

Equipment for Activities at Outside Temperatures of -50°C

II. Equipment

- **Clothing:** please look at the separate file "I. Clothing"
- **Bicycle:** Adjust the parts your bike to their use in cold temperatures – grease all bearings, chain, derailleurs, and other moving parts with special grease suitable for arctic temperatures. Use teflon-coated cables. Make sure not to guide cables in narrow angles, otherwise they are likely to break. All plastic parts will become very brittle and are most likely to break. Tires with spikes (e.g. Schwalbe Snow Stud) are recommended. A fur cover on the saddle is very comfortable. In arctic regions (at least in winter) you most likely don't need waterproof panniers. It is more important that panniers are large enough to hold all the equipment – as most things (clothing, sleeping bag, etc.) will be much more bulky than what you are used to from normal tours. For the Greenland trip, we have used self-made panniers, as none of the commercial ones were large enough. It is most important to carry a set of tools and the necessary spare parts for the bicycle. During a winter bicycle trip, your way of riding has to be adapted to the temperatures, not to the topography.
- **Tent:** When choosing a tent, the wind stability and size of the interior space are most important factors. In order to make your tent a comfortable home even at unfavorable conditions, you want to have enough space to change clothes, store your gear, and you even may have to cook in the vestibule during stormy weather. For two persons it is recommended to use a 3-person tent. The tent material should be of silicon-coated ripstop nylon, and all zippers should be of high quality. Their use in ice and snow is similar as to sand. Snowflaps on the outer tent fly are recommended. The outer tent cover should have triangulated fixation of lines and offer only small areas that are exposed to wind. Use aluminum tent poles (E8 or E10). It is important to replace the rubber that connects the individual segments of the tent poles with a 2 mm string and a stopper – rubber will lose its elasticity in cold temperatures. The tent should also be well ventilated. In the interior tent you should provide enough space to hang clothes. The tent should be easy to set up, and not be ripped apart when setting it up in a storm.
- **Backpack:** The backpack should be personally adjusted to your body geometry, and be robust. Due to the bulkiness of all the equipment necessary for a winter trip, you will probably find that even a big hiking pack will be too small. The even bigger problem with backpacking is that carrying a backpack over many hours will always lead to accumulation of sweat on the back which can only slowly evaporate. And that is exactly something to avoid. Therefore, a pulka or bicycle is the better alternative to transport equipment. However, a medium-sized backpack should still be carried for emergency cases.
- **Sleeping bag:** For extreme low temperatures down sleeping bags are best. They offer the best combination of packing volume, weight, and comfort. We have used the sleeping bag Mountain Equipment "Everest", it is good up to -45°C , but it is very expensive. However, it is most important not to save on comfort – you will need a good rest at night and long waiting hours during storms can get very frustrating if you compromise on the sleeping bag. In order to avoid condensation of sweat in the downs of the sleeping bag, one should sleep in a nylon liner that acts as a vapor barrier between the body and the sleeping bag. Furthermore it increases the isolation properties of the sleeping bag a bit.

Using the above combination, wearing a set of thermo-underwear and after a good meal we have slept at -55°C , but comfort ends about five degrees above that.

- **Sleeping mattress:** It is most comfortable to use an air-filled sleeping mattress (e.g. Thermarest). However, the problem with these is that the water vapor blown into the mattress will freeze there, making it impossible to compress the mattress afterwards. We have circumvented this problem by fixing a bicycle valve at the mattress and inflating it using the bike pump. Even then, after 2.5 months of use we still found some ice crystals building up inside the mattress (even cold air has still 20% of water vapor), and at some point the cover material detached from the foam part of the mattress. Furthermore, we used a wide aluminum mat on the tent floor below the air mattress. This aluminum mat should be wider than the air mattress. It is also recommended to spread a 40cm wide foam piece between the air mattresses of individual people.
- **Cooking:** We recommend using the MSR-XGK or MSR-Dragonfly stoves. The Primus VariFuel or MultiFuel look very promising, too, but we don't have any experience with them in cold environments. Use kerosene as fuel. The kerosene brought from Germany precipitated in Greenland at Temperatures of -40°C , the Greenlandian kerosene worked much better. Use large fuel bottles with your stove to avoid frequent refilling – you may have to do more pumping though. If possible leave the stove attached to the pump as frequent assembly and disassembly will rapidly wear out the rubber seal between pump and fuel line. Carry a spare stove (you will want to have at least one hot meal a day!), e.g. MSR-WhisperLight, or Trangia alcohol burner.
- **other cooking equipment:** steel pots, even if they are a bit more heavy than aluminum pots. However they are more resistant to the heat of the fuel stove and you can more easily remove burnt stuff. If you can afford it, use titanium pots. It is most important to carry a big enough pot to melt snow or ice to supply water for cooking and drinking. Water melts more easily in warm water rather than by itself. We highly recommend using a "cooking box" ([click here for a picture](#)) consisting of two levels for pots above one another with the stove on the floor level. This box saves a lot of fuel while melting snow or ice as the heat of the stove is kept in the box and the lower level pot can be used for cooking while more snow or ice is melting in the top level. In addition, the warm lid of the box can be used to dry gloves or socks. A disadvantage of the cooking box is that due to the higher temperatures one has to be more careful not to burn stuff. What else is needed? A large thermos bottle, cup, wooden spoon, potholder (with wooden handle).
- **Skis & Pulka:** There are several brands of ski that are suitable for arctic tours. We recommend telemark type cross-country skis with a universal simple binding (e.g. from [Rottefella](#)). For the pulka, there is not much choice of manufacturers in Europe, there is „[Fjellpulken](#)“ in Lillehammer/Norway, „Segebaden Pulkas“ from Segebaden-Berg AB in Säter/Sweden and pulkas from Scansport/Norway. In Siberia we used a self-made pulka to transport equipment. It was made of a wooden frame coated with glassfiber mats. If you want to build your own, it is important to inform yourself about snow and ice condition of the region traveled to. The shape of the skids will be critical.
- **Technical equipment:** GPS-devices are standard equipment these days. However, if you are not traveling remote regions they are not essential, as they consume lots of battery life. A good compass (with adjustable deviation from magnetic north), as well as good topographic maps are more important. If you are traveling in a larger group, it may be worthwhile to carry small radio devices to stay in contact among group members. If you want to carry an emergency device (e.g. Satfind-Pocket PLB), you may have to have special import permits. The most critical problem is to supply energy for the electronic

devices. Solar panels are only effective, once the sun is up high enough. It is important to keep the batteries warm. We carried a "battery belt" around our waists and connection cables stuck out our jackets. The power-supply of our cameras was changed such that we could connect them to these external batteries.

- **Small stuff:** a good pocket knife or Leatherman tool (grease it well!), a book to read, or some pocket games for stormy days in the tent, notebook and pens
- **Defense against polar bears** (Greenland, Spitzbergen, arctic North-America): In Greenland we carried a 9 mm pistol. It was also possible to fire 11 mm explosive ammunition with it which explode on impact and cause noise during flight. They are shot using ammunition for warning shots. Furthermore, we carried signal rockets (white, yellow, green, red) in case of emergencies.
- **Camera equipment:** The less electronics, the better. We used Minolta X-700 and XD-7 cameras, which had proven to be very reliable and robust on other trips. Before the trip, Minolta equipped both camera cases with special graphite oil suitable for cold temperatures. The camera should never be taken into a warm room, as condensation will occur immediately. In order to avoid freezing of eyebrows to the metal parts of the camera case, one can use a rubber coating. Be very careful when handling films at temperatures below -30°C . They become brittle. It is best to pre-warm the film in a pocket and then be quick during changing. It is almost impossible to change film with big gloves on – either do a lot of practicing at home or be quick while wearing only thin gloves. Be careful when rewinding a film – don't go too fast otherwise the film may tear. I am not sure about cameras with auto-rewind: they may be going too fast, and you may have problems. Recommended lenses: wide angle lense 24mm or 28mm, Zoom lens to 200 mm, normal lens 50 mm. It is sufficient to use films of 100 ASA. If you are traveling in the polar night, it is recommended to carry more sensitive film and a tripod for good shots of polar lights. We do not yet have experiences with digital cameras at extreme low temperatures.

More Questions?

Please contact me at the e-mail address (andy_h@mountainbike-expedition-team.de) for further questions and hints.