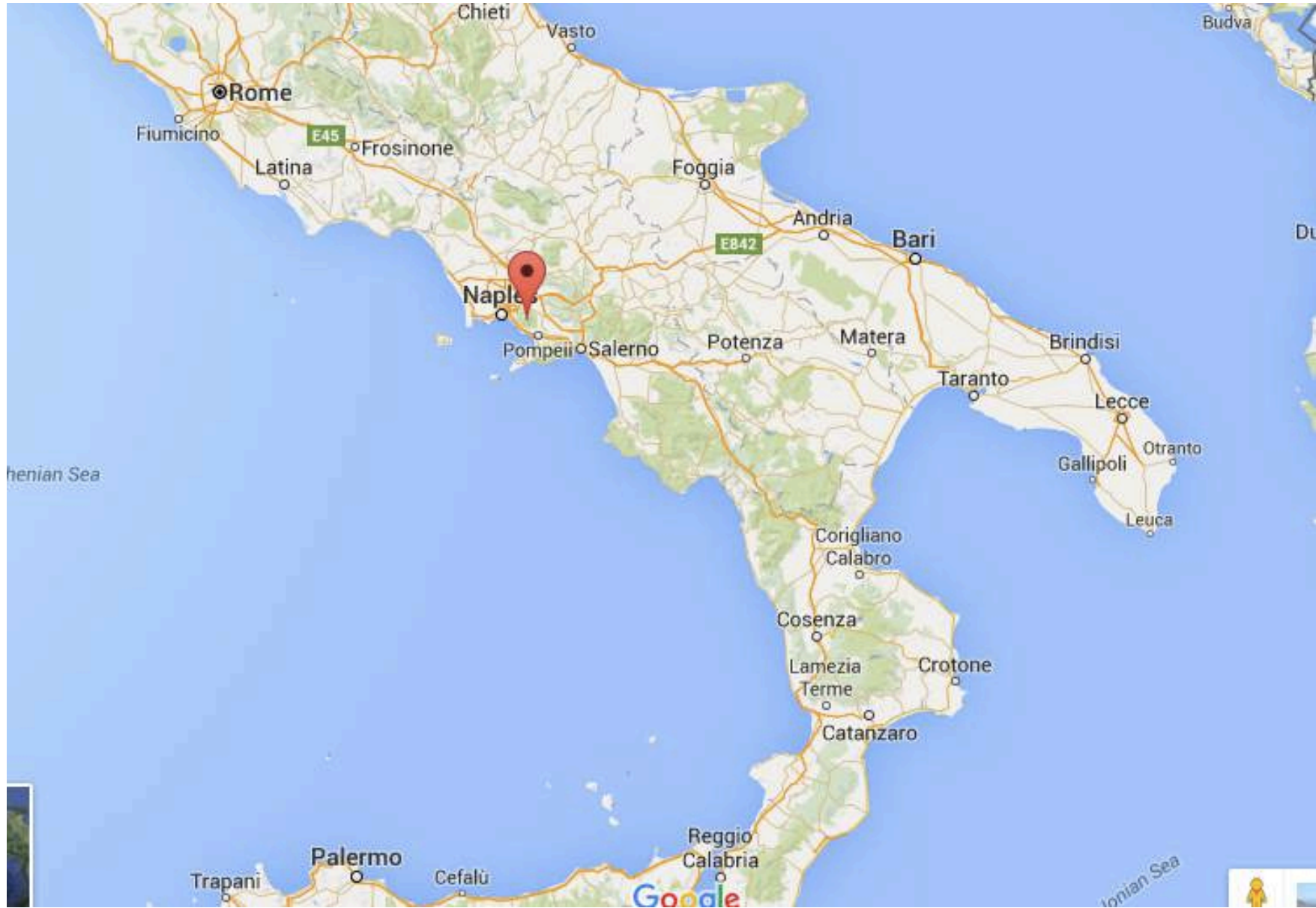


# Mt. Vesuvius & What Makes It Different

Ariel Adolphsen

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Petrology 422 – NDSU



# So why pick Mt. Vesuvius?

- Dad lived right outside of Naples for 3 years.



# Question?

- When I chose the topic Dr. Saini-Eidukat said there was something strange about Mt. Vesuvius
- So what makes Mt. Vesuvius different and how can we tell from the rock sample?

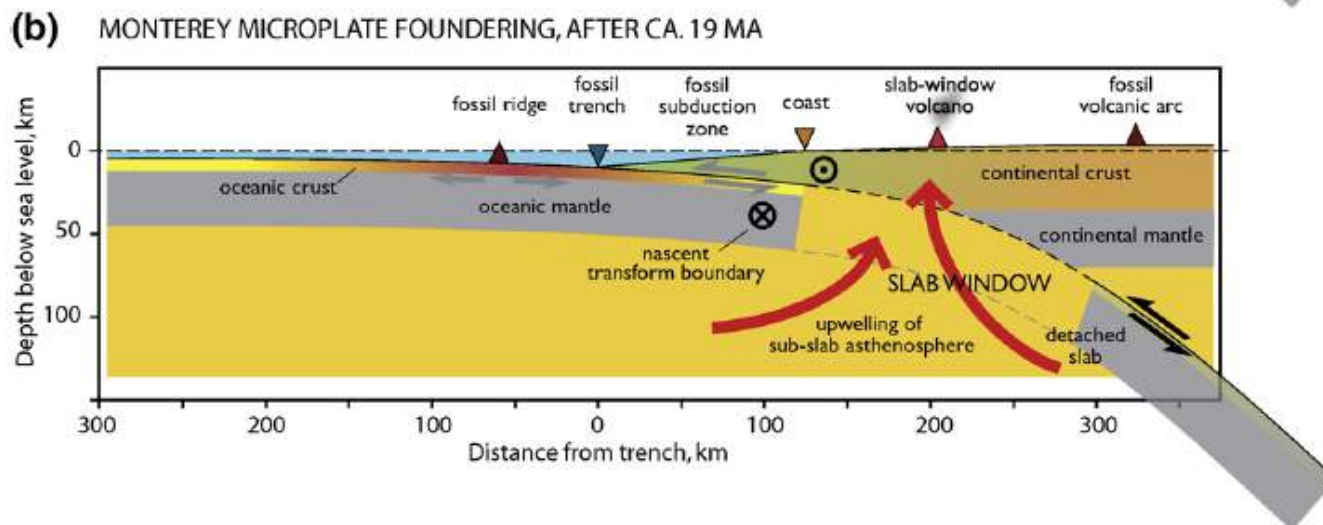
# Tectonics

- The African plate is subducting under the Eurasian plate .
- The big difference – The slab has torn apart. The lower part of the slab tore & detached from the upper part the slab.
- This leaves a slab window



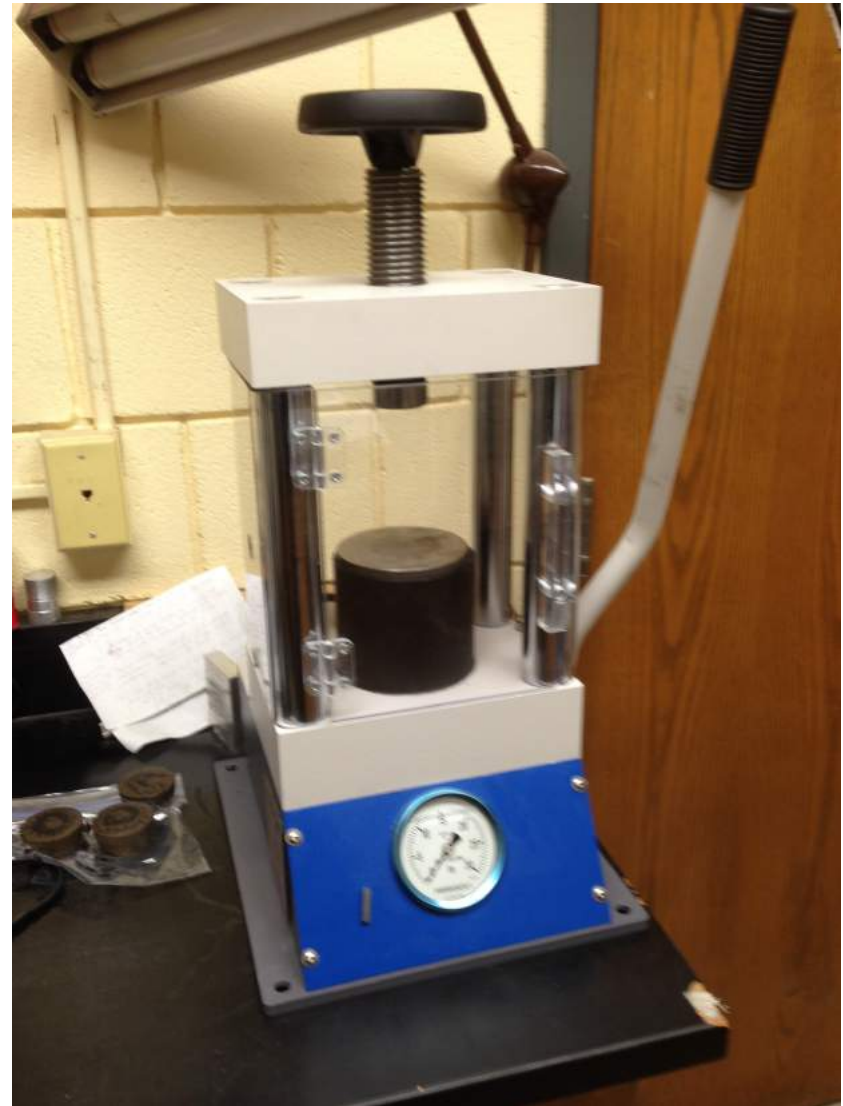
# Slab Window

- The slab window is what makes Vesuvius rocks slightly different chemically.
- Magma created from melting African plate and the magma that escapes through the slab window mixes to create the violent eruptions Vesuvius is synonymous for



# XRF

- Crushed & Powdered rock
- 5g-7 drops then 2g-3 drops ~ mixing
- Place mixture in titanium container, get out air bubbles.
- Place under 15 tons of pressure for 1.5 min.
- Dry/bake
- XRF!



# XRF

<b>Sample</b>	98-5-16-1__18784	98-5-16-2__18776
Date	4/20/2016	4/19/16 16:17
SiO2 (%)	51.3	51.5
Al2O3 (%)	16.4	15.9
Fe2O3 (%)	7.3	7.3
CaO (%)	8.5	9.0
MgO (%)	2.7	3.7
MnO (%)	0.1	0.1
Na2O (%)	2.7	2.7
K2O (%)	9.3	8.2
P2O5 (%)	0.9	0.7
TiO2 (%)	0.9	0.9

Compare these values to neighboring Volcano without slab window.

On next slide

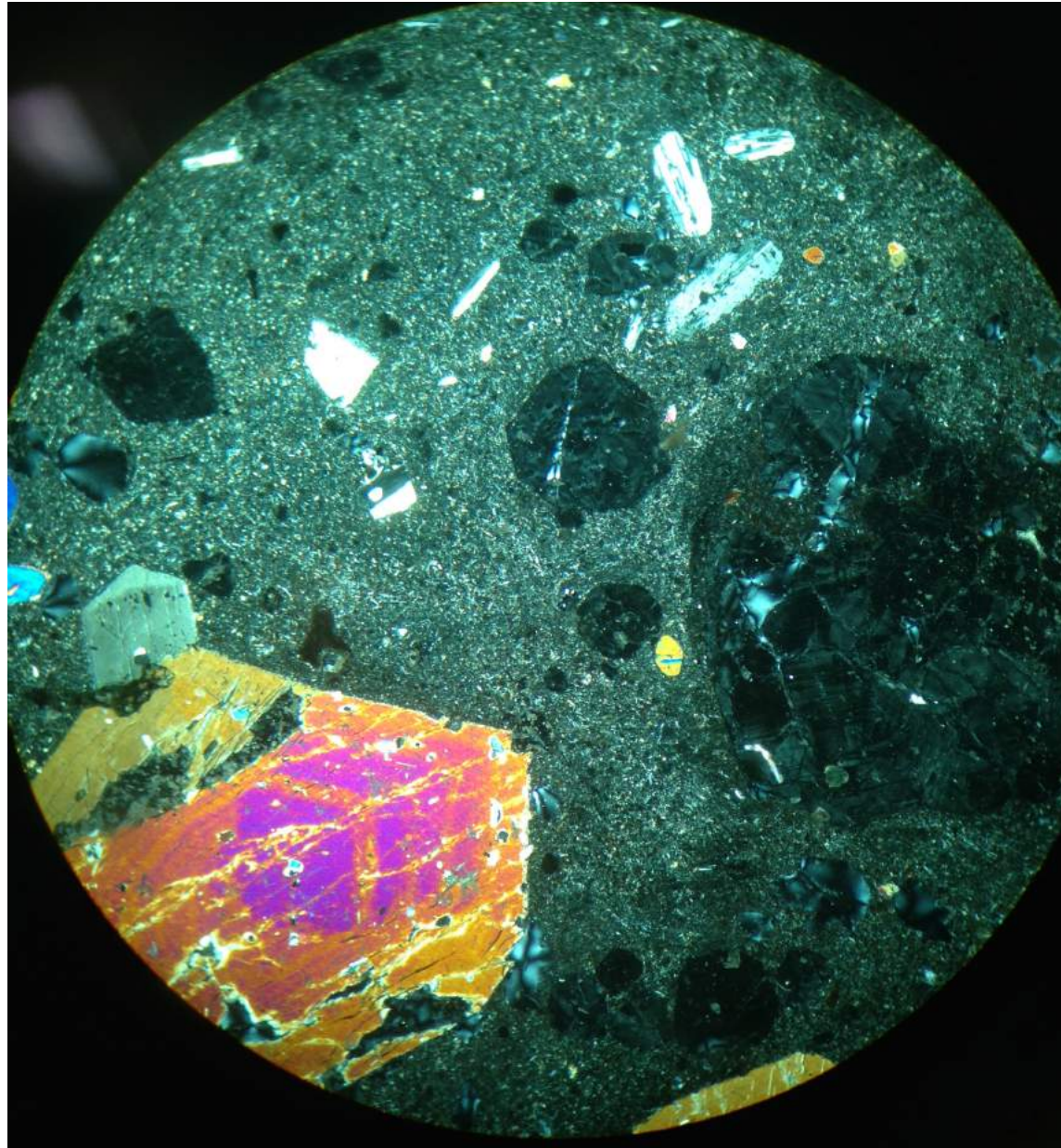


# Mt. Stromboli XRF

Sample	STR <sup>a</sup> 050403hP pumice	STR <sup>a</sup> 050403hP pumice	STR <sup>a</sup> 050403k pumice	STR <sup>a</sup> 050403k pumice	ST <sup>a</sup> 317 pumice	ST <sup>a</sup> 320 pumice	ST <sup>a</sup> 333 pumice	ST <sup>a</sup> 300 pumice	ST <sup>a</sup> 325a scoria	ST <sup>a</sup> 325b scoria
SiO <sub>2</sub> , wt %	49.23	49.44	49.77	49.34	48.38	48.63	48.99	49.51	49.22	49.31
TiO <sub>2</sub>	1.01	0.91	0.98	0.91	0.90	0.91	0.91	0.92	0.91	0.92
Al <sub>2</sub> O <sub>3</sub>	17.06	17.60	16.85	17.32	17.21	17.45	17.14	17.06	17.33	16.93
Fe <sub>2</sub> O <sub>3</sub>	3.27	8.81	3.03	8.71	8.95	8.84	8.80	8.76	8.75	8.74
FeO	5.84	–	5.76	–	–	–	–	–	–	–
MnO	0.17	0.16	0.17	0.16	0.16	0.16	0.16	0.15	0.16	0.16
MgO	6.70	6.07	6.86	5.98	6.64	6.36	6.33	6.36	6.24	6.19
CaO	11.72	11.56	11.67	11.65	12.01	11.92	11.80	11.76	11.54	11.24
Na <sub>2</sub> O	2.41	2.45	2.47	2.48	2.40	2.43	2.44	2.43	2.52	2.55
K <sub>2</sub> O	1.84	1.89	1.77	1.77	1.84	1.87	1.89	1.85	2.08	2.15
P <sub>2</sub> O <sub>5</sub>	0.37	0.55	0.37	0.53	0.59	0.61	0.56	0.54	0.61	0.57

Volcano formed from same 2 plates converging but this one does not contain a slab window. While MgO and CaO percents are much bigger in this sample, the K<sub>2</sub>O is minuscule compared to the percents from the Vesuvius XRF

Matrix: mix of  
Calcic plag,  
leucite, &  
nepheline



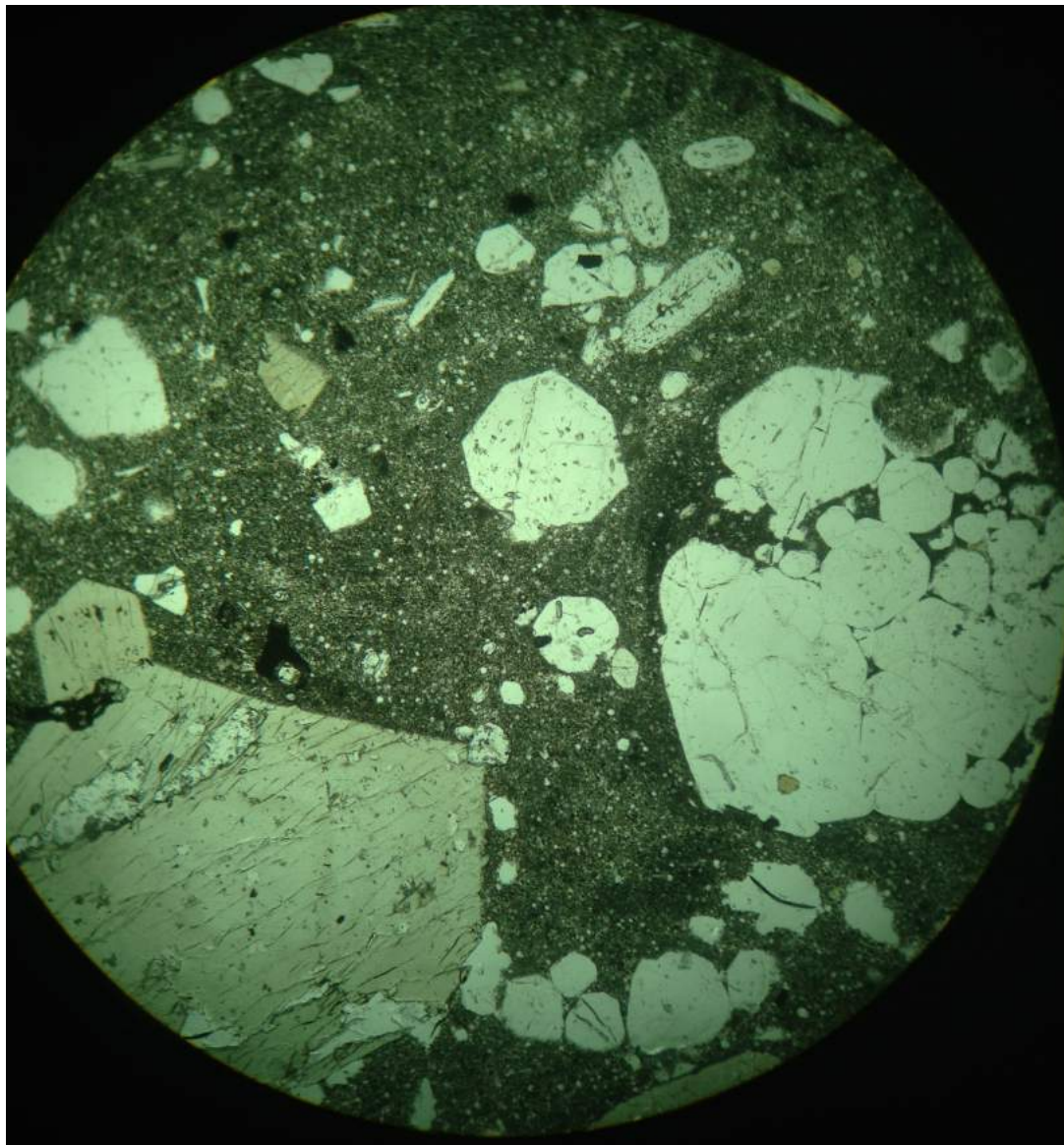
4mm

Plag

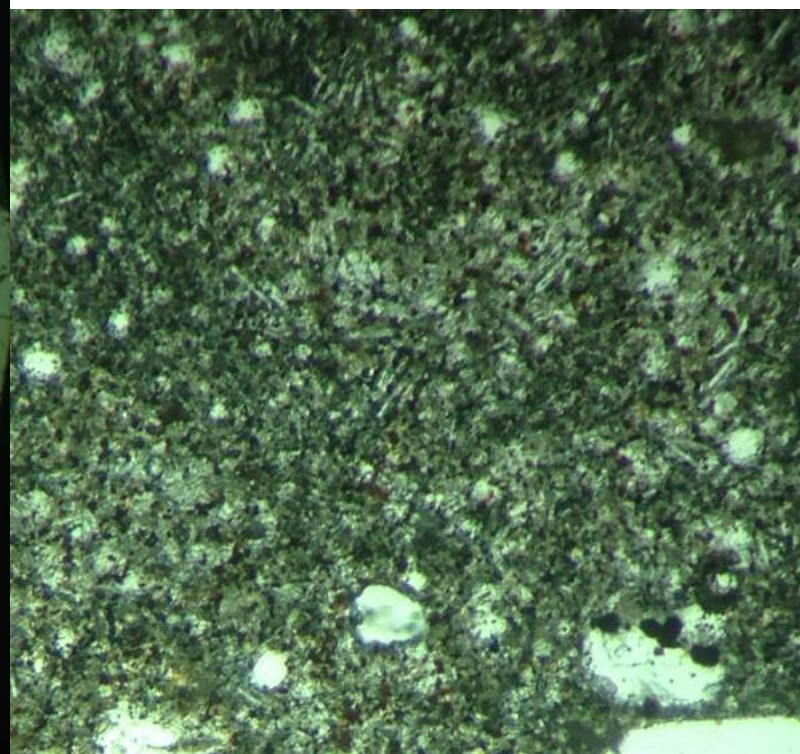
Augite

- The magma that slips through the slab window is rich in Potassium, which creates the Potassium rich basalts.

4mm



2mm



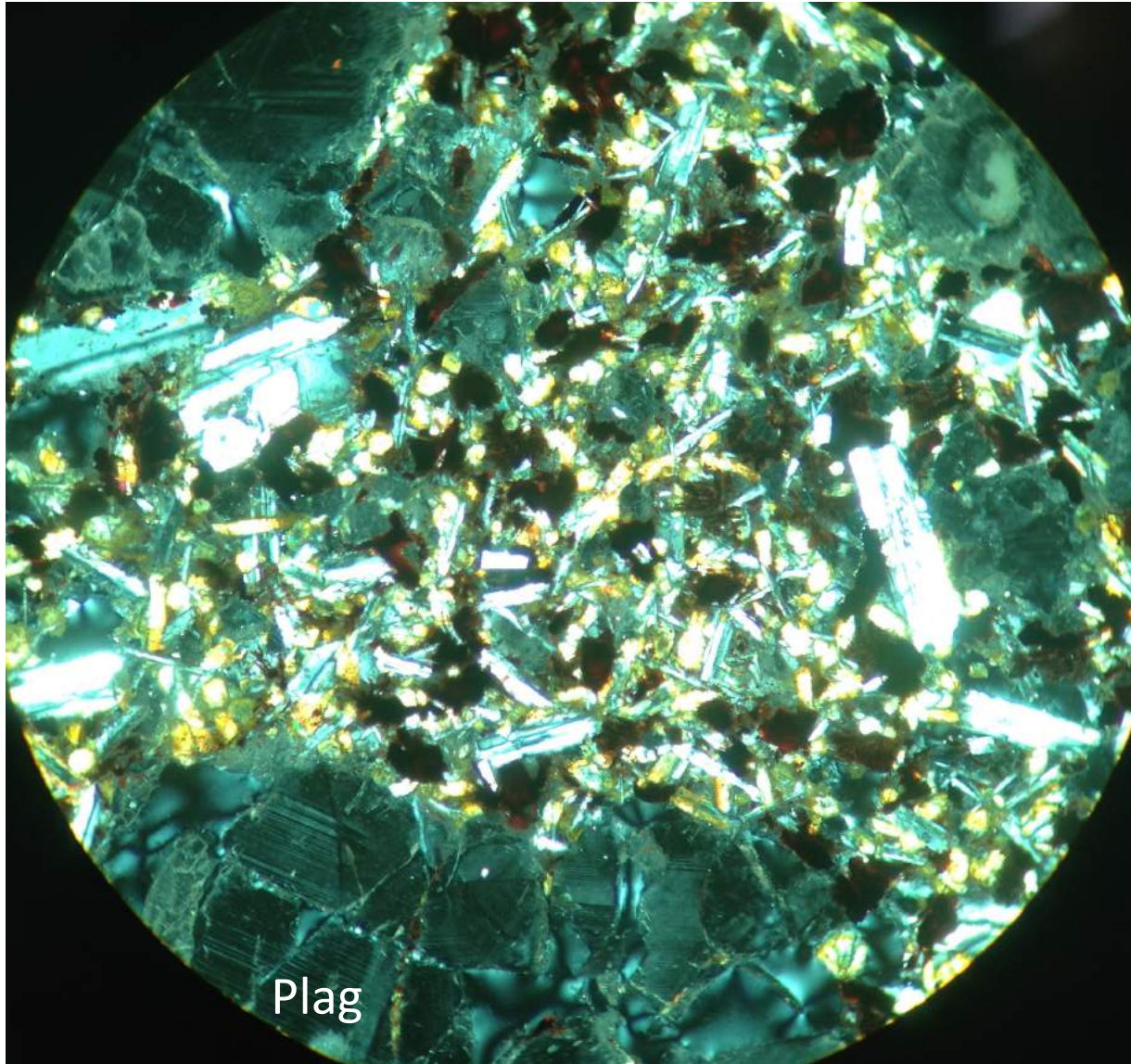
- These sample were collected at 2 different locations near the top of the crater of Mt. Vesuvius
- Also note the pinkish tint in the hand sample (Leucite & Plag)





- The other hand sample contains slightly more MgO & slightly less  $K_2O$  probably leading to its greyer color

4mm

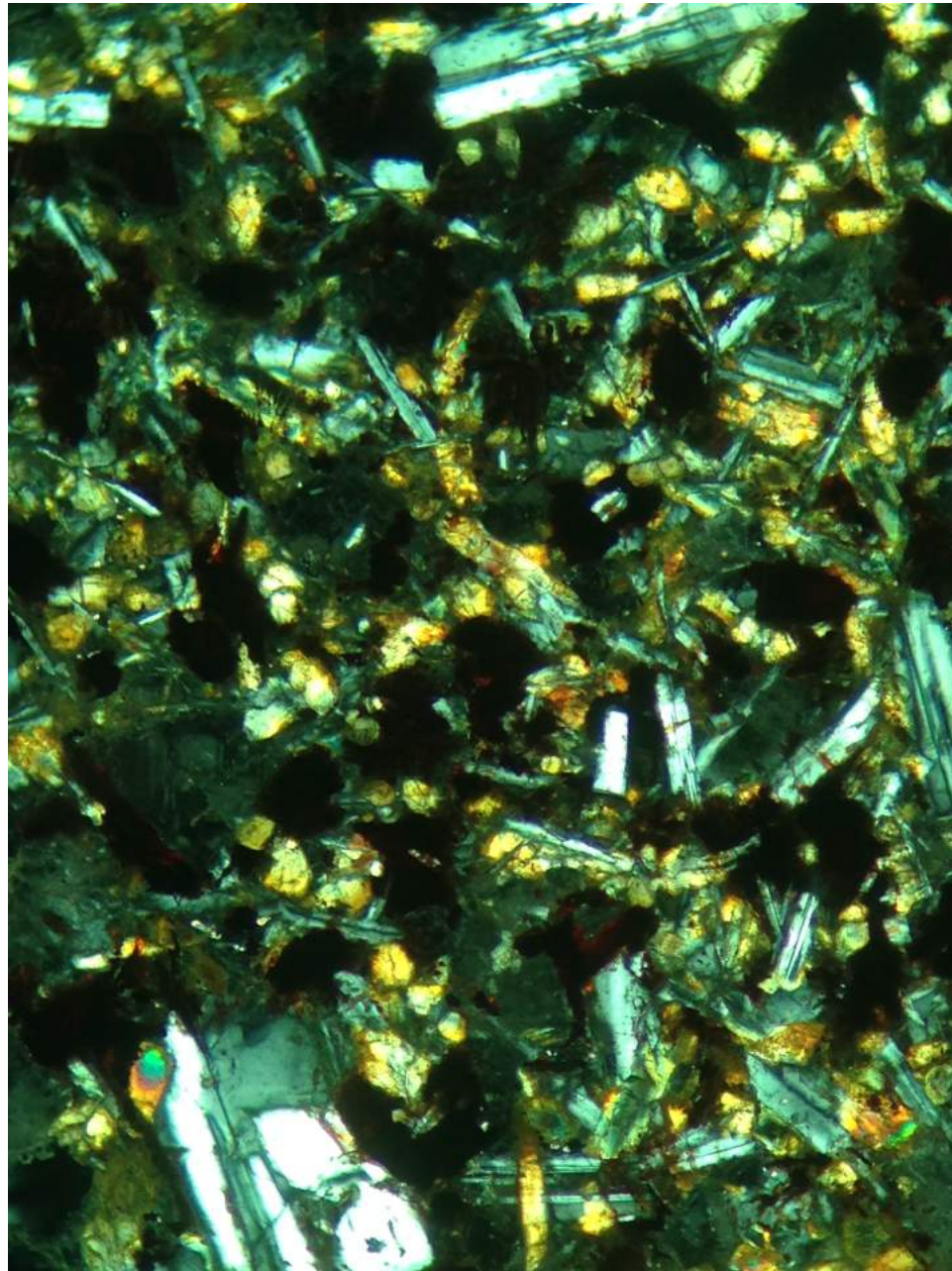


Still contains  
many large  
chunks of  
plag crystals

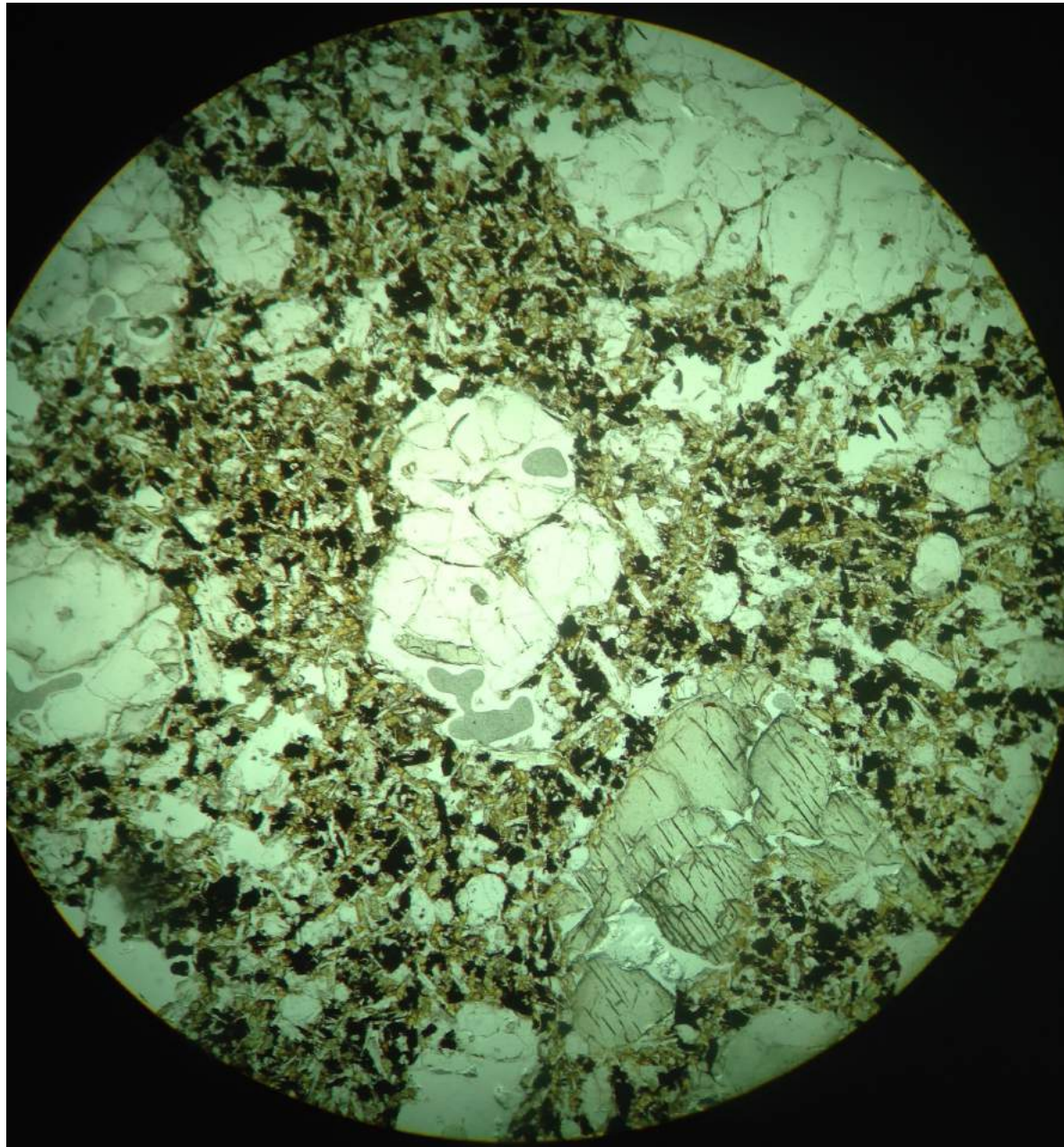
- The increase in MgO can be seen in the matrix of the 2<sup>nd</sup> sample, there is a large amount of Augite spread throughout the ground mass as seen in orange

Ground mass

2mm



4mm





# Conclusion

- what makes Mt. Vesuvius different and how can we tell from the rock sample?
- It's different because of the slab window cause by a break in the plate. This makes the composition more rich in  $K_2O$
- This can be tested by XRF and backed up visually by thin section and hand samples

# Thank You

- Thank you to Dr. Saini-Eidukat for the sample and for the help in the lab!

# Resources

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