

GLOBAL CLIMATE CHANGE



CARBON DIOXIDE

416 parts per million

GLOBAL TEMPERATURE

2.16° C since 1880

ARCTIC ICE MINIMUM

13.1 percent per decade

ICE SHEETS

429 billion metric tons per year

SEA LEVEL

3.3 millimeters per year

NASA's sustainability objectives

NASA's sustainability objectives are to:

- increase energy efficiency;
- increase the use of renewable energy;
- measure, report, and reduce NASA's direct and indirect greenhouse gas emissions;
- conserve and protect water resources through efficiency, reuse, and stormwater management;
- eliminate waste, prevent pollution, and increase recycling;
- leverage agency acquisitions to foster markets for sustainable technologies and environmentally preferable materials, products, and services;
- design, construct, maintain, and operate high-performance sustainable buildings;
- utilize power management options and reduce the number of agency data centers;
- support economic growth and livability of the communities where NASA conducts business;
- evaluate agency climate change risks and vulnerabilities and develop mitigation and adaptation measures to manage both the short- and long-term effects of climate change on the agency's mission and operations;
- raise employee awareness and encourage each individual in the NASA community to apply the concepts of sustainability to every aspect of their daily work to achieve these goals;
- maintain compliance with all applicable federal, state, local or territorial law and regulations related to energy security, a healthy environment, and environmentally-sound operations; and
- comply with internal NASA requirements and agreements with other entities.

- <https://climate.nasa.gov/>
- <https://climate.nasa.gov/solutions/resources/>

Climate change Italy

Air temperature changes until now

Mean temperature trends

Different estimates of mean temperature trend in Italy over more than 100 years have been reported: a total temperature increase from 1850–1899 to 2001–2005 of $0.76^{\circ}\text{C} (\pm 0.19^{\circ}\text{C})$, and a temperature increase from 1865 to 2003 of $1.0 \pm 0.1^{\circ}\text{C}$ per century

These results also show that minimum temperature has increased more than maximum temperature. Similar results were reported for the period 1961 to 2011 (23): a change point in 1977, with non-significant ‘cooling’ trends characterizing the sub-period 1961–1977, while significant ‘warming’ trends were identified over the period 1978–2011.

From 1978 to 2011, Italy experienced on the average the following variations per decade: an increase of four to five tropical nights and summer days, a decrease of frost days of the same order, an increase of 3–4 % of warm days and nights and a decrease of 1–1.5 % of cold days and nights.

The observed mean temperature increase recorded during the last decades in Italy, as well as in the Mediterranean and in Europe, is higher than the global mean.

Maximum and minimum temperature trend

With regard to the trend of maximum and minimum temperature, in the recent years the situation is reversed compared to 1865-2003 data. As a matter of fact the maximum temperature has increased more than minimum and, as a consequence, also the daily temperature range. Also the summer heat waves have increased both in length and in intensity. 2003 has been not only the hottest year ever recorded during the last 200 years, but has shown the strongest and prolonged heat waves. On the other hand, the winter cold spells have decreased, especially in frequency.

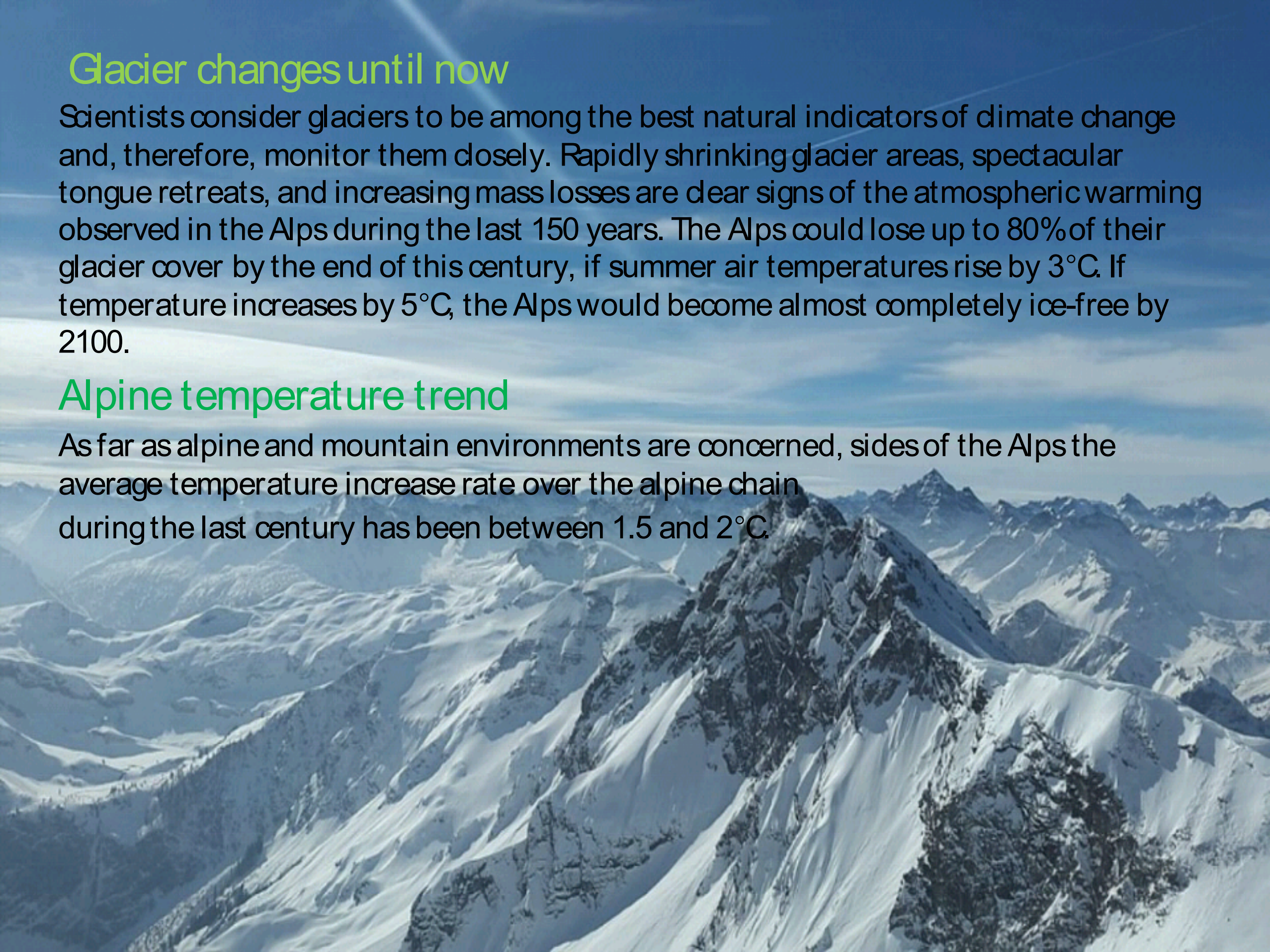


Glacier changes until now

Scientists consider glaciers to be among the best natural indicators of climate change and, therefore, monitor them closely. Rapidly shrinking glacier areas, spectacular tongue retreats, and increasing mass losses are clear signs of the atmospheric warming observed in the Alps during the last 150 years. The Alps could lose up to 80% of their glacier cover by the end of this century, if summer air temperatures rise by 3°C. If temperature increases by 5°C, the Alps would become almost completely ice-free by 2100.

Alpine temperature trend

As far as alpine and mountain environments are concerned, sides of the Alps the average temperature increase rate over the alpine chain during the last century has been between 1.5 and 2°C.



Precipitation changes until now

Total precipitation trend

An analysis of weather stations data shows a significant reduction trend for precipitation for only 2 out of 6 studied regions.

A decrease in precipitation, has been reported of 14% throughout the country but most significantly in the centre and in the south; these results were confirmed for the southern Basilicata region for the

<https://www.climatechange.org/italy/climate-change/period-1951-2010>



Climate Change in Basilicata

Basilicata has a high natural vulnerability to erosion, but the erosion has been greatly magnified by human activity - notably deforestation, agriculture, settlement and an inadequate level of soil conservation.



The decrease in annual rainfall depths observed in a number of locations is compensated by an increase in single storm [rainfall intensity](#) to produce near stationary long term values of annual rainfall erosivity in the region.



Mediterranean countries are sensitive to the combination of climate and land-use changes. In the last few decades, the Mediterranean area has experienced an increase of both the frequency and the magnitude of floods and the extension of droughts which have led to huge geomorphic adjustments of river channels and coastal areas.

In addition to the direct consequences of climate change, there are many indirect consequences of different environmental changes resulting from human pressures

