

# DIGITAL LANDSCAPING

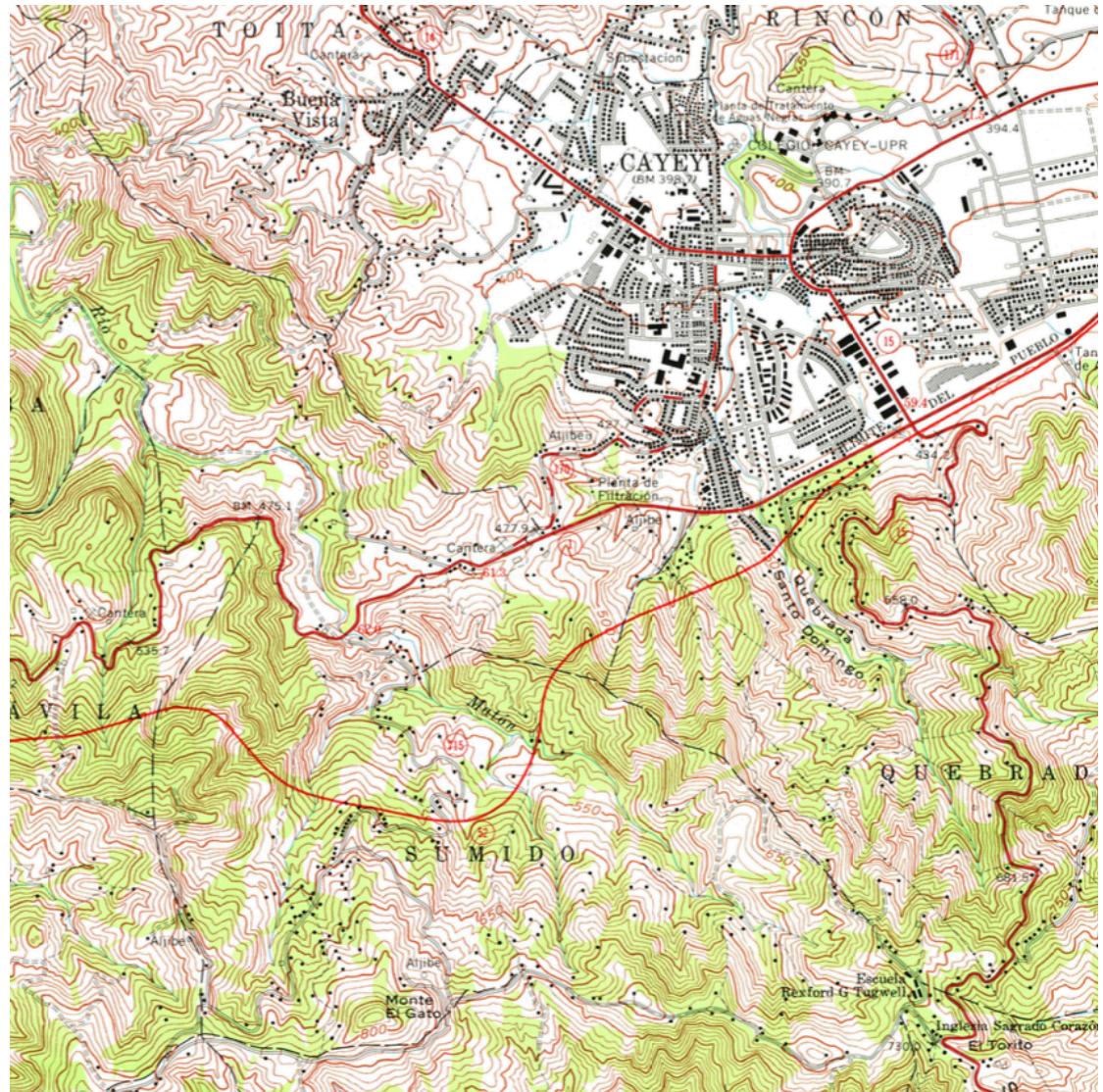
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# How we represent terrain

- Topographic maps
    - contour lines
      - contour intervals

# Example: US Topo series

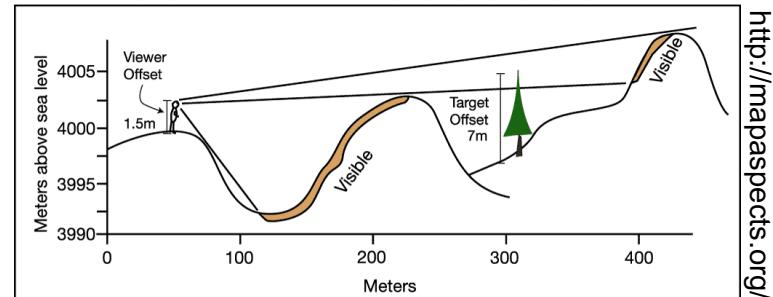


# DEM (digital elevation model)

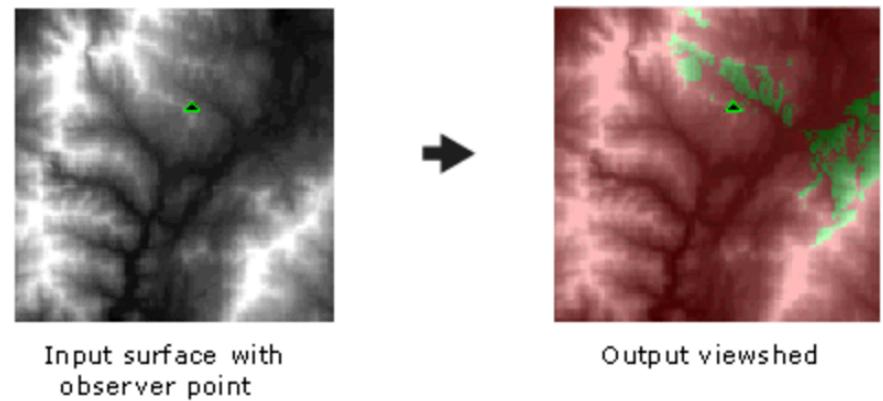


# Some of the things we can do with a DEM

- Viewshed:
  - a data layer that determines what an observer can see and cannot see from a particular location due to terrain
- Slope:
  - A measurement of the rate of elevation change
- Aspect:
  - The direction that the slope is facing



A single Line of Sight (LOS) in a particular direction, with examples of viewer and target offsets. Collectively, all of the LOS from a given location make up its viewshed.



# Some of the few things we can do with a DEM

- Hillshade:
  - A shaded relief map of the terrain created by modeling the position of the Sun in the sky relative to the landscape
    - Sun altitude: a value between 0 and 90 describing the sun's elevation above the terrain
    - Sun azimuth: a value between 0 and 360 describing the position of the sun in the sky

# Some of the few things we can do with a DEM

- Draping: A process in which an image is given z-values to match the height in a digital terrain model
  - Base height: the z values of a digital terrain model that can then be applied to an image in a draping procedure.
  - Vertical exaggeration: a process whereby the z-values are artificially enhanced for terrain visualization.

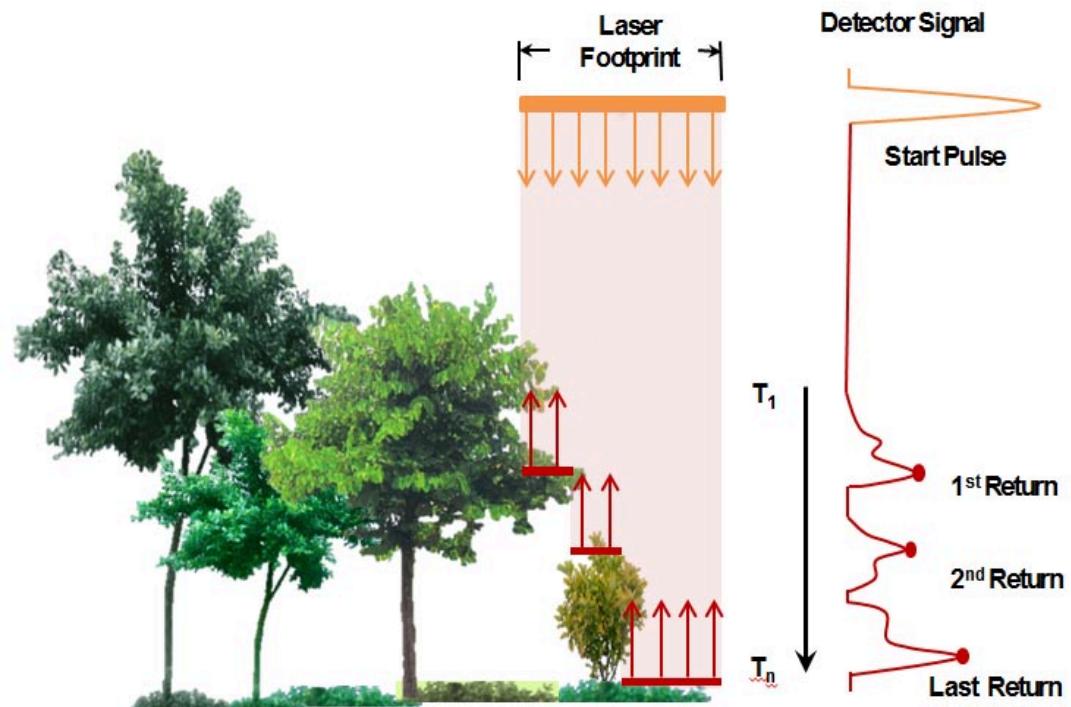
# DEM (digital elevation model)

DEM rasters can be produced from:

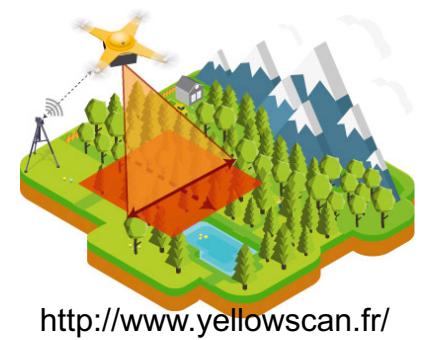
- Interpolating a sample of points with elevation values (e.g. from contour lines)
- SRTM (Shuttle Radar Topography Mission)
  - This is what we used in classroom a few weeks ago
- *lidar* (light detection and ranging)



# How lidar works

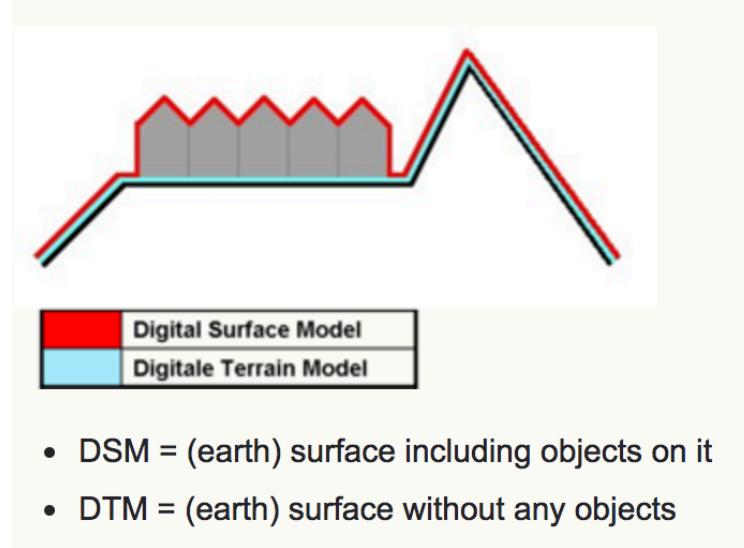


[www.lidar.com.tw](http://www.lidar.com.tw)

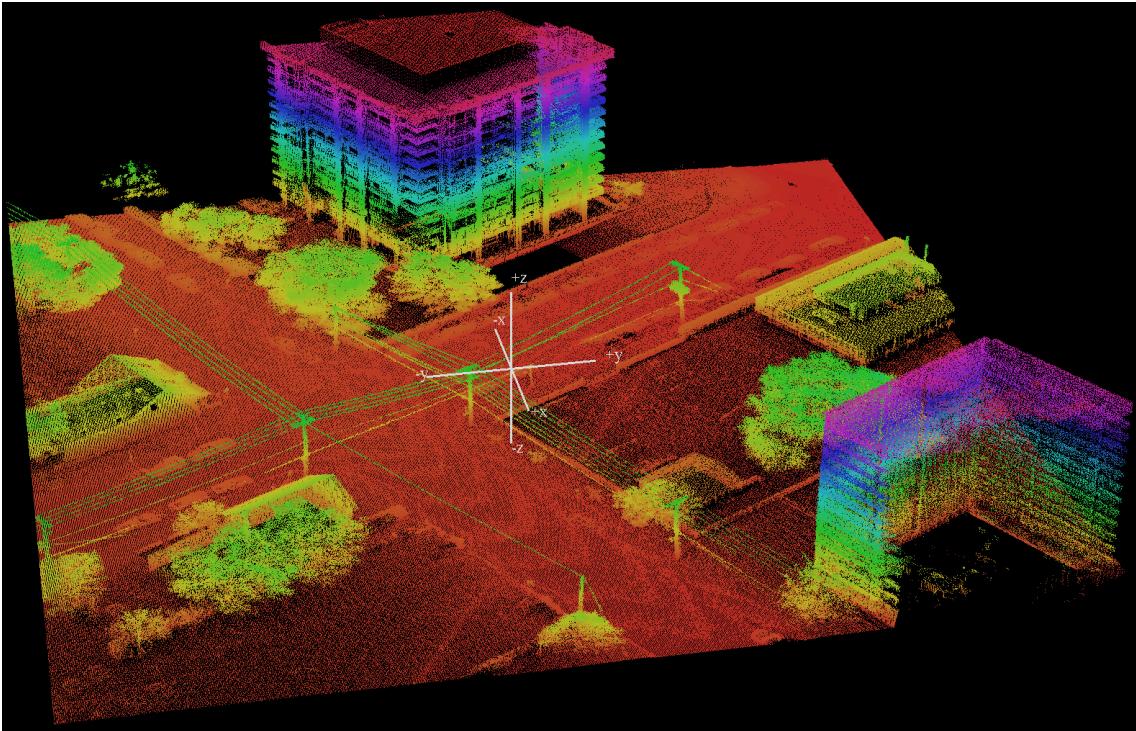


# Point clouds

- A set of points with  $x$ ,  $y$ ,  $z$  values
  - Product of lidar or stereophotogrammetry
    - LAS is one of the most common formats of point clouds
- Allows or the analyst to create both
  - DSM (digital surface model) and
  - DTM (digital terrain model)



# Point clouds



<http://www.levelset.com/wp3/>



<http://www.yellowscan.fr/>



<http://www.prweb.com>



<https://www.geospatialworld.net>