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Materials to display the components and processes of the Earth

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C1.- TRAINING COURSE

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Multimedia resources

- **The aim** - to increase the **quality of learning materials** and foster the **level of understanding of the concepts** presented in the manual.
- These will be offered as open educational resources (**OER**) and are build using other objects under the Creative Commons copyright licenses.
- Tools:

1. Genially: a tool for creating interactive objects
2. Virtual Writing tutor: for interactive dictionary of terms
3. Educaplay: for creating interactive quizzes

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Design process

- For each resource, a team has contributed with specific content according with the manual, namely with scientific text related to the presented concepts, relevant pictures and movies, audio files, quizzes.

The resources are designed with:

- a friendly user and intuitive interface
- clear instruction about the content and navigation
- scenarios that allows multiple use, with different user experience
- challenges and levels to increase user immersion
- scientific expertise to guarantee the knowledge accuracy
- accessible content

The design process was done in different stages:

1. Decision on the tools to be used
2. The scenario for each multimedia resource: writing in details what will happen when exploring the resources
3. The script (instruction, the objectives/tasks, questions, other tasks)
4. Collecting necessary resources (images, video, drawings)
5. Design
6. Test
7. Adapt (2nd version)

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Structure

1. Solar System – Birth of the Solar System and Planets
2. What's inside Earth? – Layers, Plate tectonics, Effects
3. Building blocks of Earth – The rock cycle, Earth Deformations
4. Geology around us – Atmosphere, Hydrosphere, Lithosphere, Biosphere, Weathering, Erosion
5. Life evolution – Important moments, Extinctions

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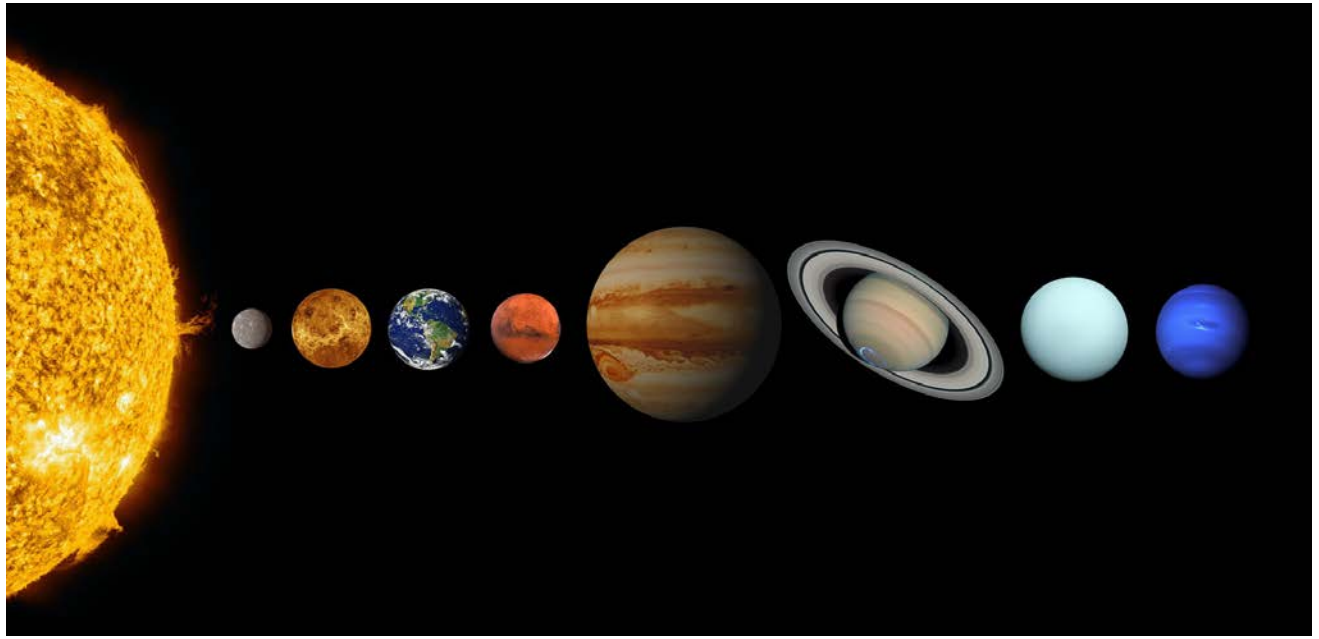
1. Solar System

- Birth of the Solar System (movie)
- https://view.genial.ly/603f6a5dbaa8980d85bd2060
- Mercury - smallest planet, closest to the sun, but not the hottest.
- Not having an atmosphere to regulate temperature,
- A day 427 degrees C and nights as cold as -179 degrees C.
- One day: 59 Earth days.
- An year: 88 Earth days
- Terrestrial planet, with a rocky surface
- Only one tectonic plate
- How many moons?



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2.1 What's inside Earth?

- Crust - Put on your walking shoes and let's explore the Crust

(solid rocks and minerals: older, thicker continental crust and

younger, denser oceanic crust) > crust | National Geographic Socie

- Mantle - Plunge in the Mantle and see how life is made

(the mantle cooled over millions of years and erupted lava

With water trapped minerals. The transfer of heat crust | National Geogra

Activity in the mantle -> plate tectonics ->

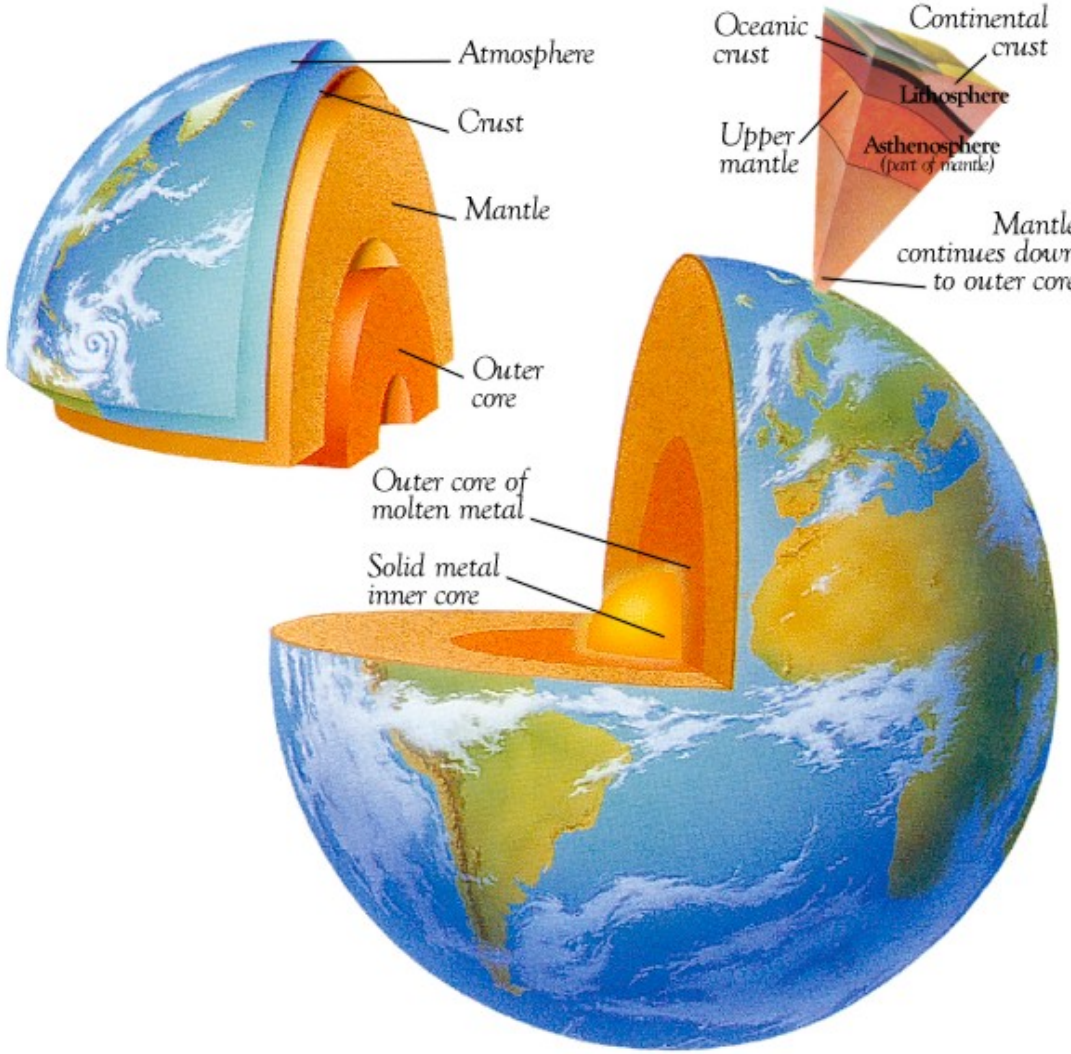
volcanoes, seafloor spreading, earthquakes, and orogeny

(mountain-building) > mantle | National Geographic Society

- Core - In 3000 km we reach the Core (iron+nikel) – 4000-6000 C

(because of decay of radioactive materials, leftover from the

Planetary formation)> core | National Geographic Society



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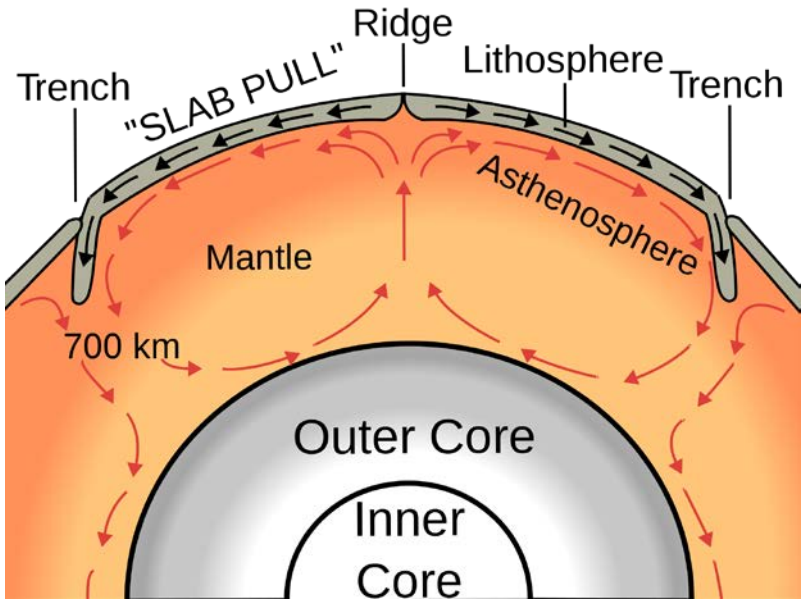
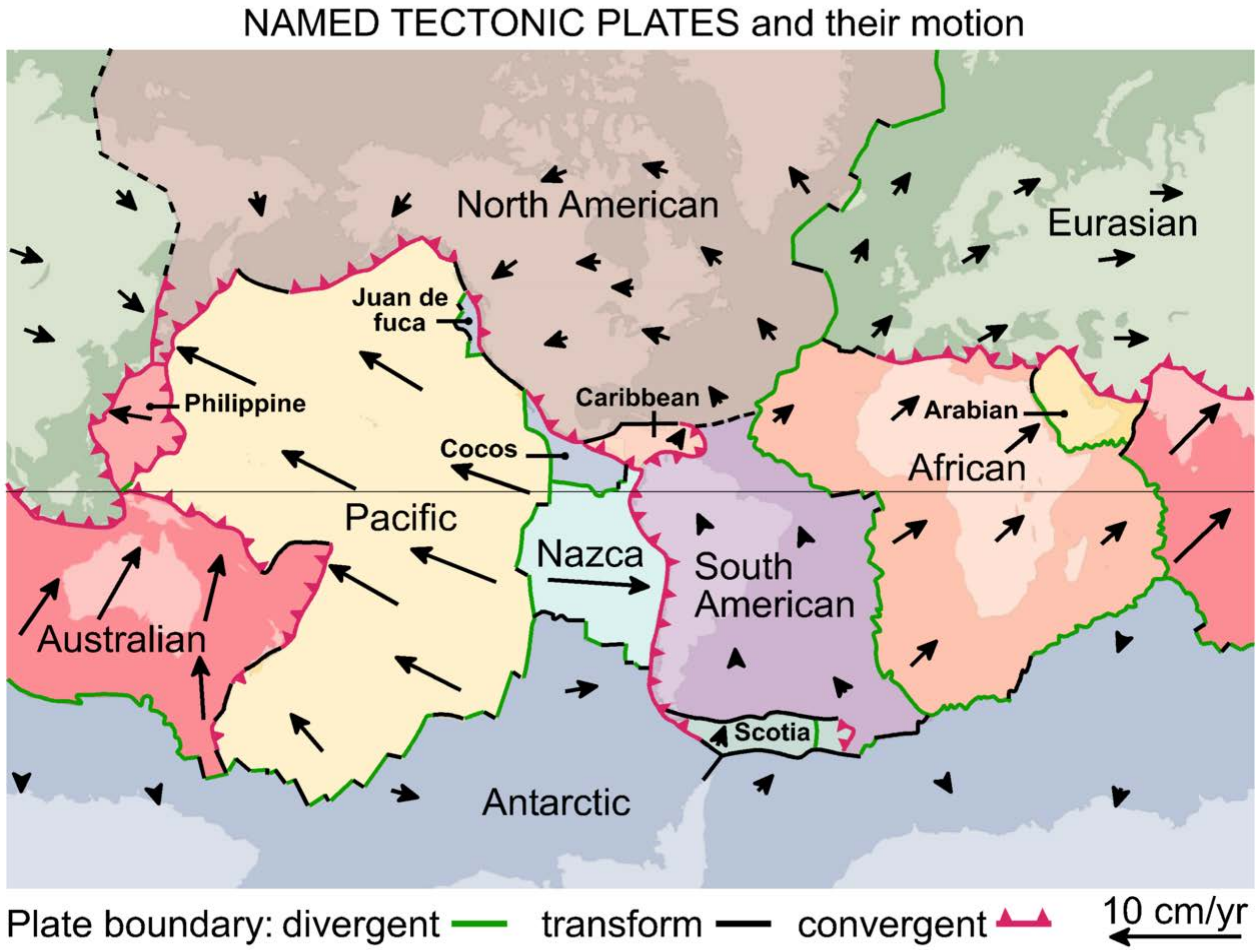
2.2 What's inside Earth?

- Plate tectonics – continental drift caused by Convection Currents – the cooler mantle near the surface is more dense so it sinks toward the iron core, driving hotter less dense mantle towards the surface – the fuel that moves the Earth's crust
- Several convection currents dived Earth crust – plates
- (371) The Whole History of the Earth and Life Part2:Initiation of Plate Tectonics - YouTube
-





(371) Plate Tectonics | Environmental Chemistry | Chemistry | FuseSchool - YouTube

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2.3 What's inside Earth?

- Plate movements effects:

Volcanoes> map of active volcanoes: https://www.volcanodiscovery.com/volcano-map.html

Earthquakes > real time seismic monitor map http://ds.iris.edu/seismon/index.phtml

https://www.quantamagazine.org/plate-tectonics-may-be-essential-for-life-20180607/#:~:text=Earth%27s%20oceans%20might%20not%20exist,forever%20to%20the%20stygian%20depths.

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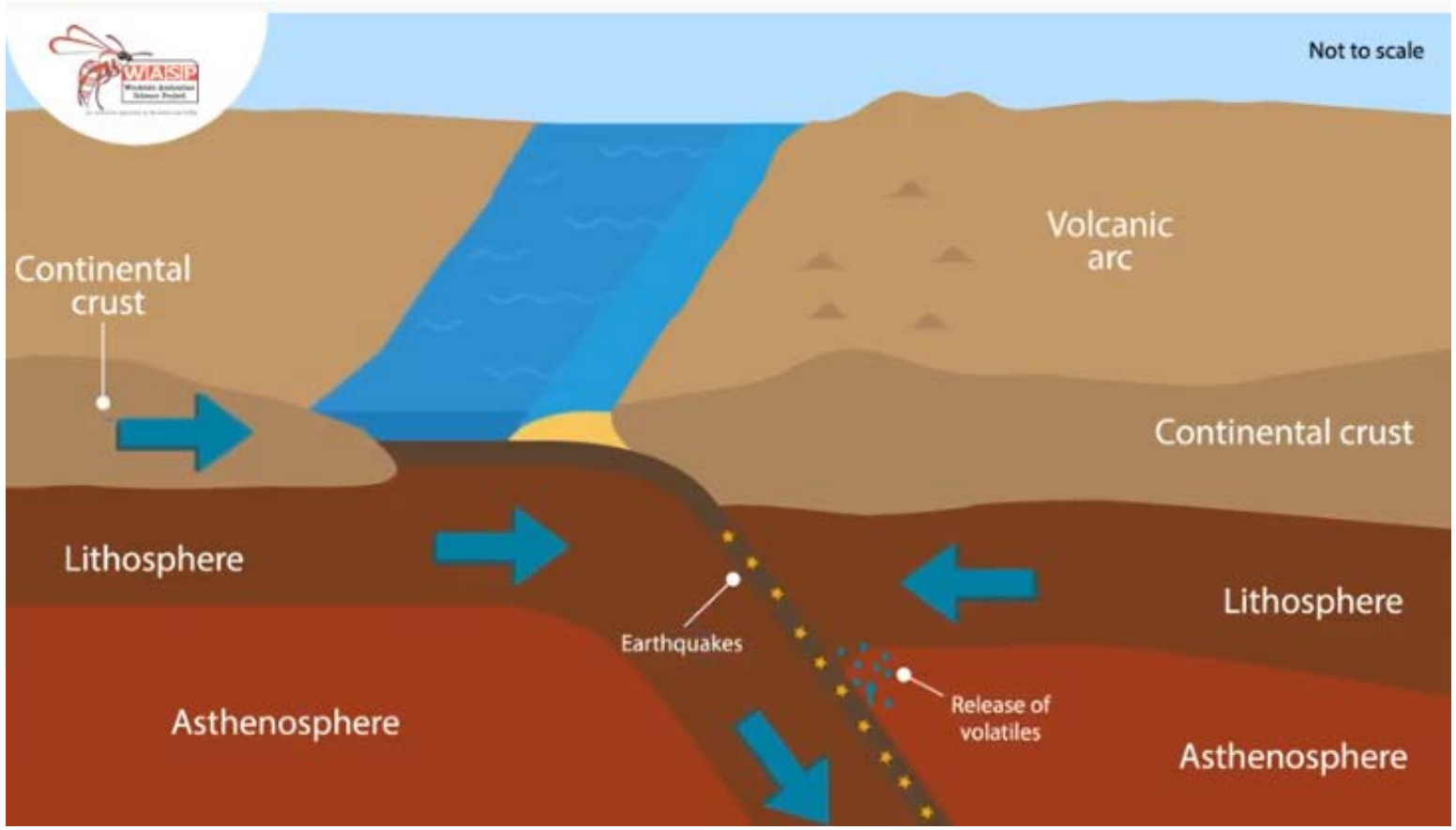
2.4 What's inside Earth?

- How can you build a mountain?

Well, you can't, but plate tectonics can: [(284) Convergence (continental crust) – YouTube]

[More to study: https://www.youtube.com/watch?v=d9bKXY0OMxc]



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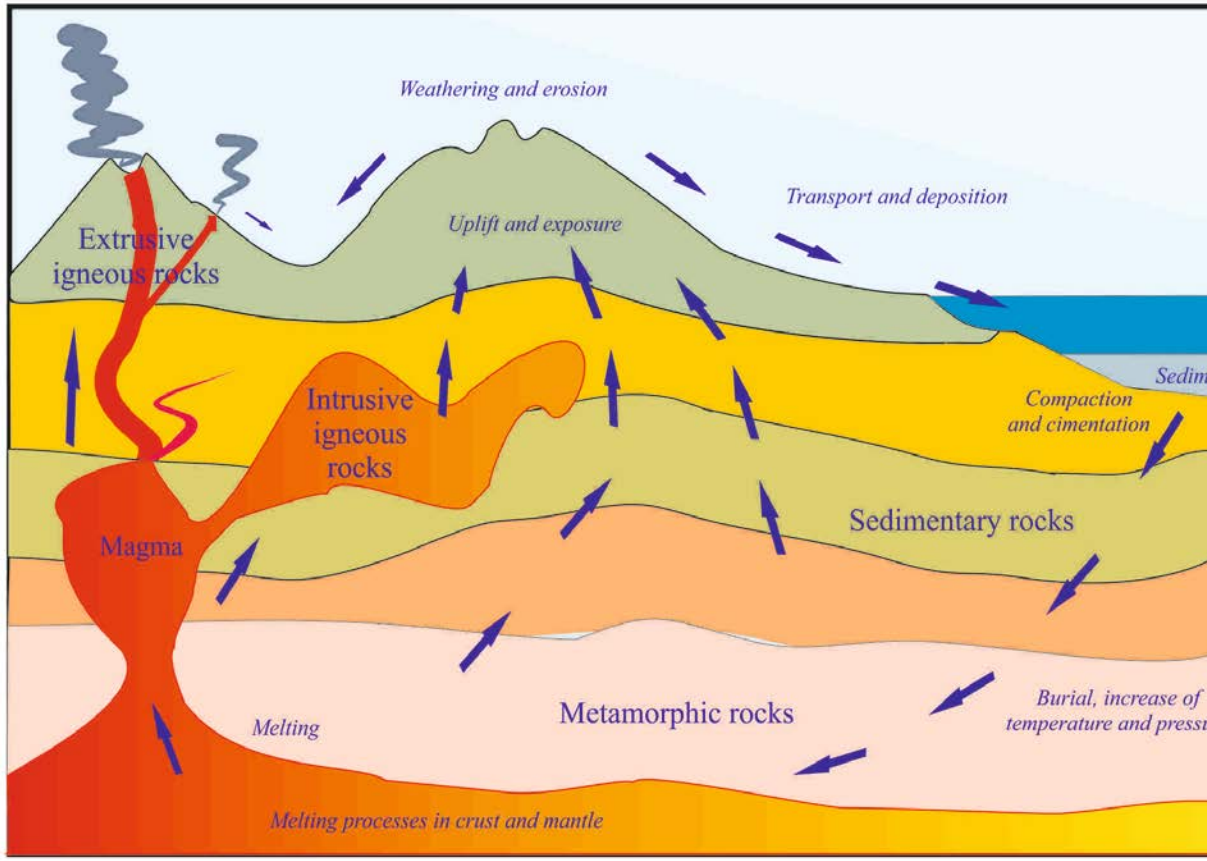
3.1 Building blocks of Earth

The rock cycle

- 4,5 billion years ago – dust and gas come together = elements – rocks + us
- The minerals that compose the rocks tell the story of our planet
- Minerals can crystalize from molten rock (magma) – igneous rocks



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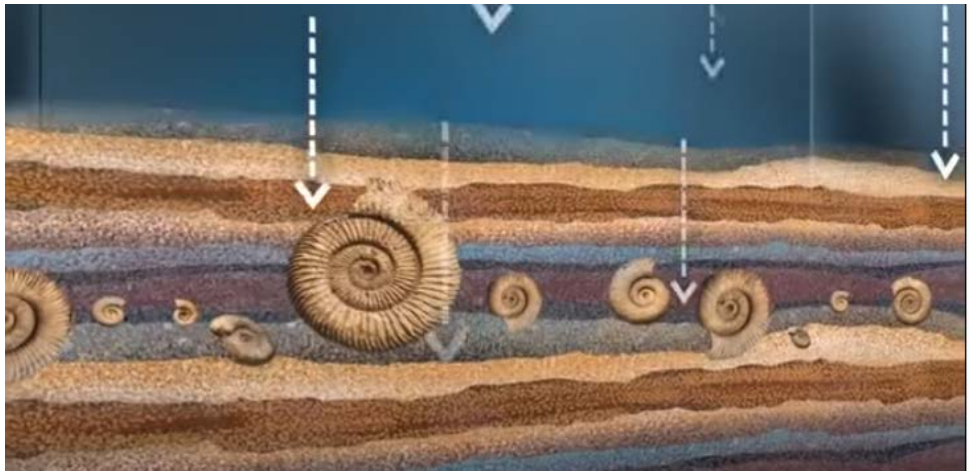
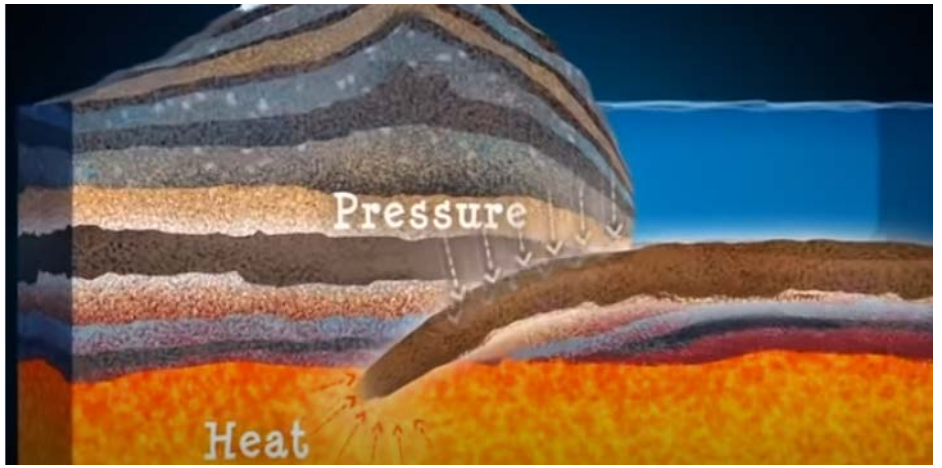
3.2 Building blocks of Earth

- 3 kind of rocks: igneous, sedimentary and metamorphic > [(372) Rocks and Minerals – YouTube]





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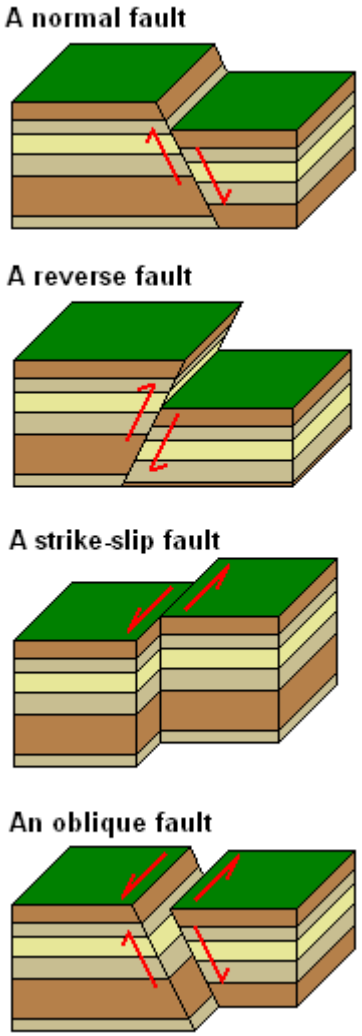
3.3 Building blocks of Earth

- Earth deformation



[(373) Classification of Faults – YouTube](#)
(external link)

[(341) Classification of Folds - YouTube](#)

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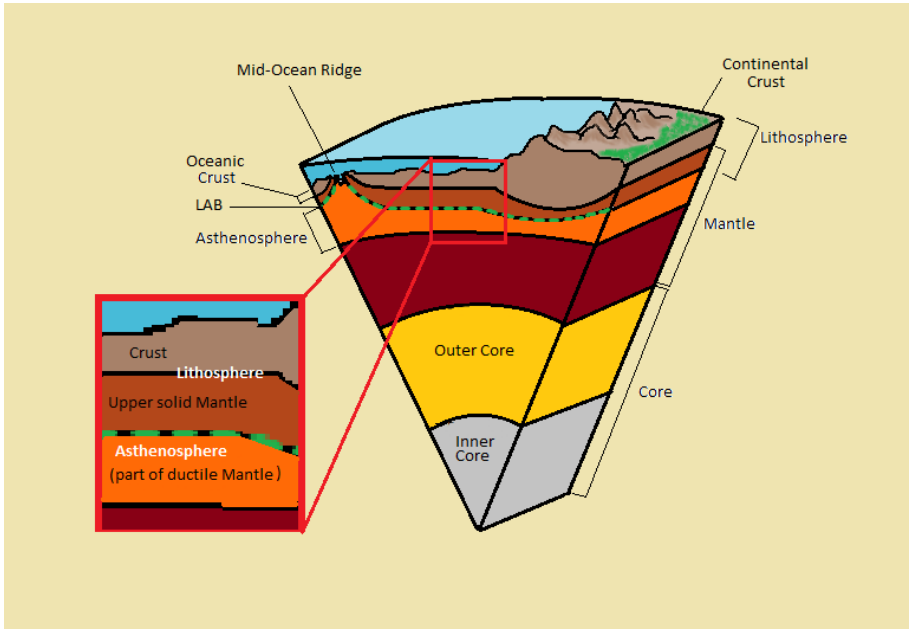
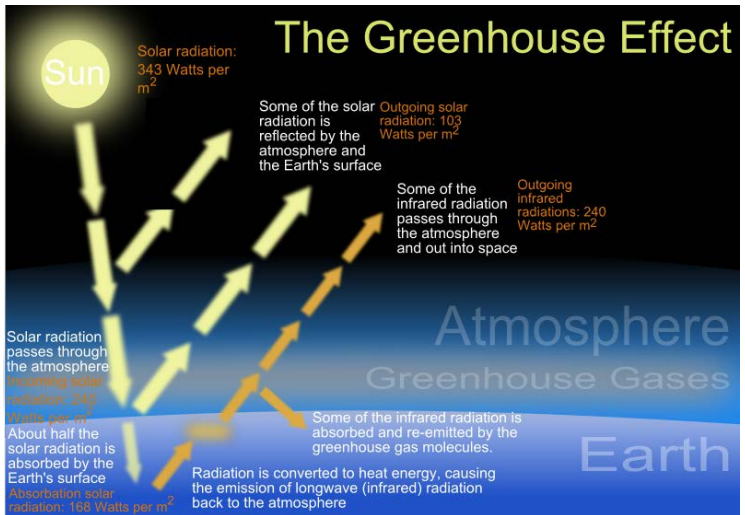
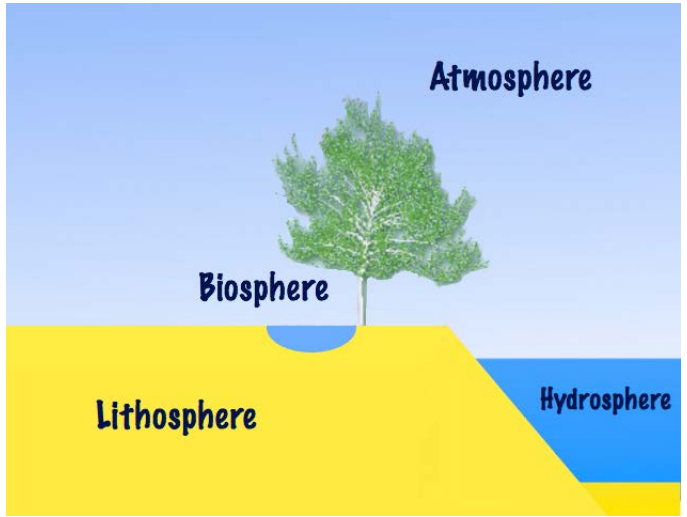
4.1 Geology around us

- Atmosphere – protects all life on Earth: gives the air that we breath, protects from the heat of the sun and also keeps the warmth near the Earth surface > (373) Earth's Atmosphere | Matter | Physics | FuseSchool – YouTube
- Hydrosphere – 71% of Earth is covered in water> (373) EARTH HYDROSPHERE – YouTube
- Lithosphere – crust and upper solid mantle –divided into tectonic plates > (373) Plate tectonics: Difference between crust and lithosphere | Cosmology & Astronomy | Khan Academy - YouTube
- Biosphere > (373) Earth's Biosphere: The Green Marble –







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4.2 Geology around us

Landforms help create our landscapes

- Weathering, erosion: How do weathering and erosion shape Earth’s surface > How do weathering and erosion shape earth's surface? 🌴Teaching Oasis🌴 - Teaching Oasis - YouTube
- Weathering – breaking rocks apart through: water, heat, rain, ice, wind
- Erosion – moving rocks from one place to another: water flowing, wind blowing
- Weathering and erosion by wind change landforms

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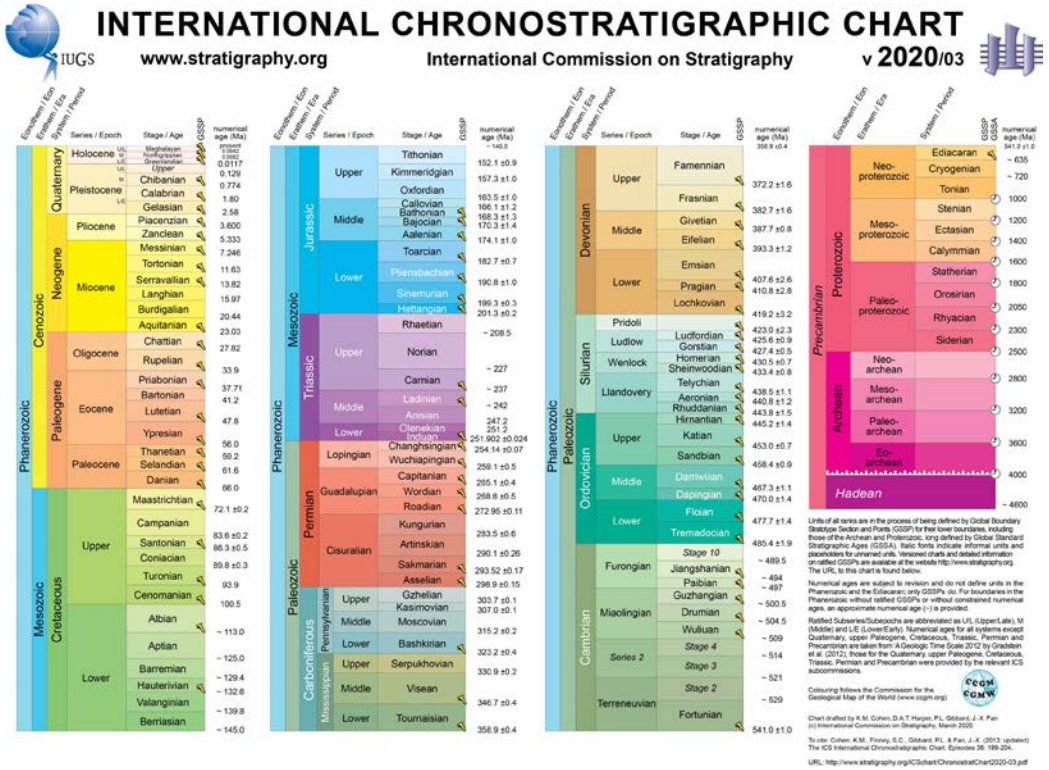
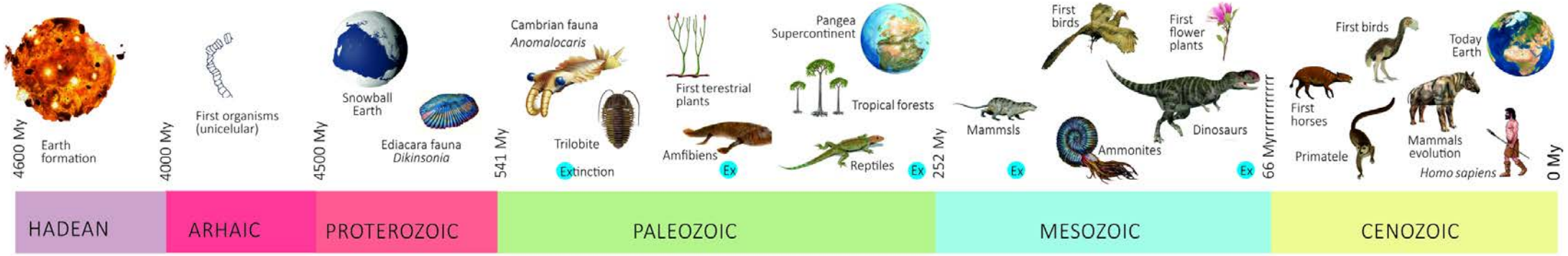
5.1 Life evolution

- Fossils – help us decipher the past > https://www.youtube.com/watch?v=ID7qhn1ipmw





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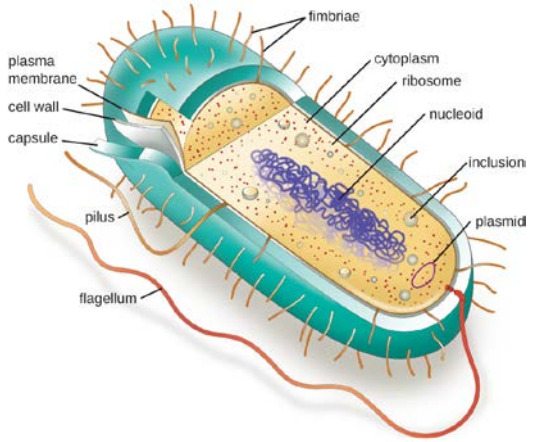
5.2 Life evolution

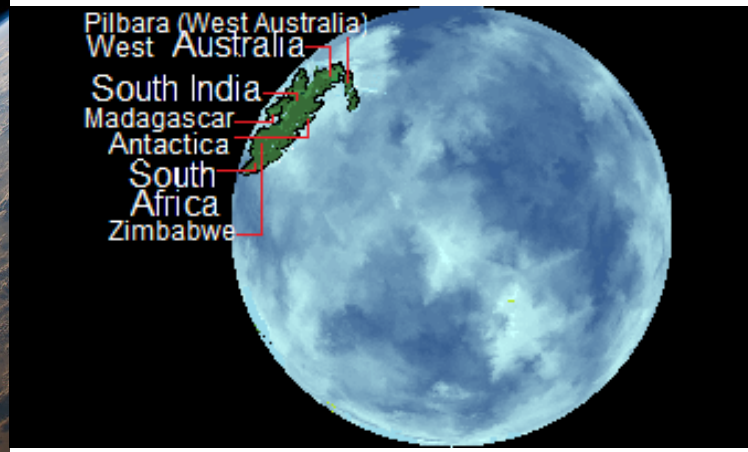
I. 4.5 billion years ago (4 500 000 000) - The birth of planet Earth> The Whole History of the Earth and Life Part1:The Origin of the Earth - YouTube

II. 4-3.5 billion years ago (4-3 500 000 000) First life forms emerged> The Whole History of the Earth and Life Part4:The Initial Stage of Life - YouTube



III. 3.4 billion years ago (3 400 000 000) The life giving Sun – some organisms started using Sun's energy

IV. Around 3 billion years ago (3 000 000 000) The awakening – plates started to move – first continent was born



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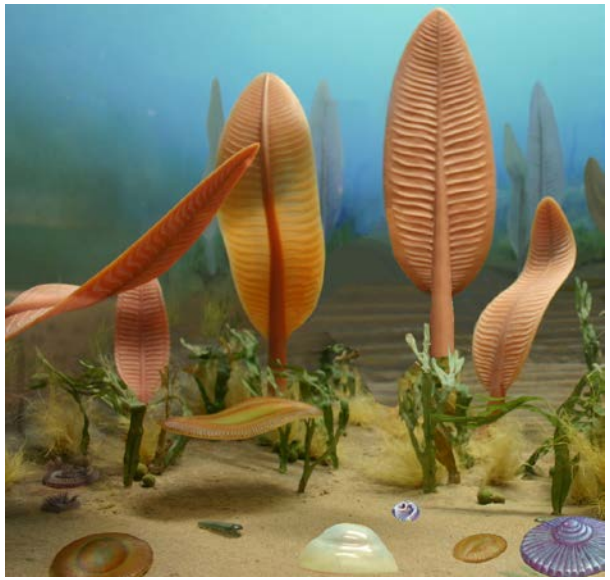
5.3 Life evolution

V. 2.4 billion years ago (2.4 000 000 000) The planet breaths - The Great Oxidation Event – bacterias were “eating” the Sun’s energy, carbon dioxide and water, they started to eliminate, as a waste, oxygen, like today’s green plants do -> Snowball Earth > https://www.youtube.com/watch?v=psH2pi4N7_M

VI. 2.1 billion years ago (2 100 000 000) From Procaryote to Eukaryote > https://www.youtube.com/watch?v=SqITfOGvfZk

VII. Around 1 billion years ago (1 000 000 000) Multicellular life + Rodinia continent

VIII. 850-635 Million years ago (850 - 635 000 000) Snowball Earth Event (extinction) – then Gondwana continent – and Ediacaran fauna> https://www.youtube.com/watch?v=sOSCrPMdQN0



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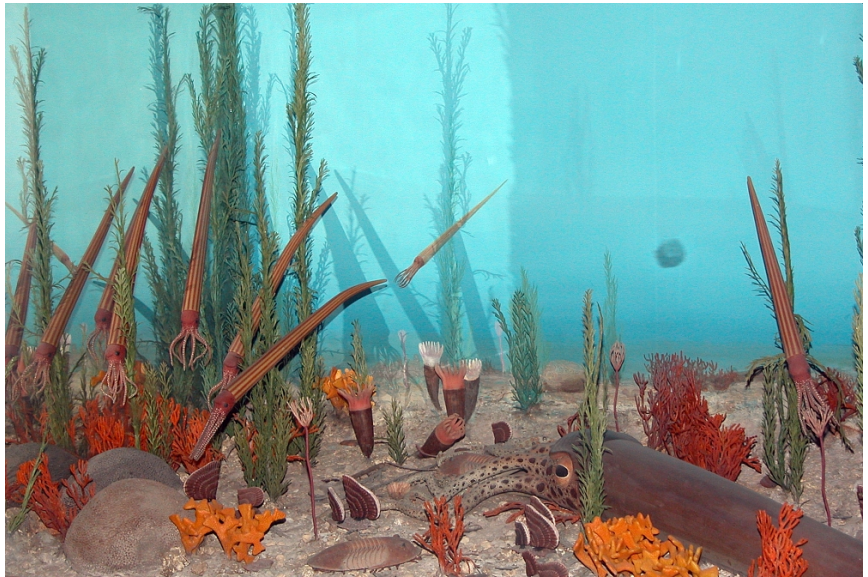
5.4 Life evolution

XIX. 535 Million year ago (535 000 000)
Cambrian Life Dangers - first vertebrates (animals with backbones), our ancestors, the fish. Also invertebrates like trilobites, crinoids, brachiopods, cephalopods - predators > https://www.youtube.com/watch?v=wqYQQTaC-V0&t=7s

X. 465 Million years ago (465 000 000)
Greening the Land
On Gondwana supercontinent, mid Ordovician plants evolved from green algae established on land+insects > https://www.youtube.com/watch?v=OyCyIOEyL20



XI. 460-430 Million years ago (460-430 000 000) Tragedy
Earth began to cool down and ice covered the planet (Ordovician-Silurian extinction)

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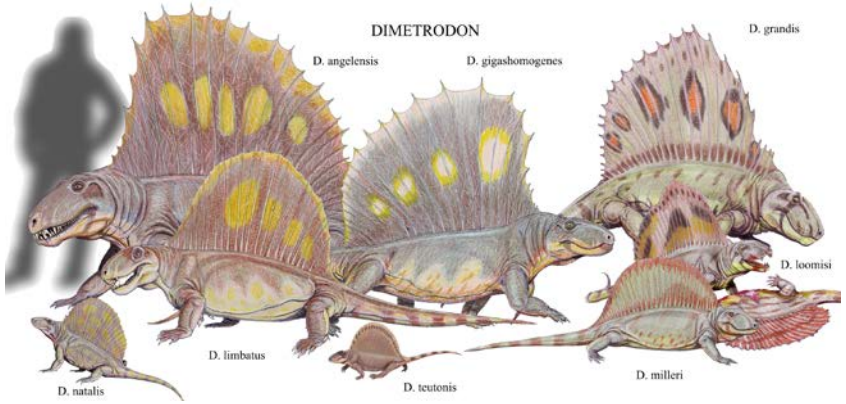
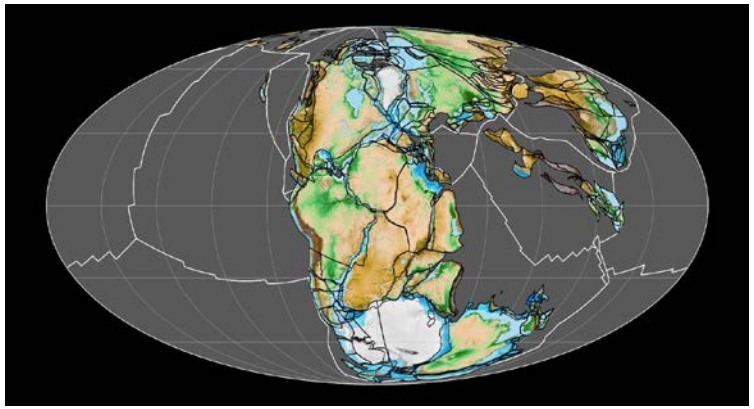
5.5 Life evolution

XII. 375 Million years ago (375 000 000) Fish grew legs and walk the land (Tiktaalik) - Devonian times, the Earth was becoming hospitable for animals and for plants which grew from 30 cm to forests of 30 m height



XIII. 320 Million years ago (320 000 000) The world of huge dragonflies and the first reptiles Oxygen levels = 1,5 x today. Reptiles become lords of the land – they are not dinosaurs

XIV. 300 Million years (300 000 000) Pangea Continent > https://www.youtube.com/watch?v=UevnAq1MTVA



XV. 250 Million years (250 000 000) The Great Dying – Permian-Triassic extinction - a hypothesis is that massive volcanic eruptions > https://www.youtube.com/watch?v=YtruRhP1oYU

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5.6 Life evolution

XVI. 220 Million years ago (220 000 000)
Dinosaurs and mammals get together
Some species survived and became dinosaurs, others reptiles and other mammals. Also Pangea was still one great continent and animals could roam. The ancient mammals evolved from a peculiar reptile with fur and whiskers, looking like a dog, the cynodont

XVII. 201 Million years ago (201 000 000) The Triassic extinction, a fresh start for Dinosaurs Era
Causes: volcanoes associated with the rifting of Pangea, has increased the global greenhouse effect and which created very warm climates and acidified the oceans or meteorites killed 76% of the marine and terrestrial species => dinosaurs dominant species of Jurassic and Cretaceous > https://www.youtube.com/watch?v=35H4mb3BUfc

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5.7 Life evolution

XVIII. 160 Million years ago (160 000 000) Birds are here
Today's birds were yesterday feathered dinosaurs: Archaeopteryx

XIX. 150 Million years ago (150 000 000) Dinosaurs had beautiful gardens
After three hundred million years since plants conquered Earth, they begin to flower.

XX. 65 Million years ago (65 000 000) End of an Era, the Death of Dinosaurs
Climate change - Chicxulub meteorite - besides the huge explosion, dust covered the sunlight and everything became cooler and darker, also it triggered volcanic activity (extinction).

XXI. 60-55 Million years ago (60-55 000 000) First primates roamed the Earth - Ida

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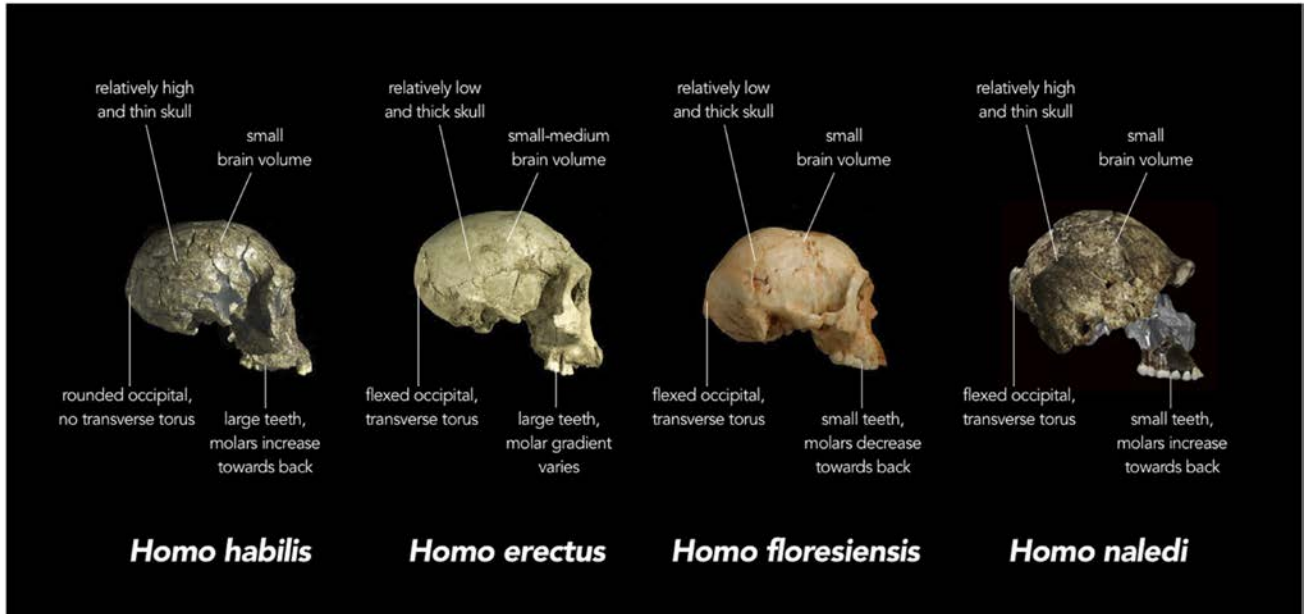
5.8 Life evolution

XXII. 13-7 Million years ago (13-7 000 000) First great-great-great-.....grand fathers and mothers
Some apes evolved into humans and others to different kinds of ape. The oldest hominid discovered is 7 million years, Sahelantropus tchadensis.

XXIII. 200 000 years ago. Us
Homo sapiens adapted and evolved according to Earth's conditions >
https://www.youtube.com/watch?v=ekRmSsB11DI



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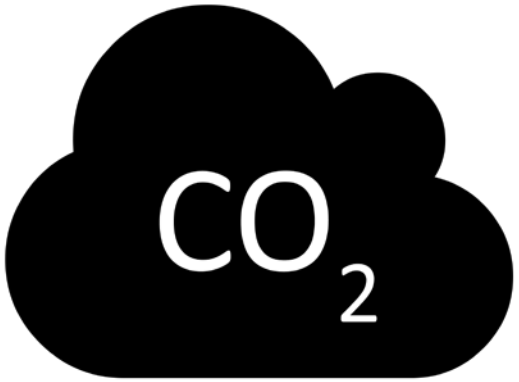
5.9 Life evolution

What may determine mass extinctions?



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Thank you very much!

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