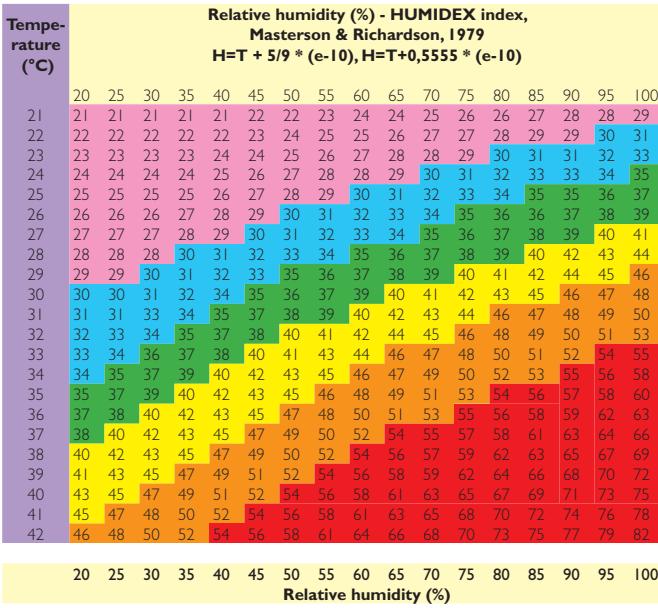


THE HEAT INDEX



20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
 Relative humidity (%)

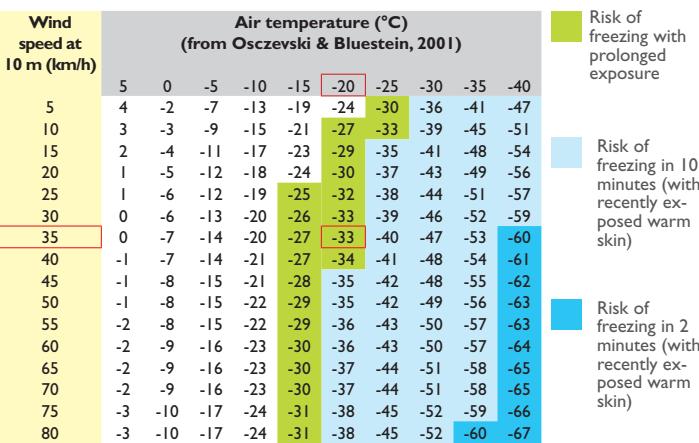
A few people feel discomfort.

Serious risk.
Suspend physical exertion.

More or less significant feeling of discomfort.

Heat stroke imminent
(danger of death).

WIND CHILL EFFECT



Risk of freezing with prolonged exposure

Risk of freezing in 10 minutes (with recently exposed warm skin)

Risk of freezing in 2 minutes (with recently exposed warm skin)

MONTAGNA e SICURA IS MADE POSSIBLE BY:



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PRESENTATION

For those going walking in the mountains during the summer, the MontagnAmica e Sicura initiative proposes various basic themes, all aimed at preventing accidents. These themes provide information on correct behaviour for those going on excursions of various levels.

This leaflet gives further information on the weather, providing instructions on how to behave to avoid the consequences of the various dangers weather may reserve for everyone.

This valuable summary of information and suggestions, indispensable for all those wanting to go skiing or walking in the mountains in an aware and responsible fashion, was made possible through collaboration with the Regional Environmental Protection Agencies (ARPA) for the Veneto and Friuli Venezia Giulia.



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Second level information and training



MONTAGNA e SICURA
 PROGETTO PREVENZIONE E SICUREZZA
 CAI - SOCCORSO ALPINO - GUIDE

I - POOR VISIBILITY AND FOG

The elements which most reduce visibility in the mountains are fog, low cloud and snowfall, in particular with wind.

- EFFECTS:**
- Orientation becomes difficult
 - The perception of objective dangers is reduced

Orientation in the mountains is helped by light-absorbing objects (rocks, trees, pylons etc.) which become points of reference; it is hindered on the other hand by objects which reflect light such as snow (whiteout effect).

ASSOCIATED WEATHER PHENOMENA

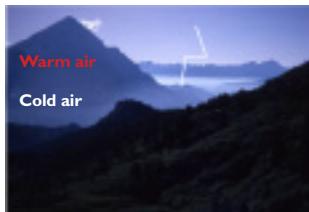
Bad weather: clouds due to a passing low.

Temperature inversion layer at a low altitude (mist, fog, low cloud).

A temperature inversion layer at a low altitude during fine weather may lead fog, mist or low cloud to form.



Temperature inversion in the winter with clouds in the lowest layers



Night-time temperature inversion during the summer with mist clearly visible in the lowest layers

IMPORTANT! If you are inside, a simple large cumulus cloud is enough to jeopardise visibility.



2 - SUMMER PRECIPITATION AND COLD

Low summer temperatures can be caused by precipitation (rain, snow) or strong night-time radiation.

- EFFECTS:**
- Hypothermia from exposure to low temperatures
 - Indirect effects in the case of wet ground (ice)

Precipitation in the mountains (rain or snow) is usually accompanied by a drop in temperature due to reduced radiation or cold air advection. The phenomenon is aggravated by wind (wind chill effect).

IMPORTANT! As you go higher, the temperature in any case drops by an average of about $0.65^{\circ}\text{C}/100\text{ m}$.

ASSOCIATED WEATHER PHENOMENA

- Passage of a cold front
- Snowfall at low altitudes
- Night freezing

COLD FRONTS

During the summer, when preceded by a long hot and humid period, the passage of a cold front may cause severe storms, strong gusts of wind, hail and even whirlwinds (in particular in the foothills and on plains). In the Alps, cold fronts are not always recognisable. They may sometimes come as a surprise and be partly hidden by mist (consult the weather bulletins!).

IMPORTANT!! The violence of the associated phenomena makes the passage of a cold front one of the most dangerous conditions in the mountains!

SNOWFALL AT LOW ALTITUDES

The snow limit is associated with the altitude of the "freezing level", intensity of the precipitation and other mainly orographic factors:

- intensity of the precipitation (the lower the limit the greater the intensity);
- local topographic configuration (the limit is lower in narrow valleys);
- geographical position (the limit is lower in internal areas of the Alps).

IMPORTANT! In the case of heavy precipitation, the snow limit may descend as low as 600/700 m below the freezing level, even as much as 1000 m if the precipitation persists.

NIGHT FREEZING

The heat loss during the night through radiation may lead to an appreciable drop in temperature.

IMPORTANT! Particularly during fine weather, the level at which ground freezing occurs does not correspond to the freezing level in a free atmosphere as indicated in bulletins, but may descend as much as 1200-1600 m lower!



3 - STORMS AND LIGHTNING

Storms and lightning (possibly with hail) may be caused by the passage of a cold front or strong daytime convection (summer heat storms).

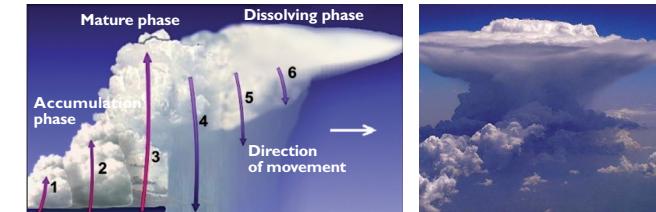
- EFFECTS:**
- Hypothermia from exposure to low temperatures
 - Risk of lightning strike
 - Slippery ground (hail)

ASSOCIATED WEATHER PHENOMENA

- Heat storms
- Lightning

HEAT STORMS

Heat storms are caused by convective uplift. When the sun heats the ground, the layer of air nearest the ground heats up. As it is lighter than the surrounding air, the warm air rises upwards, expanding and condensing to form clouds. The quicker and stronger the uplift, the more severe the precipitation and associated phenomena such as storms and lightning, sometimes accompanied by strong gusts of wind.



LIGHTNING

Lightning is an electrical discharge caused by differences in potential inside a cloud. In an ascending wind, the drops begin to freeze, becoming positively charged and breaking away from the larger drops which are negatively charged. The electrical discharges which cause lightning generally occur in the atmosphere. Those occurring between the clouds and the ground are estimated to be just 20% of the total.

CLOUD-GROUND LIGHTNING

The danger of lightning comes from the great heat generated in the lightning channel. This produces an explosion (thunder), accompanied by very high temperatures (greater than $30,000^{\circ}\text{C}$) which may cause inflammable materials (such as a tree) to burst into flame. To determine how far away a stroke of lightning is from where you are, divide the number of seconds between the lightning and thunder by three to obtain the distance in kilometres (or multiply the number of seconds by 340 m).

For example, if six seconds pass between the lightning and thunder, this means you are 2 km from the point of origin of the lightning.



4 - WIND AND WIND CHILL EFFECT

In the mountains, the wind is influenced by the morphology of the land and does not correspond to that measured in the free atmosphere. Wind is caused by temperature differences generated by differences in the sun's heating. These cause pressure variations:

- + heat = lighter air = low pressure
- + cold = heavier air = high pressure

The difference in pressure (pressure gradient) causes the air to move to fill areas of low pressure. The wind will blow from the area of high pressure to the area of low pressure.

- | | |
|-----------------|--|
| EFFECTS: | <ul style="list-style-type: none"> • Mechanical effect (risk of falling) • Chill effect (wind chill) |
|-----------------|--|

ASSESSING THE WIND

From weather bulletins:	From observation on site:
Light wind: 0-10 km/h	Observing cloud movement provides information on the direction of the wind at high altitudes.
Moderate wind: 10-30 km/h	"Wind streamers" near peaks indicate a strong wind at high altitudes and provide an indication of its direction of origin
Strong wind: 30-60 km/h	
Very strong wind: 60-90 km/h	
Gale: >90 km/h	

ASSOCIATED WEATHER PHENOMENA: • Föhn wind • Wind chill effect • Stormy gusts (see storms and lightning)

THE FOEHN (FÖHN) WIND

When a mass of moist air is forced up the upwind slope of a mountain chain, it causes a "Stau" effect (from the German for barrier). In the mountains, this occurs with a cloudy sky and widespread precipitation. When the same mass of air crosses the mountain and begins to drop down the downwind slope, without the water content which has largely precipitated as rain or snow, the sky is clear with lenticular clouds, the air is dry and a warm wind known as the Föhn often blows in the valleys.

IMPORTANT! When the Föhn is blowing, the winds may reach up to 100-120 km/h

THE WIND CHILL EFFECT

Wind chill is the chilling power of the wind and therefore its ability to subtract heat from the human body (see table on the first inside flap).

If the ambient temperature is below body temperature, the body transfers heat outwards and must therefore produce new heat by burning energy reserves. When there is also ventilation, the heat cuticle generated in the epidermis is constantly removed and the human body therefore feels cold.

IMPORTANT! In the mountains, the perceived temperature may be much lower than the actual measured and indicated temperature.

5 - SOLAR RADIATION AND HEAT INDEX

In the mountains, stable fine weather may lead to a significant rise in temperature, possibly aggravated by high humidity. Intense heat in the mountains is favoured by anticyclones.

- | | |
|-----------------|--|
| EFFECTS: | <ul style="list-style-type: none"> • Cramps • Sun and heat stroke • Orientation becomes difficult • Ophthalmia caused by exposure to UV rays |
|-----------------|--|

ASSOCIATED WEATHER PHENOMENA:

- Anticyclonic conditions with strong radiation
- Heat index



ANTICYCLONIC CONDITIONS

During an anticyclone, the air tends to drop downwards, losing moisture and becoming compressed. These downward movements lead to high atmospheric stability and a hot air mass. Even with fog, the UV rays can penetrate deeply and you therefore need to protect yourself. Strong radiation associated with a rise in temperature (e.g. south-facing wall) may cause sun or heat stroke.

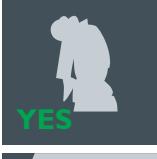
IMPORTANT! The most critical moments are the last days of a phase of fine stable weather about to break with rising humidity and no wind.

HEAT INDEX

When high temperatures cause the human body to produce more heat than is needed to maintain a constant temperature, the body tends to overheat and must therefore eliminate heat through perspiration. When combined with high temperatures, humid air causes discomfort as it limits loss of body heat through evaporation of perspiration from the skin. Low humidity allows for greater chilling through evaporation, while high humidity hinders skin evaporation. This is why with high temperatures and high relative humidity, the human body perceives a sensation of heat. In this case the term **perceived temperature** is used.

Tables are used to indicate the perceived temperature in relation to actual air temperature and the level of relative humidity (HUMIDEX index - see table on the first inside flap).

IMPORTANT! The perceived temperature may be much higher than the actual measured and indicated temperature.

move quickly away from all high areas such as exposed peaks or crests and from "spikes" of any sort (crosses, antennas or similar)		
do not shelter under trees, particularly if isolated; move as far away as possible from them		
move away from watercourses, lakes or reservoirs and from vertical rock walls		
move away (at least 50 m) from all metal conductors and avoid via ferratas. Put all metal equipment in your backpack, do not leave your ice axe attached to the backpack with the tip facing upwards		
avoid using your mobile phone		
crouch down with your head between your knees and feet together (do not lie down on the ground), ideally in a hollow		
if possible shelter in a recess or cave (but not near crests or needles), but do not touch the rock; do not remain near the entrance, move as far inwards as possible		

SAFE PLACES: the car, inside mountain huts and bivouacs

OUTDOORS: in a wood, providing you are under a tree which is shorter than the others and not isolated, crouched down sitting on your backpack, in a hollow and not near peaks and pinnacles. Free yourself of metal object (crampoms, ice-axe, nails, via ferrata equipment) and keep away from metal structures (crosses on summits and via ferratas).