

## CRYOSPHERE JUNIOR

Similarly to the hydrosphere, that includes all the planet's water in the liquid state, in any area and in any form that it may be present, or to the biosphere that consists of all the living organisms whatever kingdom they belong to, and whatever area they may live in, the cryosphere includes all the Earth's ice. When we think of ice, the image that comes to our mind is that of the clean twinkling stretches of the glaciers, however the Earth's ice may be found in many other forms, which at times are also well "hidden" and, surprisingly, also in unexpected geographic areas such as the centre of Africa!

Almost all the Earth's ice consists of ice from glaciers or sea ice. Large quantities of frozen ice can also be found in the permafrost areas, trapped in the ground and in the rock crevices, but, as they cannot be seen directly, it is very difficult to quantify their volume and extension. Also caves can contain ice deposits, at times with the characteristics of glacier ice, more often with ice that formed by freezing: generally these are rather small quantities, but they represent a very precious data bank of the climate of the past.

Glaciers may exist only on two conditions: the first, which is quite obvious, is that the annual temperatures must be below zero for a certain period of the year, so that ice can be preserved, the second, which is less intuitive, but equally indispensable, is that a sufficient amount of snow required to form a certain mass of ice must fall. In fact, just as excessive heat does not allow the preservation of a glacier, likewise, scarce precipitations prevent the formation of a glacier even where temperatures are below zero: for this reason, in the Polar desert areas glaciers do not form.

Depending on their geographic location, the temperatures within and at the base of the glacier, where the glacier comes into contact with the bedrock, vary. This is why there is a distinction between cold or Polar glaciers, with temperatures that are constantly and entirely below zero, and temperate glaciers that may have higher temperatures on their surface and/or at the base, accompanied by melting phenomena: the presence or not, of water in the liquid state influences the behaviour of the glaciers, and the response to climatic variations is very different in the two cases. The former are to be found in the high latitudes, the latter in the lower latitudes, but at high levels, where the air becomes cool because of the altitude, and the heat of the low latitude is compensated by this effect: temperate glaciers are the glaciers we find in the Alps, but also particular glaciers as those which can be found in tropical or equatorial areas, such as the glaciers of Mount Kilimanjaro or Mount Kenya in Africa, or the glaciers in the Peruvian and Bolivian Andes.

Since ice is less dense than water, icebergs float on the surface of the sea: the part below the waterline is therefore about 7-10 times (depending on the difference in density between water and ice) taller than the one above it. If you consider that some icebergs can reach several tens of metres above the sea level, you can well understand how the name 'mountain of ice' (the word originates from ice and berg (mountain), mountain of ice) is particularly suitable: an iceberg whose visible part is 30 metres high continues under sea level to a depth of over 200 metres!