

Global satellite map with the most important tectonic plate boundaries. Arrows indicate the relative direction of the movement.



Detail view of rifts of the East African Rift Valley east of Addis Ababa, Ethiopia. Data: Sentinel-2, 2023-08-26.

Tectonic Activities shape the Earth

The crustal movements and deformations driven by the movement of tectonic plates are powerful processes, shaping the surface of the Earth over millions of years. The Earth's lithosphere, comprising the crust and upper mantle, sees immense forces related to the movement and interaction of these plates, leading to the formation of mountains, rift valleys, earthquakes, and other geological phenomena. Examples illustrating tectonic processes are the Himalayas, where tectonic plates collide, and the East African Rift Valley, where they are pulled apart.

A continent breaking apart – Rift Valleys

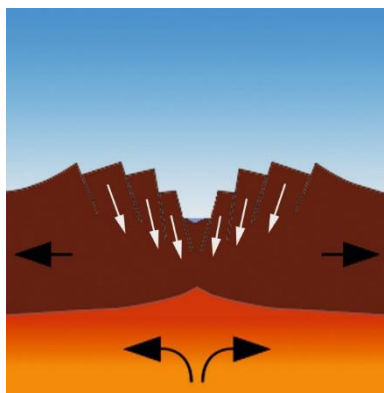
The East African Rift Valley is the result of divergent forces tearing apart the African continent. The Earth's crust is being pulled apart along a system of rifts, resulting from tectonic plates, here the Somalia Plate and the African Plate, moving away from each other. This so-called continental rifting forms the initial stages of plate boundary evolution. Magma from the mantle contributes to the thinning and eventual separation of continental landmasses. The rift valley's landscape is characterized by steep cliffs, volcanic activity, and lakes.



Exercises

- Look at the satellite image and try to identify important landuse and land cover classes (focus on bare land, sparse vegetation, dense vegetation).
- Which features in the satellite image are specific signs of a rift valley?
- Compare with the schematic view of the rifting process below. To which directions are the parts of the satellite map moving? Hint: the rifts form more or less in a right angle with respect to the plate movement.

Additional Material



Schematic cross section of the East African Rift Valley, showing the formation of the valley due to the divergence of the African and the Somali Plates.

Links and Sources

- <https://geology.com/articles/east-africa-rift.shtml> - Background information about the geology of the East African Rift Valley.
- https://www.esa.int/ESA_Multimedia/Videos/2013/08/Rift_Valley_dynamics - Video showing the dynamics of the East African Rift as observed by satellites.
- https://www.esa.int/ESA_Multimedia/Videos/2020/06/Earth_from_Space_Great_Rift_Valley_Kenya - Video showing Sentinel-2 data of the East African Rift Valley.
- https://www.esa.int/ESA_Multimedia/Images/2020/06/Great_Rift_Valley_Kenya - Sentinel-2 image of a part of the Rift Valley in Kenya.
- https://www.esa.int/ESA_Multimedia/Images/2010/10/Lake_Malawi_Great_Rift_Valley - Envisat image of Lake Malawi, located in the southern part of the Great Rift Valley.
- <https://earthobservatory.nasa.gov/images/77566/east-african-rift-valley-kenya> - astronaut photo of lakes and fault scarps along the Great Rift Valley.

