Stone Mountain, Georgia **June 28, 2010**

GPS Science Geology Standards

SG1. Students will interpret the geologic history of the Earth.

a. Describe the formation and evolution of the Earth including the lithosphere, hydrosphere, and atmosphere as driven by internal/external energy sources (i.e. solar, radioactive, gravitational).

b. Use fossils, radiometric dating and stratigraphic relationships and geologic maps (e.g. cross cutting, superposition, uniformitarianism) to interpret Earth's history.

c. Explain how catastrophic and long-term events have impacted the evolution of life on Earth.

SG2. Students will interpret the geologic conditions and processes that form different rocks and minerals.

a. Describe how minerals form under diverse geological conditions.

b. Distinguish between the processes that form plutonic (intrusive) and volcanic (extrusive) igneous rocks of differing compositions, including magmatic differentiation.

d. Interpret the changes in common sedimentary and igneous rocks under a variety of metamorphic conditions.

SG4. Students will evaluate how climate systems affect landforms on the surface of the Earth.

https://www.georgiastandards.org/standards/Georgia%20Performance%20Standards/Geology.pdf

Stone Mountain is composed of Granite

- Medium to course grained granite
- Granite is composed of:
  - quartz,
  - alkali feldspar,
  - plagioclase feldspar,
  - biotite,
  - muscovite mica

http://www.ncgeology.com/Stone_Mountain_State_Park/pages/stone_mountain_geology_rock_types_features.html

Geodetic Survey marker found at the “top” of Stone Mountain

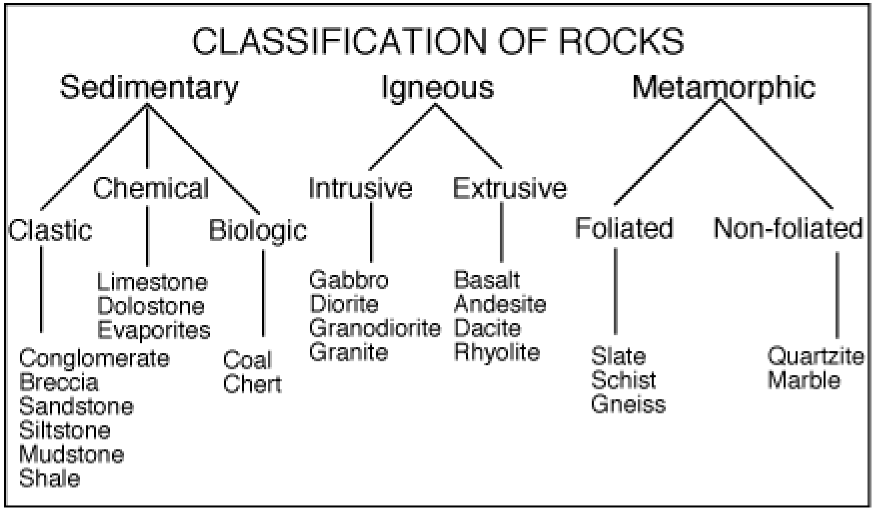
Stone Mountain is 2000 feet above sea level, 800 feet above the surrounding plateau and measures more than seven miles in circumference at its base. It has 25 million square feet of exposed granite and seven and a half billion cubic feet of granite. The gray granite boss is elliptical; the longest axis is east and west. Its steepest side is a sheer precipice, facing northward. The rocks are part of an the Piedmont Plateau extending from Southwestern Alabama through Georgia to the Carolinas, Virginia and Maryland. Stone Mountain was formed by a vent from magma of molten rocks at a great depth; the magma did not reach the surface of the earth.

Stone Mountain rocks stood up at a high angle since they were folded by great pressure over time. The rocks slipped due to folding, earthquakes and stream erosion cutting through the soils and upper layers of decomposed rocks. (1)

What questions do you have about the granite of Stone Mountain?

Granite

- Granite is a type of igneous rock
- Below is a chart that shows where granite is within the category of igneous rock, intrusive.



http://www.stone-network.com/rocks/igneous.html

Naturally Occurring or Man-Made?

Naturally Occurring or Man-Made?

Gum?

Gum Pole?

Naturally Occurring or Man-Made?

Naturally Occurring or Man-Made?

Quartz protrusions?

Dried cement mix?

Are the marks on the granite naturally occurring or man-made?

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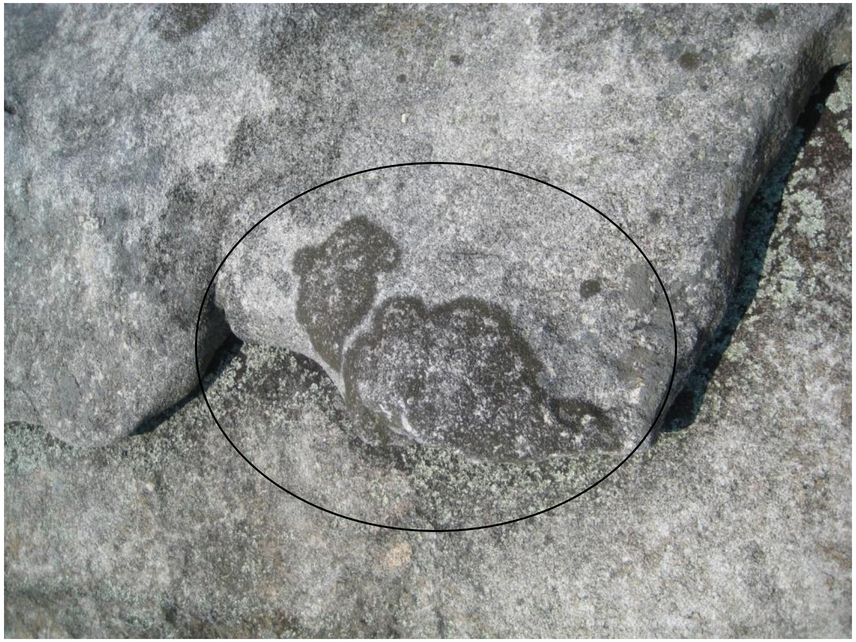
Yellow paint?

Lichens?

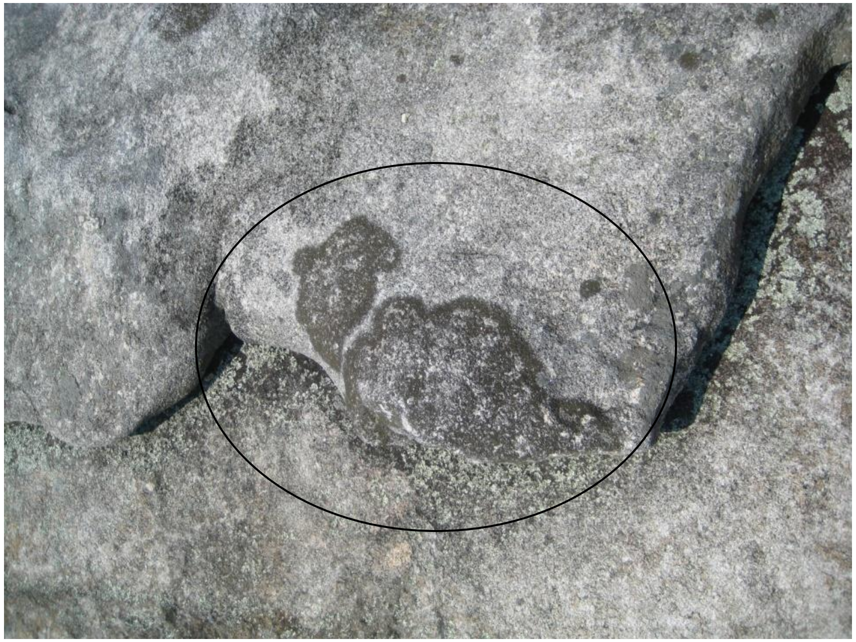
http://www.huh.harvard.edu/collections/lichens/index.html

Naturally Occurring or Man-Made?



http://www.springerlink.com/content/r36x667928jhp6vq/

Naturally Occurring or Man-Made?



Pollution?

Iron Oxidized Granite?

http://www.springerlink.com/content/r36x667928jhp6vq/

What caused these impressions?

What do you think about the processes involved that produced these formations?

Lightning strikes?

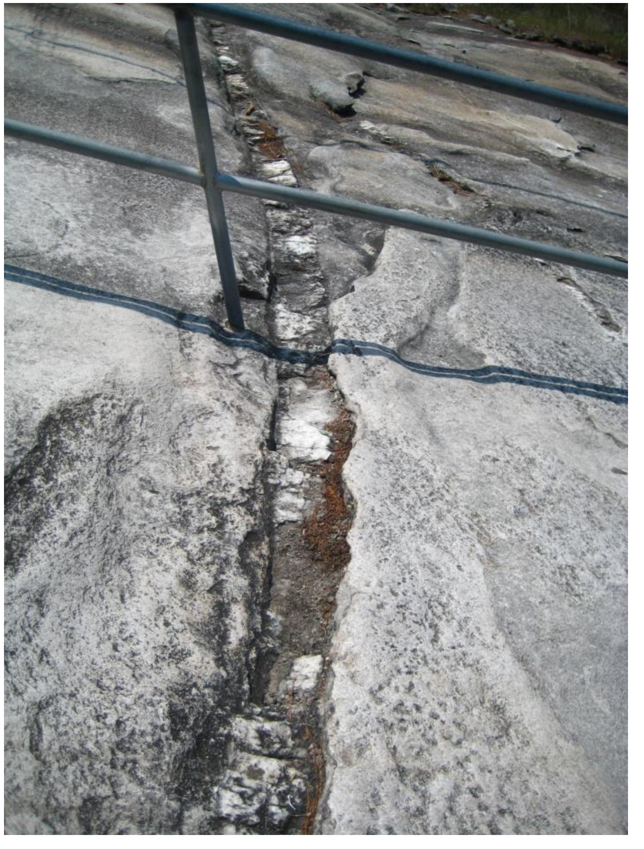
Weathering?

Hot bubbly liquid that cooled?

Disintegrated materials that were less dense?

Meteors?

What caused the strata in the granite?



What caused the strata in the granite?

Two questions from one picture: Why do we have holes and strata in the granite?

Factual Information

Figure 2. Stone Mountain granite (6 cm long). Arrow shows typical sample area for biotite flakes.

Figure 3. Stone Mountain xenolith (7 cm long).

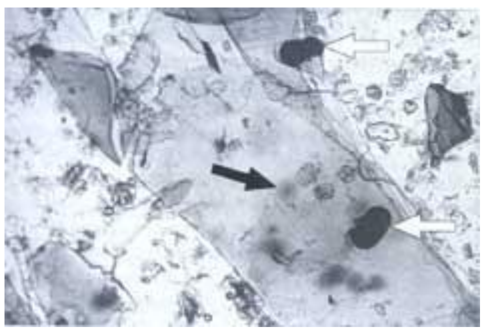


Figure 4. 210Po radiohalo in Stone Mountain granite (120X magnification). Black arrow indicates single-ring halo. White arrows indicate pollen grains. The darker areas of the biotite are due to increased thickness of the biotite. Horizontal field of view is 520 µm.

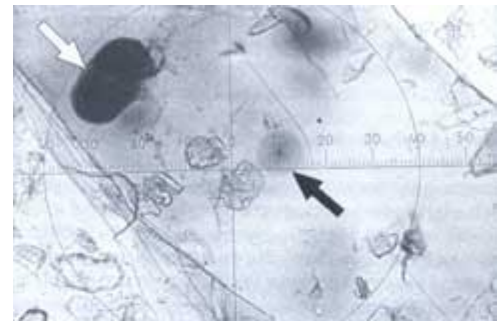
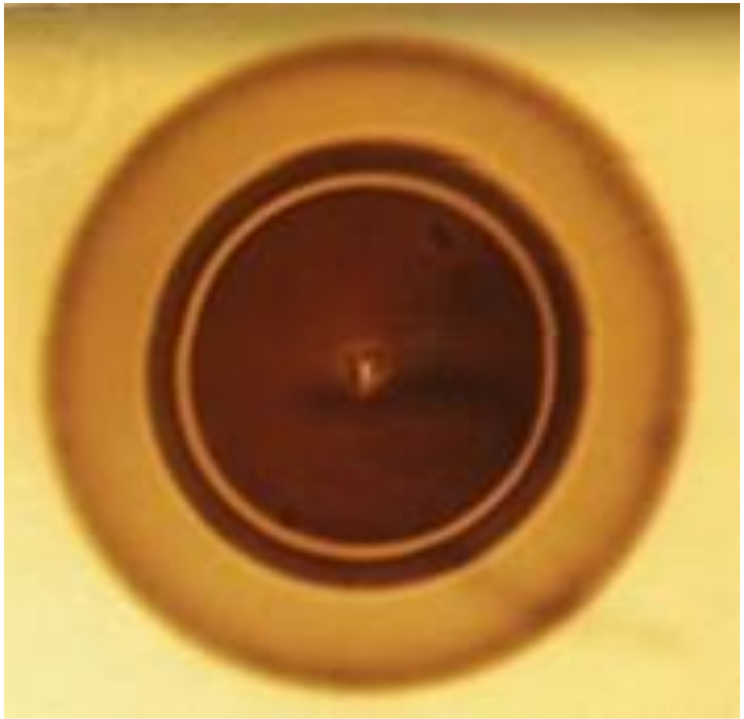
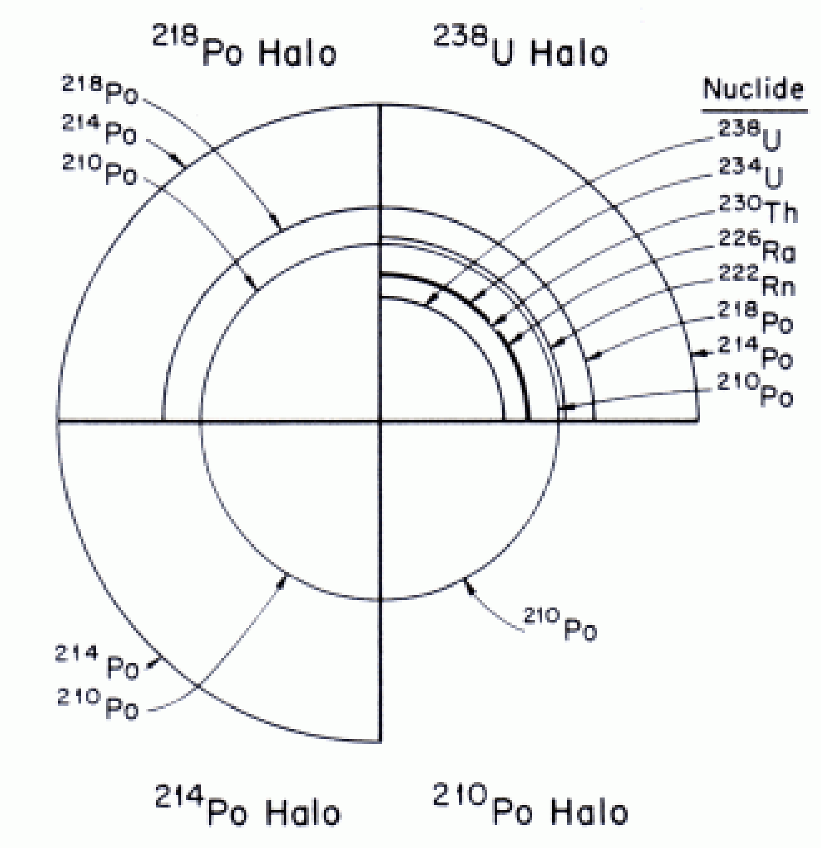


Figure 5. The same 210Po radiohalo as in Figure 4 (here 250X magnification). Black arrow indicates single-ring halo. White arrows indicate pollen grains. Scale is 1.9 µm per mark. Horizontal field of view is 230 µm.

http://www.answersingenesis.org/tj/v15/i1/radiohalos.asp





http://www.answersingenesis.org/articles/aid/v4/n1/radiohalos-three-granitic-plutons

Half Lives of Radioactive Elements

238 U	**4.5 billion years**
234 Pa	**1 minute**
234 U	**0.245 million years**
230Th	**76,000 years**
226Ra	**1,600 years**
222Rn	**3.8 days**
218Po	**3.0 minutes**
214Pb	**26.8 minutes**
214Bi	**19.8 minutes**
214Po	**164 microseconds**
210Pb	**22 years**
210Bi	**5 days**
210Po	**138.4 days**
206Pb	**Stable**

Table 1. The 238U decay series

thus 238U could not have been the original parent material.

http://creation.com/new-radiohalo-find-challenges-primordial-granite-claim

Table 1. Compilation of the Po, U, and th radiohalos counted in samples from the three granitic plutons.

Pluton	Sample	Number of Slides	Radiohalos ^{210}Po	^{214}Po	^{218}Po	^{238}U	^{232}th	Additional Notes (approximate proportional radiohalo numbers)
Stone Mountain	SMG-1	30	192	5	0	11	0	(38:5:0:2:0)
	SMG-2	30	90*	0	0	1	0	*4 in muscovite
	SMG-3	30	222	9	0	4	0	(49:2:0:1:0)
	SMG-4	30	138	2	0	1	0	
	SMG-5	30	179	36	2	26	0	(6:1:~0:1:0)
	SMG-6	141	288	41	0	45	0	(6:1:0:1:0)
La Posta	PRB-6	50	8	0	0	0	0	Hornblende-biotite facies
	PRB-7	50	2	0	0	0	0	Large biotite facies
	PRB-5	53	0	1	0	1	0	Small biotite facies
	PRB-22	50	0	0	0	0	0	
	PRB-4	50	36	0	0	6	0	Muscovite-biotite facies
	PRB-20	30	15	3	0	1	0	
	PRB-24	50	18	0	0	0	0	
	PRB-25	50	17	0	0	0	0	
	PRB-21	30	56	11	0	15	0	Indian Hill monzogranite
	PRB-23	50	159	0	0	0	0	Other monzogranite
	PRB-26	50	64	0	0	30	0	
	PRB-27	50	0	0	0	0	0	Pegmatite
Cooma	RLG-2	41	373	44	0	418	37	(9:1:0:10:1)

What happens at 150 degrees Celsius?

Quite obviously none of the radiohalos could form until the biotite crystals had formed and cooled sufficiently to preserve the α-particle tracks (with no erasure by thermal annealing). The fact that Po (and also U and Th, of course) radiohalos are found in the biotites of these granitic rocks indicates that these radiohalos formed below the temperature at which radiohalos are thermally erased from biotite. **The only available data suggests that thermal erasure of radiohalos in biotite occurs at and above 150°C.296, 297 This temperature corresponds to that of hydrothermal fluids.**

http://www.answersingenesis.org/articles/aid/v4/n1/radiohalos-three-granitic-plutons

Discrepant Event

- Polonium and Uranium Halos can be seen in Stone Mountain granite with a microscope.
- Polonium Halos have a half life of nanoseconds.
- Uranium Halos have a half life of 4.5 billion years.
- Polonium Halos “erase” if heated to over 150 degrees Celsius.

References

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References

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