

## Sólheimajökull Video Worksheet

Watch the film right through once

Then watch it again, pausing at the appropriate points to attempt the following questions

**00.38**

1. Describe the landscape at the snout of the glacier. (Huge lake/lagoon occupying the valley floor with some icebergs on the far side. Steep and rocky valley side – far side – with a deeply incised river valley. In the foreground, lots of grey sediment and some boulders (erratics). Snout of the glacier to the right covered in black sediment.)

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2. How do you think the large boulder in the foreground got there? (Transported by the ice and dumped when the ice melted/retreated. This boulder is an erratic.)

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### **Did You Know?**

The main small ponds near the snout of the glacier are called kettle holes. They form when blocks of ice buried in sediment melt to form a hollow which then fills up with water.

**00.52 /01.28**

3. Describe the size and shape of the sediment (till) in the photograph. (Sediment is very varied in its size – poorly sorted – and also in its shape, with some very angular rocks and some that are more rounded. The lack of sorting suggests very little transportation by flowing water.)

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4. What is the name of this landform of glacial deposition? (lateral moraine)

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5. How does the location of this landform provide evidence of glacial retreat? (Lateral moraines form at the edge of a glacier where it meets the valley side. This example of a small lateral moraine is quite separate from where the glacier is today; you can see it in the distance. It is also not at the edge of the valley suggesting that the glacier had shrunk in size when the feature was being formed.)

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**02.18**

6. Why are cracks in the rock evidence of the process of freeze-thaw weathering? (Freeze-thaw weathering exploits small cracks in a rock – water freezes and expands – gradually making them bigger and bigger until eventually the rock splits apart.)

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**Watch the clip describing the process of freeze-thaw weathering**

7. Draw a series of simple labelled diagrams to describe the process of freeze-thaw weathering.



**03.25-04.30**

8. Describe the landscape of the outwash plain. (The landscape is mostly flat with ridges of rocky sediment bordering the many river channels. The water in these channels is often fast flowing and turbulent.)

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9. Can you suggest why it may be dangerous to walk across this area and to camp here in the summer? (The volume of meltwater varies considerably and river channels are always changing position. During spring and summer, melting can be rapid and water levels can rise quickly which could be dangerous.)

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**03.45**

10. How does the outwash material differ from till? (Outwash is better sorted and less angular than the till.)

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**Did You Know?**

In the UK, till forms an extensive deposit along the east coast of England. It is responsible for the rapidly eroding Holderness coast.

**04.36**

11. What is the evidence that rapid melting of the glacier is taking place? (Constant dripping, small rivers flowing out of the ice and the formation of ponds.)

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04.56-05.37

This clip deals with the glacier budget by examining the ablation and accumulation zones

12. What is the difference between the ablation zone and the accumulation zone? (ablation zone is a zone of loss due to melting, calving and sublimation whereas the accumulation zone is a zone of gain, due to snow and possibly avalanches)

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DIAGRAM

13. If there is more ablation than accumulation, how will the glacier respond? (it will retreat)

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05.49-06.50

This clip examines the two main processes of ice movement, basal slip and internal deformation. Pause the video to draw simple labelled sketches to show how these two processes operate.

Basal slip (05.58)

Internal deformation (06.15)

06.50

This next section of film considers some of the evidence for rapid melting in response to global warming

14. What is the evidence that the glacier is melting rapidly? (dripping water, pools, thinning of the ice, rapid retreat – up to 10cm a day in the summer, blocks of ice breaking off the glacier – calving -, glacier is receding exposing new ground, lagoon)

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15. What impact is global warming having on glaciers in Iceland? (glaciers throughout Iceland are thinning and retreating due to global warming)

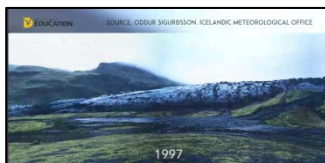
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16. Pause the film (08.39) to consider the changes in the glacier shown by the sequence of photos (1997, 2008 and 2015). (considerable thinning and retreat of the glacier)



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17. What is meant by the term 'dead ice' (**09.22**)? (ice that is just motionless, attached to a rock face but with no movement taking place)

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**09.35**

18. Sólheimajökull is one of the most closely monitored glaciers in the world. Describe the techniques used to monitor the glacier. (use of high-tech GPS or basic poles hammered into the ice to measure glacier movement)

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**10.59-11.45**

19. What is the process of calving and how can it be dangerous? (calving is where chunks of ice break away from a glacier – large blocks of ice falling into a lagoon can trigger high waves which can be dangerous)

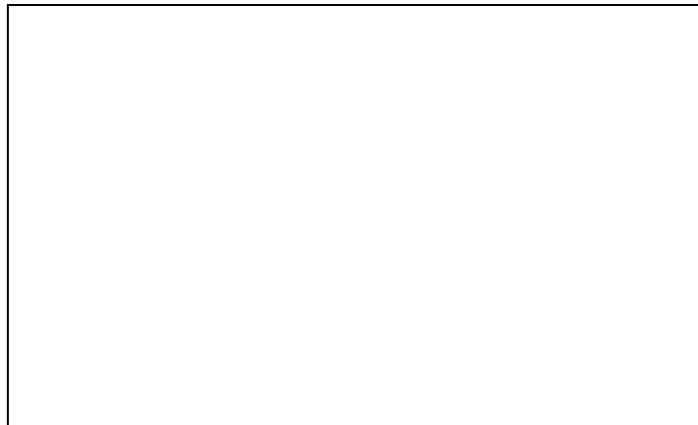
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20. Draw a simple diagram to show how calving may create a dangerous wave.



**Did You Know?**

In 2014, calving ice in Greenland created an enormous tsunami wave over 50m high!

**11.57**

21. How is Ragnar well prepared to work as a guide in this environment? Comment on his clothing, footwear and equipment. (Ragnar is wearing warm and waterproof clothes, with hat and gloves. He has a hard hat to protect his head and sturdy footwear. He has an ice axe to help assess danger and provide a hold on the glacier. He also has ropes and other safety equipment in his rucksack.)



How is Ragnar well prepared to work in this environment?

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**12.14**

This next clip considers evidence of the glacial processes of abrasion and plucking

22. Draw simple labelled diagrams to describe the processes of abrasion and plucking

Abrasion (12.37)

Plucking (13.10)

**Did You Know?**

If abrasion involves very fine particles it can actually cause a rock face to become shiny and polished

23. What do scratches (striations) on rocks tell us about glacial processes and ice movement?  
(Striations suggest the process of abrasion and tell us that ice once moved over this exposed rock. The direction of the scratches and grooves suggest the direction of ice movement.)

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24. What evidence would you look for on a rocky surface to identify which process of erosion has taken place? (a jagged surface will suggest the process of plucking whereas a much smoother, striated surface is more likely to result from the process of abrasion)

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### 13.53

**This next clip involves an interview with leading Icelandic glaciologist Thorsteinn Thorsteinsson**

25. Thorsteinn Thorsteinsson is a glaciologist. Describe the work that he does. (He monitors glaciers in Iceland, conducting field research on mass balance – accumulation and ablation – to assess changes in Iceland's glaciers. He also tries to predict what may happen in the future.)

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#### **Did You Know?**

- Ice margins in Iceland have retreated by 20-50m annually since 1995
- Each year about 20 square km of new land is exposed by the retreating ice





