USGA Death Valley Virtual Geology Fieldtrip - Extra Credit

Introduction: This virtual fieldtrip takes you to California's Death Valley National Park. There, you will observe and study some of California's most amazing geology, which includes rocks that range from 1.8 billion years to recent. You will become familiar with southeastern California's rich geologic history, which covers virtually every major tectonic setting. A wide variety of rocks, geologic features and processes are laid out across this rough, barren, yet starkly beautiful desert region.

This assignment is worth 15 extra credit points. The tour virtual fieldtrip and information to answer the worksheet questions can be found at two different websites that both give a good virtual fieldtrip of the region: Follow the directions below.

I) The USGS Death Valley National Park Virtual Geology Field Trip - Webpage at URL:

http://geomaps.wr.usgs.gov/parks/deva/devaft.html and

II) Steven G. Spear's DEATH VALLEY GEOLOGY: A Field Guide and Virtual Tour of the Geology of Death Valley National Park and Environs, California and Nevada -Webpage at URL:

http://www.palomar.edu/geology/DVWeb.htm

Directions: Below are 40 questions that pertain to the virtual fieldtrip listed above. The topics and questions in the worksheet below are arranged according to the ordered fieldtrip stops, which are arranged from the oldest geology to the youngest in the valley. Fill out the questions as you go, or after you are finished with each trip. The proper format for this assignment is identical to that of the course research assignment. Check there for an example of the proper format for filling out the worksheet. The due date for this extra credit, and all other extra credit, is listed in your syllabus.

DEATH VALLEY VIRTUAL GEOLOGY FIELDTRIP WORKSHEET

A .doc file of the worksheet below can be downloaded by clicking here

Death Valley's Precambrian Geology - Very Oldest rocks at Badwater

1) What type of rocks make up the oldest geology in Death Valley - those found in and around Badwater?

a) The present-day rock type(s). Be as specific as possible.

b) The original protolith rock type(s) - the rocks that originally formed in the Precambrian that later got metamorphosed into the present-day rocks.

2) Exactly how old are these rocks? Be as specific as possible.

3) How did these rocks form? What sort of geologic setting and processes were occurring then?

4) What later happened to these really old rocks around 11 million years ago?

Death Valley's Precambrian Geology - Second Oldest rocks at Mosaic Canyon

5) What type of rocks make up the Precambrian rocks found in and around Mosaic Canyon? Be as specific as possible.

a) The present-day rock type(s). Be as specific as possible.

b) The original protolith rock type(s) - the rocks that originally formed in the Precambrian that later got metamorphosed into the present-day rocks.

6) Exactly how old are these rocks? Be as specific as possible.

7) What was the geologic setting like when these rocks were being deposited?

Death Valley's Early Paleozoic Geology - Limey Rocks of Titus Canyon

8) What type of rocks make up the Cambrian rocks found in and around Titus Canyon? Be as specific as possible.

9) Exactly how old are these rocks? Be as specific as possible.

10) What was the geologic setting like when these rocks were being deposited?
   a) Climate?
   b) Depositional environment?

11) Are there any traces of fossils in these rocks? If so, what kind?

12) Would this region at that time have been considered a passive or active continental margin? State your reasoning.

Death Valley's Late Paleozoic - Mesozoic Geology - Rocks of Western Death Valley

13) What major tectonic changes had occurred to this region by the late Paleozoic and on in through the Mesozoic? Make sure to address these two aspects:

a) The change in plate tectonic setting - from what setting to what setting? Be as specific as possible.

b) The initiation of what sorts of geologic activities? The creation of what sorts of geologic features?

14) What was the total range in age for this geologically very active period of time for this region?

15) What types of rock were being formed by these sorts of geologic activities? Be as specific as possible.

16) What is the name of the world-famous batholith that was forming at the same time to the west of Death Valley? Hint: Yosemite is a famous part of it!

Death Valley's Cenozoic Rocks - Basin and Range Geology - Dante's View & Amargosa Chaos

17) What major tectonic changes had occurred between the Late Mesozoic and Late Cenozoic? Make sure to address these three aspects:

a) What new tectonic setting that caused the Basin and Range structures to form? Be as specific as possible.

b) What sorts of geologic activities created the Basin and Range geology? Be as specific as possible.

c) What type of faulting created Death Valley's classic basin-and-range style of geography? Normal, reverse, or strike-slip? Extensional, compressional, or shear?

18) What were the two Cenozoic epochs for when most of the extensional tectonics occurred? Also note the absolute age range in millions of years.

Death Valley's Recent Volcanic Geology - Split Cinder Cone

19) What type of volcanism has occurred in Death Valley in recent times? Be as specific as possible.

20) Why did the volcanism create a cinder cone and not a shield volcano or composite volcano?

21) What caused the cinder cone to split into two pieces? Describe the crustal motion.

Death Valley's Technocolor Geology - Black Mountain

22) What type of rocks make up the Artist's Drive Formation? Be as specific as possible.

23) Why are the Artist's Drive Formation rocks so colorful? Be as specific as possible.

Death Valley's Badland Geology - Zabriskie Point

24) What are "badlands"? How do they form?

25) What sort of rainfall patterns does Death Valley have? Does rainfall patterns play a role in badland development? How?

Death Valley's Great Alluvial Fans - View from Golden Canyon

26) What are "alluvial fans"? How do they form?

27) Does rainfall patterns play a role in alluvial fan development? How? Include in you discussion flash-flooding.

28) Does topography play a role in alluvial fan development? How?

29) What rock types are created in an alluvial fan depositional setting?

Death Valley and the Ice Ages - Shoreline Butte

30) What epoch did the last Ice Age occur? Include the age in years.

31) Describe the type of climate that Death Valley had back then.

32) Describe the type of geography that Death Valley had back then, due to the Ice Age climate.

33) Describe the lake that Death Valley had back then.

Death Valley Today - Back to Badwater and Big Dunes

34) What is the lowest elevation in Death Valley?

35) Describe the type of climate that Death Valley has today.

36) Describe the sorts of lakes that Death Valley has today, compared to the ones during the last Ice Age.

37) How do those rocks glide across the Racetrack Playa?

38) How does Death Valley develop its enormous sand dunes?

39) What sorts of valuable minerals are mined around Death Valley National Park?

40) Have you ever visited Death Valley? If so, what was your experience like? If not, then would you like to visit Death Valley some day? Why?