

# Geology - Workbook

## Hvíluklettur, Tunguskjól and Myrkrastofa- Pseudo-craters



Walk from Hæðagarðsvatn lake and along the Klausturstígur path down to Hvíluklettur (Resting Hillock), Tunguskjól and Myrkrastofa (Dark Chamber).

Examine the cliff face at Hvíluklettur:

What is the cliff made of?

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Where did these splashes of lava come from?

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For a long time the hillock was used as a resting place; what is it about the hillock that makes it a convenient place for resting?

Go to Tunguskjól and enter the hillock.

How do you think the roof was formed?

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What about the hole you crawled through to enter, how was that formed?

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**In ancient times the hillock was used as a sheepcot. Why were the sheep kept so far away from residential buildings?**

**Walk towards Myrkrastofa and take a good look at it:**

**Is it plausible that this hillock was formed in the same way as the other two hillocks?**

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**Would it be possible to use this hillock for some purpose?**

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**What is the difference between a pseudo-crater and a real crater?**

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**Sometimes there are giant balls of lava inside the craters and can be seen if the hillocks are excavated, how could they have been formed?**

## The volcanic eruption in Laki 1783-1784 and the Skaftár Fires

Look at the geological map of the South-Eastern part of Iceland and notice the flow of lava which formed in the Laki Eruption and the fissure which was formed during the eruption. Then watch the film Eldmessan and answer the following questions:

The lava that emerged in the Laki eruption is estimated to have been just under  $15 \text{ km}^3$ . If this lava were to be used to build a wall which was 10 meters in diameter and 100 meters (0,1 km) high (Hallgrímskirkja is 74,5 m), how long would the wall be?<sup>1</sup>

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Name some of the precursors of the Laki Eruption:

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Why does everything go dark during massive volcanic eruptions?

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<sup>1</sup> The volume of a things is a concept used to figure out the size of a thing or an area in three dimensions. The SI-unit of measurement is a cubic meter, symbolized with  $\text{m}^3$ . A few steps to figure out the volume of a thing: Figure out the length, width and height of the thing and match the unit of measure. Multiply these with each other. The result is the volume of the thing in three dimensions. For each unit of length, move the comma three spaces to the left. For each shorter unit of length, move the comma three spaces to the right. For example:  $1 \text{ cm}^3 = 1000 \text{ mm}^3$  but otherwise the cm is only 10 times bigger than the mm. In comparison the circular highway in Iceland (Þjóðvegur nr. 1) is 1.332 km, and the distance between Reykjavik and Oslo is 1.745 km.

During the eruption a lot of people were scared that the mountains above the countryside would melt due to the heat from the lava; how could one disprove this theory?

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On 29 June a fissure opened up at the north of Laki. Find this fissure on the geological map and figure out where its lava came from.

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Put yourself in the shoes of the people who used to live here in the summer of 1783; what would you have done and why?

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What do you think would happen differently if such an eruption were to occur today? Name everything you can think of.

## Skaftá River - Glacial Rivers

Get a map of the South-Eastern part of Iceland and take a look at the origins of the Skaftá River.

Where lie the origins of Skaftá River?

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How long is the path which Skaftá River runs from its origin to the sea?

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Go to Skaftá River and take a sample and put it into a glass bottle. Also, take a sample of the sediment from the riverbank. Take the bottles inside, to where you can see samples from Skaftá River, which have been taken at different times and at different circumstances. Compare the water sample you took to the samples in the bottles and try and figure out to which sample it is most similar.

What is the colour of your sample? - Describe the colour and compare it to the existing samples.

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Why is the water this colour?

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Why is the water in Skaftá River darker during the summer than in winter?

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What becomes of the substance which gives the river its colour?

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Are the particles in the water the same as in the sediment you removed from the riverbank? Which parts do you think are clay, silt and sand?

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Name all the advantages and disadvantages of this sediment you can think of.  
Does Skaftá River do more good than harm?

## Tephrochronology

Examine a geological map of the South-Eastern part of Iceland and name the volcanoes in your vicinity.

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Which of these volcanic eruptions were explosive eruptions and which one of them spread ash over your area?



Go to the ash-bunker and take a look at the layers of ash. Which layers of ash do you see and how far back do they reach? Draw a picture and label in it the layers of ash which are known.



Are all the layers the same or are they different; what do you think dictates the way they look?



Different layers of ash can give us information about the history of volcanic eruptions; what else can the different layers of ash tell us? Mention anything you can think of.

## Kirkjugólf - Columnar Rock

Students walk toward the Kirkjugólf (Church Floor) and wonder about its origin. It is good to begin by drying up a thick, liquid based substance and taking a look at the patterns that form before commencing this exercise.

Where do you think the lava that formed this rock came from?

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What are the possible explanations for this layer of lava being visible at this location?

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Columnar rock is often spoken of as being hexagonal, is that correct?

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Divide into pairs and count the 20 columns which are closest to where you are standing. Count how many corners there are on each of these columns and write down your results; what is the average of your results?

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In what other part of nature can you find a location filled with hexagonal columns?



Several decades ago a section of several meters was cut from the floor in order to prove or disprove that the floor was actually man made. Where do you think this theory originated?