

## Ice junior

Ice is formed when liquid water freezes. The temperature at which it freezes depends on the amount of salts dissolved in the water: at normal atmospheric pressure, it is 0°C for pure water, quite similar for fresh water and it drops to about – 1.8°C for sea water. When the temperature drops below freezing point, water changes into its solid state. This is true for all the water on the Earth's surface, such as bodies of water, lakes, rivers and seas and also for the water trapped in the cracks of rocks and in the pores of the soil where lenses and veins of ice are formed.

Because of its movement, running water freezes more slowly respect to still water. It is for this reason that in winter it is easy to find ice on the surface of small bodies of still water while the watercourses are not frozen. Of all the fresh water on Earth, which is about 3% of the overall water present, about 80% is locked in ice.

Ice has a singular property, which may seem banal, but which has important repercussions on the life of the entire planet. While the majority of substances undergo a decrease in volume when they freeze, water has the characteristic that its density is lower in the solid state than in the liquid one. In fact water reaches its maximum density at a temperature of 4°C. This accounts for the fact that ice floats on water. It is easy to notice this when we sip a drink from a glass full of ice cubes, but this phenomenon can also be seen in nature in *icebergs* and in sea ice and lake ice formation. If ice did not have this property, the ice that forms on the surface of a body of water would sink and collect on the bottom, preventing the development of life on the floor of seas, lakes and rivers. Moreover, when water freezes, its volume increases. This fact is easy to test when we put a bottle of water into the freezer: if the bottle is full of water it may crack due to the strong pressure exerted by the ice.

Glaciers are immense bodies of ice, made up only partly from frozen water. The mass of a glacier is formed mainly due to the transformation of snow as a result of variations in the temperature and pressure of the layers of snow that accumulate over time. Contrary to what it may seem, glaciers are not stationary and stable but are subject to continuous changes. First of all, in each glacier two fundamental zones can be identified: the accumulation zone, where the snow that has fallen during the winter remains and is transformed into new ice, and the ablation zone, where there is a loss of ice.

The hydrosphere includes all the Earth's water in its liquid state while the cryosphere includes all the ice found on Earth. Ice is not only present in glaciers in the mountains or at the Poles; often it can be found in hidden places, like in caves or in "unsuspected" geographical areas like the centre of Africa.

Nearly all the ice on Earth is either glacier ice or sea ice. A lot of ice can also be found in areas of permafrost (trapped in the ground and in the cracks of rocks) and in caves.