

How to overcome whiteout

1. Lt (R) Jørgen W. Eriksen, Scholarship Holder, Norwegian School of Sports Sciences, Defence Institute

A couple of year ago I was skiing in the Norwegian mountains when I suddenly found myself in a total whiteout. I saw an animal in front of me that appeared to be moving back and forth as if searching for something in the snow. I found it impossible to decide how far away the animal actually was. Just the day before I had for the first time in my life seen a wolverine. Maybe that was why I thought I was standing watching this rare and shy animal again. The next thing that happened was that the animal appeared to be walking towards me. Before I could think “now what do I do” I had an incredible experience. It was not a wolverine I was staring at but a lemming, which was only a couple of meters in front of me....

If you have never experienced whiteout, it may be hard to imagine what kind of experiences and consequences this weather condition may cause. In short; it becomes impossible to separate the snowy surface from the air. Everything appears to be the same colour of white and it becomes impossible to tell how far away the snowy surface is.

“Whiteout is a weather condition in which visibility and contrasts are reduced by snow and diffuse lighting from overcast clouds”

Whiteout

There are three different forms of a whiteout:

1. In clear air conditions, when there is no snow falling, diffuse lighting from overcast cloud may cause all surface definition to disappear, and a kind of optical illusion is created. This effect is accentuated by a smooth surface of fresh-fallen snow.
2. In blizzard conditions, the windblown snow in the air may simply make it too difficult to see very far.
3. In snowfall conditions, the volume of snow falling may simply obscure objects reducing visibility.

Whiteout may cause two different kinds of problems:

Danger

Whiteout poses the greatest threat to military aviation. In Polar Regions, this optical illusion can

make whole snow-covered mountains appear invisible against the background. This creates difficult conditions for helicopters and low flying planes. Whiteout might also be a significant threat to military missions where operations are performed by snow mobiles and even for soldiers using skis. Due to the fact that whiteout causes the horizon to disappear it might become impossible to identify large snowdrifts and cliffs. It would even be impossible to judge the steepness of a hill not only downhill but sideways and uphill. You may find yourself in an avalanche area without being aware of it. There have been several accidents related to whiteout. Snow mobiles and skiers have fallen from cliffs and snow mobiles have even collided with tents and stones covered by snow.

What to do?

For aviation relying on visual feedback for navigation:

- Try to avoid these weather conditions. Fly at a higher altitude.

For soldiers on the ground, in conditions of extreme whiteout:

- If possible, wait for better weather. Whiteout is a weather condition that changes character very quickly. A couple of minutes may be enough. See if the conditions are liable to change.
- Whiteout is sometimes a local phenomenon, and often related to a specific altitude. If possible, try to move to a lower position.
- If you need to change position:
 - o Try to follow an old track that may give some kind of contrast in the snow
 - o Throw objects in front of you. Dark or colored objects make a distinct contrast in the snow, but even snowballs may be sufficient to identify cliffs and snowdrifts.
 - o Dogs on a long leash may be the best way to avoid unexpected formations under whiteout conditions.

Navigation

Whiteout can cause even more difficult conditions for navigation than fog and total darkness. It can become impossible to see recognizable details and to locate your position even in familiar surroundings. It might also be very difficult to follow your compass course and to measure the distance covered.

What to do?

There are different ways to handle whiteout. Primarily, whiteout usually causes problems in topography characterised by the absence of trees. This is because trees create the sufficient contrast needed to differentiate between the surface and the horizon. In other words, problems related to whiteout usually occur at higher altitudes above the timber line, or in a snow-covered desert area like the tundra. To avoid whiteout, try to seek lower forest areas whenever possible.

If there are no trees close by, try to identify the most likely areas on the map for finding objects that can give you any kind of contrast to the white surface. The easiest objects to find for contrast are normally stones and rocks placed on ridges or edges where the wind has blown the snow away. The best ridges for this purpose are normally those where the prevailing direction of the wind has diagonally passed the ridges, as there is usually less snow on the side facing against the direction of the wind. These ridges should not be hard to identify on the map. Whiteout demands essential map reading and compass skills. Technological equipment, such as digital maps, altimeters and GPS, may also be an indispensable aid in these demanding conditions. The altimeter may help you to identify your own position by using the maps contour lines. The GPS tells you where you are and where to go, but it is important to emphasize that it does not tell you how to avoid snowdrifts, cliffs and avalanches. So even if you know where you are, you will need sufficient map reading skills to handle whiteout. However, GPS makes it possible for even less experienced map readers to handle difficult navigation challenges. Don't forget to change batteries.

If you don't know where you are:

Whiteout makes it impossible to establish your location by using recognisable features in the terrain around you. These features just disappear in the whiteout. What do you do if you don't have a GPS to help you out with your position? One possibility is to retrace your footsteps by returning in your own tracks to your last known position. This presupposes that it is possible to follow your own tracks. Whiteout caused by a blizzard may make this difficult or even impossible.

Another option is to use a compass to make a course from where you believe you are, in a direction where it is impossible not to find a recognisable feature. These features may be rivers, roads that are cleared of snow or power lines. The feature you select must be impossible to cross without being aware of it. But even if you find the road you are searching for, it may be hard to identify your exact position. An intersection or a house close to the road may help, but do you go to the right or left once you are on the road to find these features? It is a good idea to 'aim off' to one side of the landmark you are seeking. If you 'aim off' (say 5 degrees/15 miles) to the right of the landmark then once you are on the road you simply turn left.

Experience has shown that it is easier to navigate in an undulated rather than a flat terrain under whiteout conditions. It is above all easier to hold a steady direction by making use of a hilly terrain. Soldiers are prevented from drifting off course by following a mountainside or a ridge. It may be a good idea to identify the hilly terrain in your surroundings. If this is not an option, try to locate formations that are visible even during snowy conditions.

Maybe the most difficult task related to navigation under whiteout is measuring the distance covered during movement. It is possible to use several techniques to measure covered distance such as counting rope-lengths or steps, but these techniques are not very reliable. To count steps is best suited to a flat terrain with nice snow conditions. Even small snowdrifts can cause difficulties and both downhill and uphill may be a source of uncertainty related to measurement. To count rope-lengths may be more precise but it takes more effort and equipment to organise, also one is less flexible while tied together. It is also possible to measure distance if you know

approximately your average speed, but this may not be a very reliable technique related to whiteout. It takes normally much more time to move under these conditions. The best remedy to help you out related to measuring the covered distance is GPS.

It may also be very difficult to follow a compass course under whiteout conditions. It is like navigating in fog or total darkness. It becomes easy to drift off course due to the lack of reference points. If you are alone, check the direction as often as possible, and try to locate features as far as possible in front of you, in the direction you are heading. It is much easier to follow the direction of the compass if there are three or more people together. This is because it is easier for those behind the first two persons to detect any drifting out of the compass course by those in front. The first and third persons in line are both expected to navigate after the same compass course, and the queue corrects the direction if they record any deviation. If you have drifted off course, GPS is the only tool that is helpful in guiding you back on the right course. A compass can tell you the right direction from where you believe you are and to your objective. A problem occurs however if you find yourself 200 meters to the left of where you think you are; this distance where you are off course will never be corrected by the compass. If the whiteout condition comes and goes, make sure that you have your compass available. Even short periods of sight may give you the opportunity to make a compass course towards a recognisable feature.

One of the problems about overcoming whiteout is related to the fact that this weather condition does not occur often. There may be too few chances to practice and train map reading skills and navigation under real conditions to develop sufficient skills. The best substitute is to practice at night or in conditions of fog. If you manage to navigate under these conditions, the experiences and skills you develop are useful also to handle whiteout.