



UNDER ANTARCTICA

Booklet n°3 - World's Glaciers' Tour

Heidi

Paco

Matthieu



At full speed!

AFTER A FEW DAYS OF THOUGH CONDITIONS, OUR EXPLORERS SPEED AHEAD, CARRIED BY THE WIND.

“We have already traveled more than 700 kilometers! Thanks to a favorable wind, we are able to move quick and keep progressing toward the Southern Pole of Inaccessibility...”

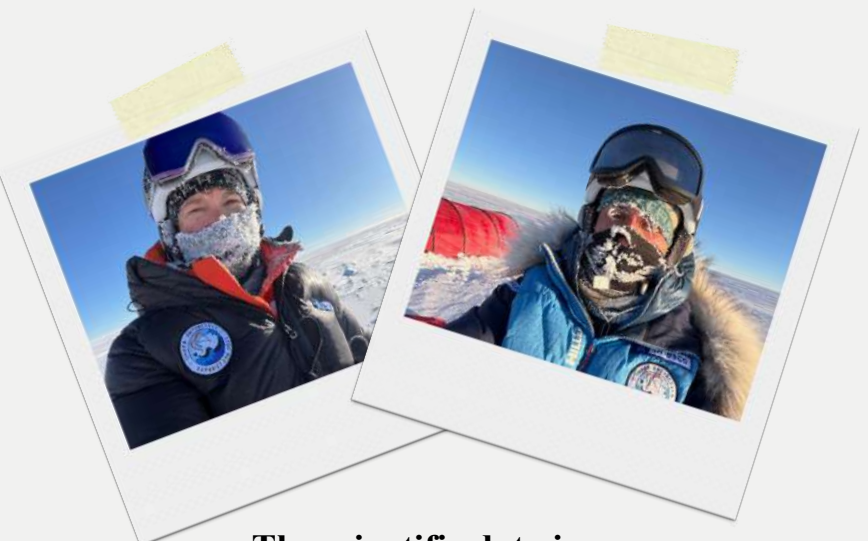


Heïdi checks the data quality of the ground-penetrating radar.



Heïdi and Matthieu are kite-skiing under the midnight sun.

“After several days of intense kite-skiing, we were finally able to take a break on Friday. We needed to repair some equipment that had been damaged by the cold. We also managed to back up our scientific data, but above all to regain our strength. This was much needed!”



The scientific data is very precise and promising for the science team!

Psst...
Paco, I need to show
you something.

I'm going to introduce you
to my extraordinary
family. Come on, I'll take
you around the world! It
will be much warmer than
here.



Eat
Eat
Eat



...ZZZZ



Oh, Mr. Glacier,
what are you doing on my
fishing trip?



Paco, come on! I never said we were going to the beach! Let me remind you that for glaciers to exist, it needs to snow part of the year.

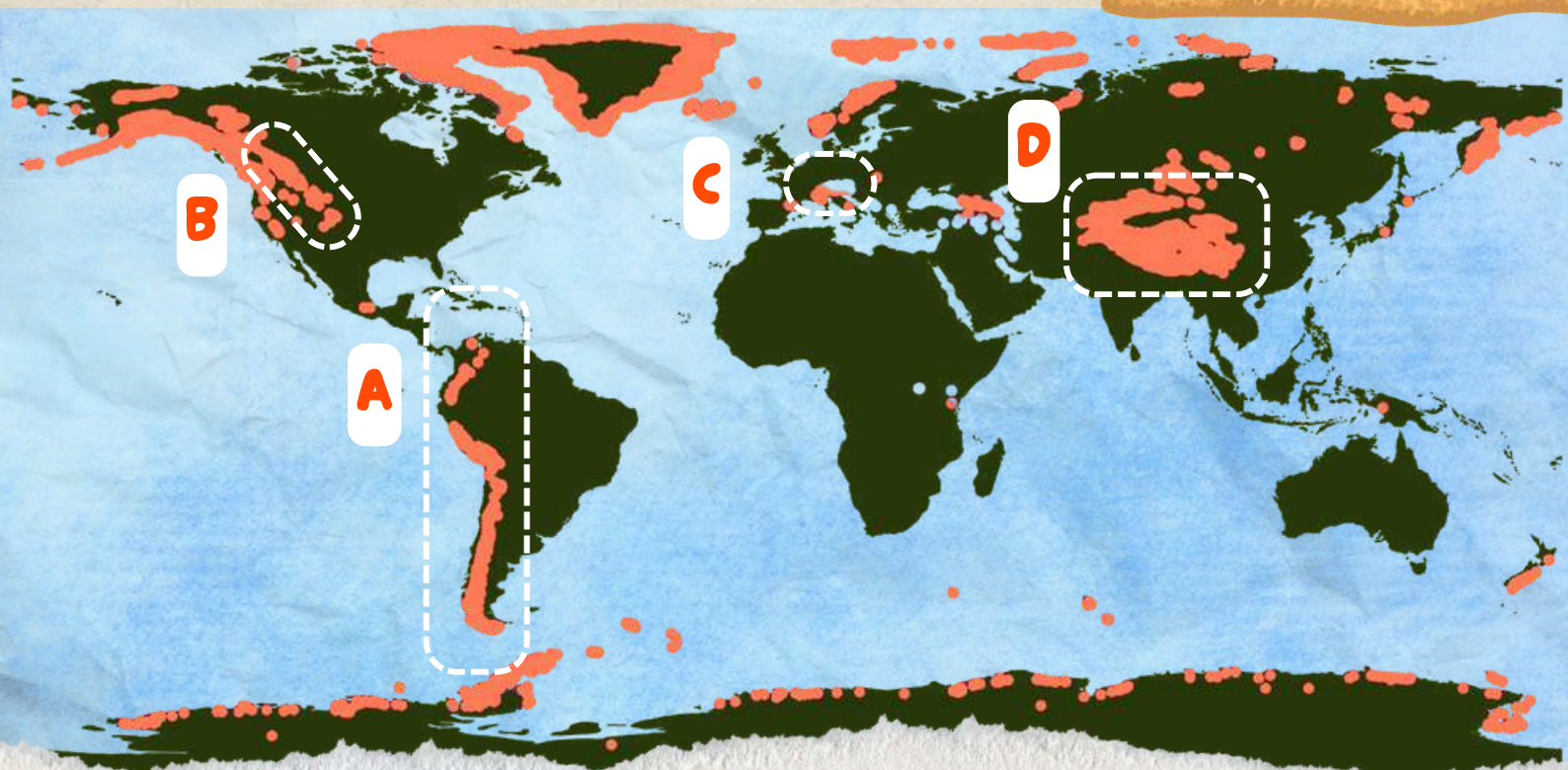
Click here for a reminder about what a glacier is.

Oh darn, I almost felt like I was back home in South Africa!

zzz
zzz
zzz
...

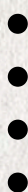
Did you know there are about 275,000 glaciers on the planet? Quite a frosty family!

As you can see, we are found on every continent, and right next to humans.

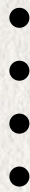


Match these major mountain ranges with multiple glaciers to their names and their highest associated peaks.

A
B
C
D



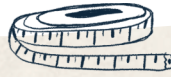
The Alps
The Himalayas
The Andes Cordillera
The Rockies



Aconcagua (6962m)
Mont Blanc (4806m)
Everest (8849m)
Mount Elbert (4401m)



In our family, we come in different sizes, which give us different names.



Glaciers of all sizes!

My Swiss uncle is as big as a small town. He dwells among the rocks and nourishes the rivers. We call him a mountain glacier.



Jungfrau-Aletsch, Switzerland

My Icelandic niece, on the other hand, is much larger: she can cover the size of an entire region! We call her an ice cap.



Vatnajökull*, Iceland

* Jökull (pronounced yeu-kutl) means glacier in Icelandic

The two largest ice caps in the world are Antarctica and Greenland. They are called ice-sheets.



Greenland



Help Paco answer the questions

Using a globe or a world map, try to guess:

➔ Which ice cap is 4 times the size of France?

➔ Which ice cap is 27 times the size of France?





And here are my little cousins...
they're really into rap right now!

THE RAPPING GLACIERS

Yo, I'm Kilimanjaro, they just call me Kili
I'm a big volcano, but with ice I'm chilly
I live in Tanzania, one of those high magical peaks
Where wild animals roam below my three peaks



I'm Sermeq Kujalleq, live near Ilulissat
I move a lot each day, looking good, no ties, just like that
I make up 10% of Greenland's icebergs, it's true
But I'm losing lots of ice ; I'm afraid I'll just be a legend one day too

I'm chillin' in Nepal, Khumbu Glacier's my name
So high in altitude, the others don't feel the same
I give cold sweats to climbers who dare
On my slopes they dream, thinking I'm theirs to bear




I live in Tajikistan, I'm the Fedchenko Glacier
Feeding mighty rivers, streams, and every water racer
I'm a stylish mountain glacier, looking cool and fly
So cold, I even have the longest **ice tongue**, oh my!

By the way, speaking of ice
and tongues, I could really go
for a strawberry ice cream...

Your turn!

Imagine a glacier with its own unique features
and write a four-line rhyming paragraph to
describe it!





This beautiful icy world is
changing... The ice is disappearing,
slow... slowly. Me, I'm melting... I
sli...slide...

It's weird... I'm get... getting
hotter and hotter, I feel all... all
soft, I think it's the clim... clim...
climate warming.

Mr. Glacier ! What's happening?!!

Sniff sniff...
Yum, you smell so good when you melt, Mr. Glacier...

No, silly! You're awake!
What you're smelling is our meal cooking in melted ice. We're getting ready for a big day of kite-skiing!
Thanks to the stove, we heat up our food portions to meet our energy needs.



Breakfast

MUESLI AND DRIED FRUITS



Lunch



DEHYDRATED NOODLES,
CHIPS, AND CHEESE



Snacks

DRIED FRUITS
AND PROTEIN BARS



FREEZE-DRIED MEALS* AND BUTTER

Dinner

*High-fat food to fight
the cold

Alright, we've got to go.
Help yourself to our supplies
if you want a snack before
leaving!

I had a strange dream about Mr. Glacier;
after introducing me to his family, he
started melting...

Yes, this is the case
for most glaciers
today.

But isn't there a doctor for glaciers?

I'm gonna show you how we do
it: you have to compare the
snow accumulated at the end of
winter with the melting during
summer.

If more snow
accumulates in
winter, the glacier
grows.

If there is more
melting during
summer, the
glacier shrinks.

Yes! Those "doctors" are called
glaciologists, like me. We have a
great technique to find out how a
glacier is doing.

Snow accumulates

Ice melts



2025 health report



Name : Ossoue
Place of birth :
Pyrenees, FRANCE

Snow in winter (m) 3

Melting in summer (m) 6

2025 summary (m) -3

Remaining thickness : 30 m

If the glacier continues to lose 3 meters of
thickness per year, how much longer does it
have to live?

☐ 10 years ☐ 50 years

☐ 100 years

Oh dear, we can't take it easy. I'm
prescribing you a few tons of snow
to take morning, noon, and night
throughout the whole winter.

I think I've found what makes me tick: glaciers.
And you, Heidi, how did this passion begin for you?

Since I was very young, this subject has touched me deeply. Where I was born, in the French Alps, the glaciers supply the Rhone River. When they melt during summer, they release precious water that flows from the mountains to the sea. Thanks to them, the local people can drink, farm, and live.

The Rhône begins at the Rhone Glacier in Switzerland.
This glacier has lost 1.7 km in length since 1880.



Geopolitics

The Rhone River is half Swiss, half French, which can lead to some tensions regarding its use.



Energy

It enables electricity to be produced through hydroelectric dams and cools the nuclear power plants in the valley.



Biodiversity

It supports life in the Camargue, a natural site with exceptional biodiversity.



Agriculture

It irrigates the farmland and orchards.

And it ends its journey in the sea!

But if the glaciers disappear, the rivers' flow in summer, like the Rhone, will decrease. Worldwide, nearly two billion people depend on glaciers for their water supply.



So, are glaciers just a kind of big water tower?

In many cultures, glaciers are not only landscape elements; they are seen as living entities, ancestors, or spirits, witnesses to the deep connection between humans and their environment.

I'm going to tell you a story that both fascinates and saddens me : about the Conejeras Glacier in Colombia. It's a tropical glacier : fragile, threatened, and above all sacred to some Indigenous peoples, such as the Koguis.

I understand, the glacier disappearance also means the ancestors' memories and the Indigenous people's culture will fade away.

We should all preserve harmony.

CHAPTER III : THE CONEJERAS AND THE KOGUIS

For more than five centuries, this people have watched over the Conejeras. They honor this glacier every day, seeing it as alive, almost like a deity.



now...

For the Koguis, glaciers are like the "heads" of the Earth. When they melt, it's as if the Earth itself is getting sick. According to them, everything is a great balance, which humans are disrupting.



But what are humans doing to protect the glaciers?!

Blocking a construction site on a glacier in the Alps

4



They lead activist actions

1



Scientists study them to better understand them

3



They talk about them with people

2



They organise conferences

5



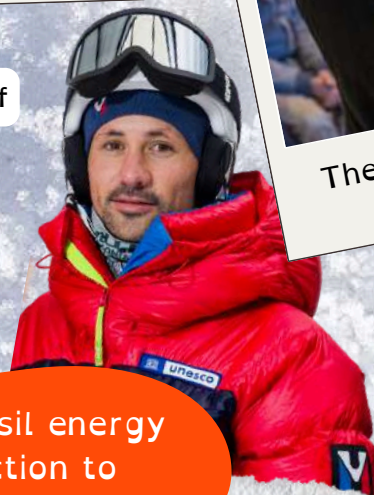
2025
International
Year of Glaciers'
Preservation



They coordinate internationally to protect them

Louis Lliboutry, founder of French glaciology

Find the glaciers listed as UNESCO World Heritage sites in the booklet*



But above all, some people are reducing their fossil energy consumption, and that is the most powerful action to preserve the ice... We'll talk about it next week!

Hi friends,

Thanks to my encounter with Mr. Glacier and his family in my dream, I discovered that there are many types of glaciers on Earth! And then, revelation: I want to become a glaciologist! Yes, yes, a penguin glaciologist, ready to do health check-ups on glaciers! I'm sure Heidi will be able to help me make a name for myself in the field. Well, I understand that global warming is not good for them... nor for the humans who love them or depend on them. However, I still haven't figured out the cause of their melting; I have a few steps left to untangle the truth in this complicated investigation. Matthieu told me that next week, we're going to discover the link between glaciers and the climate.

Byeeee!

Paco



Activity

Create a "Flipbook" of how a glacier is formed!

Materials needed :

- A stack of papers (small sheets or index cards)
- A pencil and colored pencils (blue, white, gray, brown)
- A rubber band or a stapler to hold the sheets together



Flipbook example!

Steps to follow :

1

Prepare the flipbook

Number the sheets from 1 to 20 (or more if you want the glacier to move more slowly).

Keep the sheets aligned and secured on one side with a rubber band or clips.

2

Draw the glacier formation

Sheets 1–5: Draw a mountain and snow falling on it.

Sheets 6–10: Show the snow accumulating and turning into ice.

Sheets 11–14: The glacier begins to slowly slide down into the valley (the ice moves a little more on each page)

3

Draw the glacier melting

Sheets 15–18: The glacier shrinks; you can see melted water flowing downward.

Sheets 19–20: Less ice remains, and you can see a river in its place.

4

Try your flipbook

Hold your flipbook tightly in one hand and quickly flip through the pages with your thumb.

Watch the glacier form, move, and then melt.

Any questions ?

Got a question or a kind word for Heïdi and Matthieu? Send it through their mailbox. They'll reply as soon as possible!



Lexicon

C

Camping stove: a small device used to cook or heat food outdoors or in places without a permanent kitchen, such as during an expedition.

f

Freeze-dried: refers to a food that has been dehydrated under vacuum (without air), which makes it lighter and less bulky. It has a long shelf life and must be rehydrated before being eaten.

G

Glacier tongue: a long, narrow extension of a glacier that slowly flows into a valley or the sea under the force of gravity.

Ice cap: a type of glacier that forms a large expanse of ice and is not confined by the terrain. If the area exceeds 50,000 km², it is called an ice sheet.

i

Iceberg: A block of ice that breaks off from a glacier and falls into the water. It floats on the surface of the ocean, with only a small part (about 10% of its volume) visible above the water.

Ice sheet: An ice cap so large that it covers entire continents or islands. Its size must be more than 50,000 km². There are only two on Earth today: Greenland (2.1 million km²) and Antarctica (14 million km²).

U

UNESCO World Heritage: a list of exceptional natural or cultural sites protected for their universal value and importance to humanity. Among them, 50 natural sites contain glaciers, representing around 18,600 glaciers in total : nearly 10% of the planet's total glacier area.

To go further

Glaciers play music!



A film to watch without moderation



GAMES SOLUTIONS

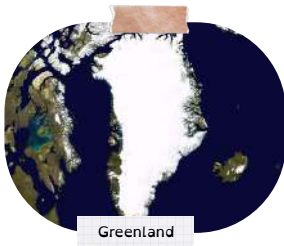
Page 3



Page 8

$$\text{Life expectancy} = \frac{\text{Remaining thickness}}{\text{Health check-up}} = \frac{30}{3} = 10 \text{ years}$$

Cut out the images



Snow accumulates

Ice melts





Indian Ocean

