

Clothing for field work

Introduction

Having the right clothing for the environment is crucial to comfort and safety. Failure to wear the correct clothing and use it correctly can lead to several potential problems and risks:

- Hypothermia
- Frostnip and frostbite
- Non-freezing cold injuries
- Skin damage due to UV (sunburn)
- Eye damage due to UV (snow blindness)
- Cuts and abrasion to skin
- Physical eye damage

Generally work clothing should be used for messy jobs such as refuelling vehicles but in certain situations it may be appropriate to use field clothing for messy jobs.

General

The layering system

The layering system is a basic principle in the outdoors. As the name suggests it involves wearing a variety of different layers to create warmth rather than one or two really thick warm layers. The advantages of a layering system over one really warm layer are both flexibility to adapt to a multitude of temperatures and also greater overall warmth. The layering system works by creating air gaps between each layer of clothing; this air warms up with your body heat and is more effective at keeping you warm than one thick layer. In terms of flexibility, using a layering system allows you to remove a mid or top layer in the event of getting too warm due to physical exertion or a temperature change. If sweat begins to build up this will cause you to chill rapidly as clothes become damp. Therefore, adjusting layers at the right time is crucial. While out working each person has to take a degree of responsibility for his or her own comfort and safety. It is very hard for anyone else to know how warm or cold you are. Extra layers should always be put on when ceasing to move for any length of time and as you begin to heat up take the time to stop and readjust your layers. This ideally needs to be managed so that everyone stops at the same time rather than stopping every few minutes, as someone else needs a layer change.

Base layers

The thin first layer of clothing is designed to wick moisture away from the skin and provides little insulation. A damp layer next to the skin will be uncomfortable and also speed up the process of heat loss. Cotton is a very poor material for transferring moisture away and instead soaks it up leaving the moisture right next to your skin. Cotton t-shirts should never be used as a base layer. Most base layers are made of a synthetic fiber that is quick to dry. Other base layers are made of wool which provides more warmth while still being very efficient at transferring moisture away from your body.

Mid layers

The next layer in the system is a mid layer. Mid layers are often manufactured from fleece and come in a variety of thicknesses. A thinner micro-fleece works well in most conditions and a thicker fleece can go on top of this in cold conditions or when very little activity is expected. There are lighter alternatives to fleece such as synthetically insulated jackets that are a good substitute for a thick fleece. Fleece trousers are a good mid layer for the bottom half.

Outer layers

The main function of the outer layer is to protect against wind and water. The specific choice of outer layer will depend on the environment and the activity being undertaken. Outer layers need to be roomy enough to allow several layers of inner clothing to be worn underneath and yet still permit easy movement. If the outer layer is too large and loose it will create a billowing affect and cause heat to be lost from the system.

Insulated top layers

In extreme cold conditions an additional outer layer may be necessary. Down jackets are provided by AWI. These are not very robust and need to be treated with care. They can only be worn if there is no risk at all of falling into the water due the fact that they will soak up water and will reduce the buoyancy of the flotation suit.

Clothing for work on sea ice

When working on sea ice it is of utmost importance to guarantee buoyancy of clothing in case of breaking into the ice and falling into the water. Working life vests that are automatically inflated when falling into the water can be an alternative, but do not release reliably in very cold conditions (below -20°C), which will be encountered during MOSAiC. Therefore, it is compulsory to always wear a flotation suit when working on the sea ice. The suit supplied by AWI ensures buoyancy and isolation in the water. If you plan to wear your own suit on the ice, make sure to agree upon the necessary and correct features of your suit with AWI ship coordination (schiffskoord@awi.de) before the expedition starts. Work on the ice is only allowed when wearing correct and safe clothes.

Extremities

Your extremities (head, eyes, hands, and feet) are the most vulnerable parts of your body in the polar environment and typically the first areas of your body that will be affected by exposure. The main risks to your extremities come from cold injury and Ultraviolet (UV) radiation:

Cold injury

The extremities are the first areas of your body that will get cold. Your extremities get cold generally because your core temperature is beginning to drop and your body's automatic response to this is to reduce the energy spent heating the less essential parts of your body and focus on maintaining heat to the vital organs.

Non-Freezing Cold Injury (NFCI) This is one to be particularly aware of as often appears insignificant at first but can result in life-long problems. NFCI is common in feet when they are exposed to damp conditions just above freezing for a prolonged period of time – also known as 'trench-foot'. Ensure boots appropriate to the temperatures are used and dried out properly each night. Changing socks on a regular basis is also important.

Ultraviolet radiation

UV radiation is far higher in the Antarctic than in Northern Europe and consequently the eyes and skin need special protection. Sunscreen should be applied frequently to exposed parts – especially the face, neck and ears. Pay special attention to parts that receive reflected UV from snow, such as the nostrils. Eye protection should be worn virtually all the time, even on cloudy days.

Eyes

Your eyes are particularly vulnerable in the polar environment and even more so when in the field.

Snow blindness

The main risk to your eyes is from UV radiation, which can cause snow blindness. Snow blindness is effectively sunburn on your eyeballs – it is incredibly painful and in severe cases can cause long-term damage. Even on a cloudy day the UV radiation can be extremely harmful so get used to wearing eye protection all the time! BAS provides category four sunglasses to all staff going into the Polar Regions.

Weather

Blowing ice crystals or even small stones picked up by strong winds can damage your eyes. When outside in the polar environment you should generally always wear some form of eye protection. Both goggles and

sunglasses are provided. Clear lensed goggles are also provided for use in poor weather during the winter but these should not be used in the summer. Always carry goggles and sunglasses when out in the field. This way if the weather changes you are prepared and if you break your sunglasses you have another form of eye protection. Emergency clothing bags are carried for each person going into the field and these contain an additional set of goggles and sunglasses.

Glasses/contact lenses

The polar environment can make life difficult for those that wear glasses or contact lenses. The air is generally very dry and can cause significant irritation for those who wear contacts. If you wear contact lenses it is recommended that you take daily disposables rather than monthly disposables or hard contact lenses. This is primarily due to the difficulties in keeping reusable lenses clean and issues with them drying out. It is advised that you also bring suitable eye drops to keep eyes and lenses moist. There is of course an issue with contact lenses freezing so make sure you try to keep them warm and store them inside your sleeping bag overnight. Make sure you take a large enough supply in case you end up in the field longer than expected or find you need to replace them more than once a day. If you wear glasses you must bring two pairs in case you break or lose a pair. BAS can arrange prescription sunglasses for those who need them before departing the UK. Contact your Line Manager for more information. Larger-framed goggles can also be provided to fit over the top of glasses.

Head

Headgear is issued to protect against the following:

Cold

Up to 30% of the body's heat can be lost through the head so wearing the correct headgear is important. The main types of headgear issued are peaked windproof hats which cover the ears, fabric tubes (head overs) which can be worn as a neck scarf or as a thermal balaclava, fleece balaclavas and neoprene face masks.

Impact

When travelling on a snowmobile a crash helmet must be worn to provide protection in the event of an

accident. A helmet also helps to keep the head warm and protect the face from cold injuries. Additionally it can help to reduce engine noise.

UV radiation

Hats also protect against sunburn. A sun hat is a basic and essential item of polar clothing for warm sunny days.

Hands

In the field you will almost certainly experience cold hands on some occasions. This can be exasperated by handling items that conduct the cold or by working with your hands above the height of your heart. Having your hands up high causes the blood to drain out of your finger tips and because gravity is against you it is hard for your heart to pump a warm blood supply back to the ends of your fingers quickly. Taking care of your hands is obviously extremely important as you rely on them for virtually everything you do. If you feel your fingers becoming cold, take a minute and warm them up. It is much easier and less uncomfortable to sort your hands out before they become really cold. Even if driving on snowmobiles signal to the lead driver to stop so that you can rewarm your hands if required. The fit of your gloves is crucial to the warmth they provide. Too small and they may cut off circulation causing cold to set in quickly. Too big and your hands will be unable to warm all the air around them and again they will chill down. In addition to this your gloves must be dry in order for them to work effectively. Any moisture will conduct heat away from your hands very quickly. This can be caused by snow or sweat. If your gloves get damp, change into a fresh pair! A variety of different types and styles of gloves are available to enable you to find a combination that works well for the work you need to do. Mittens are the warmest style of glove as all your fingers sit together and keep each other warm. The down side to mittens is the loss of dexterity. Always carry a variety of pairs of gloves with you in the field and take spares! In the evenings make sure you hang gloves up to dry so that they are ready when you need them next.

Remember that your hands often become cold because your core is beginning to cool. Often sticking an extra jacket on results in your hands warming up. Take particular care when handling fuels as spilt fuel causes rapid cooling of skin. Also be careful handling cold objects (not just metal) as skin can stick to them. If this happens you will want to use a warm liquid to detach yourself from the object – pulling your hand away without doing this will result in a loss of skin and discomfort!

Feet

Your choice of footwear depends upon climate, conditions expected and any special applications. BAS provides footwear for all conditions. The following table suggests the best uses for each item of footwear – note that variations may exist within the system and there may be a small selection of footwear available that is not mentioned here.

Whatever footwear you choose to use make sure the fit is right. Before deploying away from station test your footwear out on and around station to make sure they are comfortable. Fit is extremely important for getting the most out of your footwear. Too tight and you will cut off circulation resulting in cold feet, too loose and you won't be as stable on your feet and risk slipping. When in the field take special care to dry boots out every night. If boots have removable liners, take them out and hang them to dry. Putting on damp or frozen footwear significantly increases your chances of getting a cold injury such as frostbite or a NonFreezing Cold Injury (NFCI).

Work clothing vs. field clothing

Generally speaking, deep field clothing should be reserved for such use. Specific work clothing is issued by AWI clothing store for jobs that do not require the features of field clothing. As with most things there are grey areas when deep field clothing may be required for a work task. For example during the winter it may be necessary to use deep field gloves for some routine tasks such as refuelling. If temperatures are particularly low, the most appropriated gloves may very well be deep field ones. In this situation the priority is your safety and comfort rather than looking after expensive kit, but endeavor to use an older already worn item of field clothing before using brand new items. Use the most appropriate clothing for the task you are carrying out. Clothing is provided to keep you safe and comfortable. If in any doubt as to the best item of clothing for your needs speak to the group leader or expedition leader.

General points

Snow glasses, balaclava and mittens should always be carried. Arctic weather can change rapidly and clothing is the first defence against it. On day-trips outside of the central observatory carry some spare clothing, especially gloves, socks and a balaclava. Emergency clothing, like gloves, mittens, hats and blankets are part of the emergency box for travel outside 3nm range. Clothing should be kept clean and in good repair. Clean clothing is thermally more efficient than dirty clothing. It is important to try and avoid contaminating clothes with fuel. Additionally, clothing must be clean and inspected prior to use in the field for biosecurity reasons. Use the buddy system to ensure your working partners are not suffering from cold injury. Check for frostnip on the face when outside in cold temperatures, especially if there is a breeze or when travelling on snowmobiles. Personal 'admin' is key in the field – continually monitor how you are feeling and don't be afraid to stop and take a minute to change your clothing layers etc. if you are not comfortable. This will ultimately save a lot of time and hassle compared with ignoring an issue and ending up with a serious injury. Operating safely and efficiently in the Polar Regions takes time to master. Don't get complacent as even the most experienced people can get caught out. Comfort in extreme environments comes down to a huge number of variables, the foundation of which is ensuring you are well fed, rested and using kit appropriately.