



THE MER DE GLACE AND  
CLIMATE CHANGE

# Our journey !



On Tuesday the 21<sup>st</sup> of September 2012, we left Lyon to go to Chamonix in order to observe The « Mer de glace », one of the biggest glaciers of the Alps.

# Depart from Chamonix



To Montenvers rail station





Glaciers are very good indicators of recent climatic changes :  
They are like a **record that scientists can** study ...

The Mer de Glace glacier was one of the first mountain glaciers studied by scientists allowing them to imagine a functional model which is still useful for the study of other glaciers.

# A few features ...

- Length : 11 km long
- Surface area : 35 km<sup>2</sup>
- Thickness : 400 meters
- Speed : around 40 meters/year

The « Mer de glace »  
is easy to observe  
from the Montenvers  
rail station.





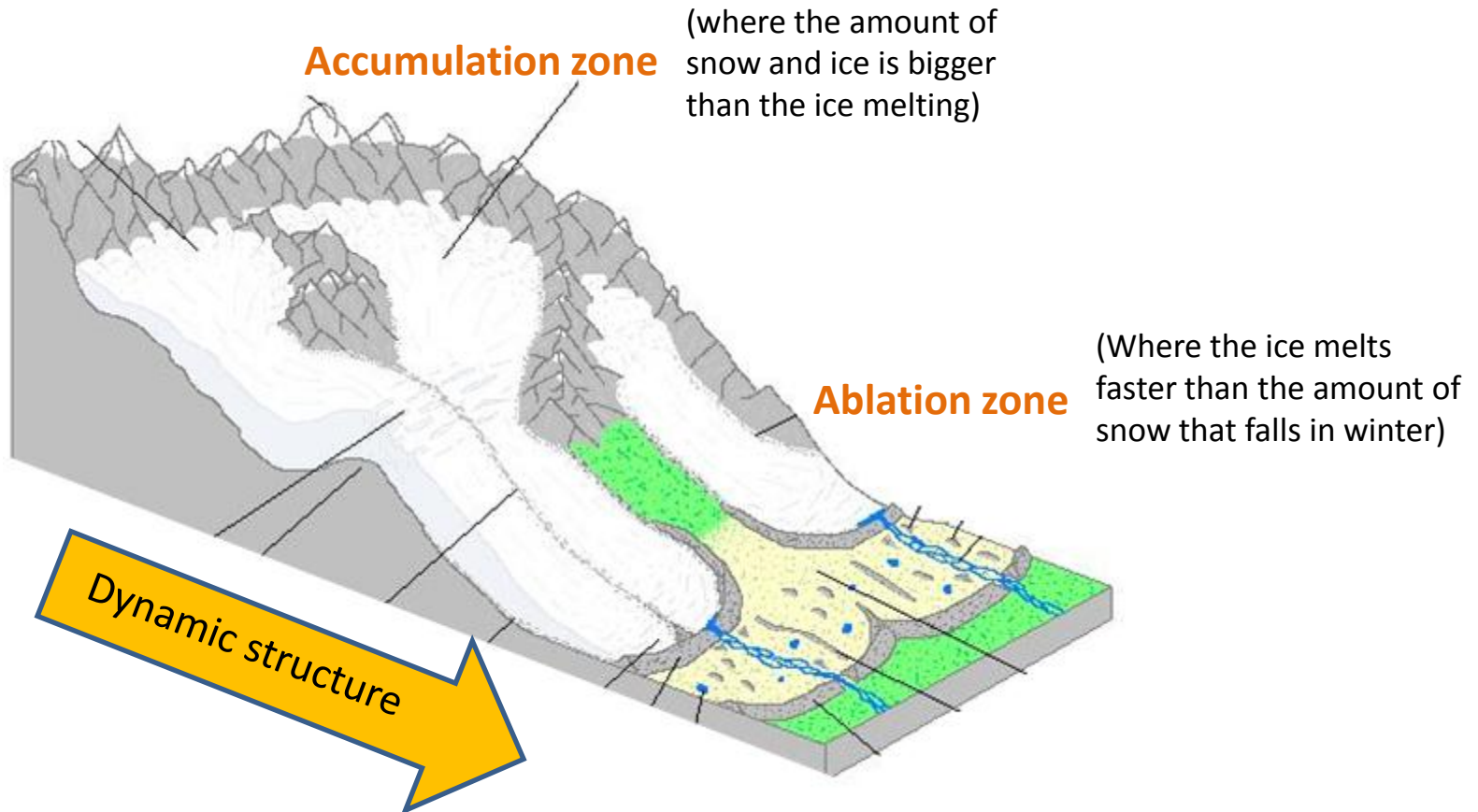


The Monteverse station is also a nice place for a picnic

# Glaciers : Back to basic

Glaciers are :

- formed by the natural accumulation of snow
- Divided into 2 parts : accumulation zone and ablation zone)
- Dynamic structure. It moves and evolves depending on snow fall and melting rate.





# The evolution of the glacier

The Mer de Glace in 1949



The Mer de Glace now



The Montanvers rail station

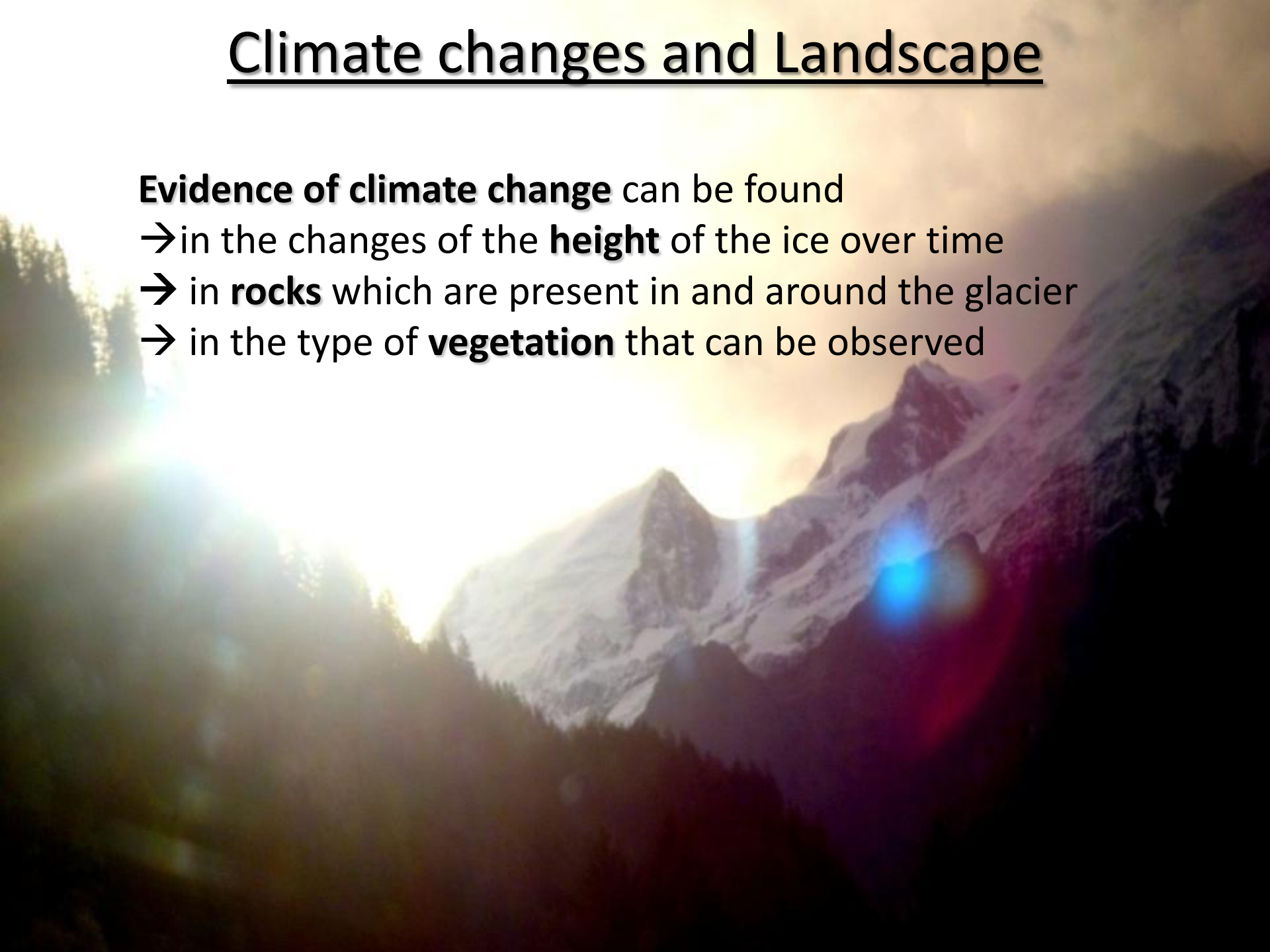
The average **temperature** has risen about 2°C in Chamonix during the last 40 years which has led to a very fast melting rate !




# Climate changes and Landscape

**Evidence of climate change** can be found

- in the changes of the **height** of the ice over time
- in **rocks** which are present in and around the glacier
- in the type of **vegetation** that can be observed



# Reading the landscape ....



**Trimline** last glacial maximum (25 000 years ago)



**Forbes' Bands** due to the alternation of seasons

**Moraines** from the little ice age (XVIIth century)

**Crevasses in the bend :** mecanical strains linked to the flow

The glacier is covered by moraines at the end of summer, it hasn't snowed for a long time and wastes accumulated.



# Granite and Gneiss:

- The mer de glace's bed is composed of gneiss
- Minerals : quartz and plagioclase feldspars (light) and the mica (dark).
- An old metamorphic granitic rock that rose out of the earth during the Alps genesis

**Dark layer  
(mica)**

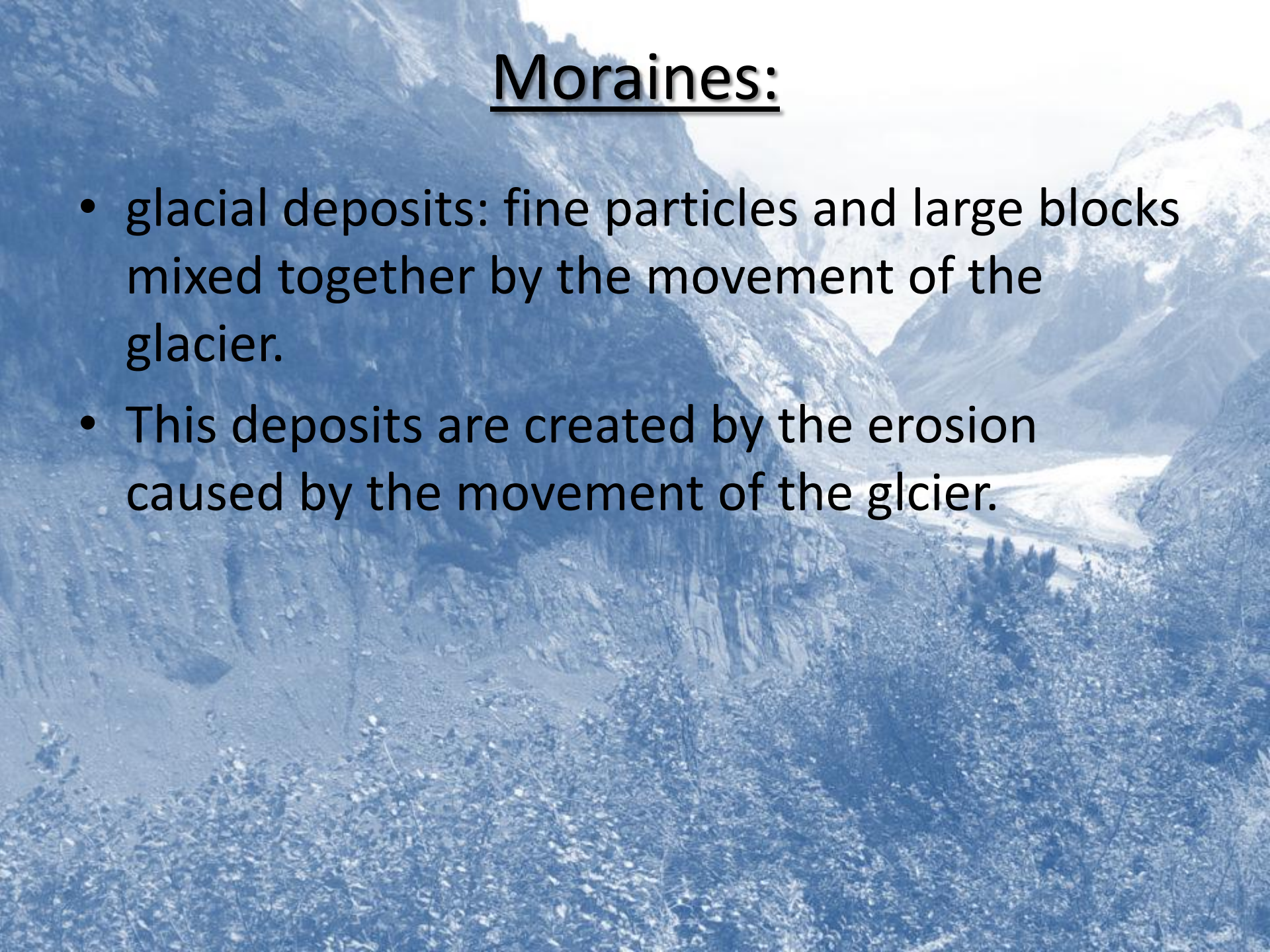


**light layer (quartz  
and feldspar)**



# Moraines:

- glacial deposits: fine particles and large blocks mixed together by the movement of the glacier.
- This deposits are created by the erosion caused by the movement of the glcier.





# Moraines:

Line indicating the height of the glacier during the 17th century



Steep slopes of moraines

# Trimline

The trimline is the line that marks the most recent highest extent of the glacier. It's the limit between glacial erosion and non glacial erosion. The trimline of the mer de glace marks the last ice age.




Erosion by freezing  
water into ice

Erosion by glacier



# Understanding the landscape ....



**Trimline** last glacial maximum (25 000 years ago)



**Forbes' Bands** due to the alternation of seasons

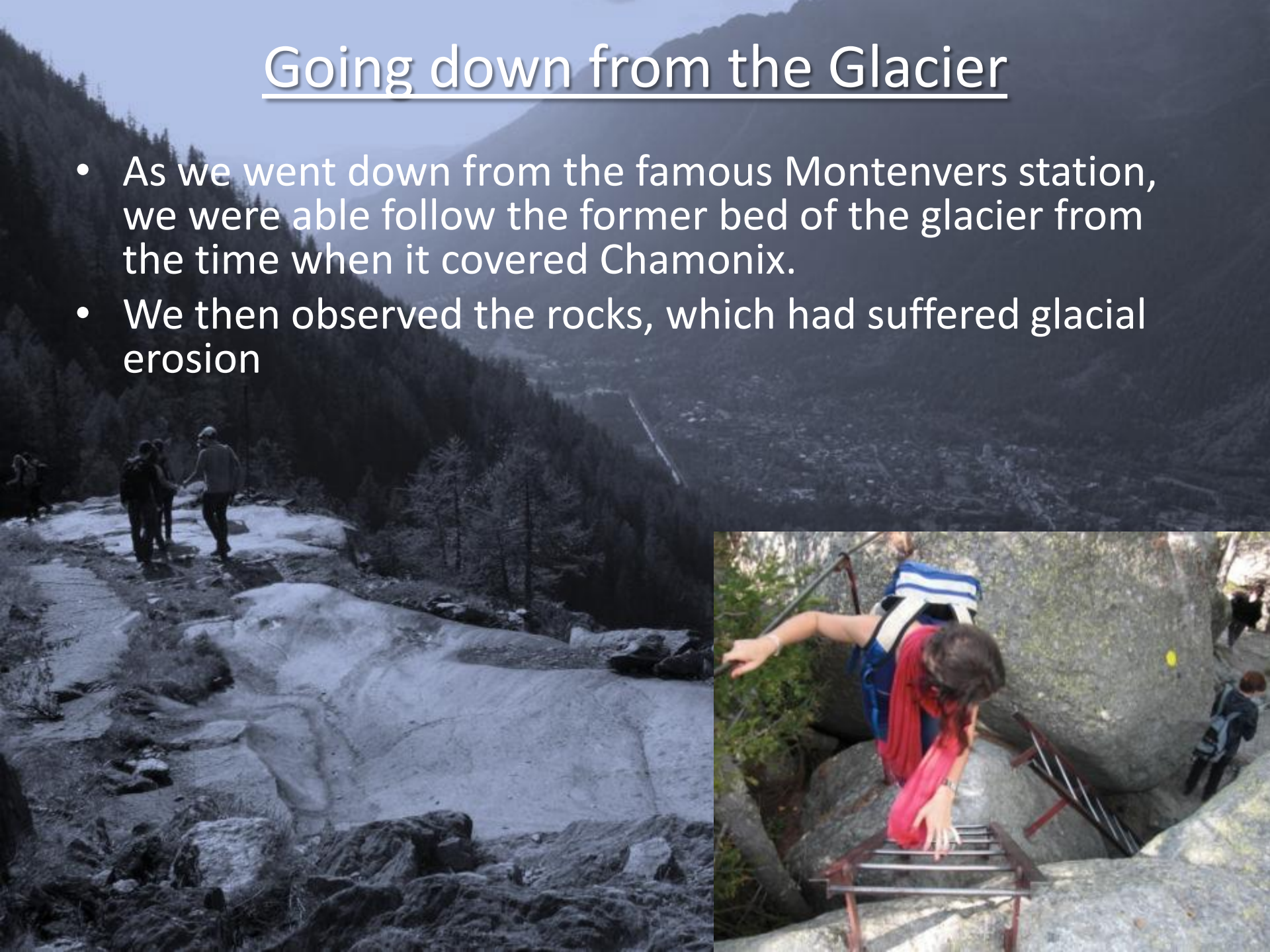
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# Going down from the Glacier

- As we went down from the famous Montenvers station, we were able follow the former bed of the glacier from the time when it covered Chamonix.
- We then observed the rocks, which had suffered glacial erosion





# Glacial striation



**Erosion by glaciers : In an abrasion process, debris in the basal ice scrapes along the bed, polishing and gouging the underlying rocks, similar to sandpaper on wood**



# “whale’s-back”

- named after the shape: a polished dome.
- formed in blocks of rocks by the abrasion process
- Striation’s orientation indicates the direction of the glacier’s movement .







After a descent of 900 meters we were happy to arrive in Chamonix where the coach was waiting to bring us back to Lyon



**Back in Lyon, in our biology and geology classroom, with our best friend Priscille, Mathieu, Méghann, Mister Skeleton, Alexandra**

SE PAS OUBLIER  
D'ETEINDRE LES  
ORDINATEURS ET LA  
LUMIERE EN PARTANT,  
LUMIERE DE FERMER LA  
PORTE DE FERMER LA  
SALLE.







**Thank you for your attention**