

# Virtual Fieldwork Experience (VFE): SP Crater near Flagstaff, Arizona

Before you start...

## **Review what you already know about volcanoes (knowledge needed to complete this VFE):**

*If you don't know these off the top of your head, review your notes or textbook.*

How are magmas different?

What factors control volcano violence?

What hazards do volcanoes produce?

What do past hazards look like in the rock record?

What are the different types of volcanoes and their characteristics?

How do different volcanoes form?

How are igneous rocks described and identified?

**Overall Objective:** Apply your knowledge of geology to a real field site. By the end, you should be able to: (a) make meaningful geologic observations; (b) interpret observations to infer the geologic history of an area; and (c) communicate your findings in the format of a paragraph.

## **Field site objectives:**

Explore this volcano and be able to:

- Name the type of volcano
- Explain the nature of its magma source (composition, gas content, viscosity, temperature, etc.).
- Describe how it behaved over time to form what we see today (eruptive style, volcanic products, etc.).
- Assess the volcanic risk for the local residents.
- Explain how seismicity, gas emissions, ground deformation, and temperature data can be used to determine if this volcano is active.

*Be sure to cite evidence you observed to support your claims!*

## **Directions:**

- Open the PDF file.
- Read the first page and familiarize yourself with navigating through the Virtual field site using hyperlinks (rather than flipping through pages).
- Click on "START" to begin exploring!
- Document your fieldwork using the field notebook outline provided.
- Write a paragraph summarizing your findings.

***Be sure to address all the field site objectives listed above in your response.***

**SP Crater near Flagstaff, AZ**

Click on red boxes to zoom in

**How to use:**

Click on these to see different views from the perspective of the red dot.

Click on these to go to a map showing the views available at that stop.

Click on globe to return to map showing different stops.

Yellow signs indicate current location.

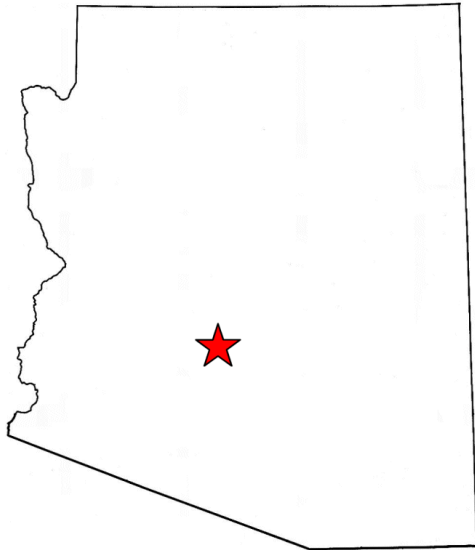
Click on arrows to return to map showing views available at that stop.

Other views at STOP #

**Click this box to START exploring!**

This virtual field experience was created from a field site visited during the 2010 NAGT SW Region annual field conference. Photos ©2010 Laura Lukes

## Field site orientation:



Arizona - The Grand Canyon State

Indicate the location of the field site on the map to the left.

Image source: [http://www.netstate.com/states/maps/az\\_maps.htm](http://www.netstate.com/states/maps/az_maps.htm)

Looking at the digital elevation map, briefly describe the topography (shape of the Earth's surface) of the region (What features do you observe nearby?):

## Field site investigation:

As your exploring the field site and climbing up the mountain, record relevant geologic observations. There is a field site map to below to help keep you oriented.



### *Tips for making geologic observations:*

**Topography:** This refers to the shape of the Earth's surface. Consider changes in elevation or slope. Describe features that stick out or plunge into the overall landscape.

**Rocks:** The tan rocks that make up most of the landscape are sedimentary rocks. The rocks you will be observing are igneous rocks, so you want to look for color (dark vs. light); crystal size (too small to see, large/clearly visible, or mixture); presence or absence of vesicles (air bubbles); and structure (Lava flow pattern? Volcanic bombs (football shapes)? Pyroclastic materials (ash, lapilli, cinders, etc.)). Use this info. to identify rock name(s).

**Evidence of weathering:** Rocks that contain a lot of iron will chemically weather through oxidation (rust), turning rocks pink to red in color. So if you do or do not observe this, what can you infer about the chemistry of the rocks present?

**Sites 1, 2, 3:**

General landscape/topography observations (Stops 1a,1c, 2a, 3a, 3d, 3e):

Volcano topography (slope) observations (Stop1b, 2b, 3e):

Volcanic structures (Stops 3b, 3b-1):

Other observations:

**Site 4, 5, 6:**

General landscape/topography observations (Stop 4d, 5c, 5b-2, 6b)...nearby features:

Volcanic structures (Stop 6c)...nearby features:

Other observations:

Igneous rocks:

<b>Sample #</b>	<b>Color</b> (dark, light, or in the middle)	<b>Inferred composition</b> (mafic, intermediate, felsic)	<b>Crystal size</b> (glassy, fine-grained, coarse grained, or mixture)	<b>Inferred cooling location</b> (above ground or below ground)	<b>Vesicles or structures?</b> (lava flow pattern, bombs, pyroclastics: ash, lapilli, cinders)	<b>Inferred Rock name</b>

Conclusion (see “Field site objectives”):

**Reflection on your Virtual Fieldwork Experience (VFE)**

1. After completing the Virtual Fieldwork Experience (VFE), what does “doing geologic field work” mean to you?

2. Prior to this VFE, did you have any previous geology field work experience?

Circle one:      yes      no      uncertain

If yes, select one that best describes the nature of your experience:

- a) Virtual fieldwork experience
- b) Short (1-3 hour) experiences once or on separate occasions
- c) Long (4-all day) experiences once or on separate occasions
- d) Extended (a series of short and/or long experiences over a period of a week or two, returning to civilization at night)
- e) Immersed (a series of long experiences over a period of a week or two, sleeping in the field at night)
- f) Extended immersed (a series of long experiences over a period of several weeks or months, sleeping in the field at night)

If yes, describe, what you did in the field:

**For the following...**

Make a vertical line indicating your level of confidence. For example if you are 30% confident: 0-----|-----100%

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3. How would you rate your **confidence in your ability** to do geologic field work after completing the VFE?

0-----100%

4. How would you rate your **interest** in doing geologic field work...

... as part of a class after completing the VFE?

0-----100%

5. How would you rate your **interest** in doing geologic field work...

...as part of **your future job/career** after completing the VFE?

0-----100%

6. How would you rate your **interest** in doing geologic field work...

...**for fun** (outside of school and work)?

0-----100%

OVER→

***Retrospective VFE reflection...***

7. **BEFORE** completing the Virtual Fieldwork Experience (VFE), what did “doing geologic field work” mean to you?

***For the following...***

Make a vertical line indicating your level of confidence. For example if you are 30% confident: 0-----|-----100%

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8. **BEFORE** completing the Virtual Fieldwork Experience (VFE), how would you rate your **confidence in your ability** to do geologic field work?                    0-----100%
9. **BEFORE** completing the Virtual Fieldwork Experience (VFE), how would you rate your **interest** in doing geologic field work ... **as part of a class** after completing the VFE?                    0-----100%
10. **BEFORE** completing the Virtual Fieldwork Experience (VFE), how would you rate your **interest** in doing geologic field work...as part of **your future job/career** after completing the VFE?                    0-----100%
11. **BEFORE** completing the Virtual Fieldwork Experience (VFE), how would you rate your **interest** in doing geologic field work ...**for fun** (outside of school and work)?                    0-----100%

***Your feedback on the VFE experience***

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What did you like about the VFE?

What didn't you like?

How could it be improved?