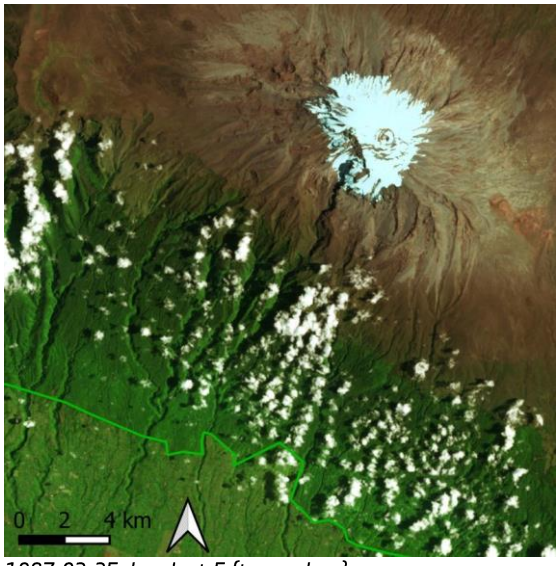
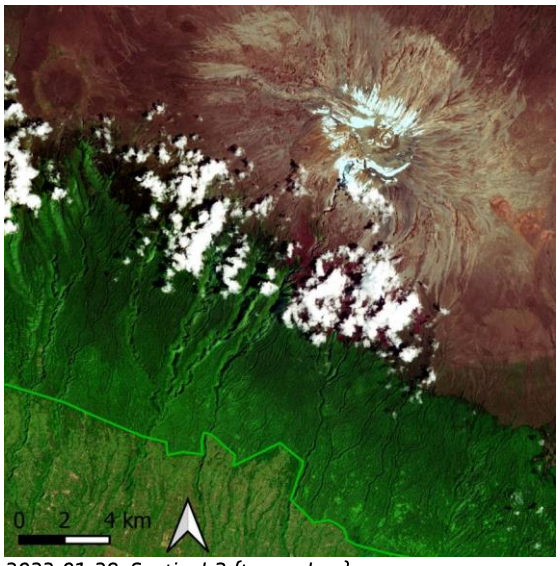
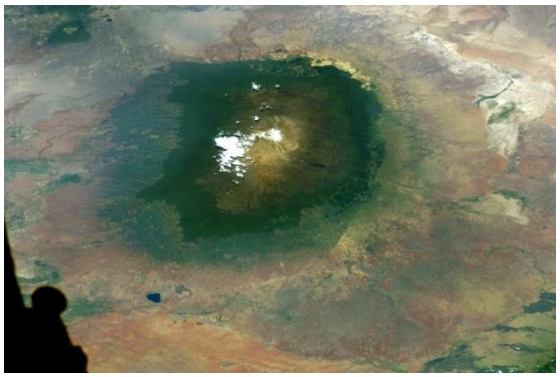
CLI06.2
Kilimanjaro – Retreating tropical glacier



1987-02-25, Landsat 5 (true colour)



2023-01-28, Sentinel-2 (true colour)


Mount Kilimanjaro viewed from the International Space Station.

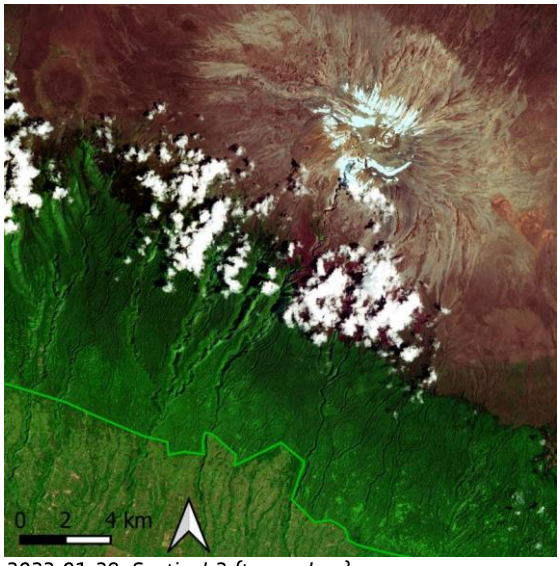
With its elevation of 5,895 metres, Mount Kilimanjaro in Tanzania is Africa's highest mountain. During the last decades the famous glacier on top of the volcano has been significantly affected by climate change. Satellite images have revealed a dramatic decrease in glacier coverage. For instance, in 1912, Kilimanjaro had an estimated 12 square kilometres of glacier; by 2011, this area had shrunk to just 1.76 square kilometres.

Climate change has played a key role in this transformation. Average temperatures in the region have risen by approximately 0.3 °C per decade, causing the glaciers to recede. This retreat not only affects the water supply but also endangers the unique alpine flora and fauna that have adapted to these cold, high-altitude conditions.

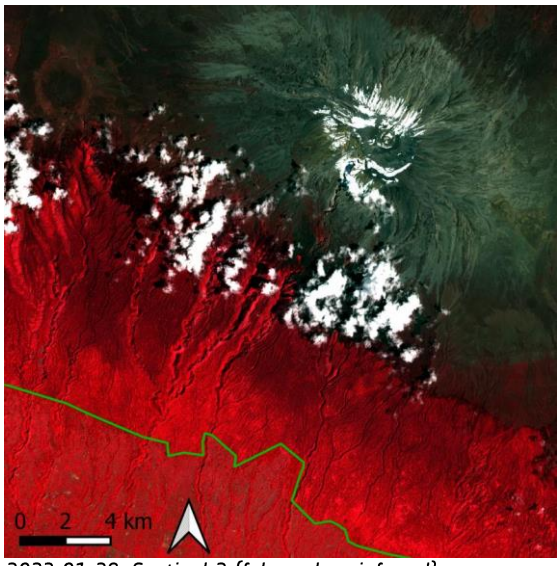
Deforestation rates on the lower slopes of the mountain are also concerning. In the last several decades, Kilimanjaro has lost nearly 40% of its forest cover due to agricultural expansion and logging. This deforestation exacerbates soil erosion, leading to sedimentation in local rivers and threatening water quality. In 1973 the Kilimanjaro National Park was established to protect the forest belt surrounding the peak area of the mountain.

Exercises

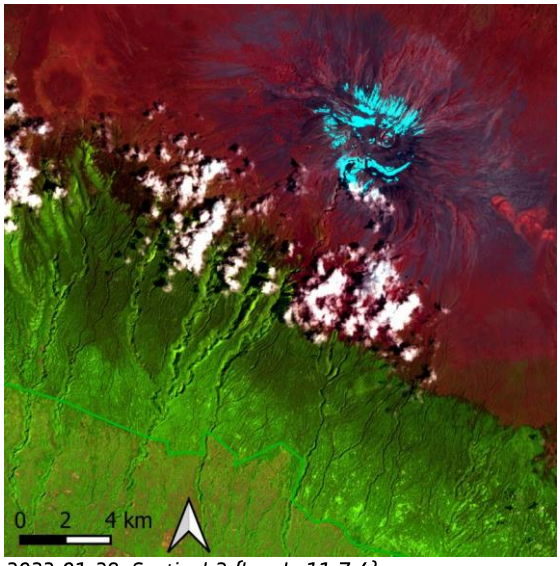
- Look at the true colour satellite image from 1987. Describe the structures you can identify in the image. Where are mountains, glaciers, water bodies, vegetated areas?
- Compare the true colour satellite images from 1987 and 2023 and describe the changes in the glacier extents.
- Look at the three different visualisations on page 2. Which differences can you see? Can you identify anything new, e.g. with respect to the vegetation on the mountain slopes? Which visualisation shows ice most clearly?
- Look at the diagram showing the development of the glacier area. When do you expect the glacier to be gone?



2023-01-28, Sentinel-2 (true colour)

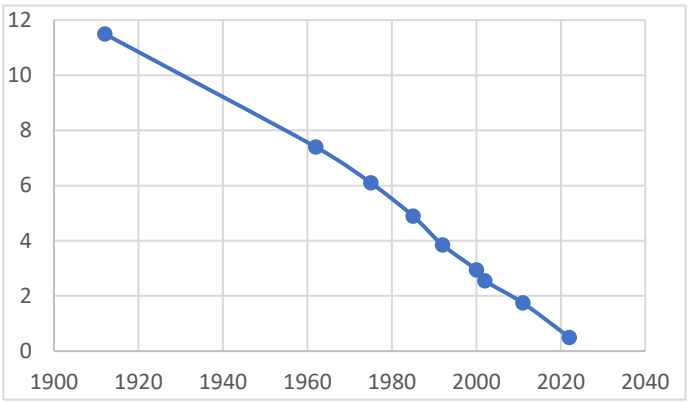


2023-01-28, Sentinel-2 (false-colour infrared)



2023-01-28, Sentinel-2 (bands 11-7-4)

Additional Material



Kilimanjaro glacier, total area in square kilometres, change since 1912.

Links and Sources

- https://www.esa.int/ESA_Multimedia/Images/2014/01/Kilimanjaro_Tanzania - ALOS image of the Kilimanjaro region
- https://www.esa.int/ESA_Multimedia/Videos/2014/01/Earth_from_Space_Kilimanjaro - Video featuring the ALOS image of the Kilimanjaro region