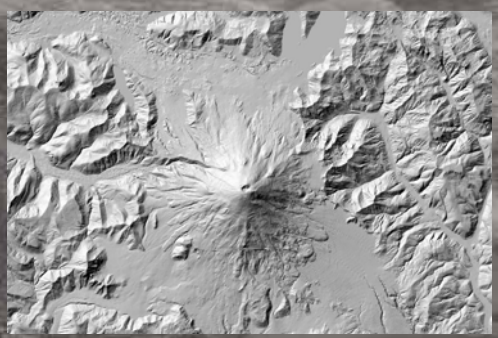
Map by Ratnanjali Adhar

DIGITAL ELEVATION MODEL
5.1.1980

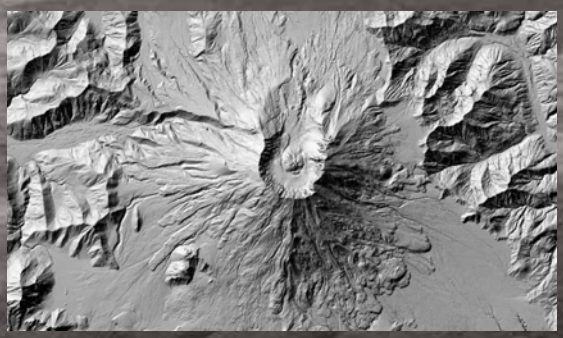
Map by Ratnanjali Adhar

Hillshade

Mt St Helens Before and After



Mt St Helens
1980
Data collected by
Photogrammetry



Mt St Helens 2006
Data collected by
Lidar

Conclusions:

- It may be possible as photogrammetry software improves to model and map areas otherwise lost to geologic or natural processes.

Historic Photos
Mt St Helens

Figure: USGS , Cascade Volcano Observatory

The end ! Happy Winter Break!