GEOROUTE 6

THE FLYSCH ROUTE

TALAIA

DEBA - ZUMAIA

#GEOPARKEA

TALAIA GEOROUTE

PRACTICAL INFORMATION

GR 121

DURATION

4 h

DISTANCE

14 km

ELEVATION DIFFERENCE

+650 m
-650 m

CIRCULAR

NO

geoparkea.eus

#GEOPARKEA

((112))
SOS DEIAK

TALAIA GEOROUTE

HOW TO GET THERE?

View in Google Maps

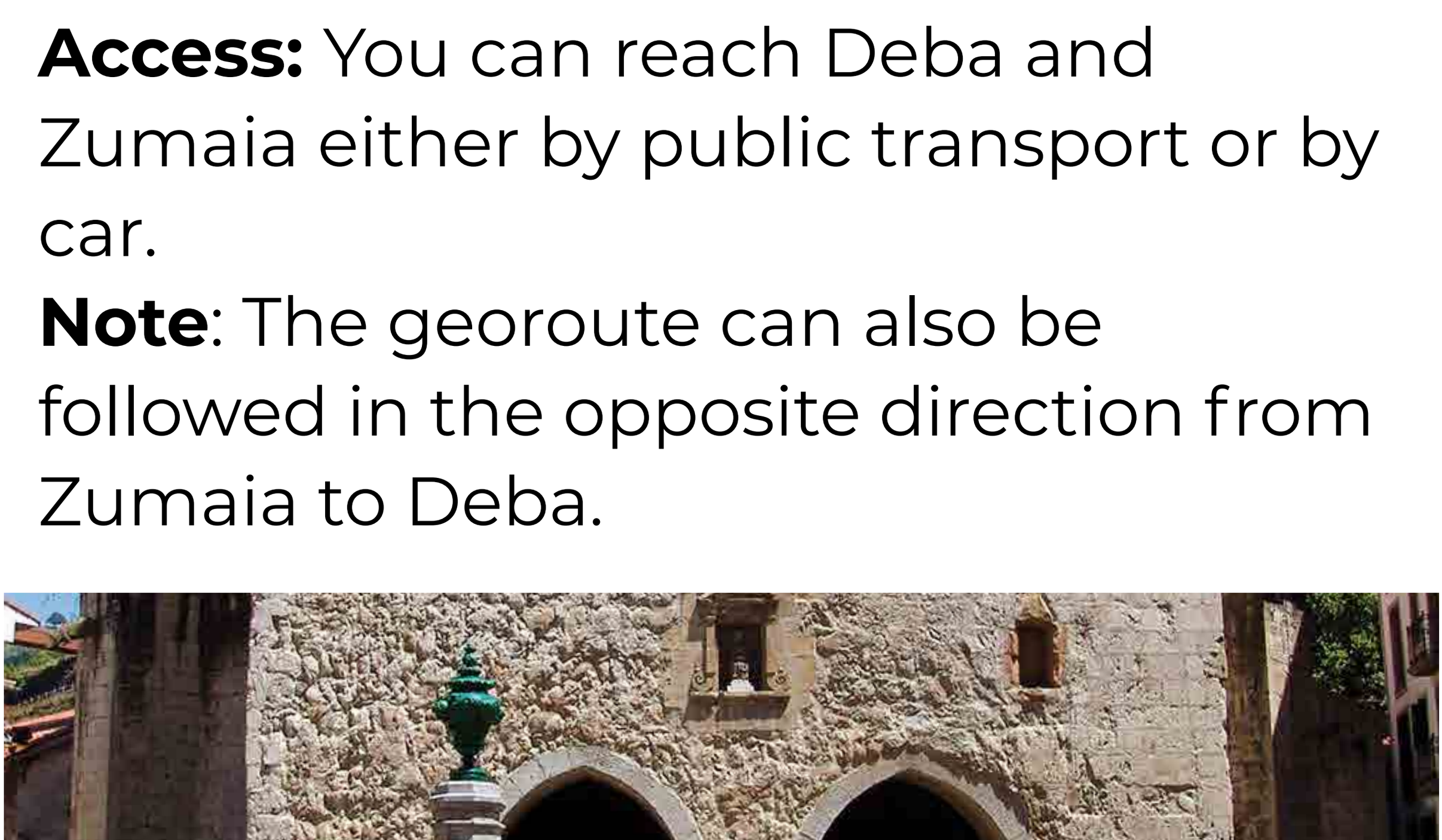
Starting point: Plaza Zaharra in Deba.

Nearest town: Deba.

Coordinates: 43°17’41.4”N 2°21’13.5”W

Access: You can reach Deba and Zumaia either by public transport or by car.

Note: The georoute can also be followed in the opposite direction from Zumaia to Deba.



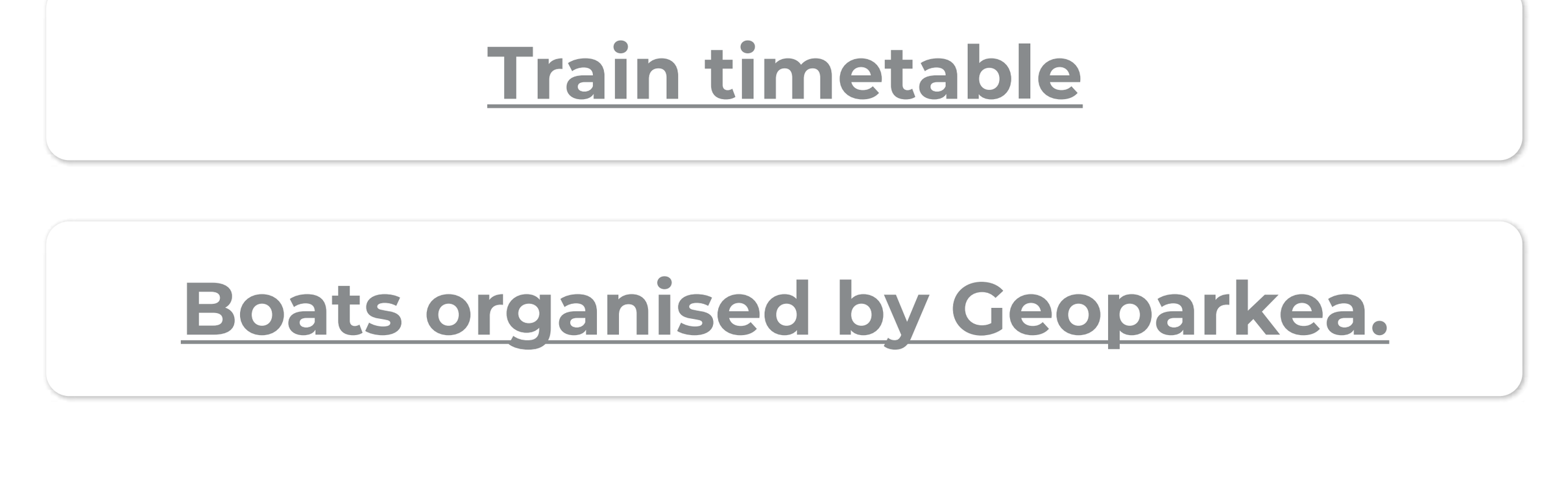
TALAIA GEOROUTE

HOW TO GET BACK TO THE START?

The return journey can be made by train or on boats organised by Geoparkea. Check timetables:

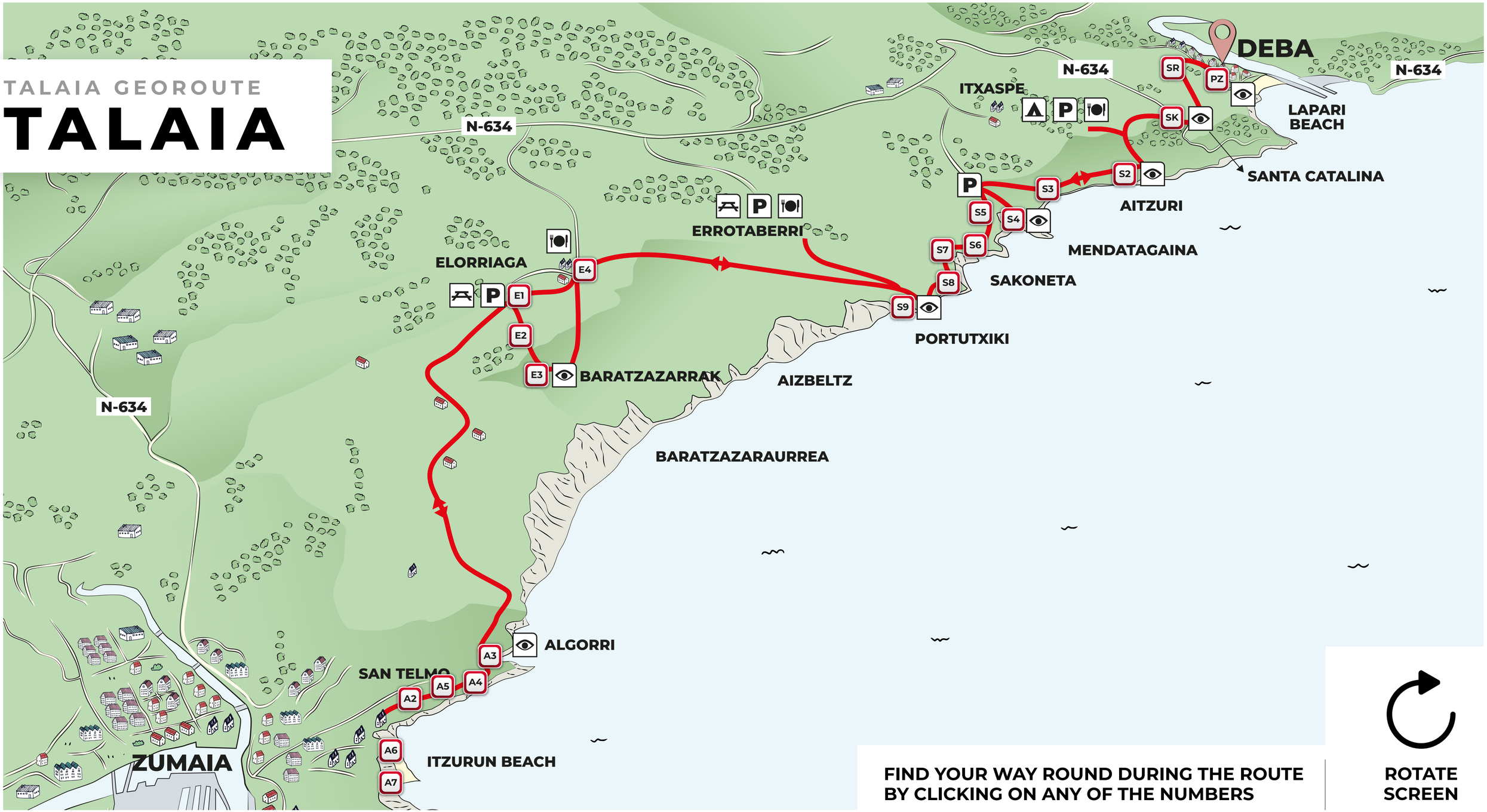
Train timetable

Boats organised by Geoparkea.



TALAIA GEOROUTE

TALAIA



FIND YOUR WAY ROUND DURING THE ROUTE BY CLICKING ON ANY OF THE NUMBERS

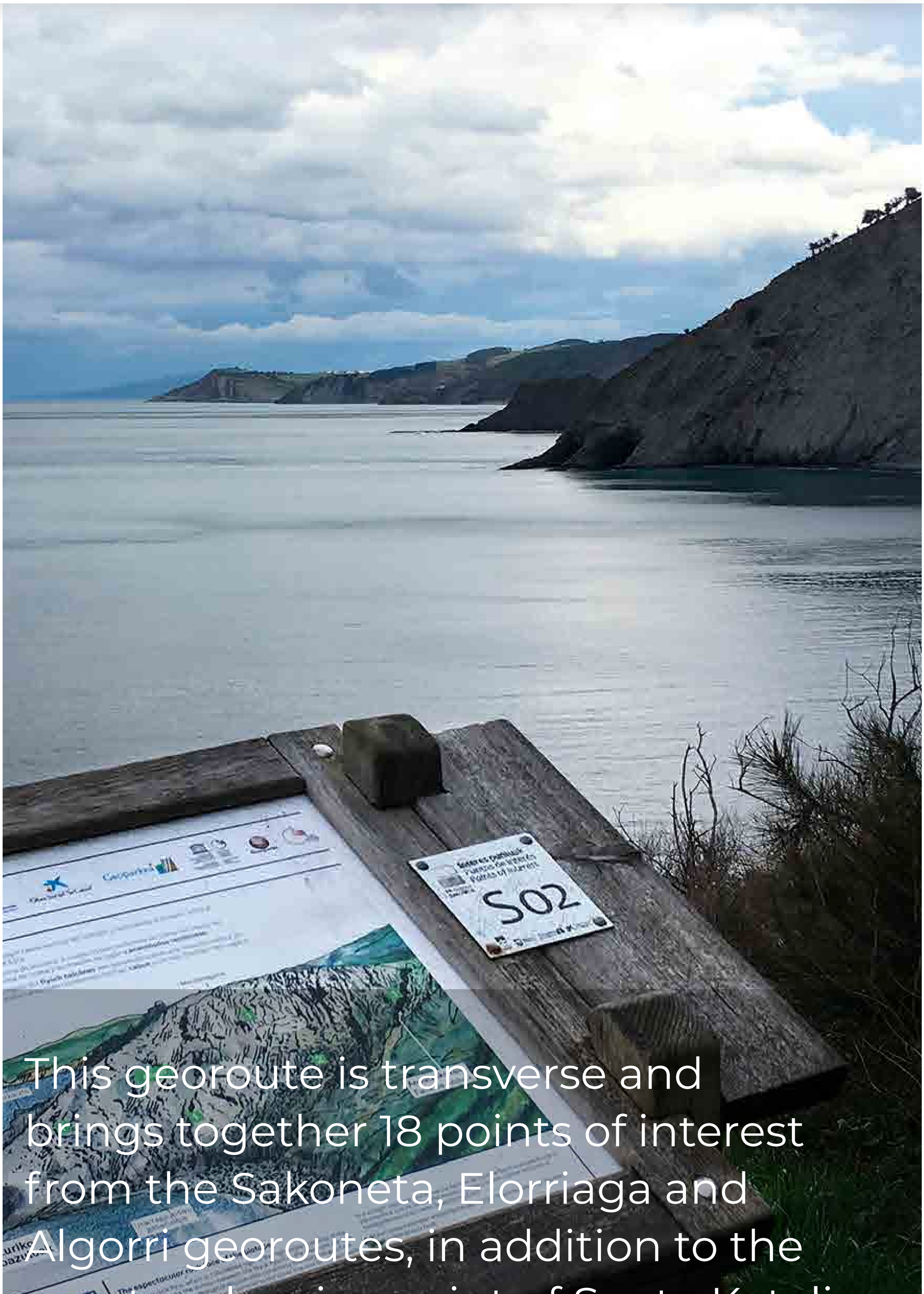
ROTATE SCREEN

TALAIA GEOROUTE

INTRODUCTION

If you want to discover all the different corners of the flysch coast, this is the option for you. Take the whole day and enjoy the mountains of the coast, the cliffs, the coves and the flysch viewpoints.

TALAIA GEOROUTE



This georoute is transverse and brings together 18 points of interest from the Sakoneta, Elorriaga and Algorri georoutes, in addition to the spectacular viewpoint of Santa Katalina. The points are marked with plaques along the route. Locate them and read the interesting explanations.

PLAZA ZAHARRA

A GOTHIC GEM IN DEBA

TALAIA GEOROUTE

PZ A GOTHIC GEM IN DEBA

PZ

The church of Santa María in Deba was built in the **15th-16th centuries**.
It is outstanding for its imposing facade and the richness of its interior which includes possibly the oldest cloister in Gipuzkoa.

TALAIA GEOROUTE

PZ A GOTHIC GEM IN DEBA

The church of Santa María is a reflection of the commercial importance of the **port of Deba** in the 15th century. The wool of Castile and Aragon left for other countries from here.
Deba was also an important whaling port.

TALAIA GEOROUTE

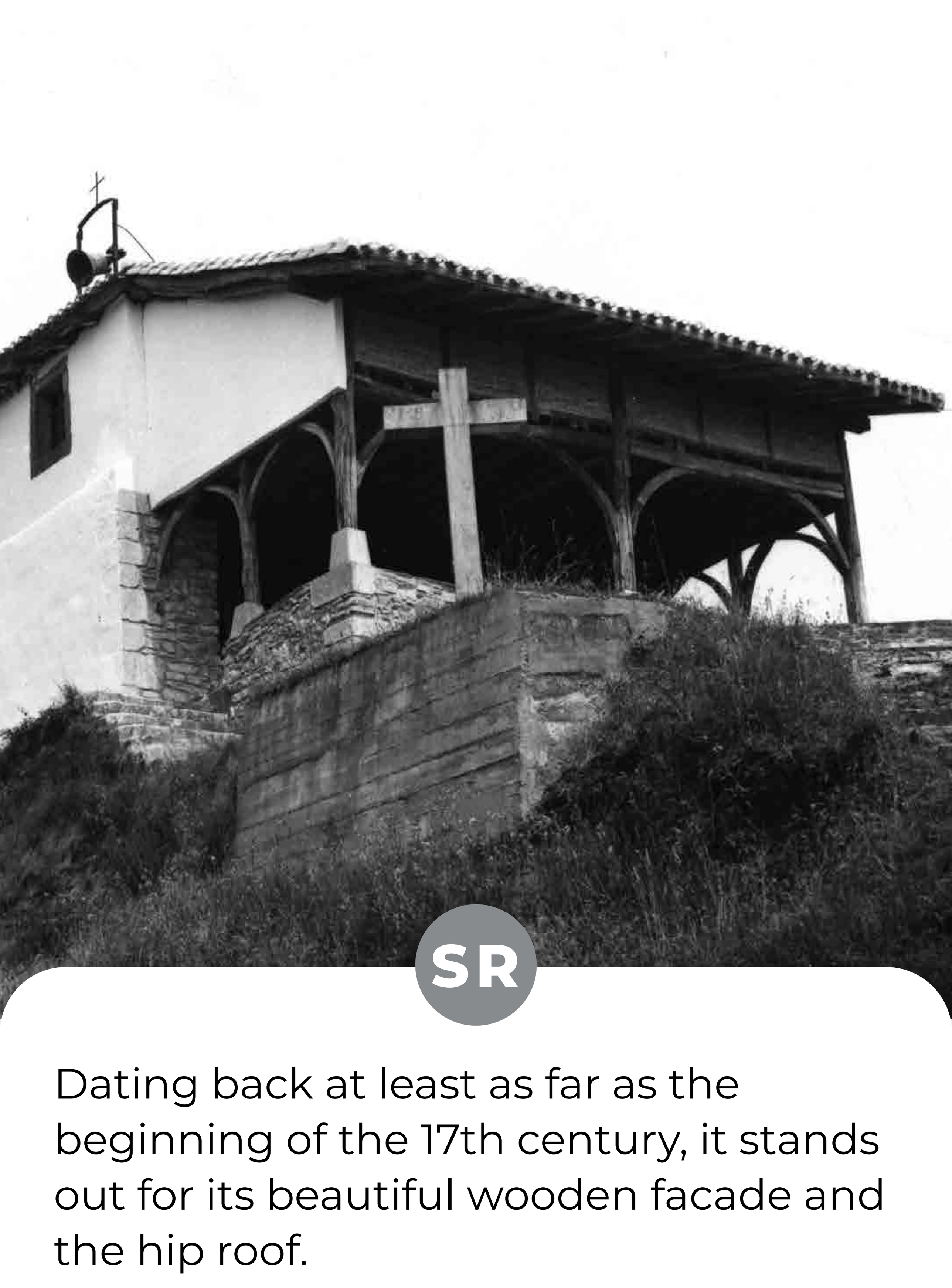
PZ A GOTHIC GEM IN DEBA

We now pass through the town hall square to reach the starting point of the tour, in **Itur Kalea**. Here we can take the lift or go up the stairs to reach the path that will take us to the hermitage of San Roke.

SAN ROKE

TALAIA GEOROUTE

SAN ROKE



SR

Dating back at least as far as the beginning of the 17th century, it stands out for its beautiful wooden facade and the hip roof.

SANTA KATALINA

A 360° VIEWPOINT

TALAIA GEOROUTE

SK A 360° VIEWPOINT

SC

Santa Katalina is an icon of the Deba landscape. It is cited in 1515 documents, but what matters here are the surroundings.
Look around you. A 360° view from which to discover the Basque Coast Geopark.

TALAIA GEOROUTE

SK A 360° VIEWPOINT

There is our route. This is the Protected Biotope of the Deba-Zumaia coastal section. It was declared a protected natural area in 2009 and was the first one in the Basque Country primarily because of its special geological interest.

S2

THE GREAT WALL AND ITS CAVES

TALAIA GEOROUTE

S2 THE GREAT WALL AND ITS CAVES

S2

Approach from the **Itxaspe viewpoint** and enjoy the panorama.

TALAIA GEOROUTE

S2 THE GREAT WALL AND ITS CAVES

The wall of Aitzuri is completely fractured and very unstable. From time to time there are **great landslides** such as the one that occurred in 2018.

TALAIA GEOROUTE

S2 THE GREAT WALL AND ITS CAVES

The caves of Aitzuri are formed by the erosion of the sea which works away on the fractures where the rock is weaker. These caves are about 15 metres high and have an interior length of 25 m.

TALAIA GEOROUTE

S2 THE GREAT WALL AND ITS CAVES

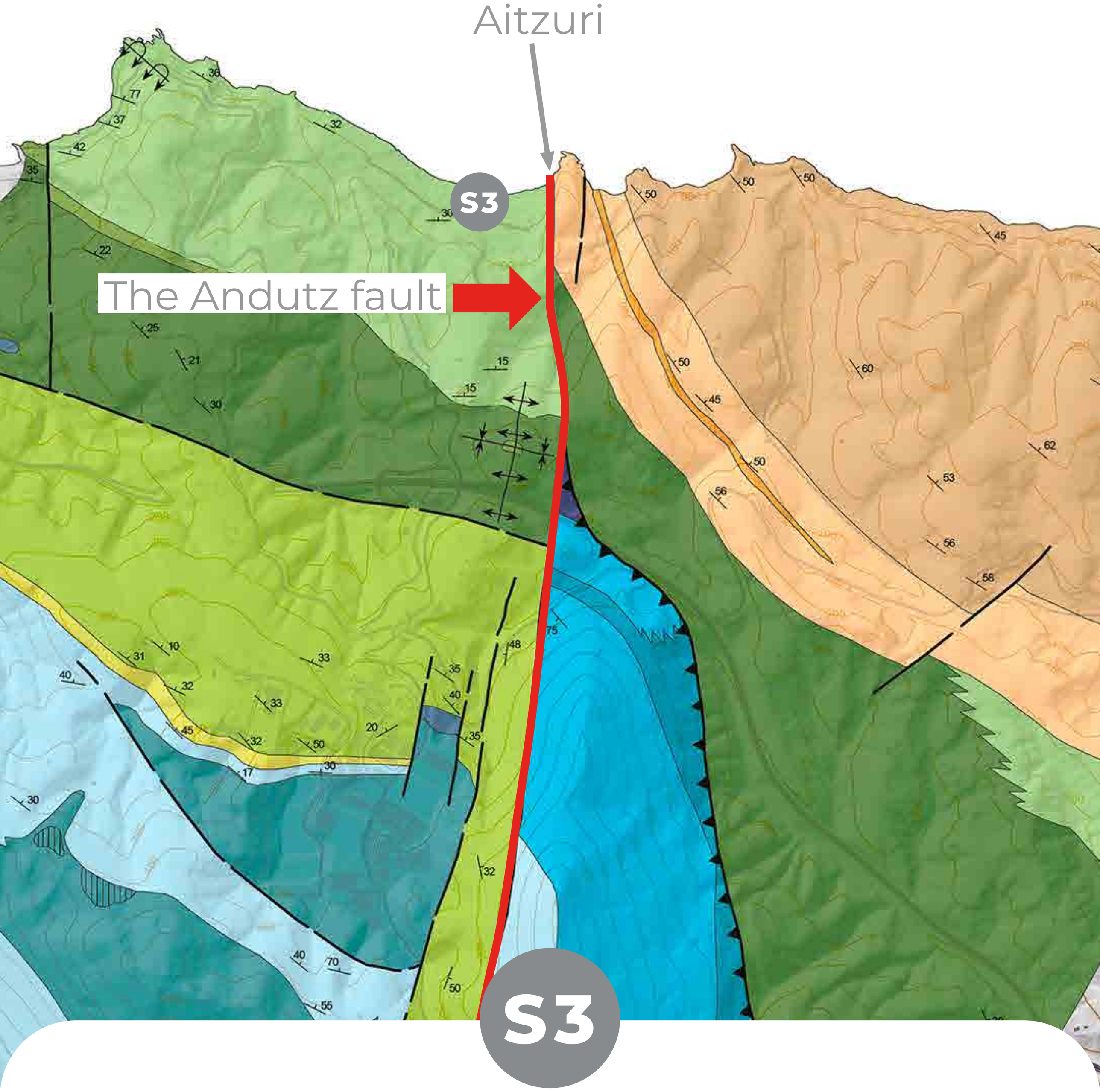
The wall is home to the nest of a **peregrine falcon**. It is not uncommon to see them in flight and plummeting at dizzying speeds of more than 200 km/h.

S3

THE FAULT THAT CHANGES EVERYTHING

TALAIA GEOROUTE

S3 THE FAULT THAT CHANGES EVERYTHING



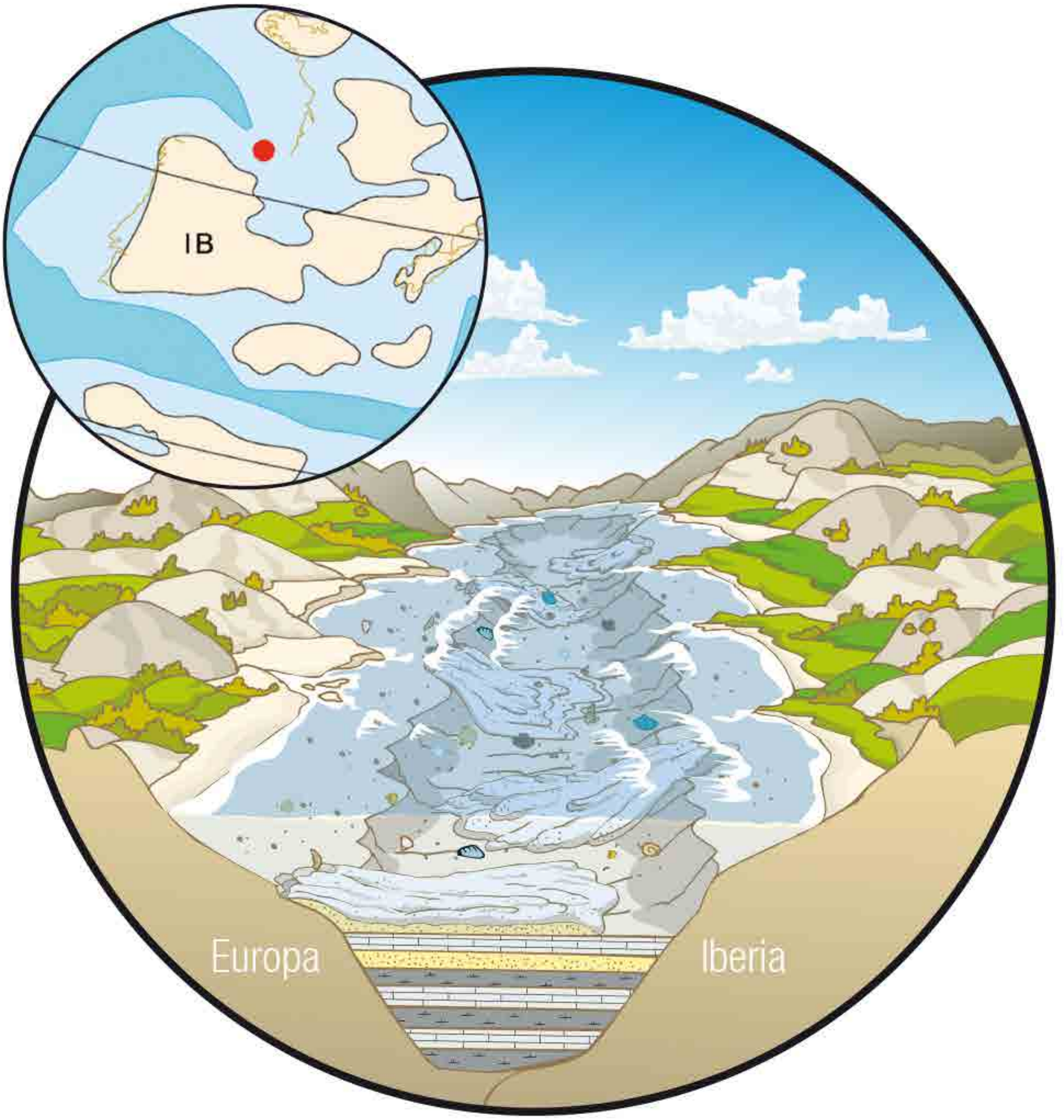
The **cliff wall of Aitzuri** is shaped by the **Andutz fault**, one of the most important in the geopark. This fault has an N-S alignment and its origin is related to the opening up of the Bay of Biscay.

HOW WAS THE FLYSCH FORMED?

Before continuing with the fault let's look at how the flysch formed. The different layers are like the pages of a great book formed by the settling of sediments and small shells at the bottom of the sea. Going through the layers we can read more than 50 million years of the history of the Earth.

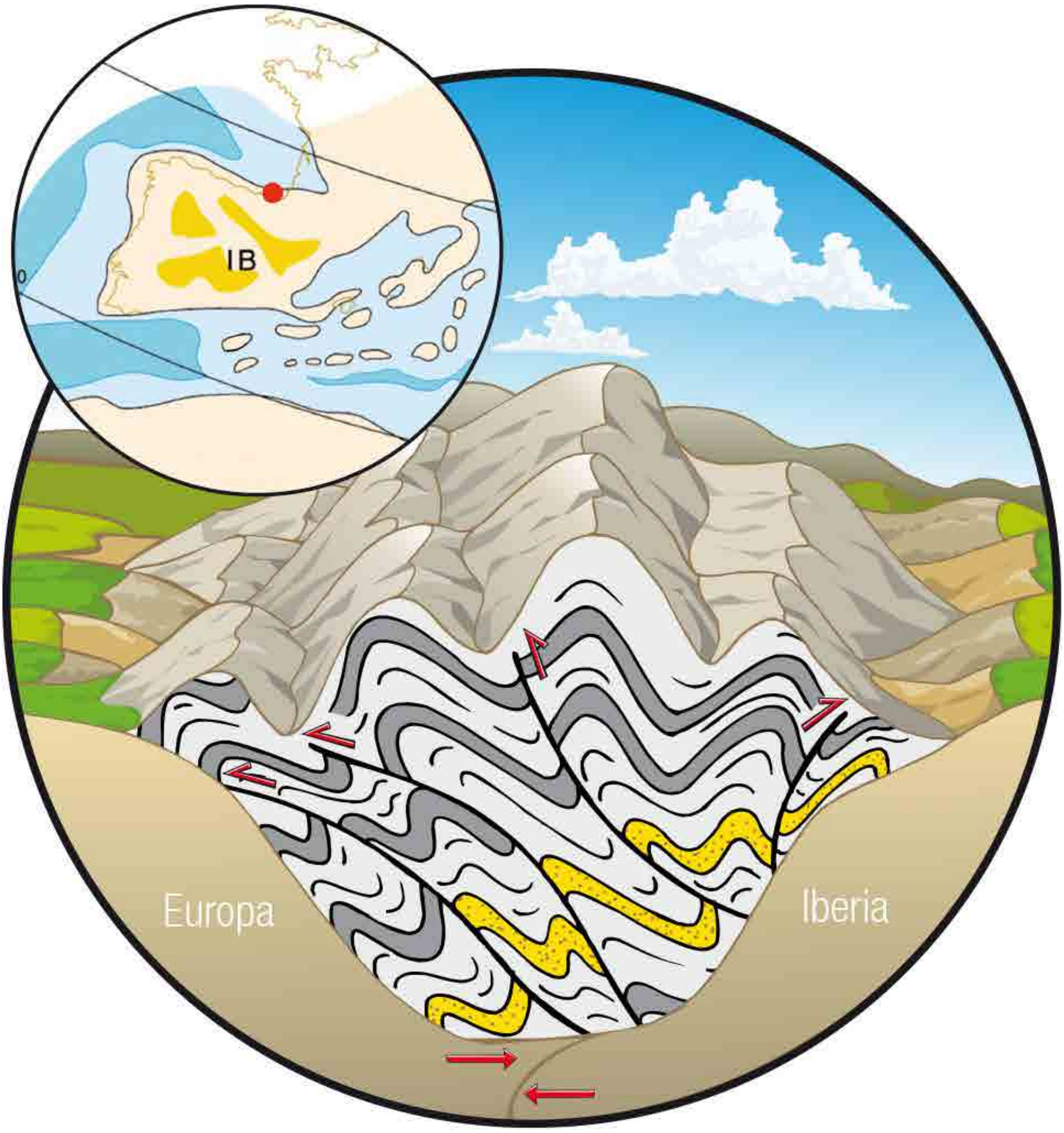
TALAIA GEOROUTE

S3 HOW WAS THE FLYSCH FORMED?

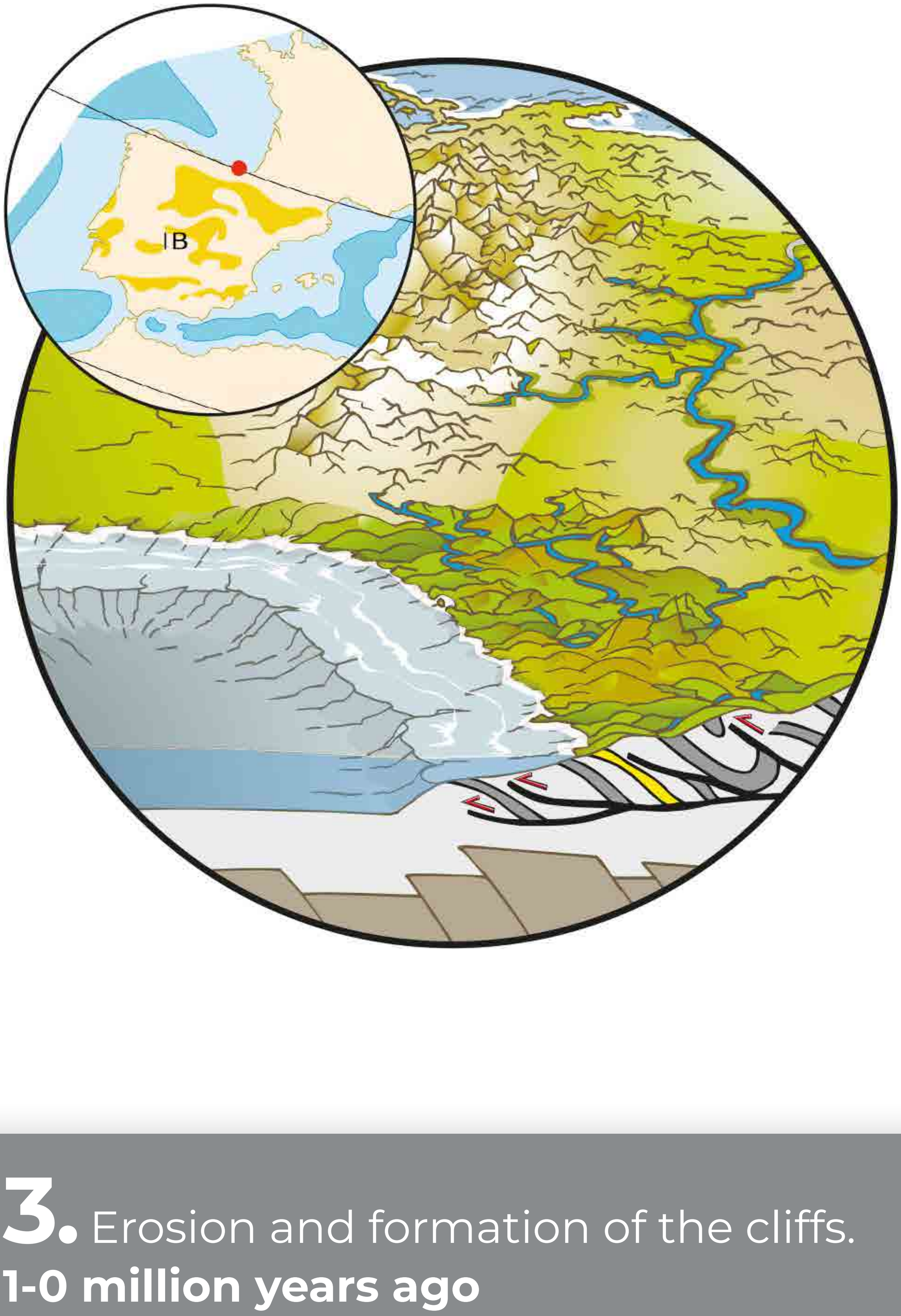


Marl Limestone Sandstone

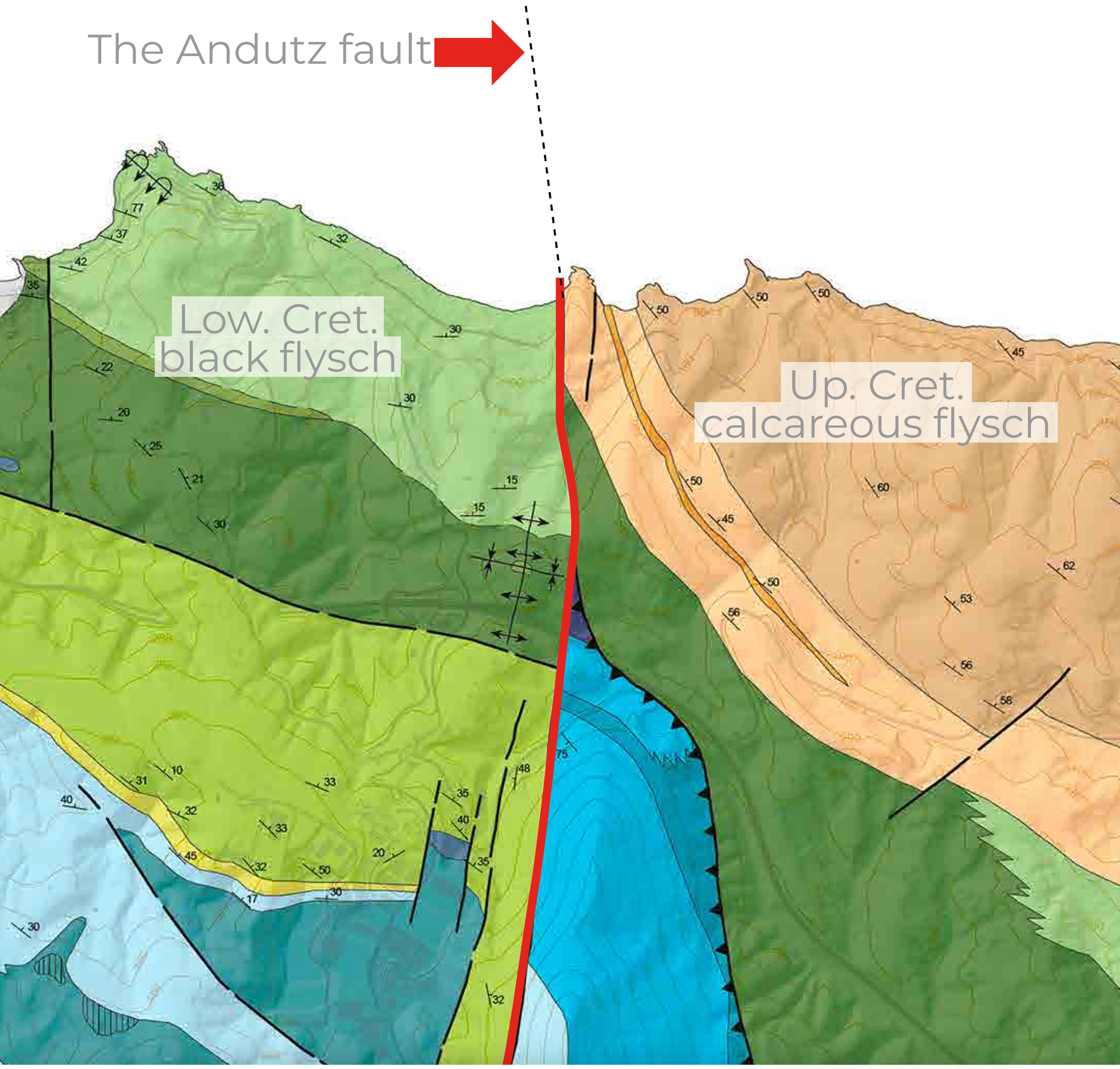
1. Settling of sediments at a depth of around 1000 m on the seabed.
100 – 50 million years ago



2. Collision between Iberia and Europe and lifting of the layers.
50 – 10 million years ago

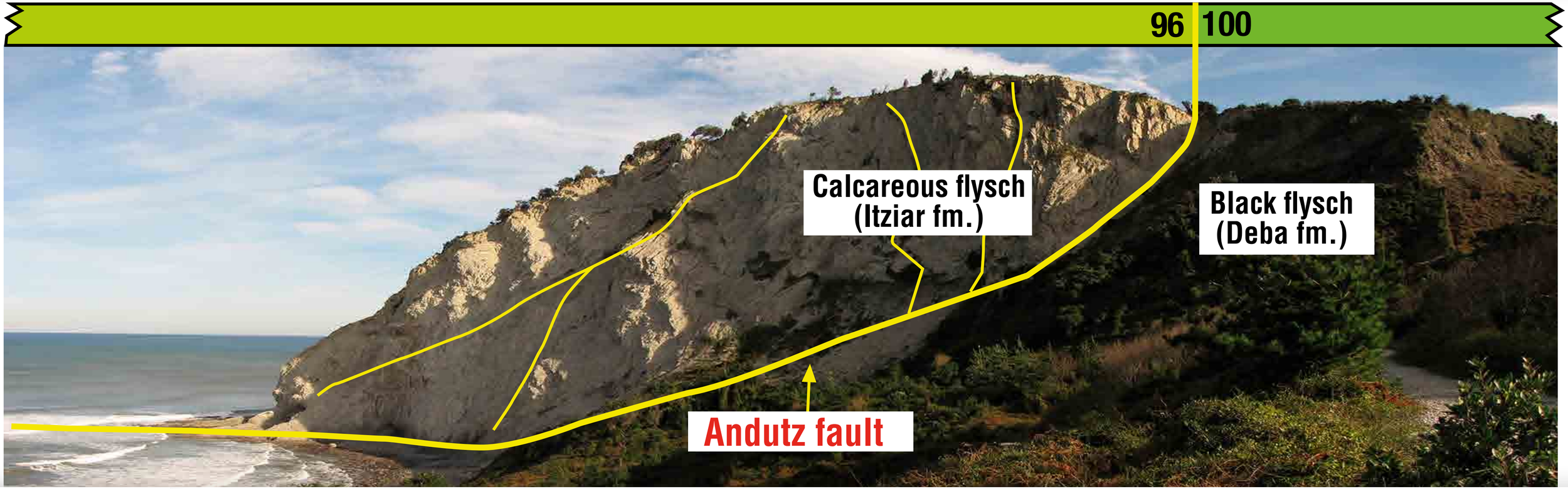


3. Erosion and formation of the cliffs.
1-0 million years ago



THE BOUNDARY BETWEEN TWO COLOURS

The Andutz fault separates the oldest black flysch of the Lower Cretaceous (in green and to the west) from the most recent calcareous flysch of the Upper Cretaceous (in brown and in the east).



ROTATE SCREEN

The Andutz fault is not just a single fault plane. It is an extensive area full of fractures. Look at the white cliff wall.

S4

WHERE YOU CAN SEE EVERYTHING

TALAIA GEOROUTE

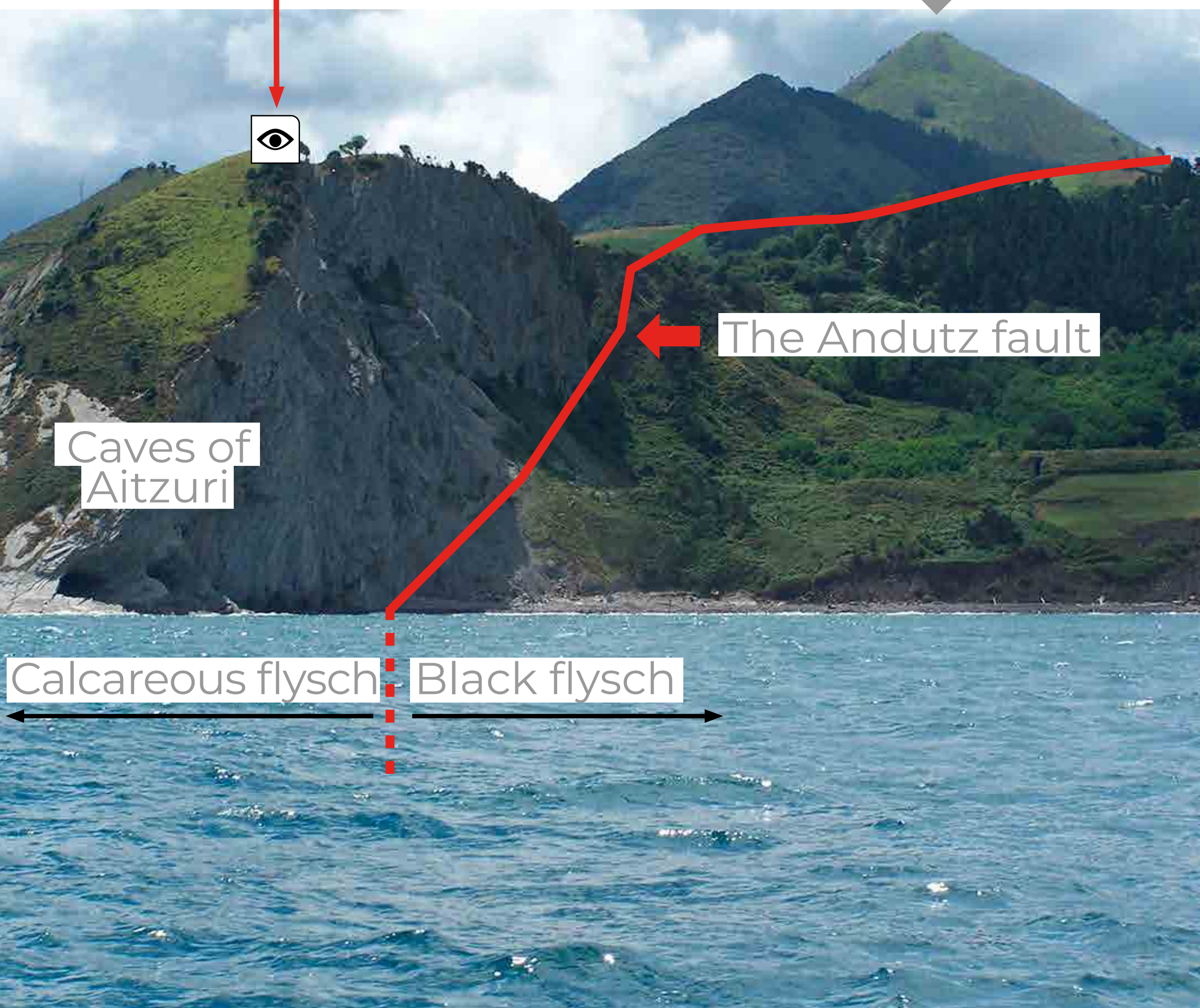
S4 WHERE YOU CAN SEE EVERYTHING

S4

Take your time. Make the most of the 360° view. There are not many places like this.

TALAIA GEOROUTE

S4 WHERE YOU CAN SEE EVERYTHING



THE PYRAMID-SHAPED MOUNTAIN

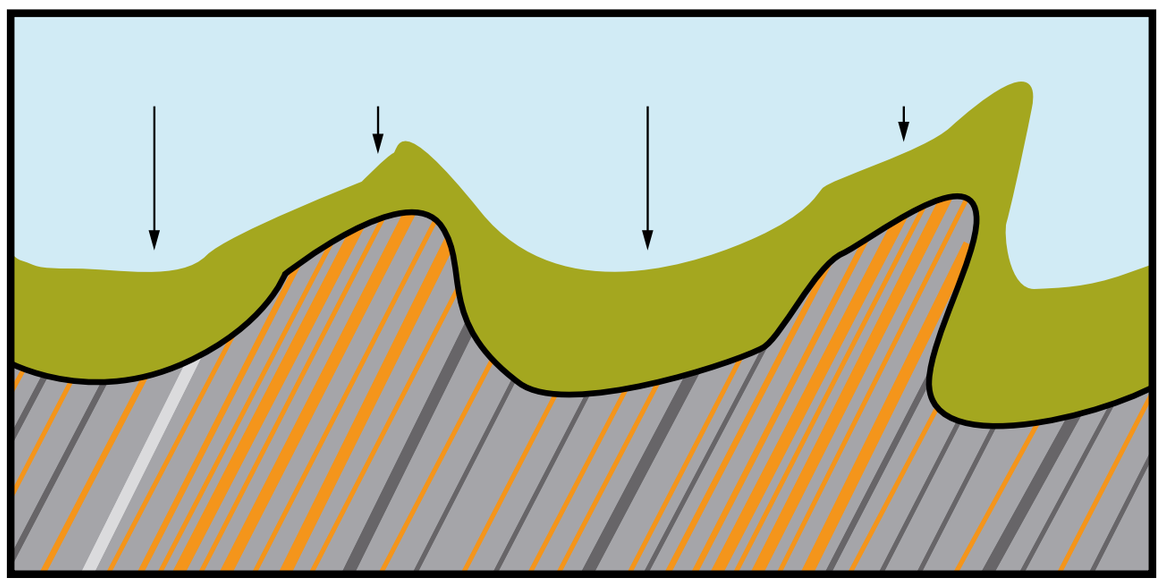
It is called Andutz and gives its name to the fault that lies beneath our feet. Its summit is one of the best viewpoints of the entire Basque Coast.

TALAIA GEOROUTE

S4 WHERE YOU CAN SEE EVERYTHING

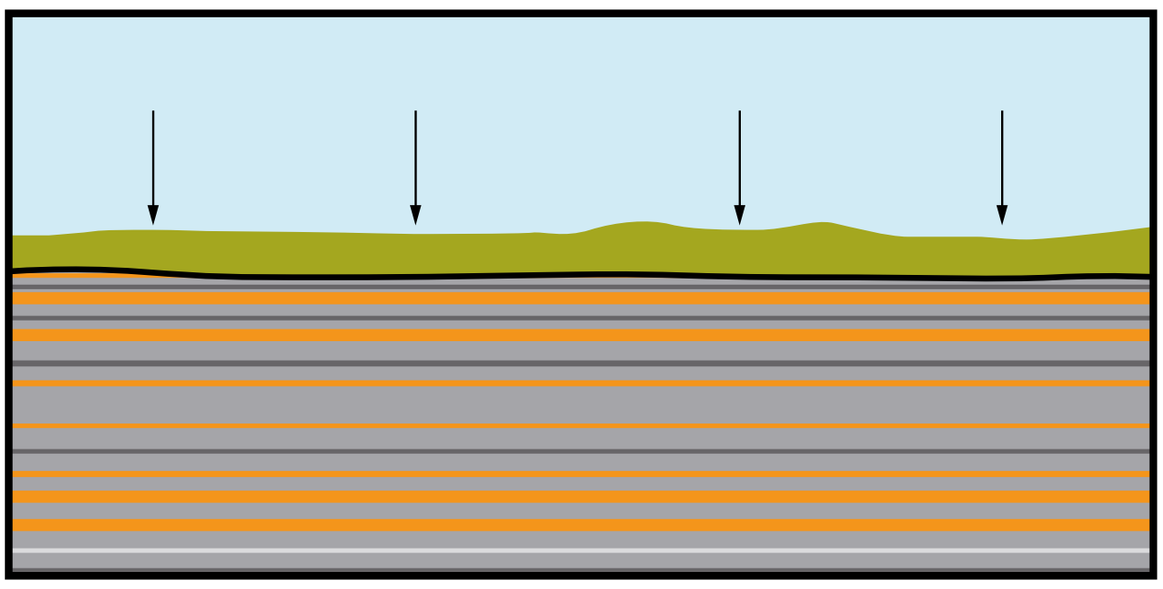
Perpendicular layers

Differential erosion



Parallel layers

Homogeneous erosion



WHY DOES THE SHAPE OF THE COAST CHANGE?

This fault also changes the **orientation of the layers** (see map S3) and this fundamentally conditions the erosion and the shape of the coast.

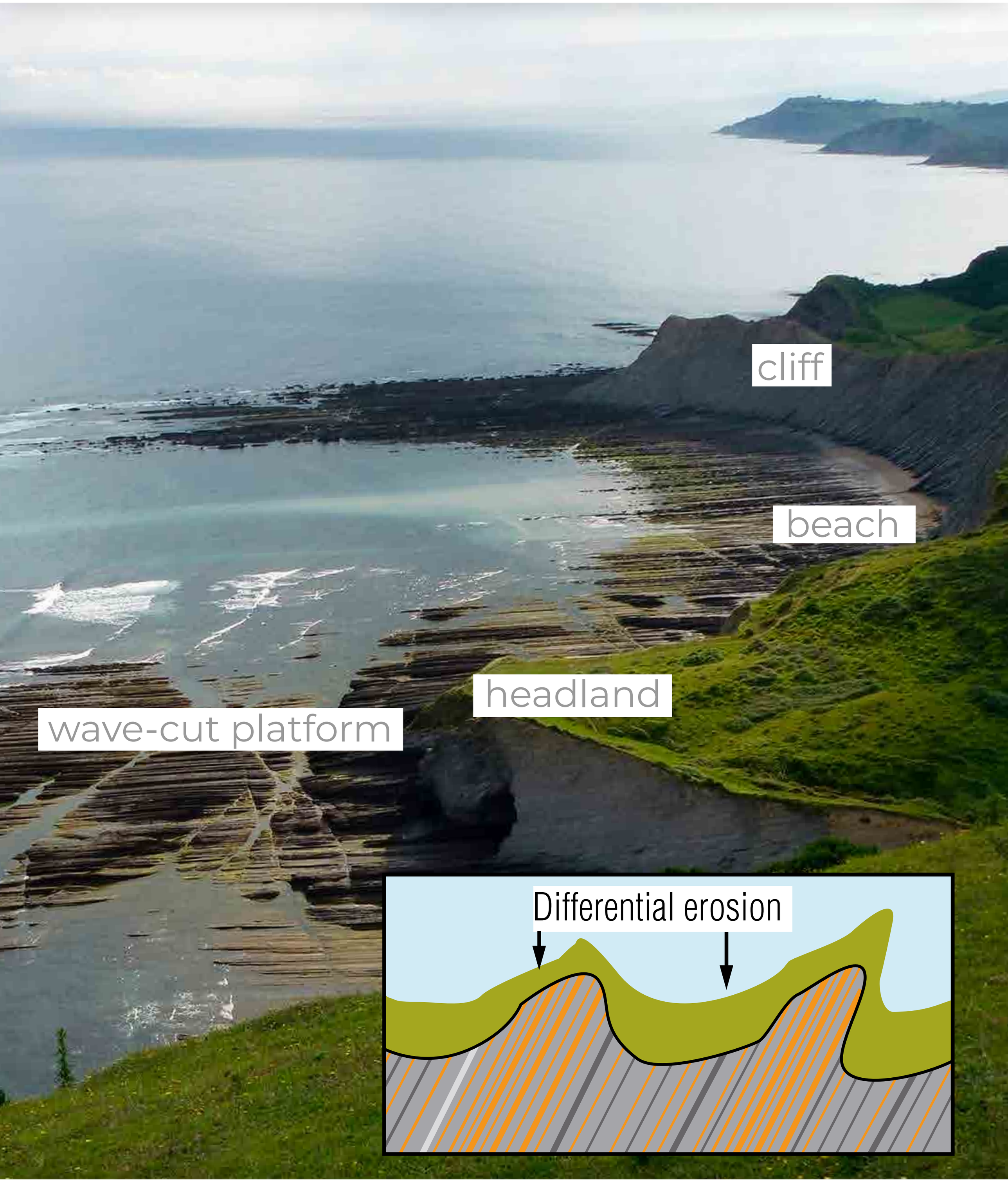
TALAIA GEOROUTE

S4 WHERE YOU CAN SEE EVERYTHING

To the west, the orientation of the black flysch layers is **parallel to the coastline**. Erosion occurs homogeneously and the coastline is quite straight.

TALAIA GEOROUTE

S4 WHERE YOU CAN SEE EVERYTHING



To the east the **layers** are **almost perpendicular**. The erosion acts differently on the hard and soft layers and gives rise to a coast of inlets and headlands such as Sakoneta.

S5

A GREAT LANDSLIDE IN MENDATA

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S5 A GREAT LANDSLIDE IN MENDATA

S5

Look at the great landslide down to the cove of Mendata. Possibly the fractures of the nearby Andutz fault have had an influence.

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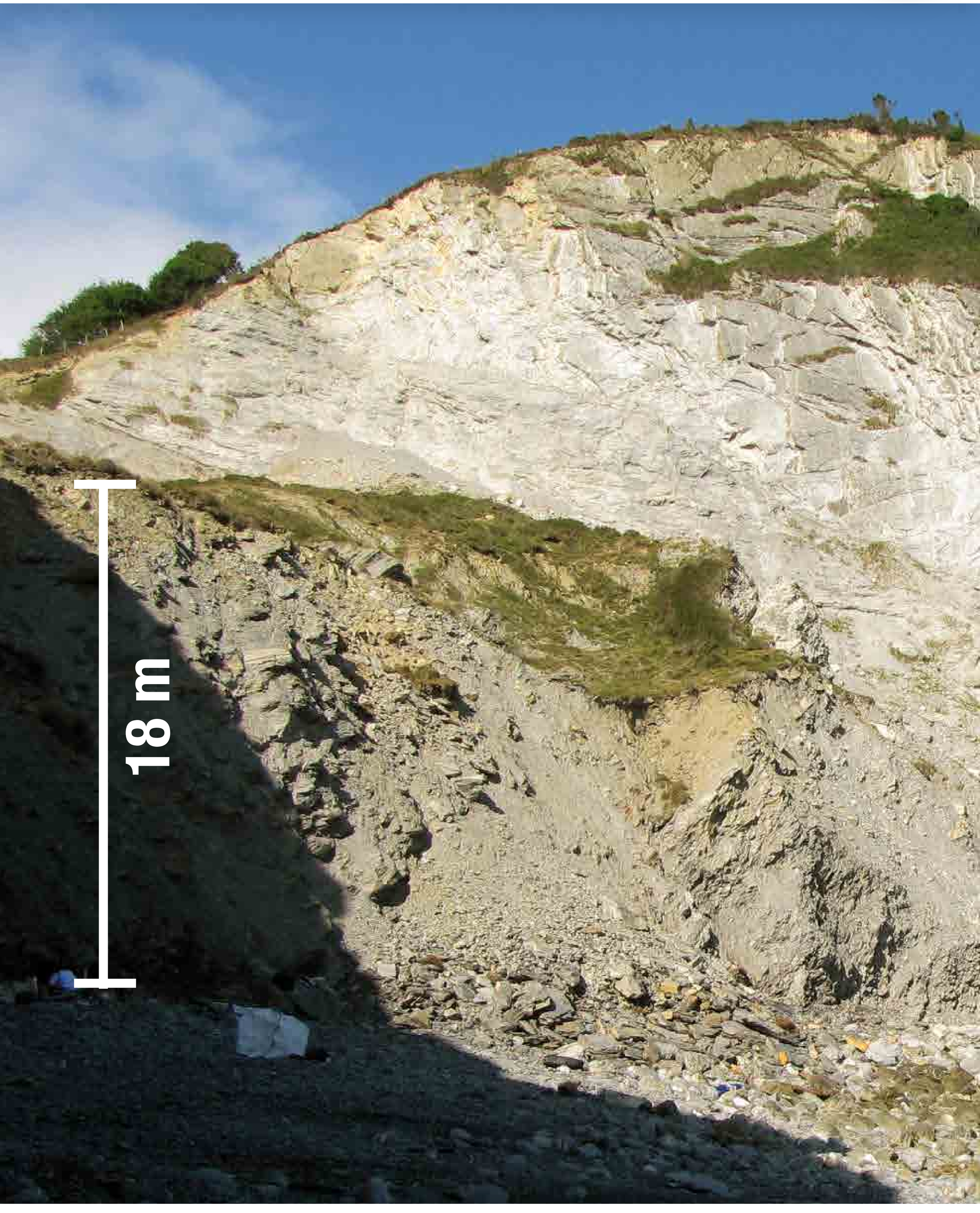
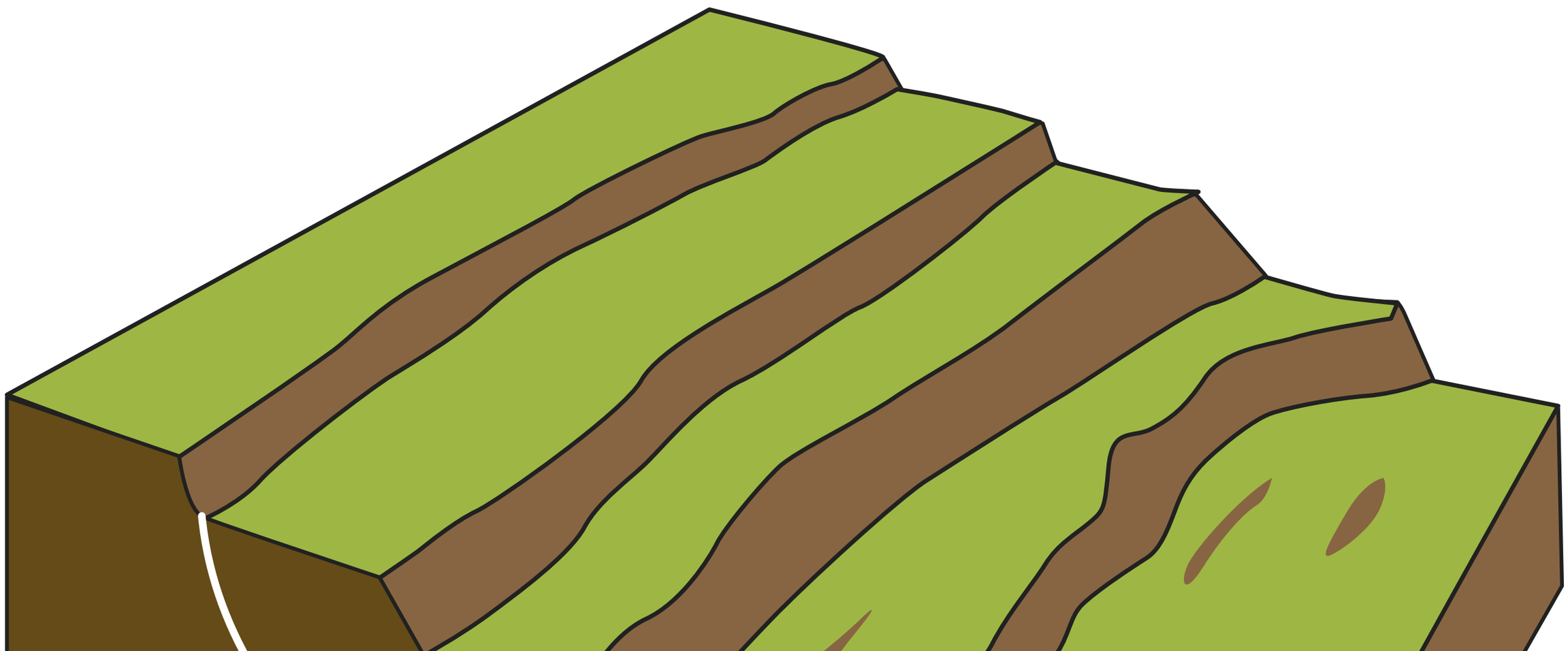
S5 A GREAT LANDSLIDE IN MENDATA



The vegetation has almost completely covered the landslide, but if we go down to the beach the **scree-covered area** is **18 metres high!**

Diagram of a typical landslide.



TALAIA GEOROUTE

S5 A GREAT LANDSLIDE IN MENDATA

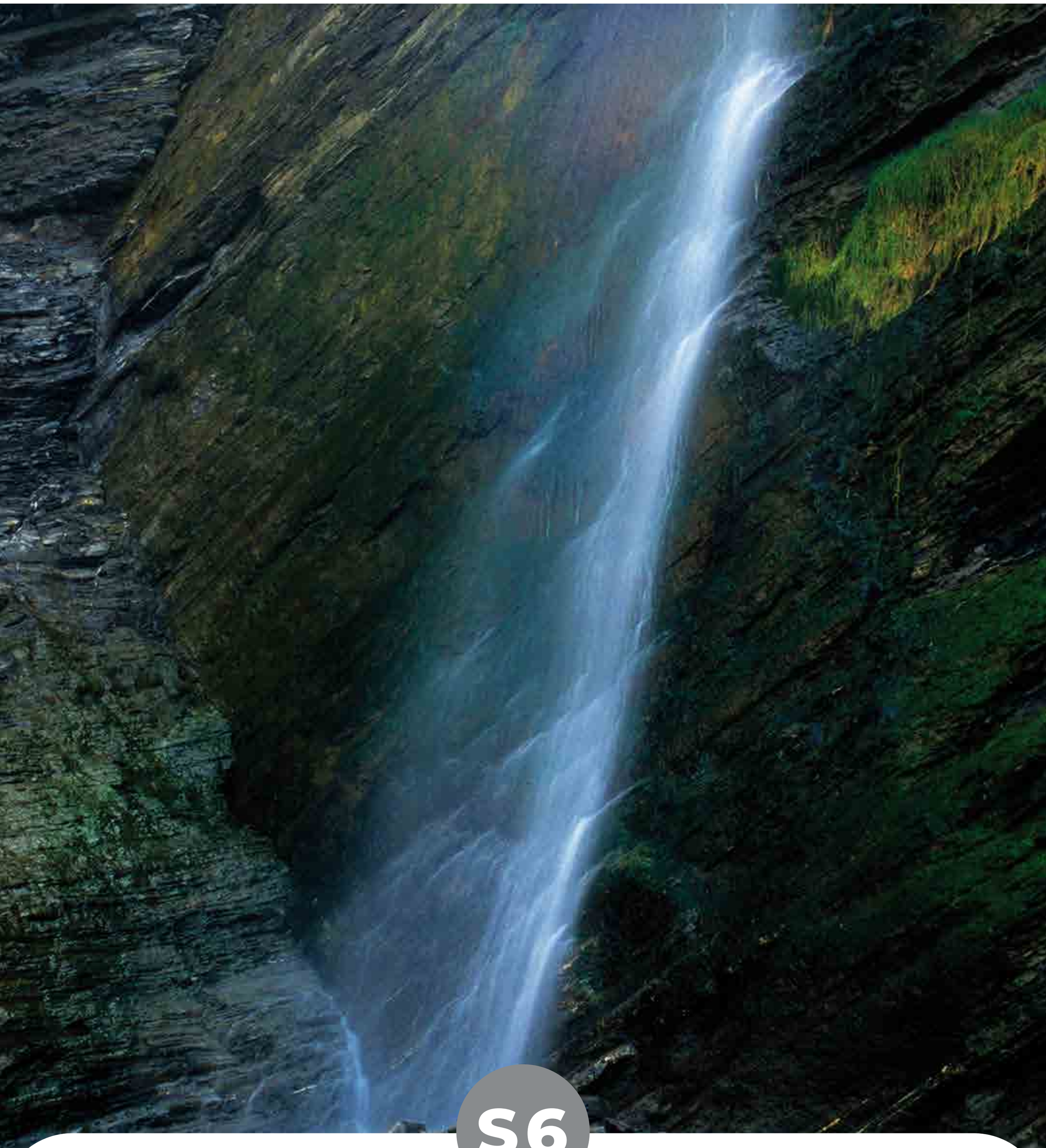
At low tide and at sunset the cove of Mendata is a little paradise.

S6

A WATERFALL FALLING INTO THE SEA

TALAIA GEOROUTE

S6 A WATERFALL FALLING INTO THE SEA

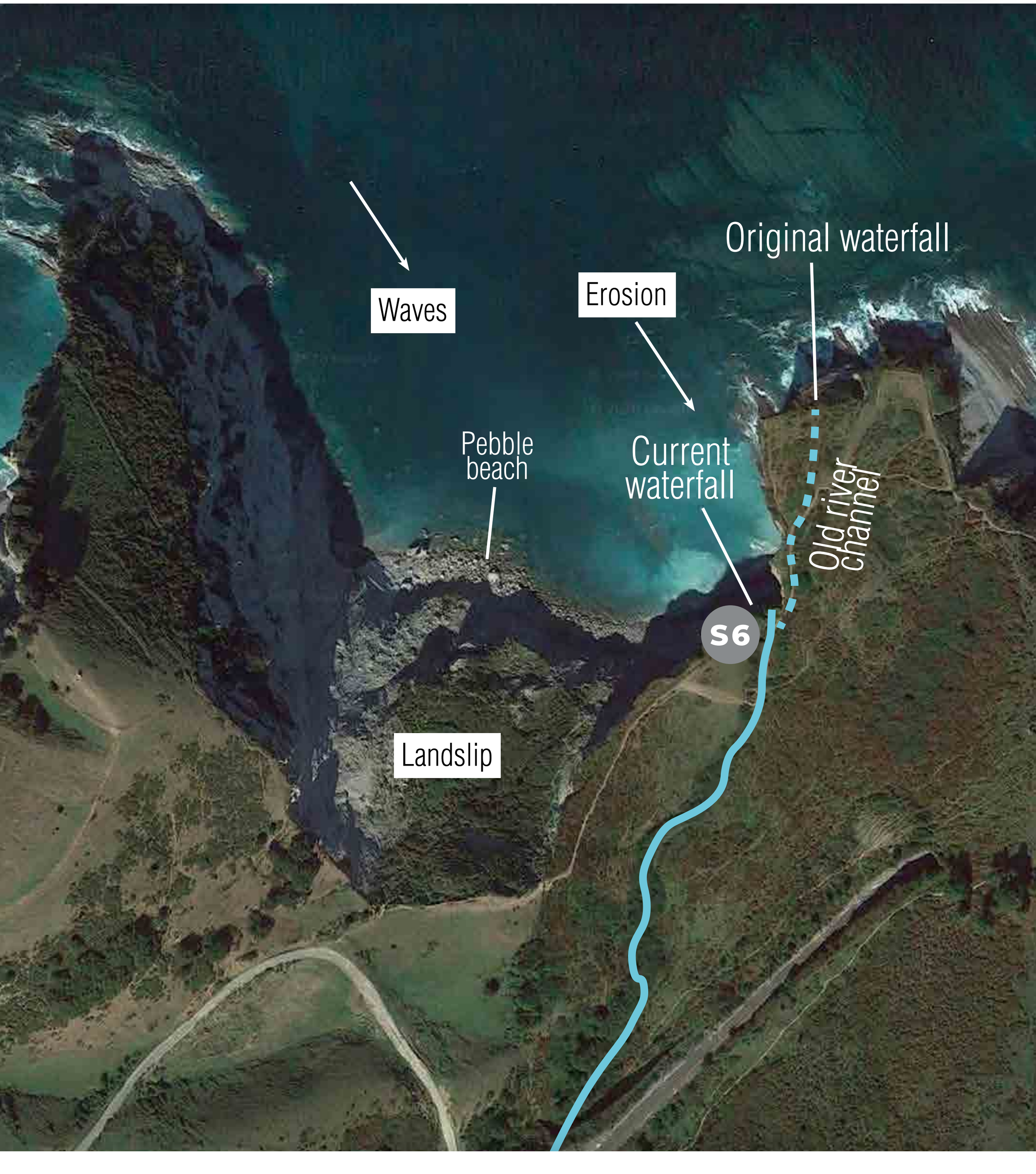


The river always ends up reaching the sea. Waterfalls in cliffs are created when **the erosion of the cliffs is greater than the erosion of the river channel itself**.

The case of Mendata is special.

TALAIA GEOROUTE

S6 A WATERFALL FALLING INTO THE SEA



Notice the route of the old channel. **The waterfall was originally located further on**. Not all that long ago, the erosion of the cliff caught up with a small meander of the stream and the water began to fall here.

THE WHALE TOWER

When you start climbing, take the detour to the restored whaling watchtower. In the past, whales swam in the Bay of Biscay and were the mainstay of many coastal towns.

S7

HOW WAS THE WAVE-CUT PLATFORM FORMED?

TALAIA GEOROUTE

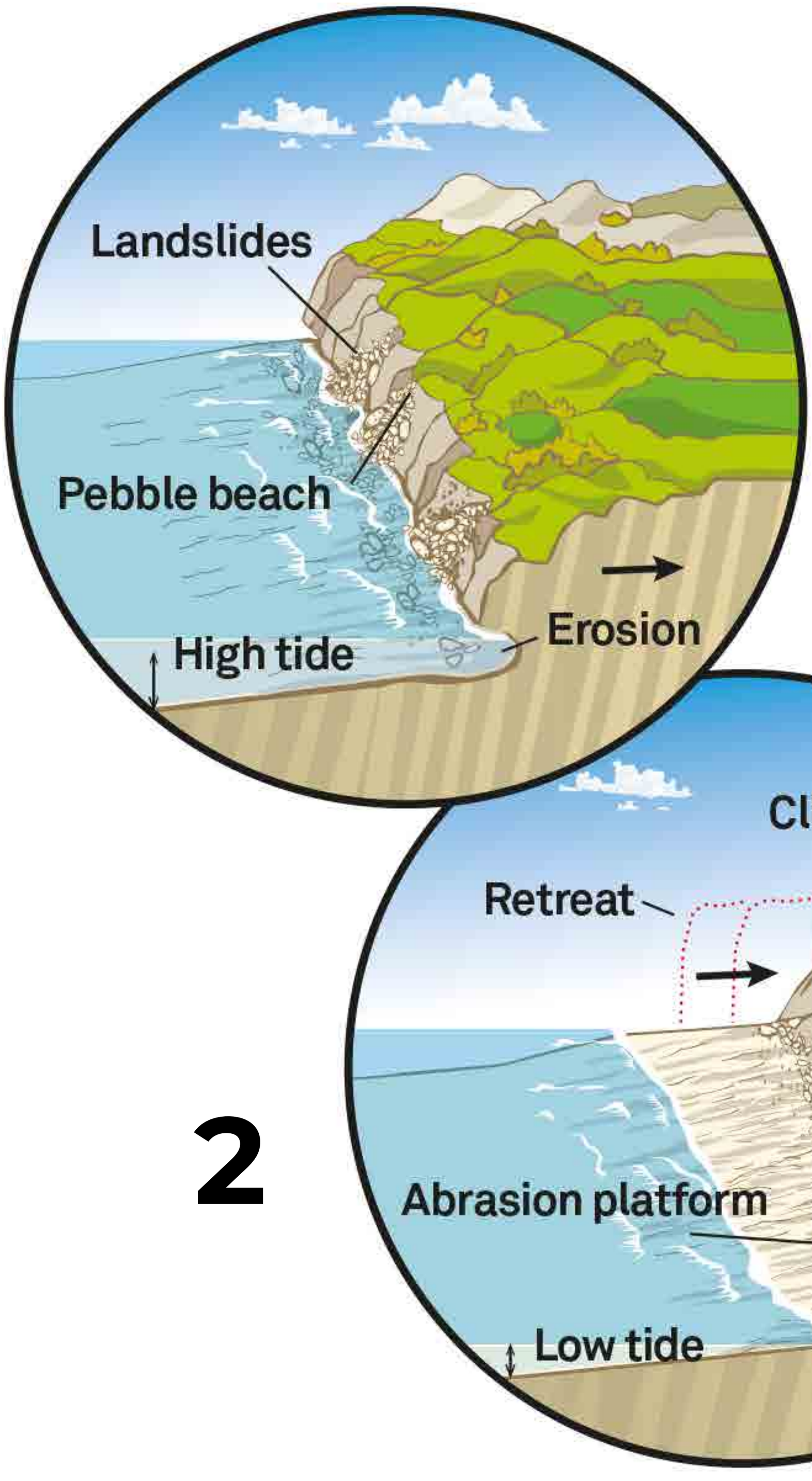
S7 HOW WAS THE WAVE-CUT PLATFORM FORMED?

S7

The sea erodes the cliffs and they recede to expose a horizontal rock platform called a **wave-cut platform**.

TALAIA GEOROUTE

S7 HOW WAS THE WAVE-CUT PLATFORM FORMED?



1. EROSION
2. RETREAT

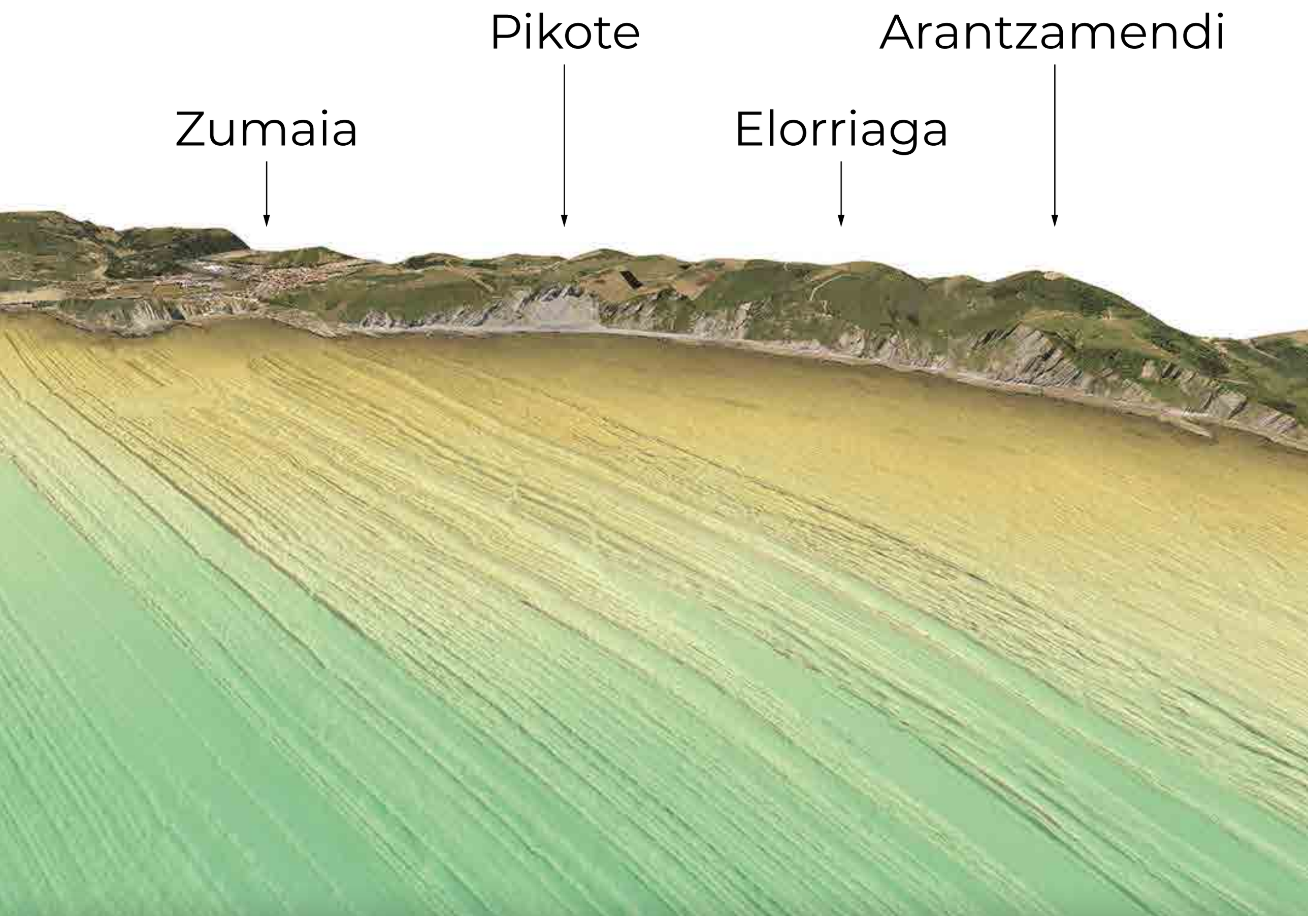
TALAIA GEOROUTE

S7 HOW WAS THE WAVE-CUT PLATFORM FORMED?

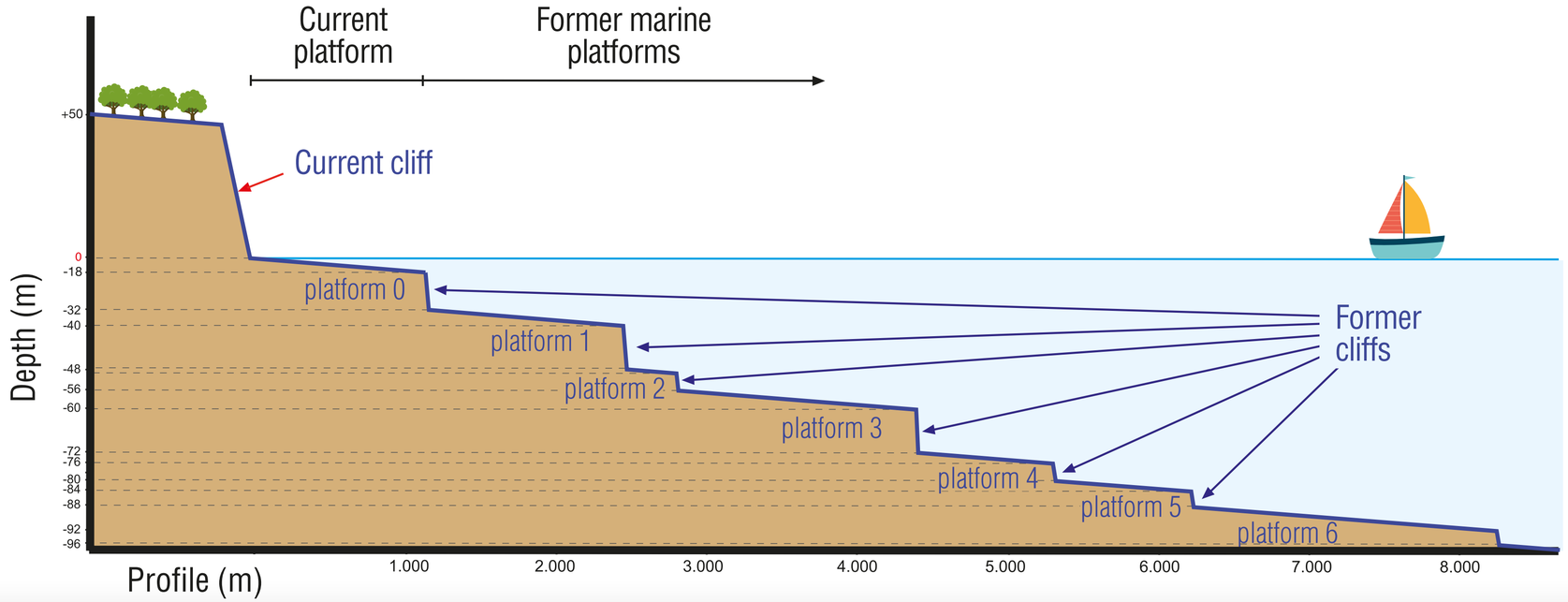
The blocks that have accumulated at the base of the cliffs act as **projectiles that increase erosion**.

There is normally a temporary accumulation of sand.

S7 HOW WAS THE WAVE-CUT PLATFORM FORMED?



Following it out to sea, the wave-cut platform continues with a slope of approximately 1% for about 8 km. Only 20,000 years ago, during the last ice age, the sea level was 100 m lower.



ROTATE SCREEN

If you look closely at the profile you can make out **steps** that mark the position of **ancient cliffs** and wave-cut platforms from when the sea level was lower than it is now.

S8

THE ONLY RIVER THAT REACHES THE SEA

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S8 THE ONLY RIVER THAT REACHES THE SEA

All the small streams in the biotope fall into the sea from the cliffs in waterfalls like Mendata (Point S6).

Why is the Errotaberri the only one which manages to reach sea level?

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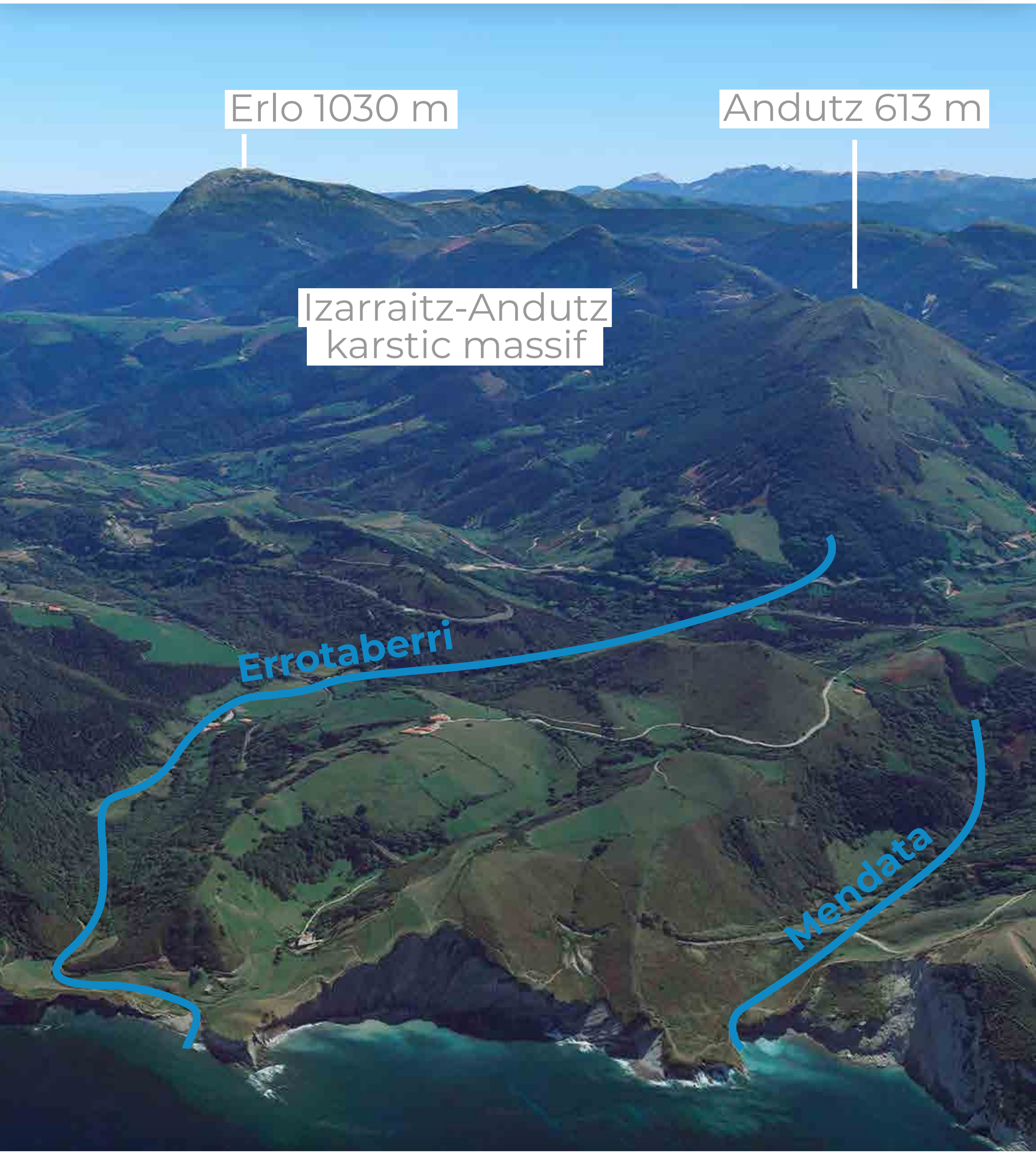
S8 THE ONLY RIVER THAT REACHES THE SEA



All the streams of the biotope are very short in length. However, the Errotaberri rises in the **karst massif of Andutz** and its underground waters provide a sufficient flow to continue eroding the channel throughout the year.

S9

THE VIEWPOINT OF PORTUTXIKI

TALAIA GEOROUTE

S9 THE VIEWPOINT OF PORTUTXIKI

S9

Sometimes it is better not to get distracted.
Enjoy the wildest part of the protected Biotope.

E4

EQUILIBRIUM IN THE ATLANTIC COUNTRYSIDE

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E4 EQUILIBRIUM IN THE ATLANTIC COUNTRYSIDE

The intense use of recent decades has given rise to a **landscape** of green fields which is aesthetically attractive but quite **simplified** from an ecological point of view.

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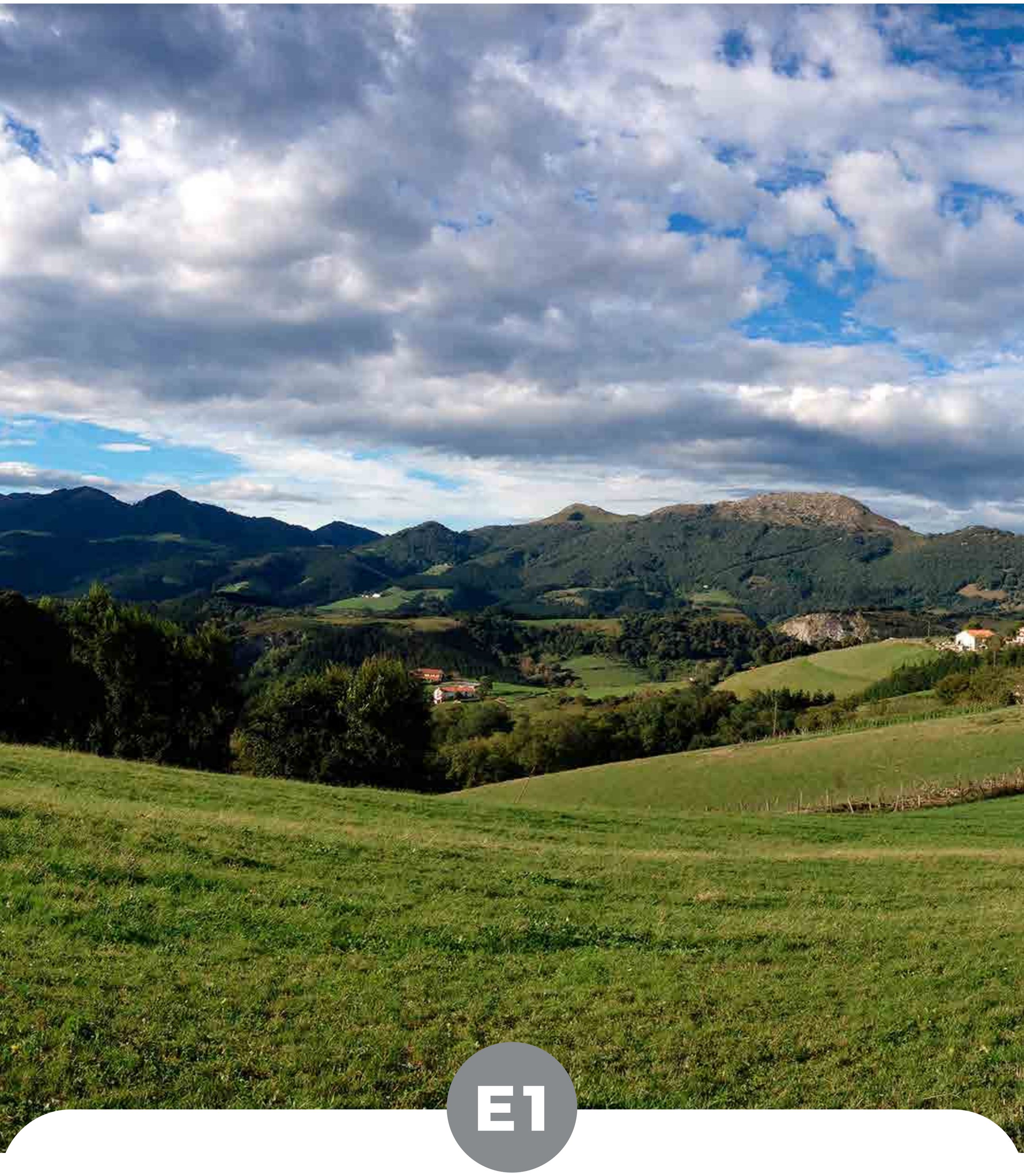
E4 EQUILIBRIUM IN THE ATLANTIC COUNTRYSIDE

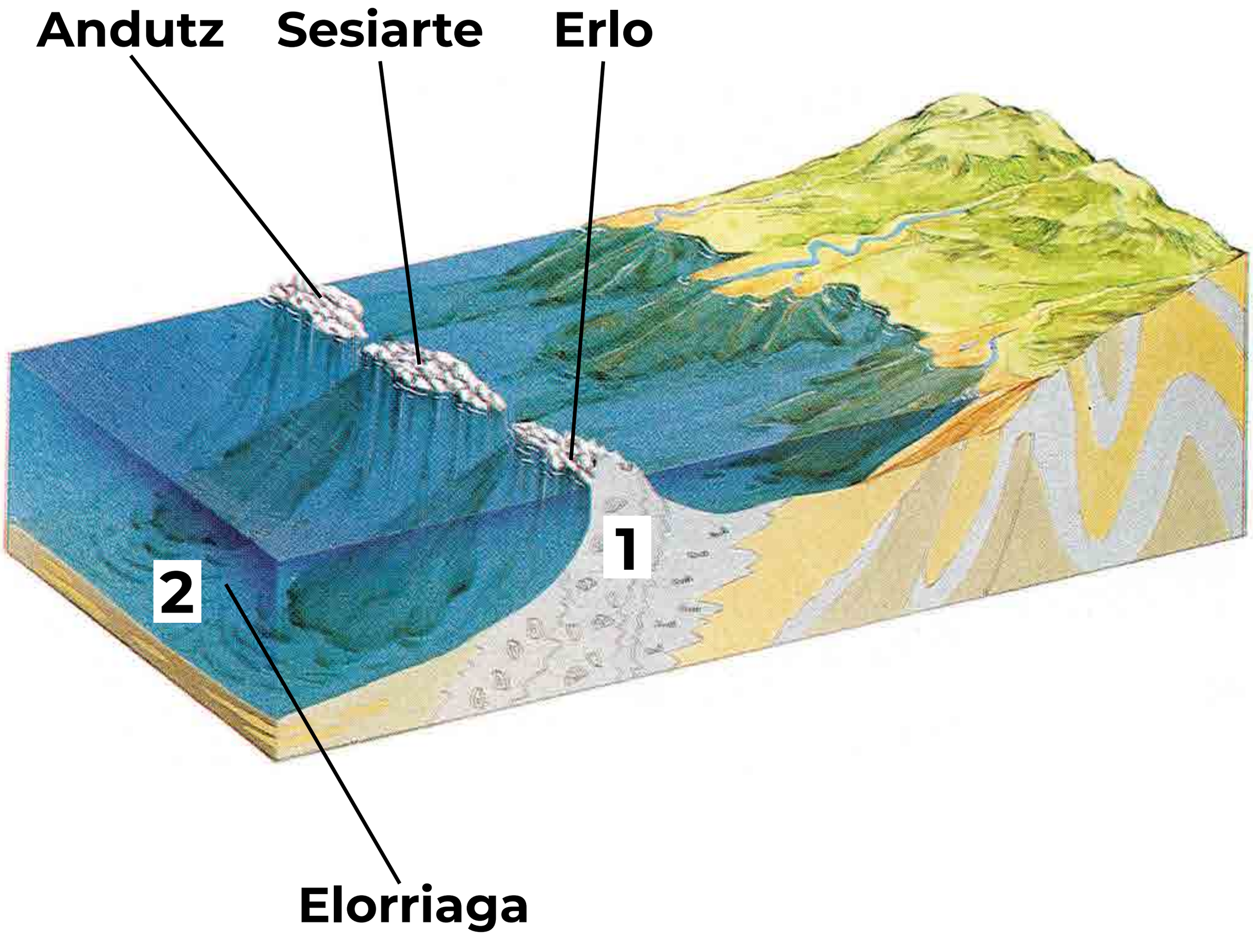
The aim of the protected biotope is to make agricultural-livestock use compatible with conservation, introducing **natural copses and hedges** that increase the number of ecological niches and biodiversity.

MOUNTAINS OF CORAL



E1

Go and look at the panel in the recreation area. The **mountains** within the geopark are made up of hard limestones full of **fossils of coral** and reef organisms. About 100 million years ago our land was under a tropical sea.

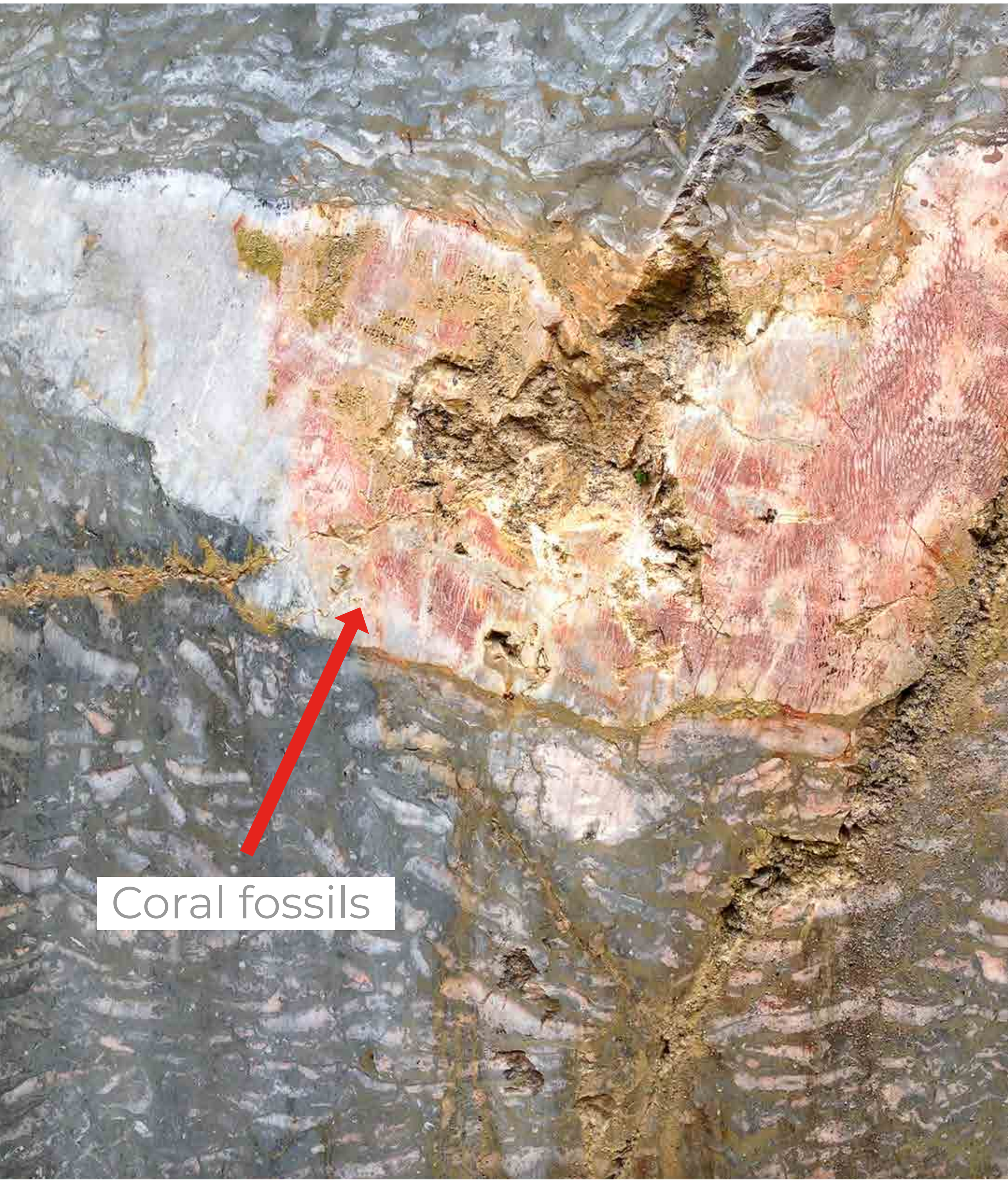


1. Coral reefs

2. Formation of the flysch

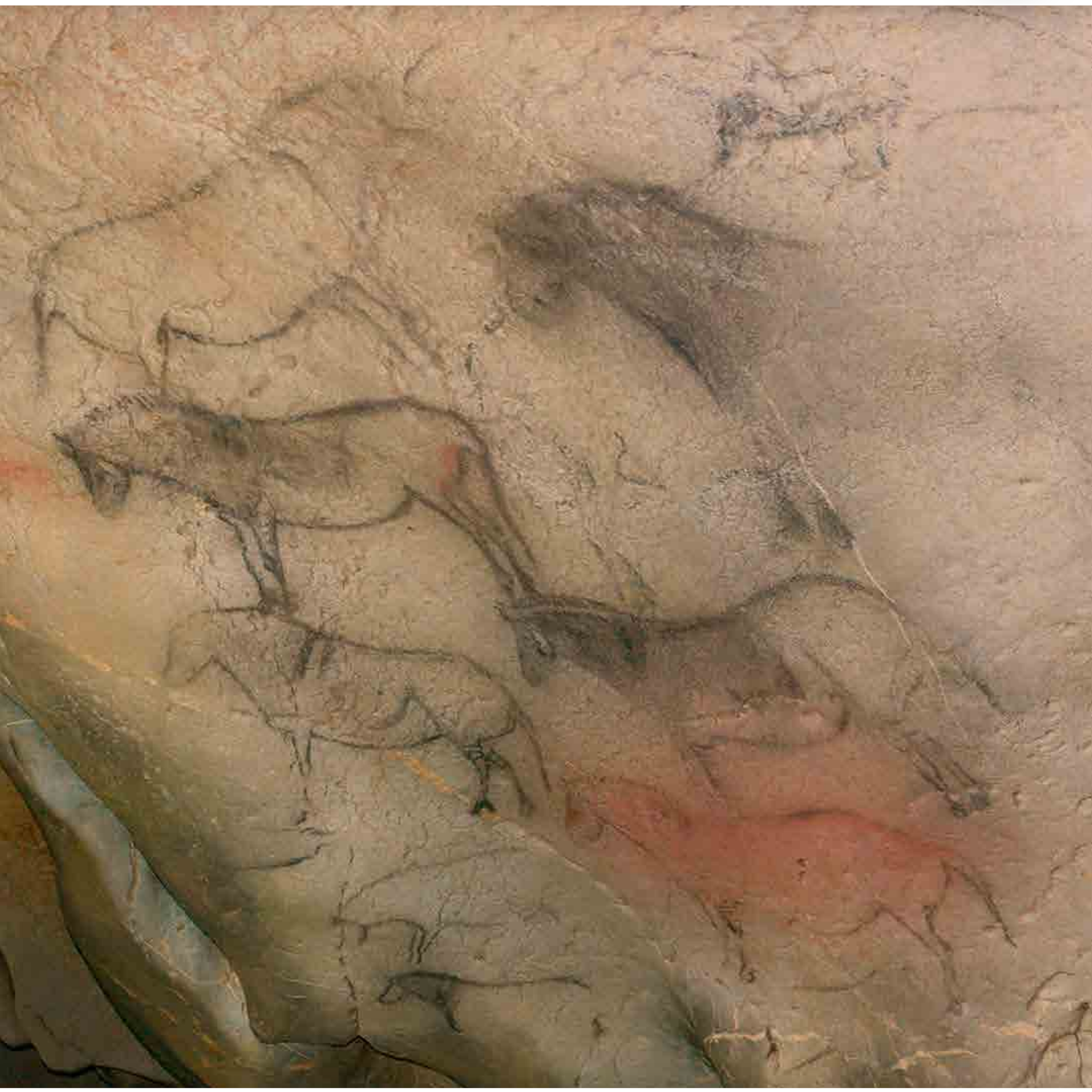
If you imagine that the sea level is a few meters above the summits you can picture that tropical Cretaceous sea.

TALAIA GEOROUTE



These limestones are quarried as **ornamental rock** in the Lastur quarry. Did you know that many of the stones for lifting and dragging used in Basque rural sport come from this quarry?

TALAIA GEOROUTE



In these mountains there are many caves with archaeological remains. **Ekain** is a **UNESCO World Heritage Site** and contains one of the best examples of rock art in Europe.
The original cave is closed to the public, but you can visit the replica at Ekainberri. **ekainberri.eus**

E2

CULTURAL LANDSCAPE - NATURAL LANDSCAPE

TALAIA GEOROUTE

E2 CULTURAL LANDSCAPE - NATURAL LANDSCAPE

E2

The pastures are a cultural landscape linked to the farmhouse. In the public plots the aim is to recover the **original woodland** with plantations of maple, oak, Pyrenean oak, holm oak, cork oak, birch, ash and cherry trees.

E3

THE GRAND VIEWPOINT. HOW DO THE CLIFFS RETREAT?

TALAIA GEOROUTE

E3 HOW DO THE CLIFFS RETREAT?

E3

If you go and look at the panel you can find out how the flysch was formed, how the different types of rock are distributed along our coast and how the sea has eroded the cliffs to form the wave-cut platform.

TALAIA GEOROUTE

E3 HOW DO THE CLIFFS RETREAT?

Baratzazarrak landslip

Pikote rockfall

Under our feet we have an enormous **landslip** covered by vegetation. To the right, however, is the great Pikote **rockfall** which has no vegetation. Why?

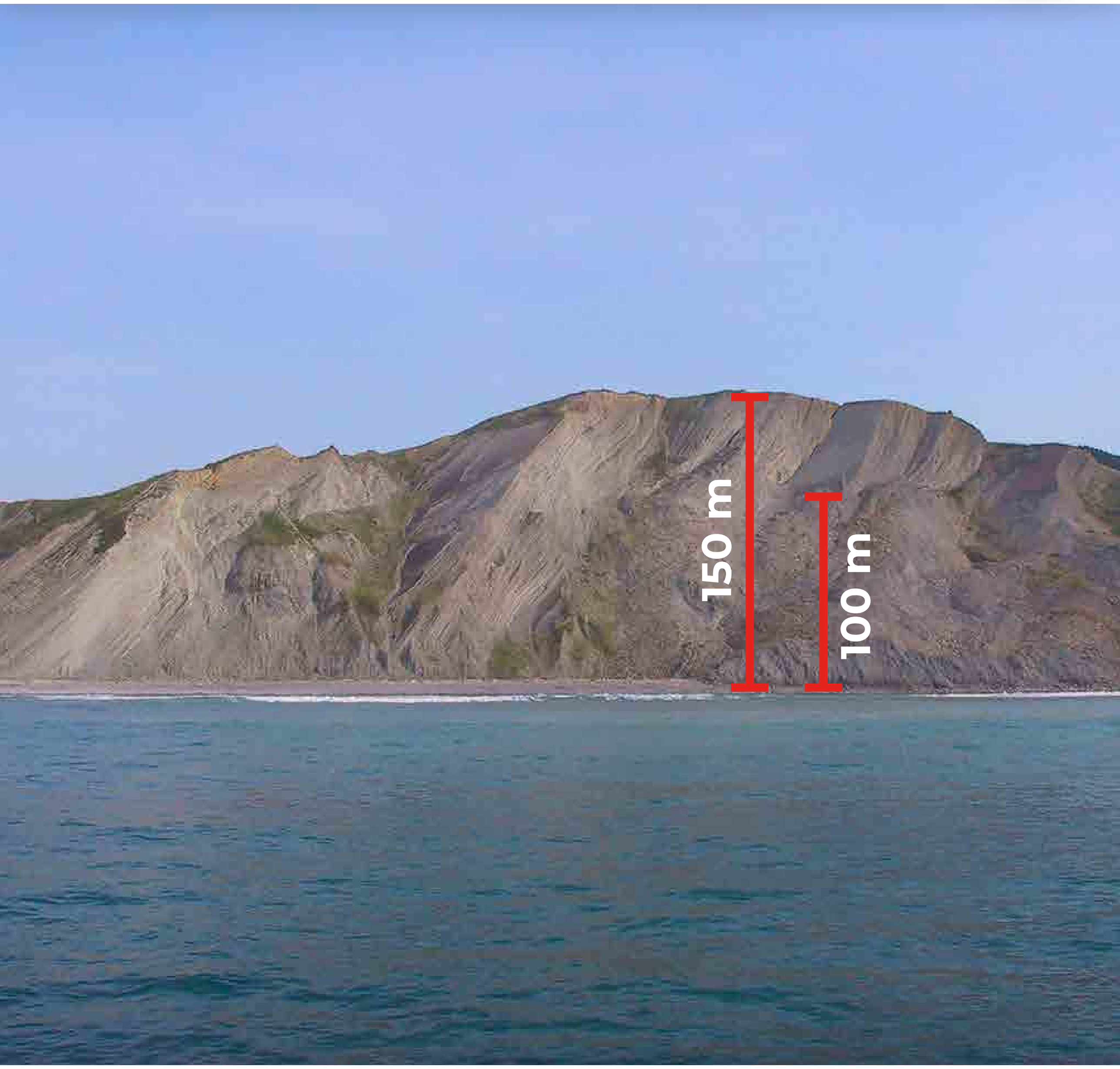
BARATZAZARRAK LANDSLIP

If we go down to the base we will see that it occurs a little at a time, when the superficial part of the flysch slowly breaks and slips. This **process** is **slow** and happened quite a long time ago, allowing vegetation to grow on the ground.

TALAIA GEOROUTE

E3 HOW DO THE CLIFFS RETREAT?

The layers slide over each other and folds and breakage zones are produced which demonstrate that this is an **active process**.



PIKOTE ROCKFALL

The cliffs in front of us are **150 m high** and with an accumulation of rock that exceeds 100 m. The rocks fall into the void in sudden landslides. There is hardly any soil. The vegetation has not yet had time to colonise.

TALAIA GEOROUTE

E3 HOW DO THE CLIFFS RETREAT?

At the base of the cliffs the fallen blocks are rounded and form **beaches of pebbles** which act as projectiles that increase erosion.

THE ABRASION PLATFORM

The cliffs recede and at their base an extensive abrasion or wave-cut platform is formed which is only visible at low tide.

TALAIA GEOROUTE

E3 HOW DO THE CLIFFS RETREAT?

The wave-cut platform is home to one of the richest and most complex ecosystems on the coast. Living conditions change completely twice a day with each tide. We are in the **fully protected reserve area of the protected biotope**.

A3

HOW WERE THE CLIFFS FORMED?

TALAIA GEOROUTE

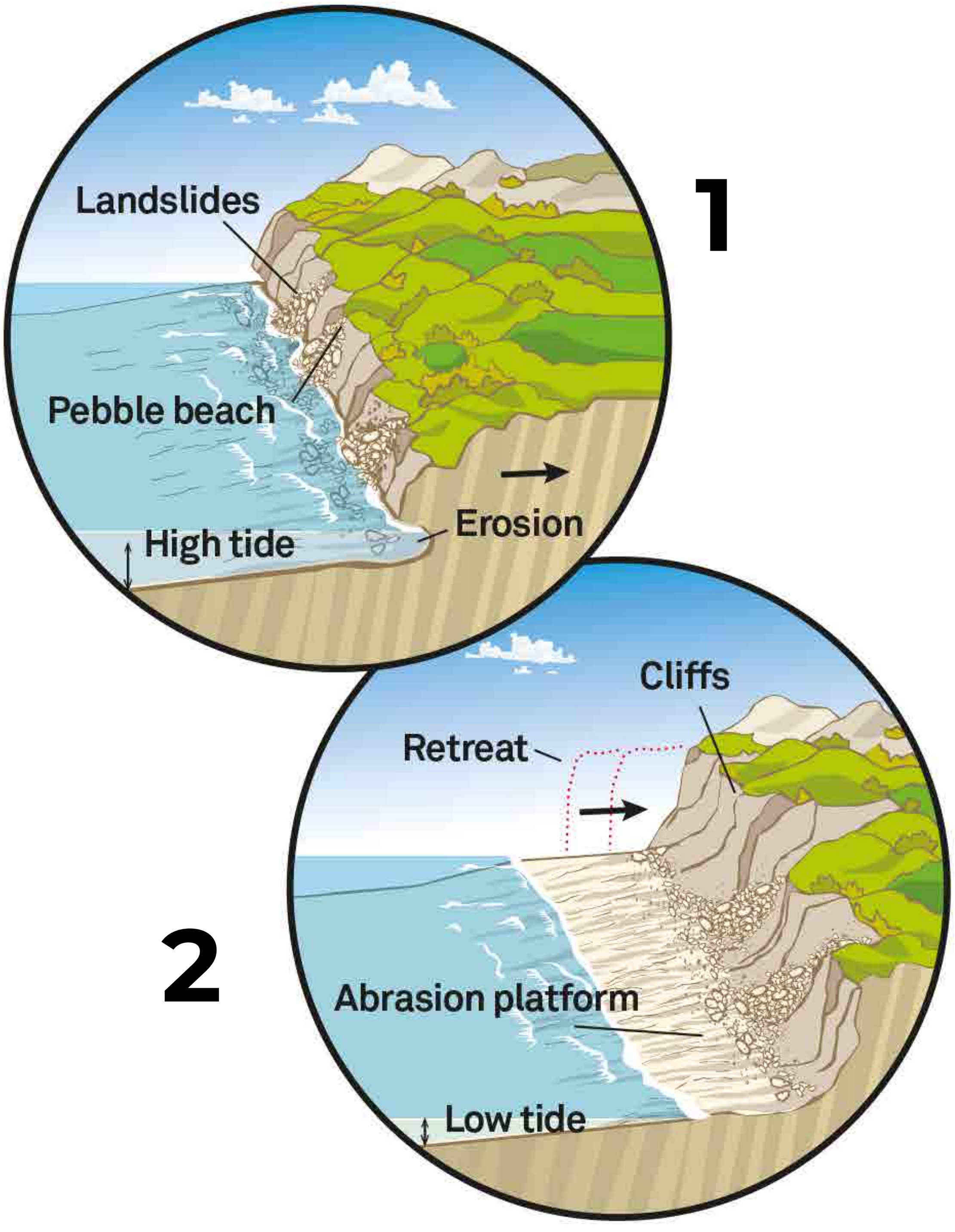
A3 HOW WERE THE CLIFFS FORMED?

A3

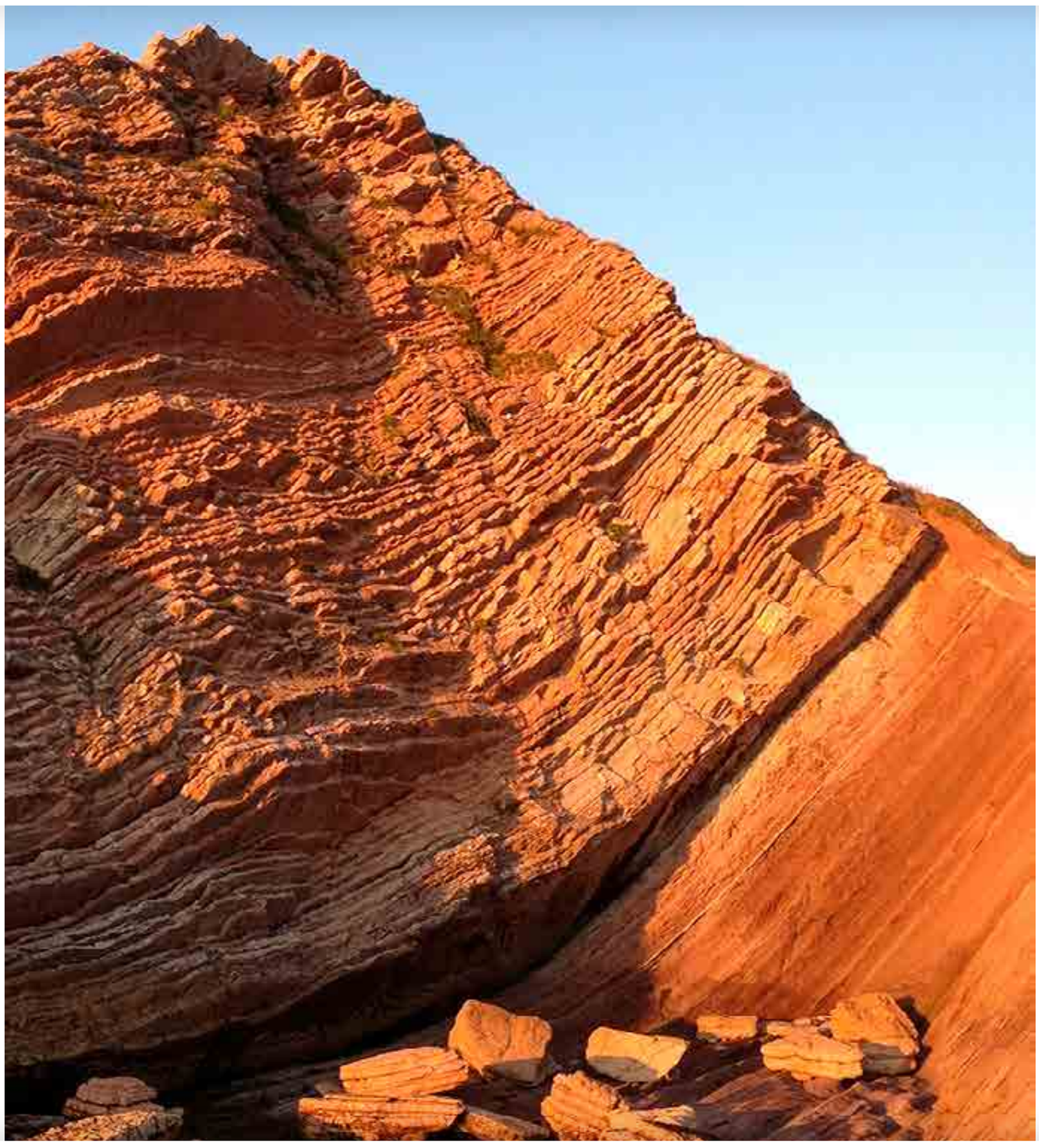
When the tide falls we can observe the **wave-cut platform**, a horizontal platform formed by the erosion and retreat of the cliffs.

TALAIA GEOROUTE

A3 HOW WERE THE CLIFFS FORMED?



1. EROSION
2. RETREAT



HOW DID THE DINOSAURS BECOME EXTINCT?

In the cove of Algorri a thin black layer lies hidden. It has an age of 66 million years and in the 1980s it was the key to explaining the extinction of the dinosaurs due to the impact of a meteorite.

This great extinction is known as the **K/Pg boundary** because it marks the end of the Cretaceous Period and the beginning of the Paleogene.

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A3 HOW DID THE DINOSAURS BECOME EXTINCT?

The layer is only 2-3 millimetres thick but it contains some critical clues:

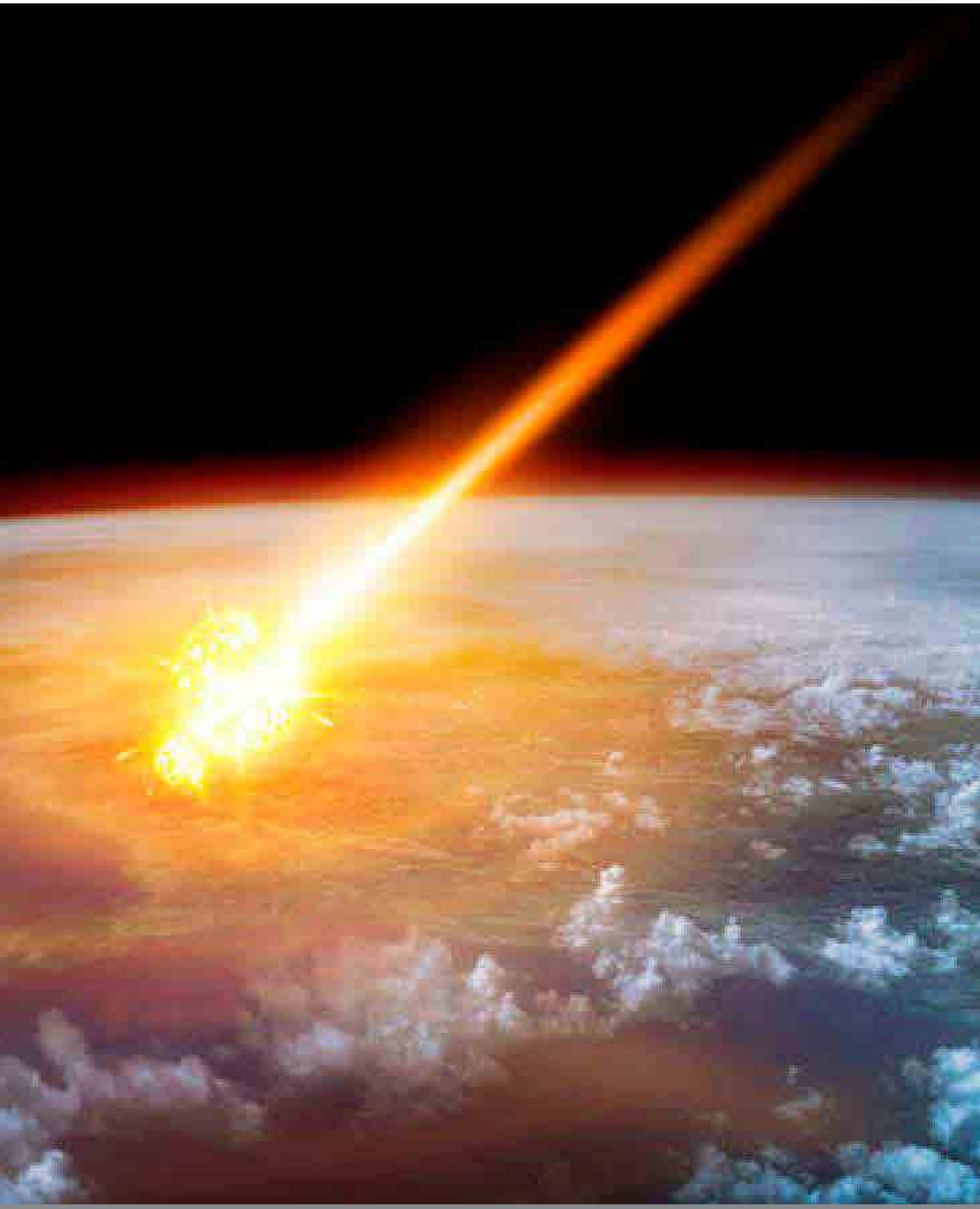
TALAIA GEOROUTE

A3 HOW DID THE DINOSAURS BECOME EXTINCT?

Globotruncana arca

100 microns

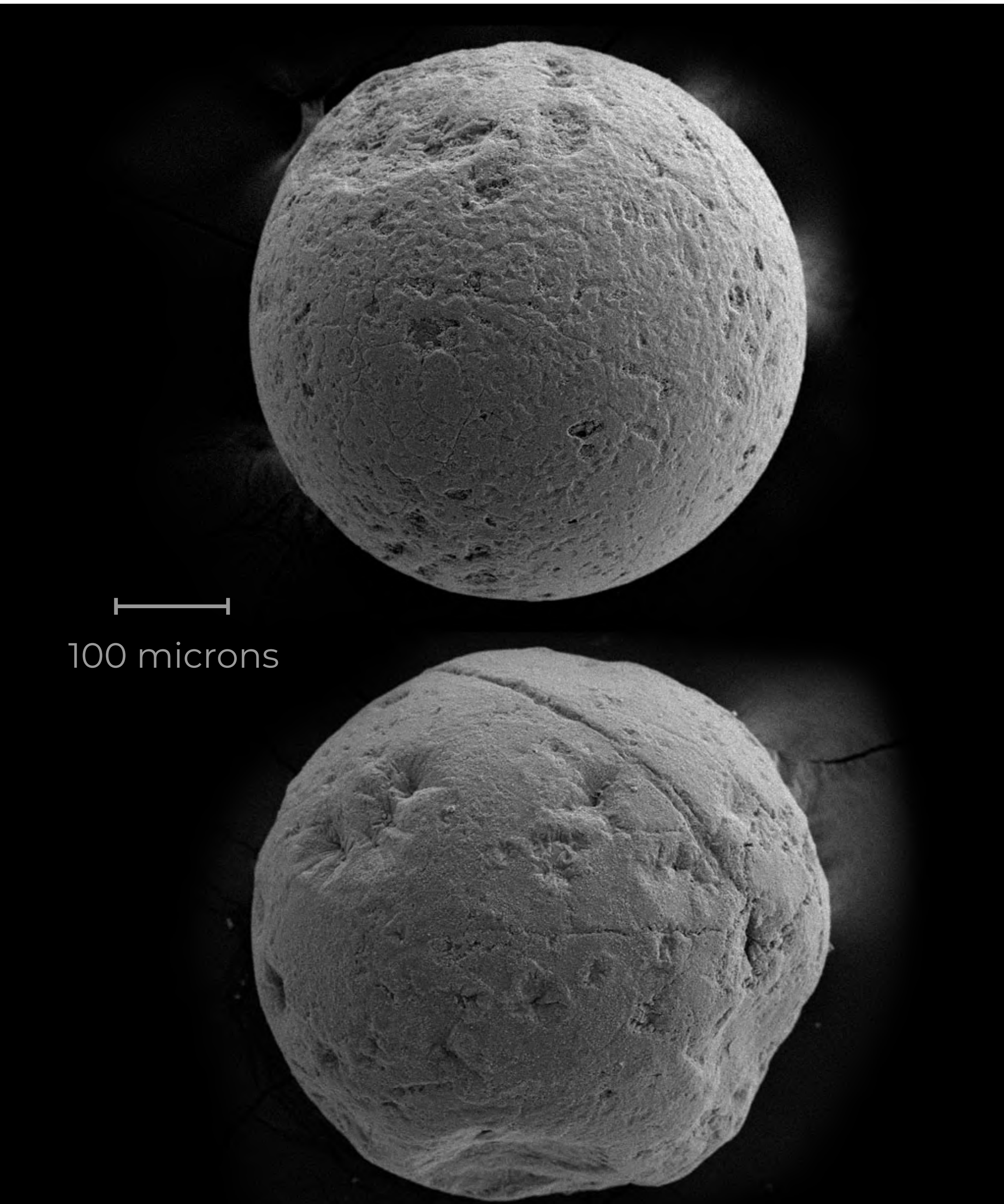
1. Extinction. More than 70% of the microfossil shells found in the previous layers suddenly disappear and never appear again.



2. A high concentration of iridium, a very scarce element on Earth but quite common in some meteorites. How could it get here?

TALAIA GEOROUTE

A3 HOW DID THE DINOSAURS BECOME EXTINCT?



3. Nickel-rich microspherules. These were formed by the rapid crystallisation of molten material from the impact zone.

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A3 HOW DID THE DINOSAURS BECOME EXTINCT?

4. **Soot** from great fires.

TALAIA GEOROUTE

A3 HOW DID THE DINOSAURS BECOME EXTINCT?

WHERE IS THE CRATER?

The **Chicxulub** impact crater is buried in the Yucatan Peninsula. It is 170 km in diameter and 66 million years old.

The meteorite was 10 km in diameter.

A4

IS THERE AN ORDER TO THE LAYERS OF THE FLYSCH?

TALAIA GEOROUTE

A4 IS THERE AN ORDER TO THE LAYERS OF THE FLYSCH?

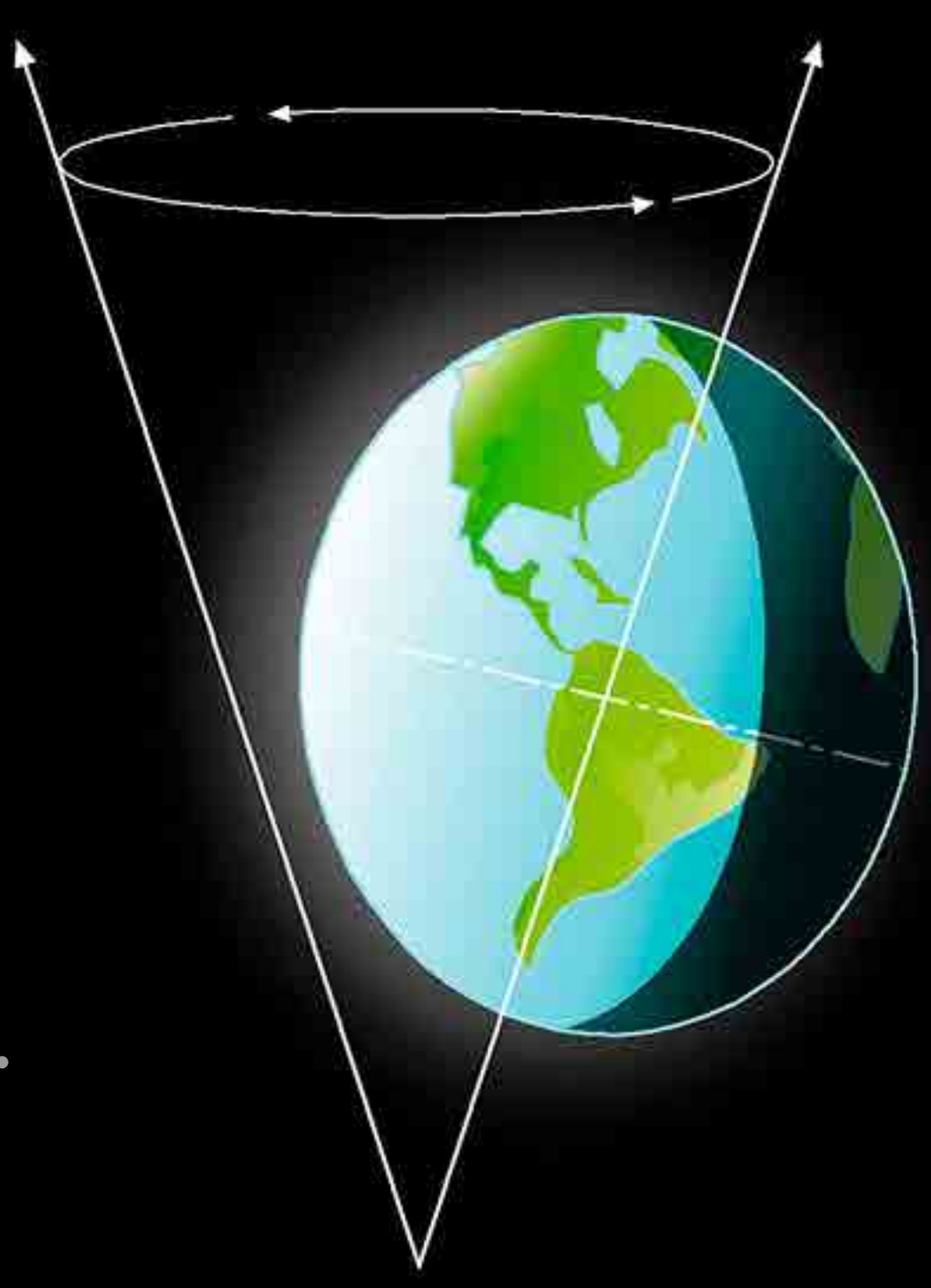
A4

Look at the base of the cliff. The layers of the flysch are arranged in pairs of **limestone** (harder) – **marl** (softer) and also in groups of 5 pairs.

Milankovitch astronomical cycles

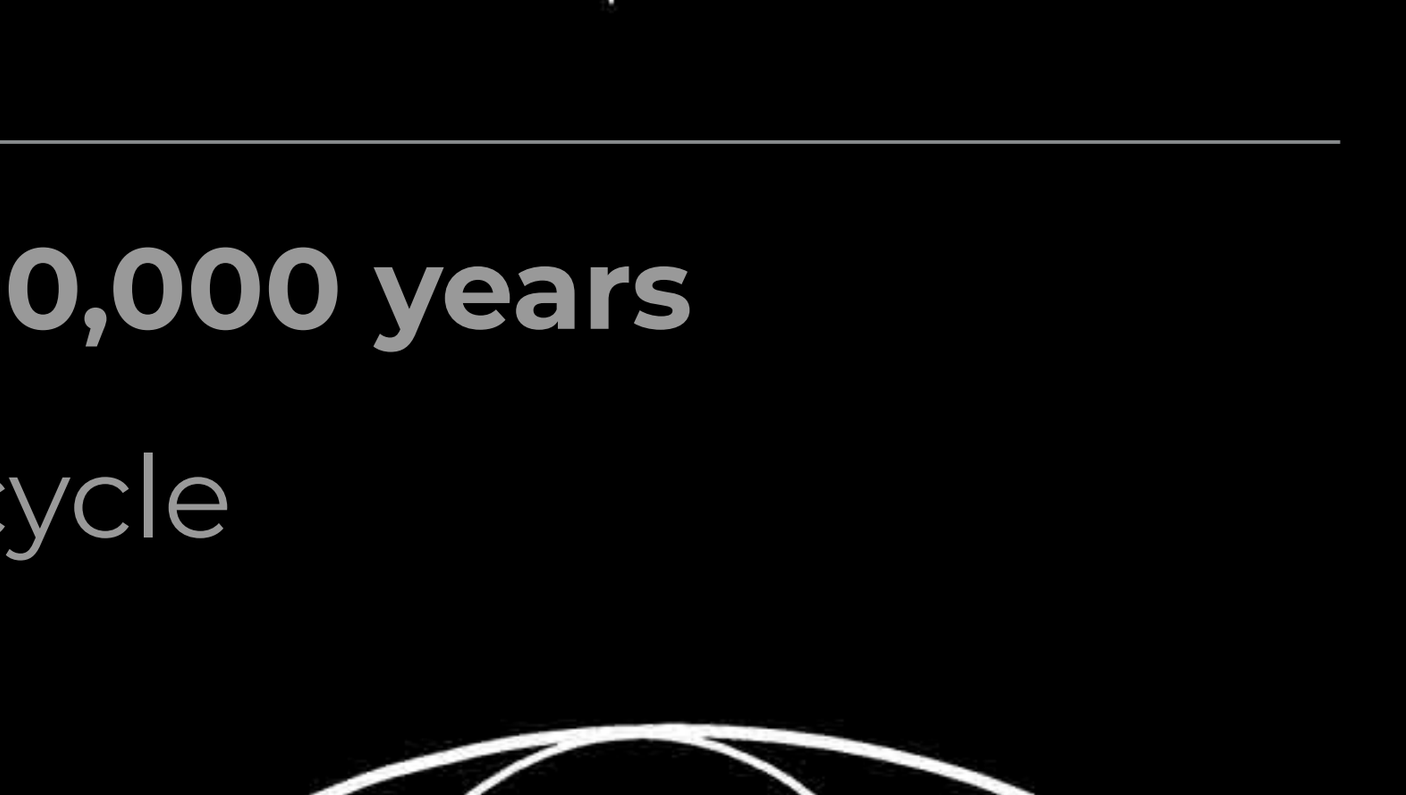
Precession ~20,000 years

A precession cycle gives rise to a limestone/marl pair.

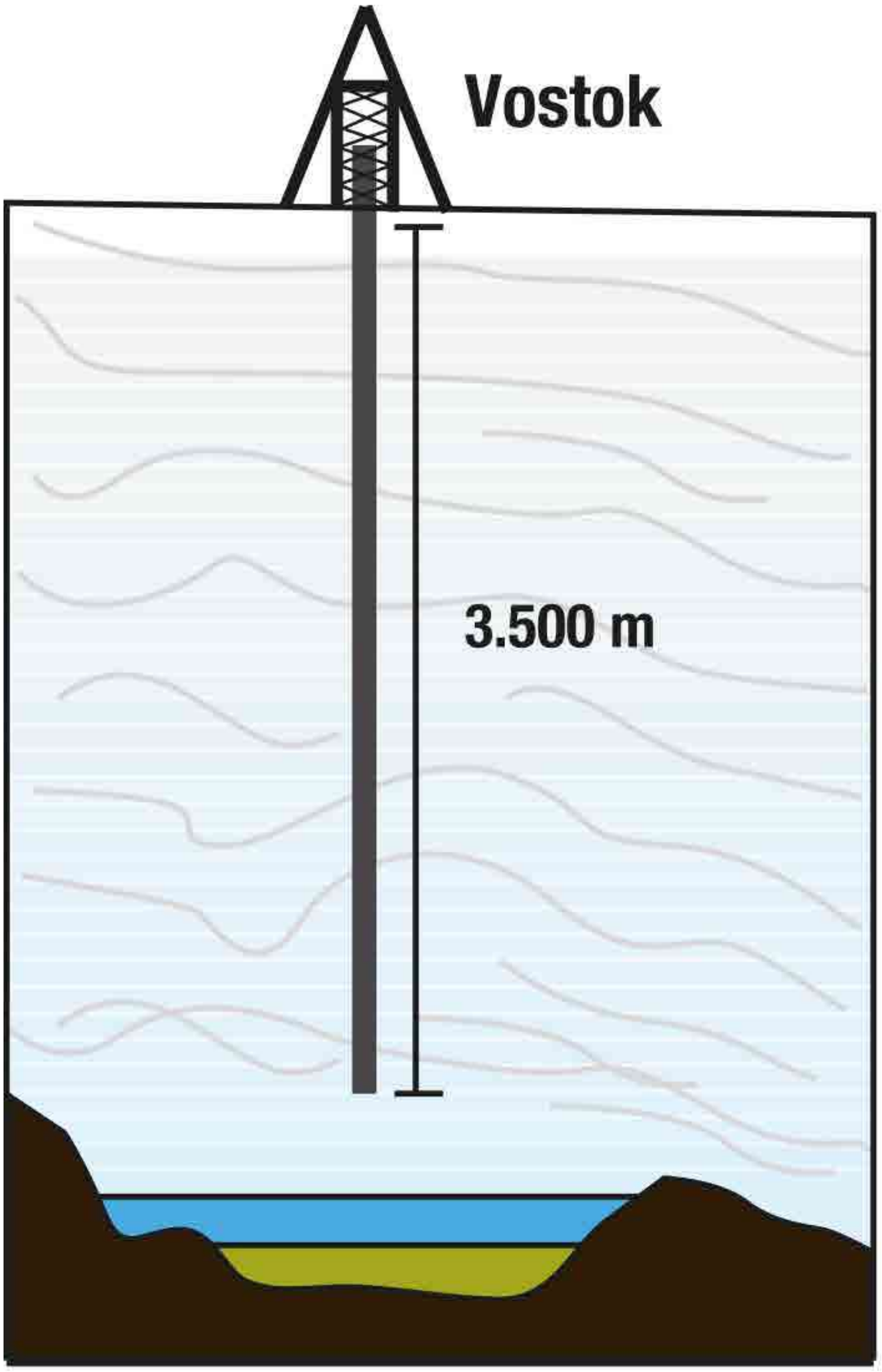


Eccentricity ~100,000 years

An eccentricity cycle is made of five pairs.



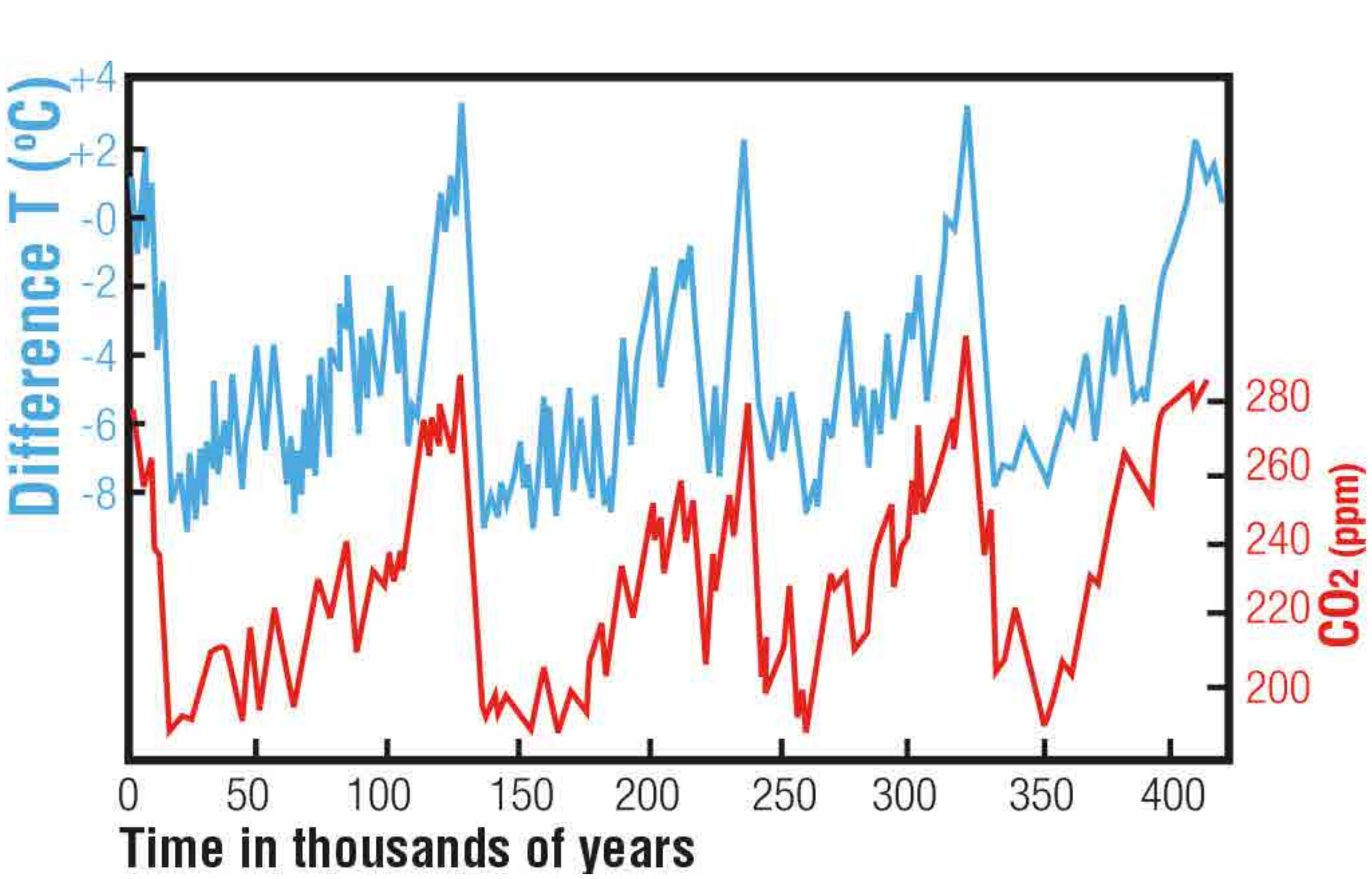
This cyclical pattern is defined by the Milankovitch astronomical cycles which **condition the Earth's climate**.



This same cyclical pattern can also be seen in the CO_2 and temperature data of the **Antarctic** ice cores.

A4 IS THERE AN ORDER TO THE LAYERS OF THE FLYSCH?

Data from the Vostok survey



There is a clear **relationship** between **temperature** and the concentration of **CO_2** in the last 400,000 years. The climate has been changing every 100,000 and 20,000 years in a natural way.

A5

DID YOU KNOW THAT THE MAGNETIC FIELD OF THE EARTH CHANGES ORIENTATION?

TALAIA GEOROUTE

A5 DID YOU KNOW THAT THE MAGNETIC FIELD OF THE EARTH CHANGES ORIENTATION?

A5

The cylindrical samples are used to establish the **orientation of the Earth's magnetic field** at the time each of the layers was deposited.

A2

HOW WAS THE FLYSCH RAISED?

TALAIA GEOROUTE

A2 HOW WAS THE FLYSCH RAISED?

A2

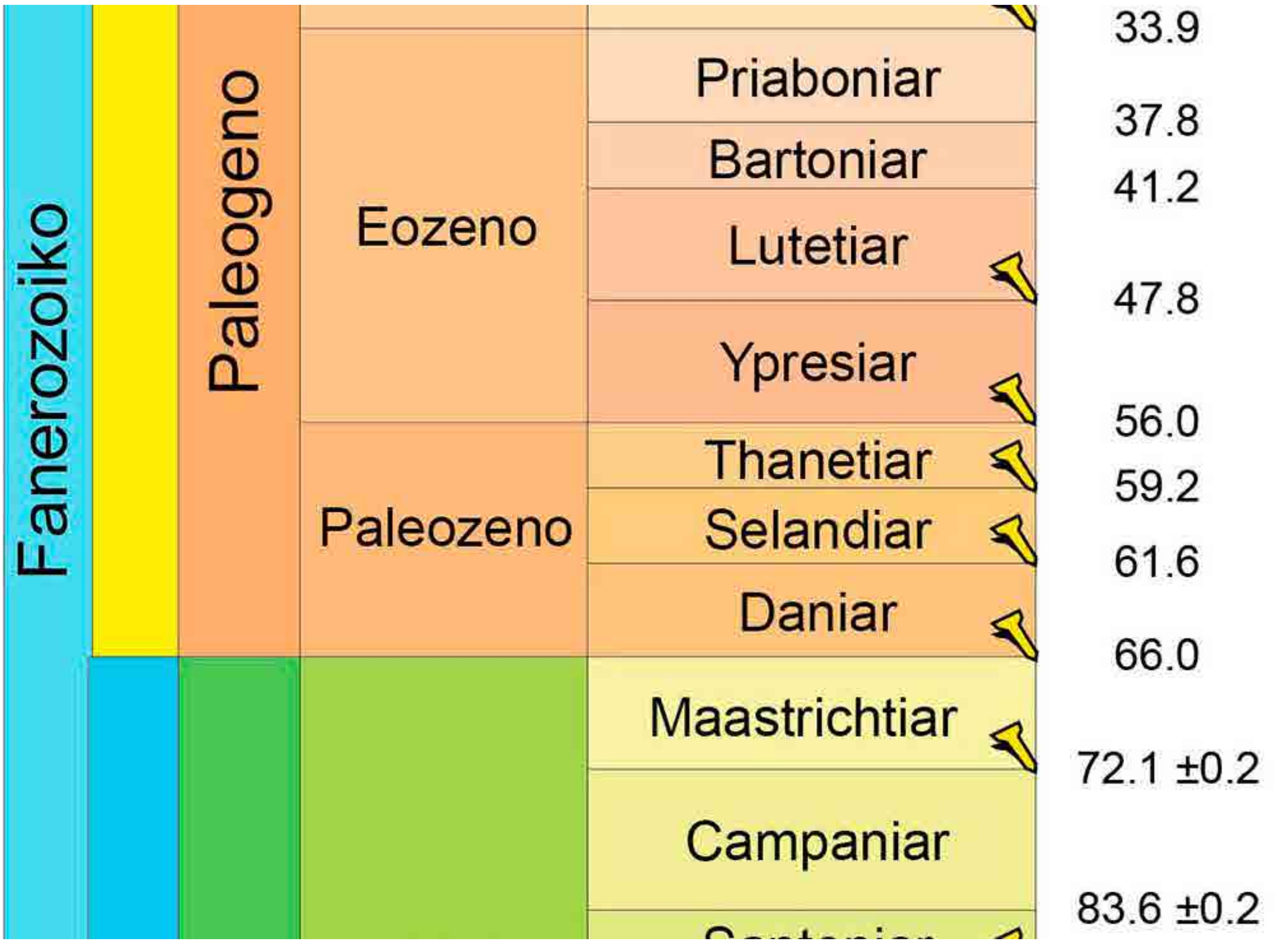
The collision between Iberia and Europe lifted up the Pyrenees and produced great forces that were capable of folding the **rocks like plasticine**.

A6

HOW IS GEOLOGICAL TIME DIVIDED?

TALAIA GEOROUTE

A6 HOW IS GEOLOGICAL TIME DIVIDED?



A6

The Earth has an age of 4,600 million years divided into chapters and sub-chapters. The boundaries between these are defined by events that we can recognise in the rocks.

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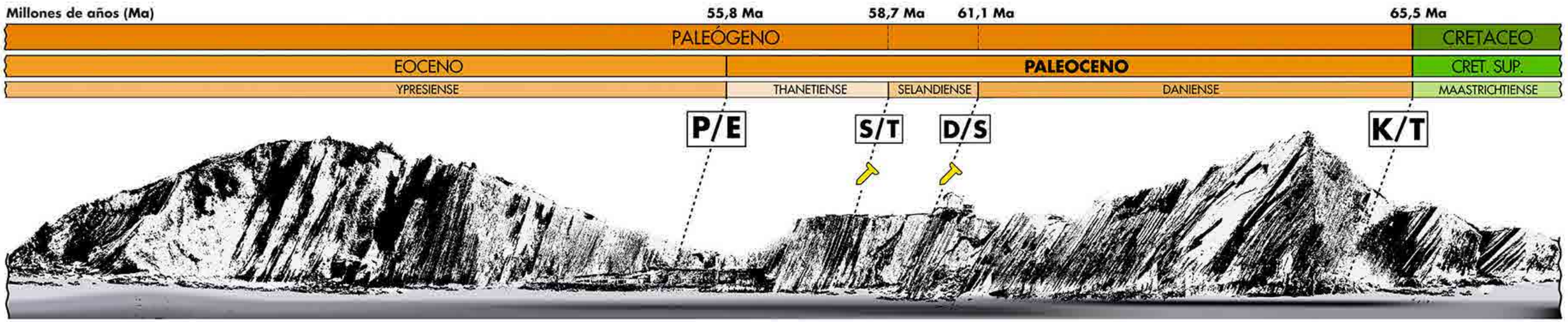
A6 HOW IS GEOLOGICAL TIME DIVIDED?



ROTATE SCREEN

In Zumaia we can see **4 boundaries of geological history** and two of them are global boundary stratotypes. Go up to the panel at the entrance and see if you can find the golden spikes in the rocks.

A7

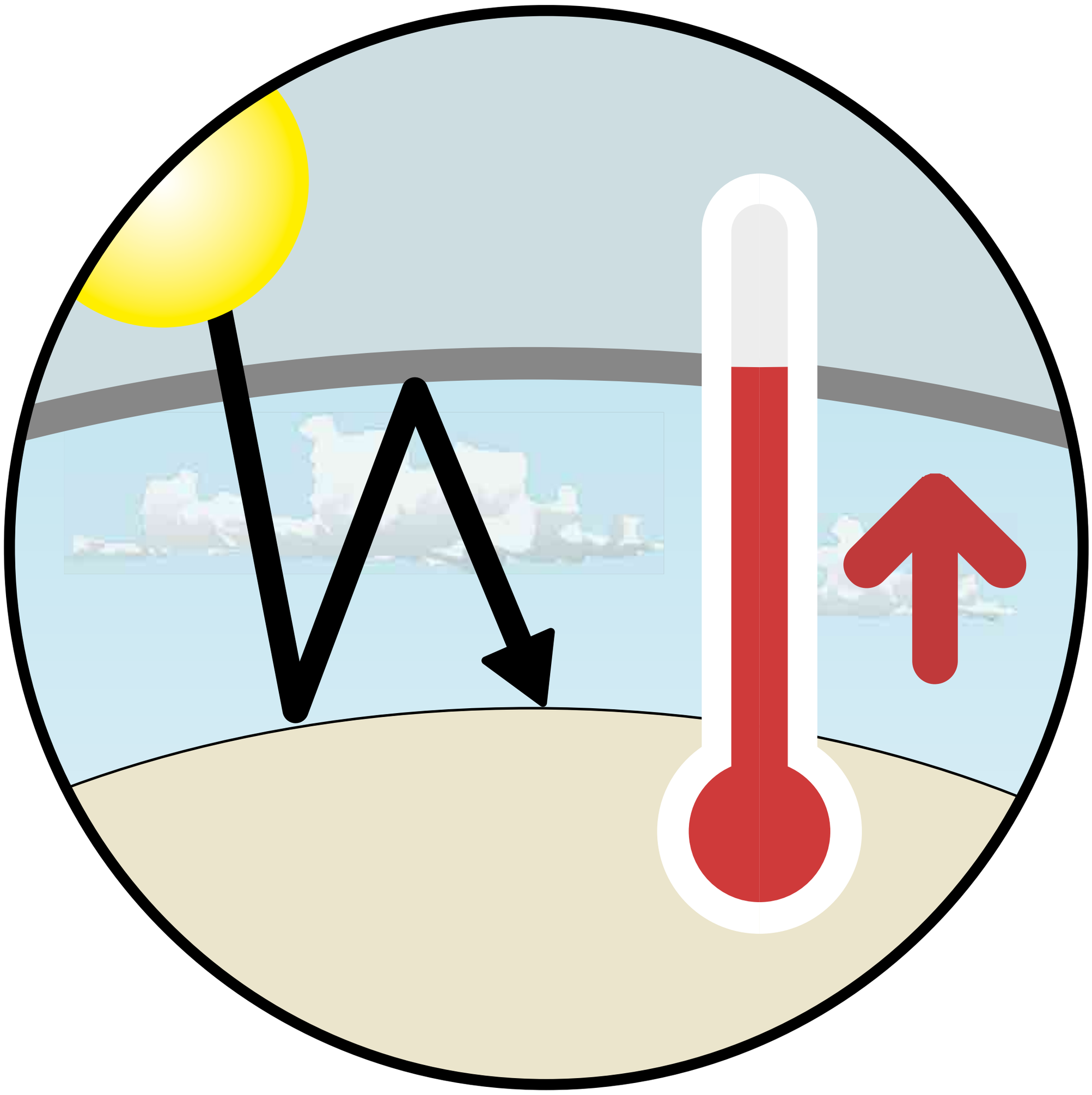
CLIMATE – COULD WE LEARN FROM THE PAST?

TALAIA GEOROUTE

A7 CLIMATE – COULD WE LEARN FROM THE PAST?

A7

56 million years ago the Earth suffered one of the greatest warming events in its history and this was also due to the greenhouse effect. In geology it is known as the **Paleocene-Eocene Thermal Maximum (PETM)** and it can be seen in the red clays of Itzurun.

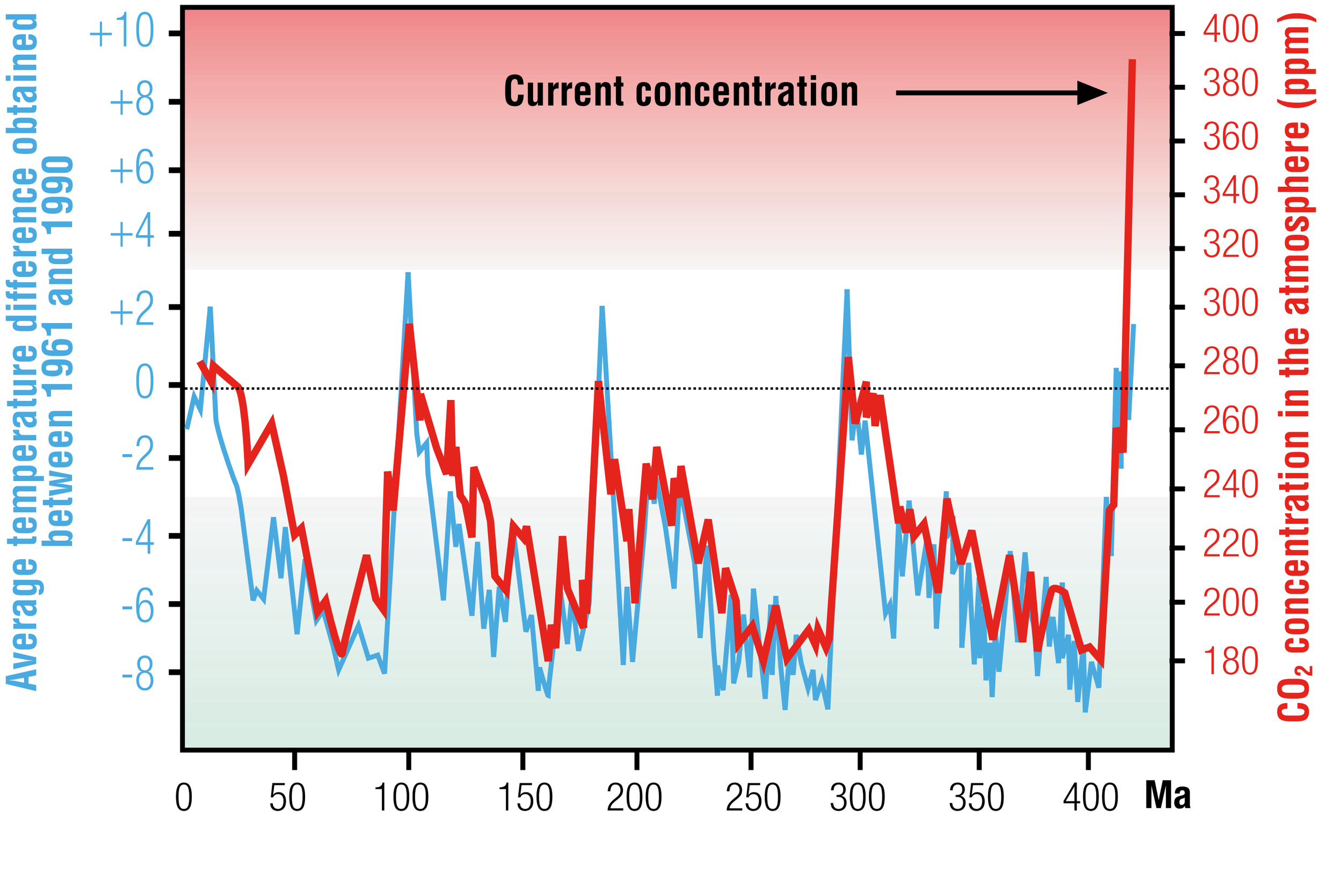


What happened?

1. A significant increase in carbon (CH_4) which produced a powerful greenhouse effect with temperature rises of more than 5°C.

2. Acidification of the oceans.

3. Important changes in the fauna, which had to adapt to the new climatic conditions.



Could it happen again?

The concentration of CO_2 has undergone a very notable increase in the last 100 years, rising to over 400 ppm.

This increase is related to the **burning of fossil fuels**.

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A7 CLIMATE – COULD WE LEARN FROM THE PAST?

If we carry on with the **“business as usual”** model, by the year 2100 the increase in greenhouse gases will be similar to what happened 56 Ma ago. Large amounts of “frozen” methane will be destabilised in polar regions and warming would be beyond our control.

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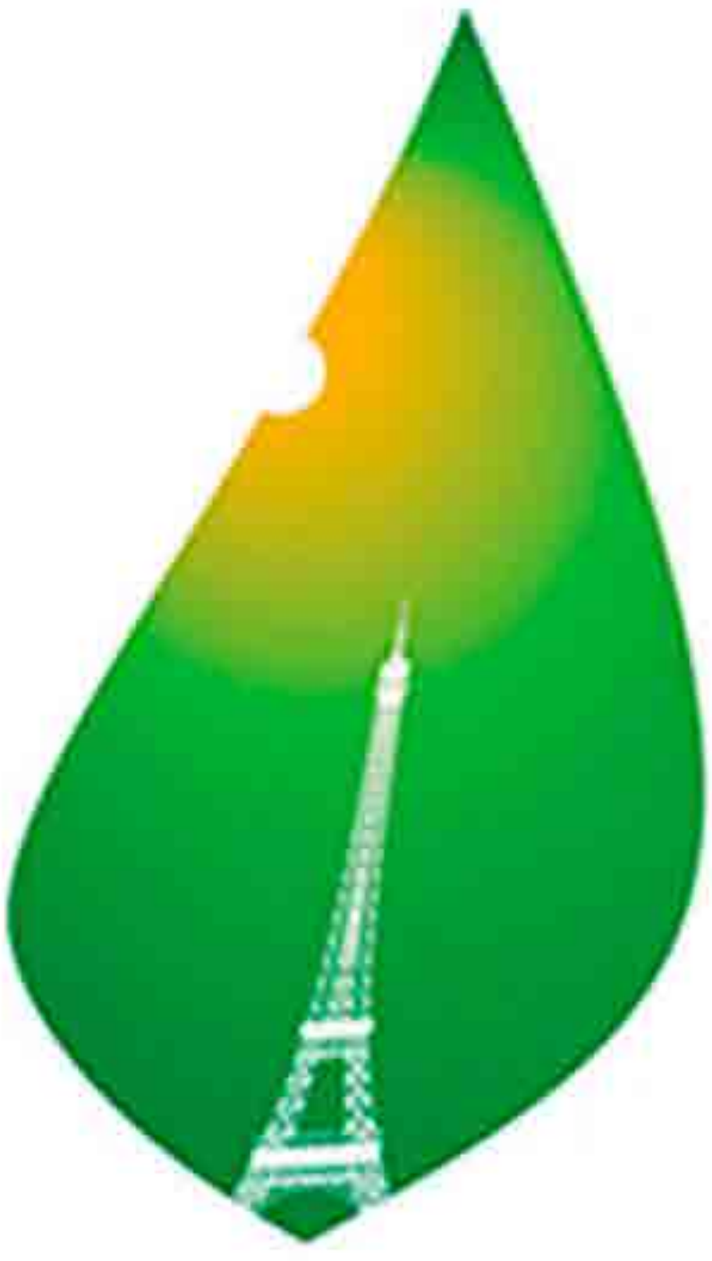
A7 CLIMATE – COULD WE LEARN FROM THE PAST?

One of the most visible effects of warming will be the **rise in sea level**. Millions of people live on small islands and in cities that will be flooded. Some of our beaches will disappear.



PARIS2015
Conferencia de la ONU
sobre el Cambio Climático
COP21·CMP11

The Paris agreement (2015), signed by 195 nations, recommends **not increasing the temperature by more than 1.5°C** during this century.

To achieve this, we must change our consumption and travel habits, change the energy policy and invest in research and education.

TALAIA GEOROUTE

MORE INFORMATION

BUY COMPLETE GUIDE

SEE OTHER EOROUTES

PROGRAMME OF GUIDED EXCURSIONS

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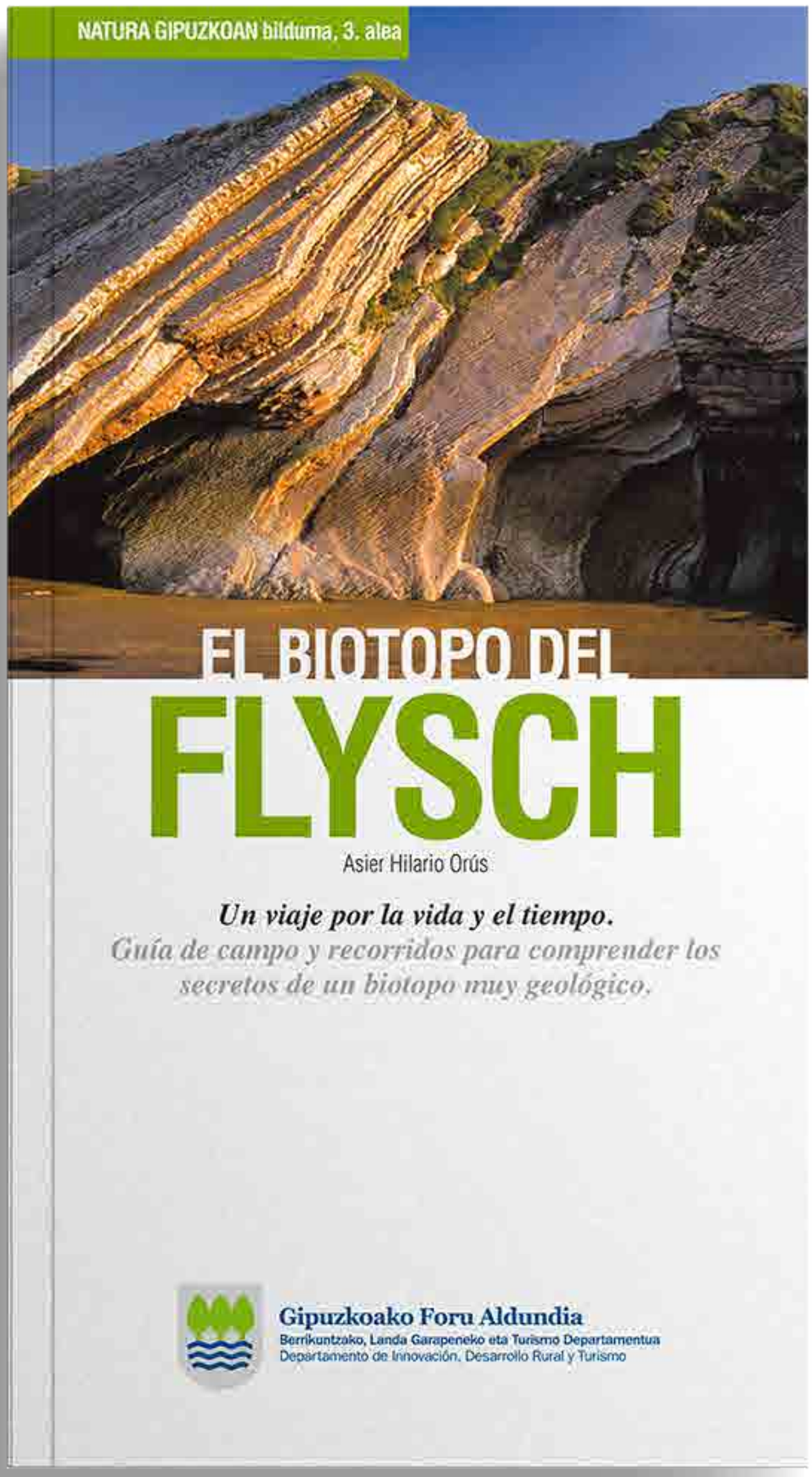

BUY COMPLETE GUIDE

For more complete information about the flysch we have the guide ‘The Flysch Biotope’ which is on sale at the geopark’s tourist offices.

Geoparkea

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Gipuzkoako Foru Aldundia

Diputación Foral de Gipuzkoa

ETORKIZUNA ORAIN

Es futuro

BABESTUTAKO BIOTOPOA
BIOTOPO PROTEGIDO

DEBA ETA ZUMAIA
ITSASERTZEKO BABESTUTAKO BIOTOPOA

EUSKO JAURLARITZA

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