

Temperature record

By Lennart Kiil



Thermometer screens at a weather station in Tarragona, where researchers compared different types. The screens shield the thermometers from sun and rain, so measurements can be compared over many years.

Project SCREEN, Center for Climate Change, Universitat Rovira i Virgili. [CC BY 3.0. Wikimedia Commons](#).

A collection of temperature measurements of various time spans. Used for showing past climate changes.

Reliable [temperature](#) records are critical in climate research. However, actual temperature readings only exist as far back as the 19th century. Although this is valuable data in climate research, much longer records are needed for dealing with the history of the climate on our planet.

To obtain long temperature records different indirect methods are used. These are also called proxies, and are used as indicators of past climate conditions. Some of the methods used are:

Ice cores: A layer from one of the thick ice sheets in Antarctica or Greenland can be analyzed for content of heavy water molecules.

Because heavy water molecules condensate easier than normal water molecules, there is a positive correlation between air temperature and the content of heavy water molecules in the [atmosphere](#). Since the ice in the [glaciers](#) originally evaporated from the oceans, the same correlation exists. When the climate is warm there will be a high content of heavy water molecules in the ice, and when it is cooler the content will be low.

The length of the temperature record obtained from ice cores depends on the depth of the ice. Some samples from Antarctica go almost 800,000 years back.

Pollen analysis: Pollen is generally very resistant, and do not decay easily. Plants produce pollen in large quantities, and it is dispersed widely by wind. Where sediments form, pollen are often present in the layers.

The pollen found in ice cores, peat bogs, lake and ocean sediments can reveal the type of vegetation that existed when the sediment was formed. Since climate changes are likely to affect the vegetation, pollen analyses can be used as an indicator of past climatic conditions.

Other methods included analyses of tree rings, corals and fossils.

The past climate changes as reflected in temperature records are fundamental for understanding and describing the climate of our time. Some controversy and disagreement exist regarding the reliability of the different methods mentioned above.

How to cite this entry

Lennart Kiil: "Temperature record". Climate Encyclopedia, climate-encyclopedia.com/temperature-record, retrieved 30 October 2026.

Climate Encyclopedia is free and needs no login.