

Geography

HOMEWORK

8A Dramatic glaciated landscapes

Name

Tutor Group

Teacher

The homework booklet contains essential reading on
© Ten dramatic glacial landscapes and features *plus*
© planning for a glaciology essay.

Your homework will be set and reviewed on ☒

☐ Monday ☐ Tuesday ☐ Wednesday

☐ Thursday ☐ Friday

People ● Place ● Pattern ● Process

In this homework booklet you will read about ten remarkable glacial areas from the tiny Isle of Rum to the towering Kilimanjaro. Each week's reading will be followed up with a quick knowledge text in class.

#10: Sognefjord, Norway 61°06' N 5°10' E

The Sognefjord is Norway's longest and deepest fjord, and its famous arm, the Nærøfjord has World Heritage status. **Fjords form when rising sea levels flood the lower course of a glacial trough creating dramatic scenery.** As a result the surrounding mountain areas of Sognefjord are amongst Norway's most popular hiking areas. The Sognefjord extends from the coast north of Bergen to the mighty mountains of the Jotunheimen National Park and the blue ice of the Jostedalsglacier. At its deepest, Sognefjorden plunges to more than 1,300 metres, and the mountains along the fjord rise to heights over 1,700 metres.

Sognefjorden's most narrow and famous fjord arm is the Nærøfjord, only 250 metres at its narrowest. **Since 2005, Nærøfjorden has been listed as a UNESCO World Heritage Site, and regularly rated as the world's number one natural heritage location.** Sognefjorden is in the process of being certified as a 'Sustainable Destination', a seal of approval given to destinations that work systematically to reduce the negative impact of tourism. In addition to providing visitors with enjoyable experiences, **authorities wish to preserve local nature, the culture and environment, strengthen social values and be economically sustainable.**

#9: Wastwater, Lake District, England. 54°26'51"N 3°13'29"W

Wastwater is a glacial ribbon lake in the south-west corner of the Lake District. It is 5.4 km long and some 540 metres at its widest point. However, what is extraordinary is its depth. **At 79 metres the lake is Britain's deepest body of fresh water.** While the surface of the lake is 63 metres above sea level the lake bed is some 16 metres below sea level. **Wastwater was carved out by glaciers over thousands of years before being filled with water as the ice retreated.** As the land rose after the last glaciation, fish species like the Arctic char appear to have been trapped in Wastwater, along with Windermere and other Cumbrian Lakes. **These cold water fish are now at risk from the rising water temperatures caused by global climate change.**

In recent years divers built a gnome garden on a 25 metre deep ledge in Wastwater. The Police, fearing an accident involving divers visiting the garden at night, removed the gnomes. However, the gnomes have since reappeared at a depth of over 50 metres.

Homework N°1: continued

#8: Rùm, Small Isles, Scotland. 56°59' N 6°20' W

Perhaps one of the smallest glaciated highland areas is the tiny Isle of Rùm located in the Small Isles of the Inner Hebrides. Just 14km from north to south and 13km east to west the roughly diamond shaped Rùm is the smallest Scottish island to have a summit above 762 metres (2,500 feet). There are two such 'Corbett' peaks on Rùm; Askival (mountain of the ash tress) and Ainshval (hill of the strongholds). They rise spectacularly in the Cuillin mountain range on the eastern side of Rùm before the land plunges down to the sea in wide glacial troughs.

Rùm has had a human population for some 9,500 years, one of the oldest sites of human habitation in the British Isles. In the 1800s Rùm had a population of some 400 people but the locals were cleared off to Canada during the Highland Clearances and Rùm's population were replaced with sheep. The island became a hunting estate for the owner who built Kinloch castle, a strange and eccentric hunting palace in 1900. **Today the island is owned by the Isle of Rùm Community Trust, and run as a nature reserve and tourist destination.** It has a permanent population of around 30, having grown from around just 15 in the 1980s.

#7: Puncak Jaya, Papua, Indonesia. 04°04'44"S, 137°9'30"E

Puncak Jaya is one of the famous 'Seven Summits' situated on the Australasian island of New Guinea, the world's second largest island. This peak is the only one of the seven which is a rock climbing peak. However it requires a trek in through remote jungle to reach the base camp. The mountain is located in the Papua province of Indonesia. **At 4,884 metres above sea level, Puncak Jaya is the highest mountain in Indonesia and one of only a few Equatorial mountains high enough to have glaciers on its slopes.**

While Puncak Jaya's peak is free of ice, there are several glaciers on its slopes. These include the Carstensz Glacier, West Northwall Firn, East Northwall Firn and until recently the Meren Glacier. Analysis of the extent of these rare Equatorial glaciers show significant retreat since the 1850s, around the coldest time of the Little Ice Age. **Since the 1970s, evidence from satellite imagery indicates that the Puncak Jaya glaciers have been retreating rapidly.** The Meren Glacier melted away completely sometime between 1994 and 2000.

High on the slopes of Puncak Jaya, next to the West Northwall Firn glacier lies the Grasberg mine, the largest gold mine on the planet: proof that people will go to extraordinary heights, as well as depths, for gold.

#6: The Zaskar Valley, Indian Himalayas. 33°27'N 76°52'E

The Zaskar Range is spread over a vast area. The valley stretches north west from the south eastern boundary of the state of Kashmir (India) to the eastern limits of Baltistan (Pakistan) Zaskar. Zaskar serves as a physical boundary between Tibetan Ladakh and the Vale of Kashmir.

Dramatic, often unclimbed, peaks soar above the valley. The 7,000m high peak Nunkun is found in the range. High mountain passes connect Zaskar to the rest of the world. The western Marbal Pass connects the valley with Kashmir while the 5,000m high Shingo La, in the extreme northwest of Zaskar range, connects the Valley with Lahaul. Many rivers have their sources in the different branches of the valley. Frozen in winter, in summer they add their meltwater to the great Indus River flowing through Pakistan.

With a population of around 13,000, living in 7,000 square kilometres, the Zaskar Valley is one of India's least populated regions. Yaks are of paramount importance in Zaskar. The hardy beats are used to plough the land, thresh the barley and used to carry heavy loads of up to 200 kilograms. Their dung not only serves as fertiliser but is also the only heating fuel available in this treeless region. Yaks are a vital source of milk but are rarely eaten. The yak's fur is used to make clothes, carpets, ropes and blankets.

#5: Machhapuchare, Nepalese Himalaya. 28°29'42"N 83°56'57"E

Machhapuchare is a dramatic mountain located in the the Annapurna range of the Himalayan mountains in Nepal. Its double summit resembles the tail of a fish, hence the name, Machhapuchare, meaning "fish's tail" in Napalese. The peak has been nicknamed the "Matterhorn of Nepal". As a result of the low terrain that lies south of the Annapurna Himalayas, Machhapuchare commands tremendous vertical relief over a very short horizontal distance. This, combined with its steep, pointed profile, make it a particularly striking peak.

The summit is revered by the local population as sacred to the Hindu god Shiva, and so the peak is off limits to climbing. Machhapuchare has never been climbed to its summit. The only attempt was in 1957 by a British team. Climbers Wilfred Noyce and A.D.M Cox climbed to within 150 m of the summit via the north ridge, reaching an altitude of 6,947 m. They did not complete the ascent, as they had promised not to set foot on the actual summit. Since then, the mountain has been officially declared sacred and is closed to all climbers.

Homework N°3: continued

#4: Fox Glacier, New Zealand. 43°27'52"S 170°1'4"E

The Fox Glacier grinds down the Fox Valley, from the high peaks of the Southern Alps of New Zealand. It surges through temperate rainforest before terminating 250 metres above sea level, just 12 kilometres from the Tasman Sea. It is the longer and the faster moving of the two most famous West Coast New Zealand glaciers. Fed by four alpine source glaciers, it falls 2,600 metres on its 13-kilometre journey towards the coast.

One of twenty-two New Zealand glaciers the Fox Glacier was named after the Sir William Fox, the New Zealand Prime Minister, who visited the glacier in 1872. During 2006 to 2009, Fox Glacier was advancing forward at approximately a metre every week, but since then, it has been retreating. The Fox is among the most accessible glaciers in the world, with 1,000 visitors every day during the tourist season. The glacier can reach a compacted ice depth of 100 metres. This ice is a classic glacial blue in colour. Occasionally the Fox Glacier causes flash flooding in the outwash valley below. This is the result of the ice trapping meltwater in cavities within the glacier. When these break open they release vast quantities of flood waters into the valley below.

#3: The Matterhorn, Switzerland. 45°58'35"N, 7°39'31"E

At 4,478 metres, the Matterhorn is Europe's 12th-highest peak but it is perhaps its most recognisable. The Matterhorn straddles Switzerland and Italy and is a pyramidal peak, created by 4 corries eroding backwards against the rock. The rock is made up of the European and African continental plates thrust upwards by the collision of the two continents. The rock is resistant to the erosion creating steep-sided slopes.



The mountain's location creates an unusual feature called banner cloud. This is formed when air rises up the steep sides of the mountain, water condenses and creates a long banner-like strip of cloud 'fluttering' from the top of the mountain. Both a railway and a cable car to the summit of the Matterhorn have been proposed but these plans have faced vocal opposition. Since the first ascent of the peak in 1865 more than 500 people have died while climbing or descending the Matterhorn, an average of three to four deaths each year. Out of respect for those who have died on the peak, the mountain is closed at certain times of the year.

#2: Kilimanjaro, Tanzania. 03°04'33"S, 37°21'12"E

At 5,895 metres, Kilimanjaro is the world's tallest free-standing mountain. While most high mountains are part of ranges, such as the Himalayan Mountain Range, free standing mountains are usually a result of volcanic activity.

Kilimanjaro lies just 320 kilometres south of the Equator. When early explorers reported seeing glaciers on the top of Kilimanjaro people did not believe them. They thought it was impossible for ice to form so close to the Equatorial Sun. Today those glaciers are under threat, Kilimanjaro's ice cover has shrunk 82% since 1912. Scientists estimate the glaciers may be completely gone in 50 years. The cause of this is thought to be mostly due to deforestation and not necessary global warming. Nearly 5 million native trees were planted around the base of the mountain in 2008 in an attempt to combat the glacial retreat.

Approximately 30,000 people attempt to climb Kilimanjaro every year. Unfortunately, about 50% of climbers fail, mostly due to altitude sickness. Kilimanjaro once had three volcanic cones, Shira and Mawenzi are now extinct. However, Kibo is dormant so it may erupt again. However, the last major eruption was 360,000 years ago and the most recent activity was 200,000 years ago, about the same time that human beings evolved on the savannah plains surrounding the mountain's base.

The origin of the name Kilimanjaro is not certain. The most popular idea is that the name comes from the Swahili word “Kilima” (mountain) and the Chagga word “Njaro” (whiteness).



Homework N°4: continued

#1: The Great Aletsch Glacier, Switzerland. 46°26'32"N, 8°4'38"E

Nine hundred metres thick and weighing 11 billion tonnes, the Great Aletsch Glacier is a vision of primeval beauty. If the mass of ice in the glacier were melted, it



could supply every single person on the Earth with a litre of water every day for fours and a half years! This majestic river of ice stretches 23km, from its source cirques (corries) in the Jungfrau region of Switzerland (4,000m above sea level), down to the Massa Gorge, 2,500m below. For centuries, the glacier has fascinated and inspired visitors to the European Alps.

The ice formed in the catchment area of the glacier moves downhill as a fractured, viscous mass providing a constant supply of ice to the melting snout. The distance covered by the ice over time is referred to as the glacier's velocity which, in the Great Aletsch, can reach up to 200m per year.

The Great Aletsch has shaped the landscape over thousands of years. During the last ice age (which ended around 17,500 years ago), ice still covered the mountain ridges between the peaks of the Bettmerhorn and the Riederhorn. These summits rose above the ice, as isolated mountains called nunatoks. Beneath the ice, erosion by abrasion and plucking was shaping the landscape we see today.

The most recent maximum extent of the Great Aletsch Glacier was around 1860. Then it was around 3km longer than today and the top of the glacier was over 200m higher. In the Aletsch Forest, growing on the slopes above the glacier, the area exposed by the retreating ice stands out against the surrounding countryside as a lighter strip of land because of the much younger vegetation.

Sadly, like most glaciers, global warming is affecting the Great Aletsch. Measurements taken by the local *Pro Natura Centre* show that the Aletsch Glacier is experiencing dramatic ablation, shrinking by up to 50 metres in length each year and retreating significantly at the edges. Like many mountain glaciers, climate change may ultimately see this dramatic river of Alpine ice melted into nothing but a distant memory.

Homework N°5: Global locations

Homework #6 Assessment Essay: show what you know.

Set date

Date for in-class write-up

Your key assessment for this unit will be to complete an essay answering the following question:-

Why are glacial landscapes valuable to people?

In this essay you should ensure that you try to cover the points numbered below. They do not need to each be in a separate paragraph, as you may choose your own structure. However, you should try and ensure that each paragraph flows clearly into the next paragraph.

You will have one lesson to write up this essay, in exam conditions, so you should plan to write for around 45-50 minutes. You will be allowed to bring in this booklet with up to four pages of prepared notes and reminders for your essay.

You will be credited for diagrams as well as writing, should you feel they are relevant. Key words should be used throughout, including those you learned to spell in Homework N°2. The essay will be marked using the standard Geography Department essay marking grid which is shown on the next page.

Use the grid to ensure you try and reach the higher levels of each criteria. If you do not use examples you will score poorly on Section 3. If you do not write in clear paragraphs or mis-spell key words you may score less well on the Section 4.

The key to a good essay is good planning, so use the homework time well.

Essay marking grid: planning for the best mark.

Your teacher will mark your essay out of 40 using the grid below. The general age-related expectations for each essay are indicated with the zone shaded grey.

Mark	1	2	3	4	5	6	7	8	9	10
1. Knowledge of the content and of the geography theory: facts, figures, locations, etc.	Basic facts loosely linked to question.		Some relevant knowledge integrated into the essay. A partial answer.		The answer is relevant and accurate . Reasonable knowledge. Facts may show some imbalance .		Sound and frequent evidence of accurate knowledge throughout the essay.		Strong evidence of thorough, detailed and accurate knowledge throughout.	
Mark	1	2	3	4	5	6	7	8	9	10
2. Understanding and application: critical commentary on the above knowledge.	Little evidence of being able to explain elements of the essay.		Some evidence of understanding and a partial explanations with occasional use of specialist vocabulary.		Reasonable and clear explanations and some evaluation. Attempts to use specialist vocabulary correctly .		Frequent evidence of understanding and well developed analysis. Good use of specialist vocabulary .		Strong evidence of critical commentary of concepts and principles. Correct and regular use of specialist vocabulary.	
Mark	1	2	3	4	5	6	7	8	9	10
3. Case study and the use of examples, including appropriate and located examples to illustrate points.	Superficial and/or rarely used.		Limited and occasional use of case studies – examples show imbalances or lack relevant detail.		Examples and case studies are clear and are used to support the purpose of the essay.		Examples are developed, balanced and support the argument or enhance the content of the essay.		Examples are well developed and integrated into the structure and purpose of the essay.	
Mark	1	2	3	4	5	6	7	8	9	10
4. Quality of argument and the written response to the question. Spelling, punctuation and grammar (SPaG).	Language is basic and over simplified . Concepts lack clarity. Little sense of focus on the task. Poor SPaG.		Arguments are not fully developed nor expressed clearly. The organisation of ideas shows imbalances . A few errors in general SPaG.		Arguments are logical and expressed with some clarity . An attempt at balance and a focus on the task . Some minor errors in SPaG.		Arguments & evaluations are accurate, logical and expressed with clarity . Balanced with clear sense of focus . Few errors in SPaG.		Arguments are detailed, focussed and logical . Ideas are expressed coherently and confidently . Structure shows flair and imagination with no errors in SPaG.	

Planning your essay: preparing notes for the task.

You should use the next four pages to make notes which may refer to when writing your essay in class. These notes are the only information you may use during the essay writing, so you are advised to plan carefully. You should plan for each paragraph including facts, figures and any examples you intend to use in the essay.

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[illegible]

Homework Reviews: 1 to 3

Review Number One: Glacial landscapes, Part 1			✓ x
1			
2			
3			
4			
5			
Review Number Two: Glaciology spellings			score
1&2			
3&4			
5&6			
7&8			
9&10			
Review Number Three: Glacial landscapes, Part 2			score
1			
2			
3			
4			
5			
			score

Homework Reviews: 4 to 6

Review Number Four: Glacial landscapes, Part 3		✓ x
1		
2		
3		
4		
5		
Review Number Five: Glacial landscape map locations		score
1		
2		
3		
4		
5		
		score

GEOGRAPHY Homework

8A

GLACIOLOGY

Remarkable glacial landscapes

People ● Places ● Pattern ● Process