

ENVIRONMENTAL ATLAS OF ABU DHABI EMIRATE

Lesson Plan: Geological Time



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Lesson Plan Content:

This lesson plan and slide presentation is to be used in conjunction with:

- 1 x geological time teacher briefing
- 1 x geological time teacher fact sheet
- 1 x geological time class work sheet

Lesson Overview:

Students will gain an understanding of geological time and the periods of time from 4.6bn years ago to today.

Estimated Time Requirement:

One 60 minute session.

Learning Objectives:

Students will be able to:

- > get an understanding of each of the main periods of geological time
- > understand the characteristics of each period
- > understand the evolution of life on the planet

Skills:

This lesson plan can aid students to demonstrate:

- > Classifying skills

- > Communicating skills
- > Observing skills

Preparation prior to the lesson:

Before commencing the lesson, download and read through the teacher briefing, fact sheet, work sheet and this presentation so you are fully conversant with the content and key terms. Also, ensure that the work sheet activity is possible to undertake in your classroom environment.

Lesson Sequence:

Here is a sequence of the lesson with suggested timings:

Preparation (5mins)

Inform the students that today they are all going to learn about time from 4.6bn years ago to present day and take part in some fun activity. Elicit from the students some of the things they already know about time periods. Many children are aware of the dinosaurs during the Jurassic period from movies.

Presentation (25mins)

Using a projector to present to the class, progressively run through the slides to impart all the key points about geological time.

Activity (25mins)

Having completed the presentation, undertake the participation and discussion exercise contained in the work sheet. This activity enables students to consider and research the key milestones of geological time.

Assessment (5mins)

Ask students to write and/or illustrate what they did during this lesson and what they learned from their participation in the activity.

Close of Lesson

Closure: Ensure the class has completed the practical session and sequenced the geological milestones correctly against the teacher copy.

Extending the Lesson: Encourage students to do some research at home on geological periods that may interest them.

Source of Lesson:

Abu Dhabi Global Environmental Data Initiative.

All supporting material can be downloaded freely at: www.environmentalatlas.ae

Classroom Presentation: Geological Time

What is geological time?

To really appreciate the geographic inheritance of Abu Dhabi, it is important to have a good understanding of geological time.

This requires thinking in terms of tens and hundreds of millions of years, which, in comparison to our own momentary life-spans, can be quite difficult to get to grips with.



What is geological time?

The geological timescale is divided into 13 distinct periods.

Within which the physical geography of Abu Dhabi developed and continues to evolve.

Each of the geological periods relate to events which have happened in the Earth's history.

Neogene	0 - 23.03 ma
Paleogene	23.03 - 65.5 ma
Cretaceous	65.5 - 145.5 ma
Jurassic	145.5 - 199.6 ma
Triassic	199.6 - 251 ma
Permian	251 - 299 ma
Carboniferous	299 - 359.2 ma
Devonian	359.2 - 416 ma
Silurian	416 - 443.7 ma
Ordovician	443.7 - 488.3 ma
Cambrian	488.3 - 542 ma
Proterozoic	542 - 1600 ma
Archean	1600 - 4600 ma

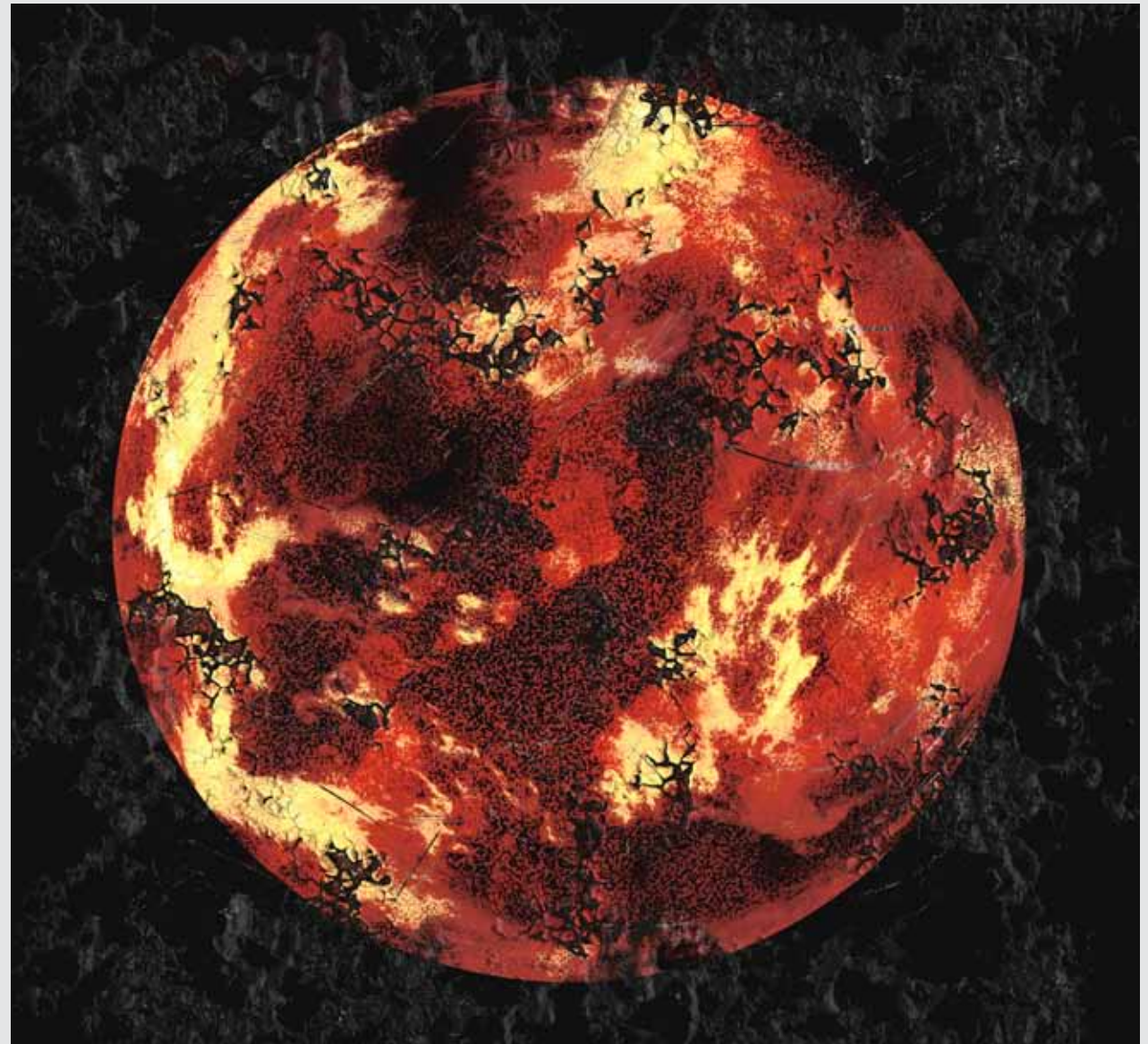
ma - million years

Archean 1600 - 4600 ma

The Archean is one of the four important eons of Earth history.

The atmosphere was very different from what we breathe today; at that time, it was probably an atmosphere of gases that would be poisonous to most life on our planet today.

Also during this time, the Earth's crust cooled enough that rocks and continental plates began to form.



Proterozoic 542 - 1600 ma

The period of Earth's history that began 2.5 billion years ago and ended 543 million years ago is known as the Proterozoic.

Many exciting events in the history of the Earth and of life occurred during this period - stable continents first appeared and began to grow together, a long process taking about a billion years.



Cambrian 488.3 - 542 ma

The Cambrian Period marks an important point in the history of life on Earth.

It is the time when most of the major groups of animals first appear in the fossil record.

This event is sometimes called the "Cambrian Explosion", because of the relatively short time over which this diversity of forms appears.



Ordovician

443.7 - 488.3 ma

From the Early to Middle Ordovician, the Earth experienced a milder climate in which the weather was warm and the atmosphere contained a lot of moisture.

However, when Gondwana finally settled on the South Pole during the Late Ordovician, big glaciers formed causing shallow seas to drain and sea levels to drop.

The Ordovician is best known for the presence of its diverse marine invertebrates.

A typical marine community also consisted of red and green algae, primitive fish and corals.



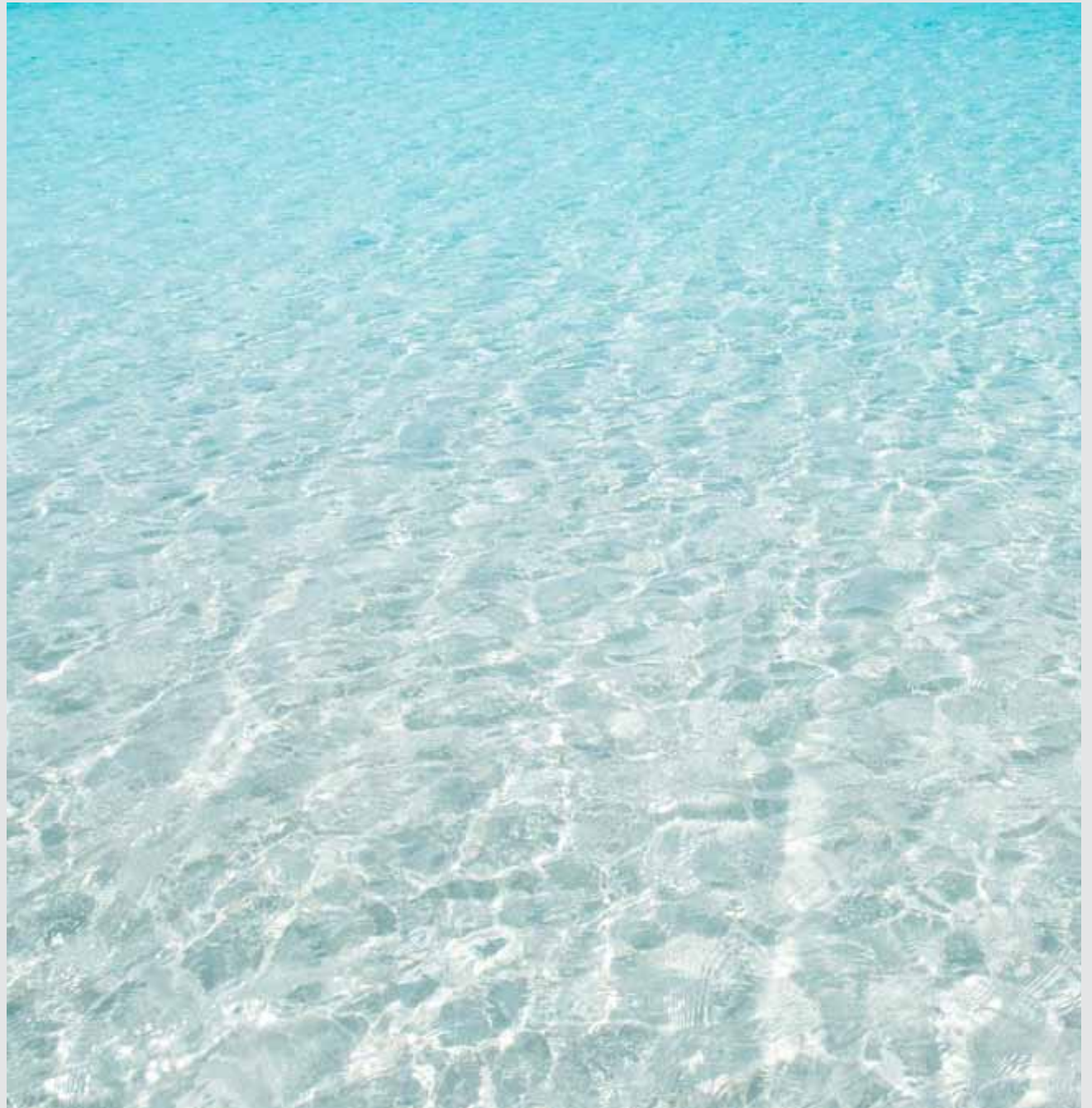
Silurian

416 - 443.7 ma

The Silurian period enjoyed quite stable and warm temperatures, unlike the extreme glaciations of the Ordovician before it, and the extreme heat of the ensuing Devonian.

During this period, the Earth entered a long warm greenhouse phase and warm shallow seas covered much of the equatorial land masses.

Early in the Silurian, glaciers retreated back into the South Pole until they almost disappeared in the middle of Silurian



Devonian

359.2 - 416 ma

The Devonian period was quite a warm period and probably lacked any glaciers.

Early Devonian plants did not have roots or leaves like the plants most common today and did not grow much more than a few centimeters tall.

The first seed-bearing plants spread across dry land.



Carboniferous 299 - 359.2 ma

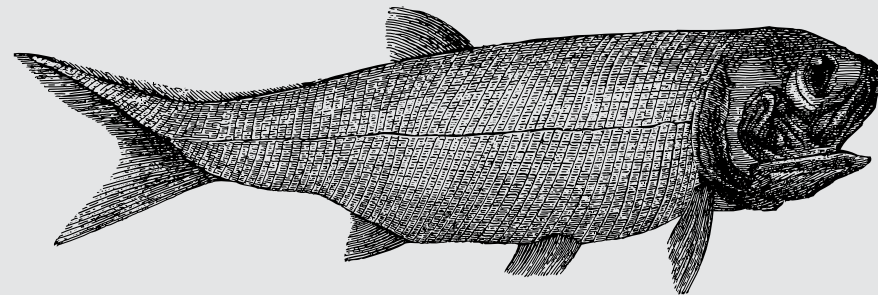
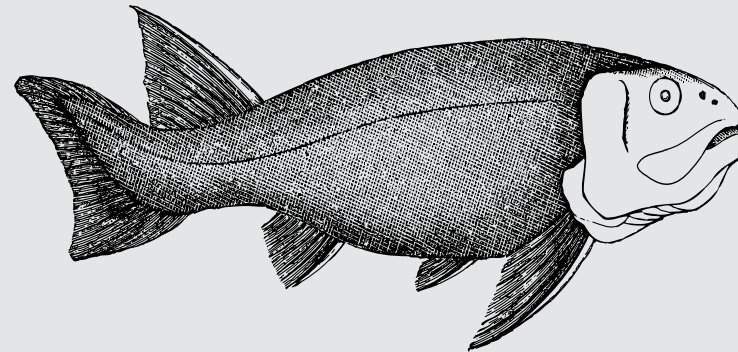
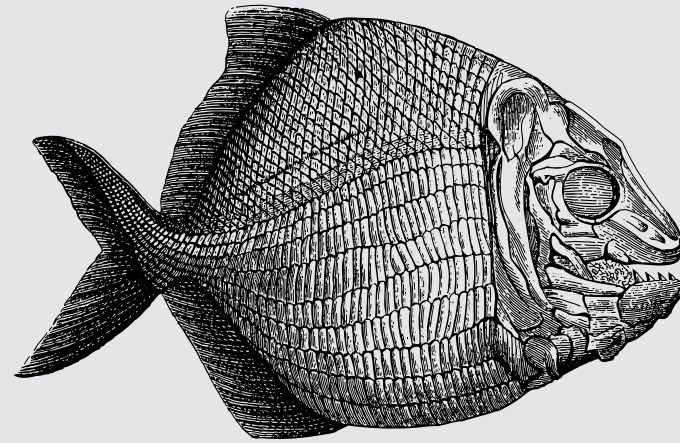
The early part of the Carboniferous period was mostly warm; in the later part of the period, the climate cooled.

Glaciations in the southern Pangaea caused by southward movement, continued into the Permian period.

The cooling and drying of the climate led to tropical rainforests to break up and then eventually be devastated by climate change.

Many fish inhabited the Carboniferous seas.

These included some fish with crushing pavement-like teeth adapted for grinding the shells of crustaceans and other marine organisms.



Permian 251 - 299 ma

The climate in the Permian period was quite mixed.

At the beginning of the Permian, the Earth was still at the grip of an Ice Age from the Carboniferous period.

The world at the time was dominated by a single supercontinent known as Pangaea.



Triassic

199.6 - 251 ma

The Triassic climate was generally hot and dry.

There is no evidence of glaciation at or near either pole; in fact, the polar regions were apparently moist and temperate, a climate suitable for reptile-like creatures.

Pangaea's large size limited the stabilising effect of the global ocean; its continental climate was highly seasonal, with very hot summers and cold winters.



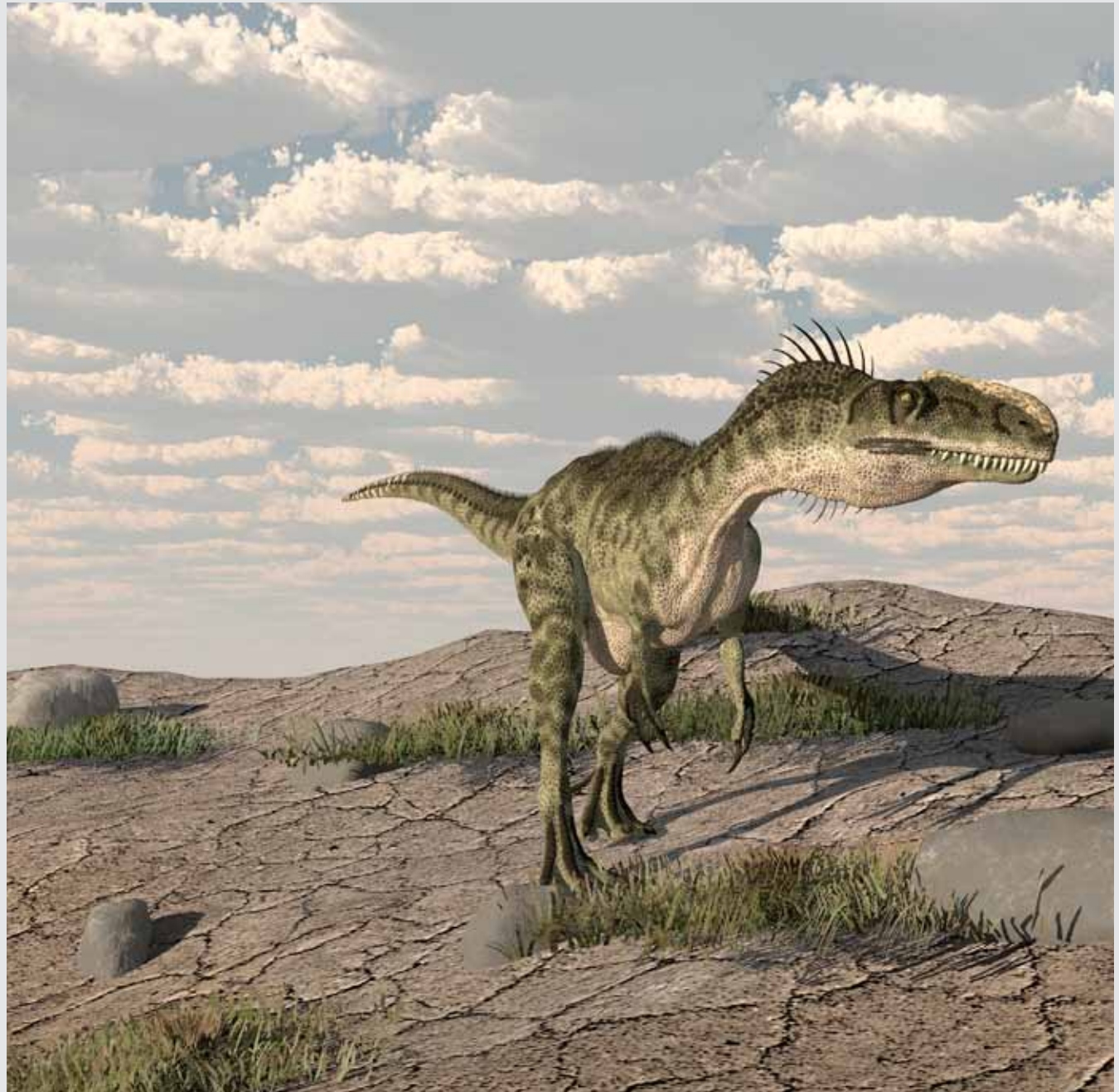
Jurassic

145.5 - 199.6 ma

By the beginning of the Jurassic period, the supercontinent Pangaea had split into two landmasses, Laurasia to the north and Gondwana to the south.

This created more coastlines and caused a change in global climate from hot and dry to warm and humid, and many of the arid deserts of the Triassic were replaced by lush rainforests.

The dinosaurs continued to dominate the land, and reached their peak in this period as they diversified into a wide variety of groups.



Cretaceous

65.5 - 145.5 ma

The Cretaceous was a period with a relatively warm climate and a high worldwide sea level.

The oceans and seas were populated with now extinct marine reptiles, ammonites and molluscs; and the land by dinosaurs.

At the same time, new groups of mammals and birds as well as flowering plants appeared.



Paleogene

23.03 - 65.5 ma

The global climate during the Paleogene changed from the hot and humid conditions of the late Mesozoic era and began a cooling and drying trend which

Although having been periodically disrupted by warm periods such as the one that persists today.

The continents during the Paleogene continued to drift closer to their current positions.



Neogene

0 - 23.03ma

The continents in the Neogene period were very close to their current positions.

Sea levels fell, exposing land bridges between Africa and Eurasia and between Eurasia and North America.

The global climate became seasonal and continued its overall drying and cooling trend which began in the beginning of the Paleogene period.



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