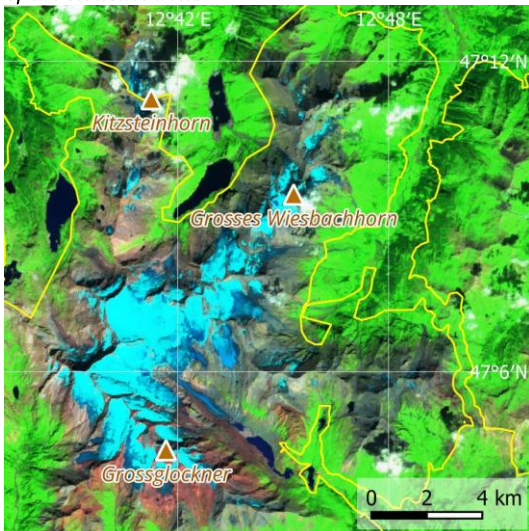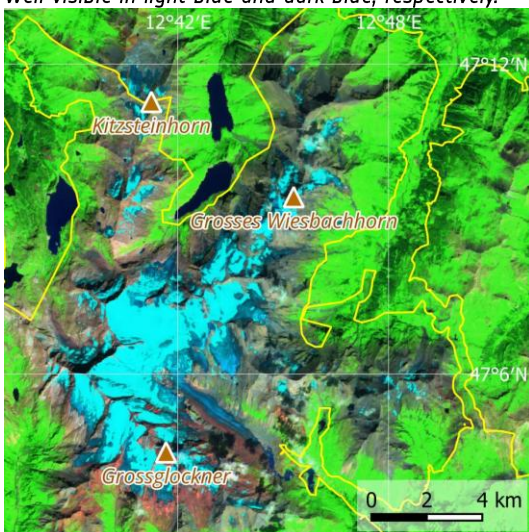ESA SCHOOL ATLAS
the view from space

1 - Central region of the National Park (2025-08-12, Sentinel-2, true colour). The high alpine regions are part of the National Park.

2 - The region in a short wave infrared (SWIR) visualisation (2025-08-12, Sentinel-2). Snow and ice are well visible in light blue and dark blue, respectively.

3 - The same area covered 10 years earlier (2015-08-13, Sentinel-2). Comparison with Fig. 2 shows the change in the Pasterze glacier north of Grossglockner.

Nature Protection in the Alps

The Hohe Tauern National Park lies in the Austrian Alps and covers about **1,856 square kilometres**. It is split into a large core zone and an outer zone and is the biggest protected area in the Alps. Its landscape includes high peaks, deep valleys, rivers, forests and some of Austria's largest glaciers.

Because of its great variety of mountain habitats, the Hohe Tauern is home to many plants and animals. Alpine species such as chamois, ibex, marmots and birds of prey live here, together with a large variety of insects and mountain plants. The park is important both for protecting these species and for scientific study.

Located near Grossglockner, with 3798 m the highest peak in the Eastern Alps, one of the most famous features of the park is the **Pasterze Glacier**, the longest glacier in Austria. Like other glaciers, the Pasterze is shrinking rapidly and will be lost in the decades after 2050.

The National Park faces several problems:

- **Climate change and glacier retreat.** Warmer temperatures mean less snowfall and stronger summer melting. Glaciers are thinning and retreating, which changes water flow and harms species that depend on cold habitats.

- **Permafrost thaw and rockfalls.** Warmer air warms the ground at high altitude, causing frozen ground (permafrost) to melt. This weakens rock faces and increases rockfalls and landslides, endangering hikers, huts and alpine trails.

- **Tourism pressures.** Hiking, skiing and mountain tourism bring money and interest in nature, but they also disturb wildlife, and cause erosion.

These problems are linked: less ice changes how mountain slopes behave, and changing weather patterns affect forests and rivers downstream. Park managers therefore balance conservation, research and visitor services to protect sensitive areas while still allowing people to experience the mountains.

Satellites provide data that is ideal for tracking changes over large areas like the Hohe Tauern. European missions such as **Sentinel-1** and **Sentinel-2** give regular data used to watch glaciers, snow cover, forests and landslides. By comparing images taken over time, they allow mapping where ice is disappearing, where vegetation is changing, and where rockfall or forest damage has appeared.

Exercises

- Look at the overview satellite image map (Fig. 4). Which land cover classes can you identify? Try to find forests, grassland, rocks and snow/ice.
- Look at the borders of the National Park. Which landcover classes dominate the National Park? What do you think are reasons to define the National Park in this rugged shape?
- Follow these considerations with the detail image (Fig. 1), too.
- Now compare the infrared images of the National Park from 2015 (Fig. 3) and 2025 (Fig. 2). Which changes can you identify? Focus on the glacier tongue north of Grossglockner and the lakes near its end.
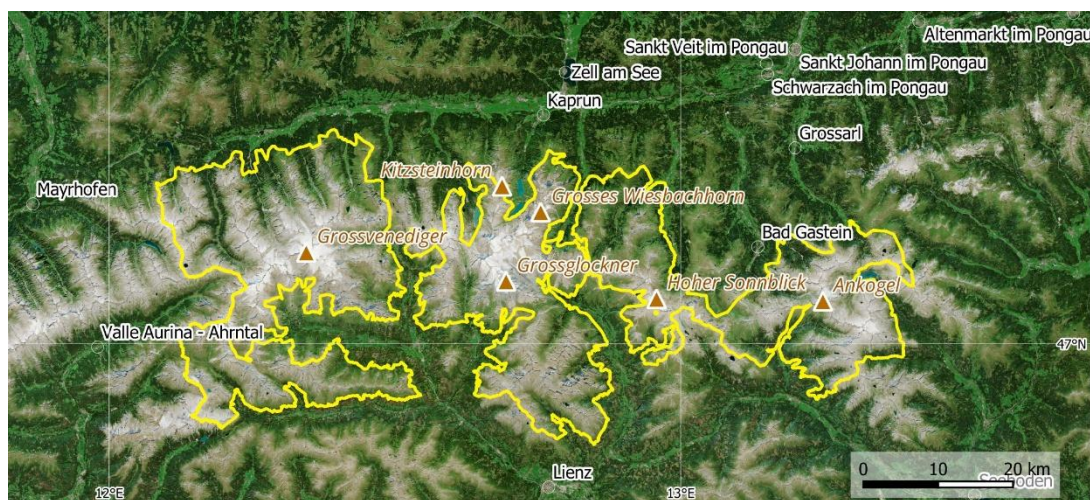
Additional Information

Fig. 4 - Overview image map showing the situation of the National Park Hohe Tauern (2023-07, Sentinel-2 mosaic)

Fig. 5 - Photograph of the Pasterze Glacier in front of the Grossglockner (left; photograph: mmechtley) and a view of Grossglockner from south (right; photograph: Bsmuc64ger~commonswiki)

Links and Sources

- https://www.esa.int/ESA_Multimedia/Images/2019/03/The_Alps - large area overview satellite image (Sentinel-3) of the Alps.
- https://eo4society.esa.int/2024/11/20/snow-cover-products-from-digital-twin-alps-for-alpine-water-management/ - overview of an ESA project aiming at providing information about the snow cover in the Alps.