Mapping Regions of Excess Carbon Dioxide in Hawaii Using AVIRIS

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Reference:

https://aviris.jpl.nasa.gov/dataportal/

Aim

- Classify different environemental components in a volcanic region from hyperspectral airborne data (AVIRIS)

Outlining Process

1) Pre-processing the AVIRIS data for Mauna Kea, a volcano on the island of Hawaii

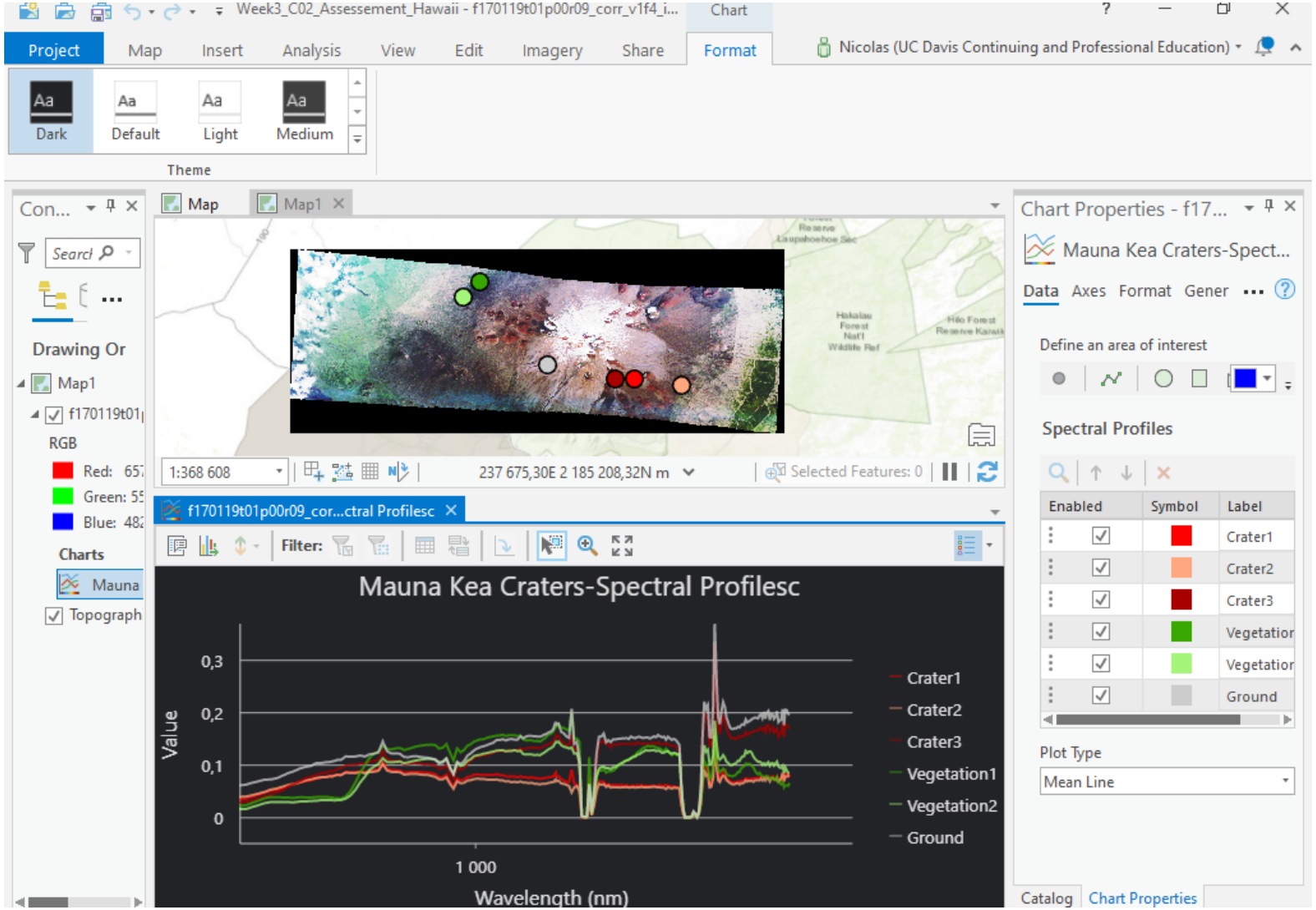
2) Create Classification Schema

3) Collect and Document Training Data

4) Plot of the spectral profiles of training

5) Classify Imagery using Support Vector Machine (SVM)

1) Pre-processing and displaying the AVIRIS data for Mauna Kea, a volcano on the island of Hawaii



Raster information

Spatial resolution
- Cell size X: 36.04 m
- Cell size Y: 4.98 m

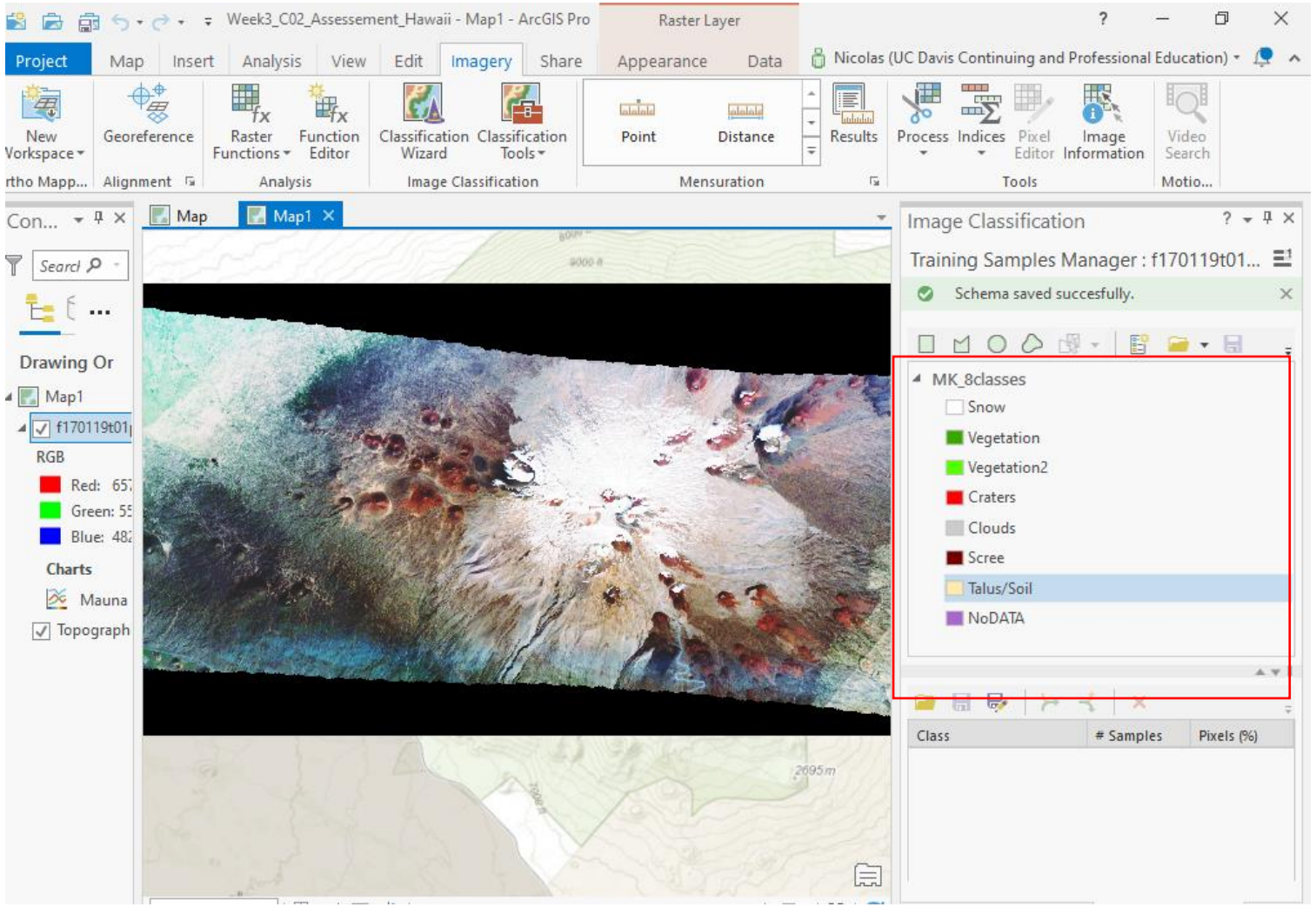
Spectral resolution
- 224 bands (Hyperspectral data)

Pixel depth
- 32 bit

Date
- 19.01.2017

Location
- Mauna Loa/Kilauea Crater

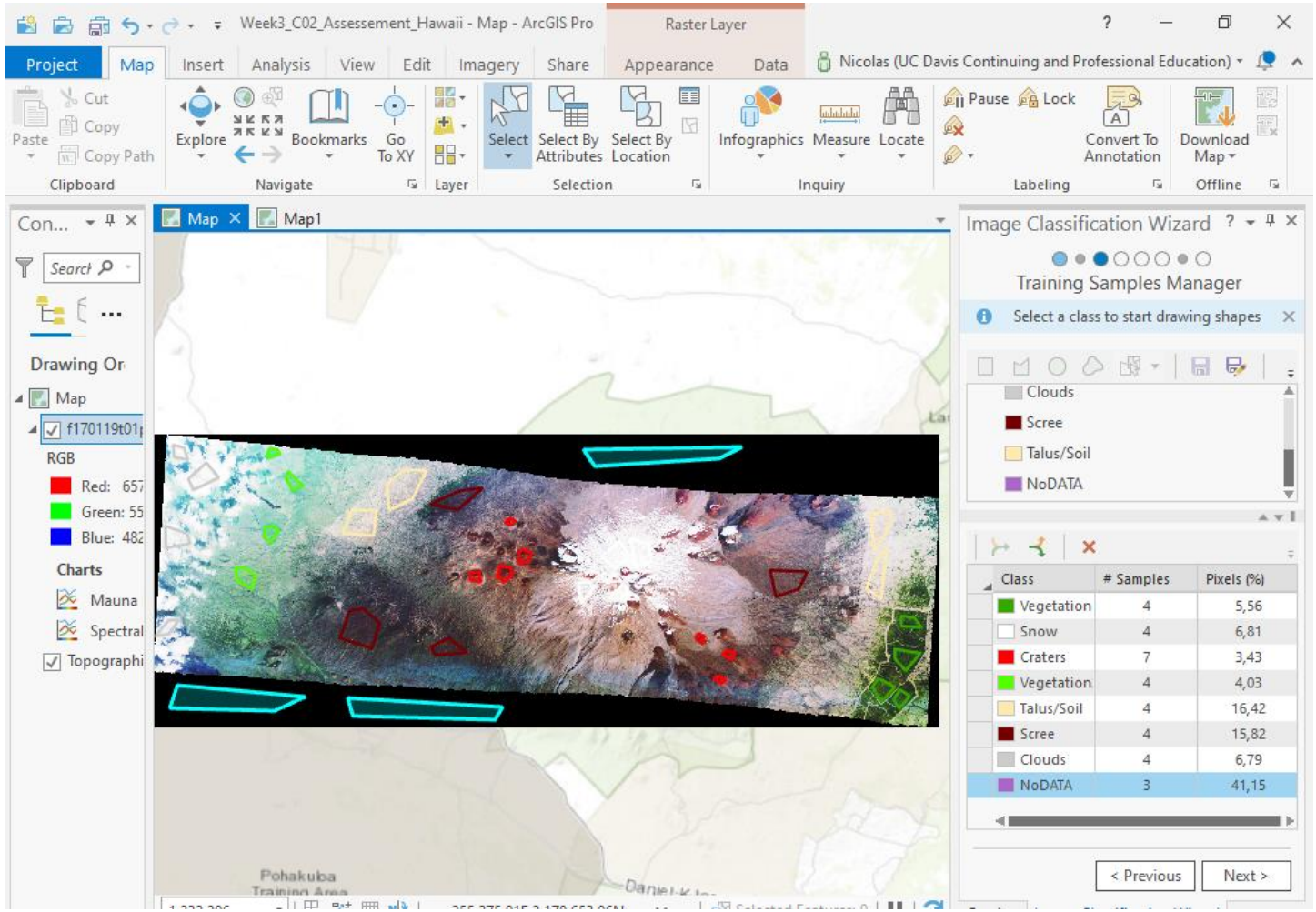
2) Create Classification Schema



Classification schema information

- 8 classes have been chosen to cluster this raster in order to separate components according to different structural and chemical properties
- This schema will be used as input in classification wizzard
- Vegetation 1 and 2 classes are used to differentiate woody and herbaceous vegetation

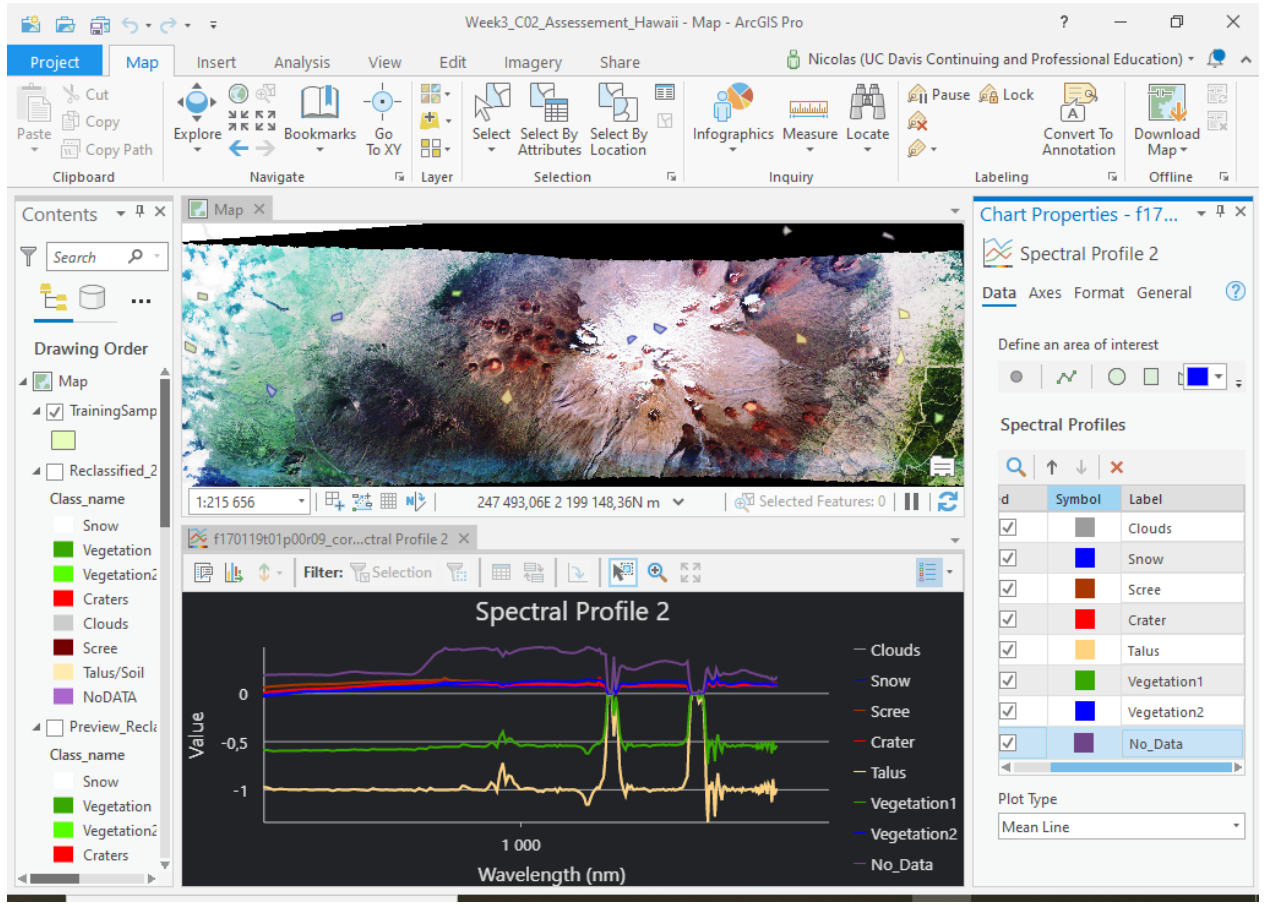
3) Collect and Document Training Data



Training data information

- The 8 classes have been attached with specific polygons belonging to their class
- The color of the polygons are defined by their color class

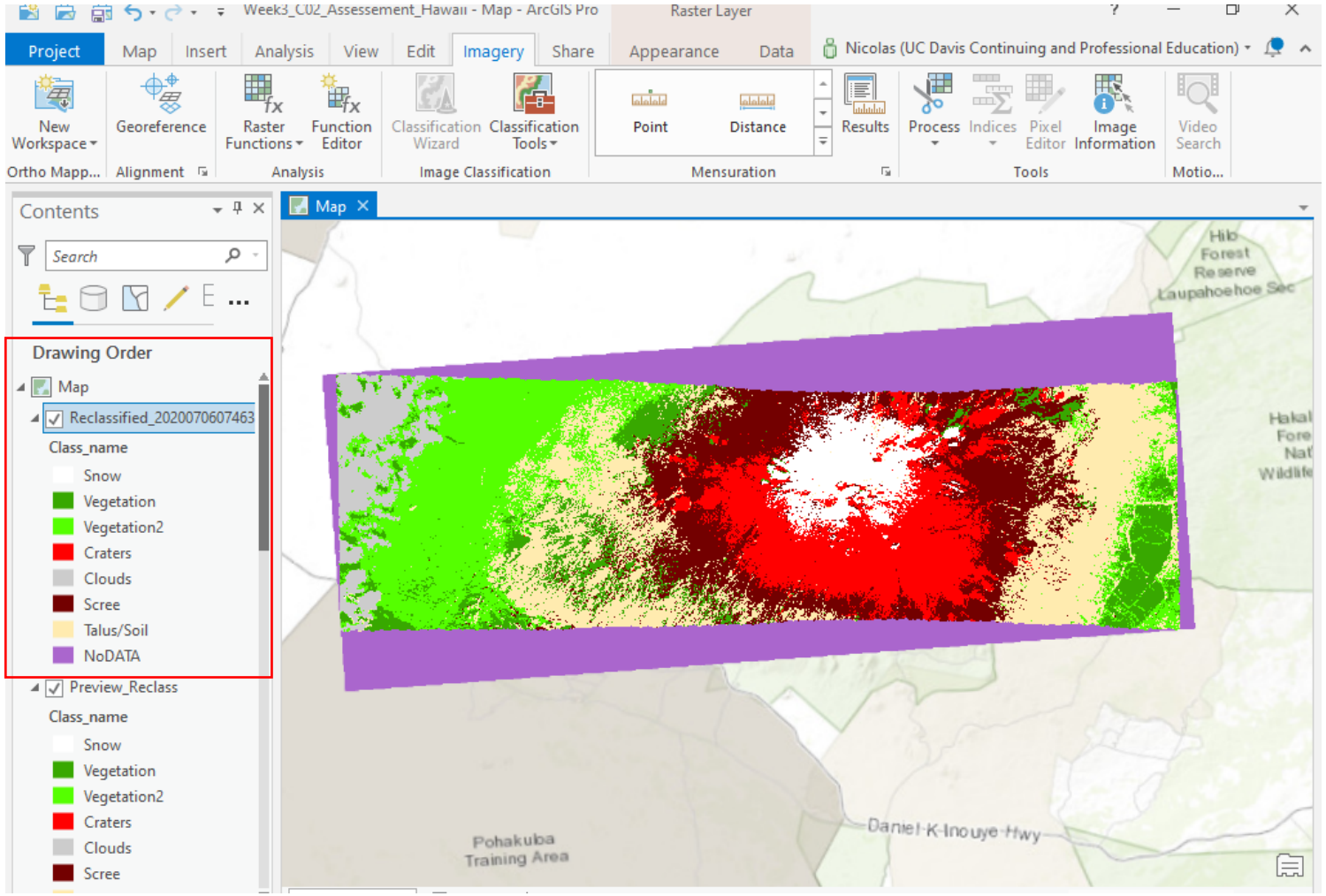
4) Plot of the spectral profiles of training samples



Spectral profile information information

- If we focus on similar spectral profile like snow, scree, crater and spreaded vegetation (vegetation2), the differences are more visible between these profiles
- However I don't know why dense vegetation (vegetation1) and talus appear with negative value and seem completely different from the other mentioned above
- For clouds and no data, that's not surprising to see that they have unique spectral profile

5) Classify Imagery using Support Vector Machine (SVM)



Final result of the AVIRIS imagery in 8 different classes (SVM classification)

- The legend of the raster is available on the left
- It was interesting to see that the craters spectral profile has been generalized to the structure of the volcano and not in specific location where we can see the craters
- Even with the strange spectral profile of dense vegetation (bright green) and talus (light brown), the classification seem good according to the visible reality

Reference

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- Site Name: Mauna Loa/Kilauea Crater
- Investigator: Robert Green
- Comments: 100% Clear
- # Samples: 1047 # Lines: 2816
- Pixel Size: 13.4m
- Solar Elevation: 45.29
- Solar Azimuth: 152.59
- Rotation: 90