

WHAT COULD POSSIBLY GO WRONG?

KITE-SKIING IN ANTARCTICA

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I was catching up with Leo Houlding during a mountain film festival when he received a call to say one of his upcoming expedition members had to pull out. “Where can I possibly find someone who can kite, ski, climb, take two months off without pay, has Antarctic experience, photography and cinematography skills, and can join me at short notice?” he asked. “I can,” I said casually, not expecting him to take me seriously. “You’re in” was all he said.

Extreme sports in an extreme environment provide a thrill that is difficult to match with any other activity. The physical difficulty, technical requirements, and utmost isolation combine to create a unique challenge. This was the start of a 70-day, 2000 km kite-skiing and man-hauling journey across Antarctica to climb the Spectre, one of the most remote mountains on Earth.

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Into the cold

We flew into Union Glacier Camp (UGC) in Antarctica, a logistic and support base for expeditions. It had a medical clinic staffed

by doctors and nurses with experience in extreme medicine and a focus on emergency, cold & altitude-related injuries and illnesses. There were no imaging, surgical or transfusion services at the clinic, but most minor issues were treated on-site while severe conditions were stabilised before evacuation to definitive care. Evacuation flights were costly and could take days to organise due to weather conditions. Therefore, we had to pay a \$100,000 rescue bond, carry medical evacuation insurance and understand the risk of being unable to get to definitive care in time...

As soon as we left UGC, we were alone and had to manage any medical emergencies ourselves. I was grateful for my ski patrol experience, expedition guiding and first-aid qualifications. We also carried a comprehensive medical kit and a communications plan for emergencies. As was the case with all our equipment, we had to balance need against weight - our pulks weighed about 200kg each, and we had to pull those! The next stage was to fly from UGC to as far inland towards the South Pole as the fuel in the Twin Otter would take us.

We landed 3000m above sea level at

-35°C with a 10-15 knot wind. Although not extreme, 3000m is high enough to induce acute mountain sickness (AMS) in 15-35% of people^{1,2}, which is worse when flying instead of walking. Although unlikely at these relatively low altitudes, generally, if left untreated, AMS can deteriorate into high-altitude pulmonary oedema (HAPE) and high-altitude cerebral oedema (HACE), which can be fatal. Fortunately, we had already spent some days acclimatising at UGC, which is at 700m, and our daily altitude gain from here would be minimal.

The beauty and serenity of the Polar Plateau was overwhelming, but the bitter cold forced us to set up the tents and get inside to cook a warm meal. I woke up during the night to a full-blown Antarctic storm with 40-knot gusts of wind threatening to blow the tent away. Losing the tent would be a disaster as it was our only protection from the intensely hostile environment outside. Therefore, we ensured the tent was secure, snow drifts were managed, and there were no accidents involving the stove. With the wind chill, the outdoor temperature was -70°C, which meant we had to do any outdoor work with mittens rather than



Image: Kiting for hours and days in one direction.

gloves. This is not easy, but frostbite can develop within seconds of exposure at these temperatures, so we had to accept the lack of dexterity to keep our fingers.

Finally, after four days, the storm settled, and we could start kiting. We rigged our 9m kites, knowing they were too big for the wind conditions and we would be overpowered, but they were the smallest we had, and bigger kites helped get the heavy pulks to move. The downside was that momentum would keep them moving, so we had 8m traces (ropes) on the pulks to slow them down (or hopefully stop them) if we crashed. Being run over by a fast-moving, 200kg pulk conjured up all sorts of potential trauma situations, which would be hard to deal with in such a remote location. We also tied knots in the rope, a standard glacier travel technique. The idea was that if a pulk should fall into a crevasse, the knot would catch in the crevasse lip and stop the pulk from pulling us in behind it.

We kited for the next week, each day travelling as far as possible. The winds were much stronger than forecast. We expected 10-12 knot winds but were battling 20+ knot winds. We held onto the kites each day



Image: Leaving UGC means you're on your own if anything goes wrong...



Images: Our first storm: 40-knot winds and -70°C.



Image: Bigger kites meant we were overpowered, but they helped to get the pulks moving.

until it became apparent that holding on for longer would result in an injury. Most kitesurfing injuries result from trauma, with an incidence of 7-17 injuries per 1000 hours of kiting^{1,2,3}. Injuries usually occur when landing from a trick or when the safety mechanism of the kite is unable to be released, and the kite gets dragged through obstacles. In our case, we were not planning on any tricks (at least not intentionally), so injuries were more likely to occur due to overuse or being dragged into a crevasse.

Eventually, as we started dropping down from the Polar Plateau, the surface we were kiting on became blue ice with massive ridges and crevasses big enough to hide a car. It all looked a bit like we were on an icefall... The wind was more than 25 knots and if we flew the kites overhead, we would lift off. The pulk skids failed to gain traction, and the pulks started overtaking us down the hill, which was not a good situation! We packed the kites and gingerly skied the pulks to the bottom, trying not to get dragged head-first into a crevasse behind one of these deadweights. After 2 hours we found some snow where we could camp. We spent a few more days walking the most crevassed areas, skiing the rest until we were only one kilometre short of our destination: the Spectre.

I went slightly ahead of my two friends to set up an arrival shot, but disaster struck when one of the pulks broke through a snow bridge and fell into a crevasse, pulling my friend towards the crevasse. Fortunately, one of the knots we tied to the rope caught on the lip of the crevasse and stopped his fall. It all happened in seconds and could have been fatal. It took hours to drag them out of the crevasse using a complicated pulley system.

The Climb

We camped below the impressive 1000m granite faces and started our climb. Due to the weight constraints, we only had lightweight crampons and ice axes intended for ski touring, not climbing. However, that is all part of the challenge. After 15 hours of difficult and dangerous climbing on a new route, we finally reached the summit. The sensation of isolation was overwhelming. We were the most remote humans on earth, wondering whether we would get down or home.

We started to head down and returned to our tents after another 6 hours. Thirty



Image: Kiting towards the Spectre.

minutes later, a storm blew in. We were lucky. Any longer on the mountain, this would have turned into an epic of survival.

Finally, we started the 1500 km journey back home, daily spending hours and hours man-hauling the pulks uphill, weaving around crevasses and over ice bulges. Finally, the terrain improved after five days, and we could kite-ski again. We made 36 km upwind that day (110 km of actual kiting as we had to tack upwind). The wind was in the right direction, and 100 km days became the norm. In some places we almost reached 50 km/h. It sounds easy, but all your weight is on the downwind foot, affecting the circulation.

Injuries

Overuse injuries are rare in kitesurfing. There are even fewer studies on kiteskiing and none on kiteskiing in one direction for several hours on consecutive days (and weeks) in freezing temperatures. The stance

required to resist the kite's pull can cause repetitive trauma and pressure on the toes, compromising circulation and increasing the risk of freezing injuries⁴. The apparent wind created by moving with the kite further increases the risk of freezing injuries to the face. My goggles froze, reducing my ability to see, but when removing the goggles, I could feel the liquid in my eyes freezing over between blinks. Even inside our 8000m down suits, ski boots three sizes too big, with special liners and a neoprene overboot, our feet still became too cold. Fortunately, we all returned with a full complement of toes and fingers.

Most high-altitude mountaineers are familiar with frostbite of the fingers, toes and face. However, there are two conditions which are almost unique to the polar regions, in particular Antarctica: "polar penis" and "polar thigh". Although both conditions are cold-induced, they are different. A "polar penis" is a freezing cold injury, similar to a

frostbite of other extremities. It occurs when the skin is exposed to temperatures below freezing and results in vascular changes, the formation of ice crystals in the tissues, inflammation, coagulation within vessels, ischaemia and necrosis⁵. A couple of years ago, a Finnish cross-country skier developed the condition while competing in a 50km event in icy conditions. However, an 8000m down suit provides better insulation than the average cross-country skiing clothing. In Antarctica, it is more likely to occur if you forget to zip up your pants after relieving yourself. This may seem unlikely, but the odds change once fatigue, mild hypothermia or dehydration starts affecting your judgement.

"Polar thigh" is more controversial. There are no published studies on the incidence, pathophysiology, risk factors or treatment of this injury, but there are anecdotal reports from polar explorers who have experienced this. It seems exclusive to Antarctica, which



Image: The pulk is being hauled out of the crevasse with a pulley system.



Image: The Spectre is one of the most remote mountains on Earth, with stunning surroundings.



Image: Kiting with heavy loads and strong winds for hours in one direction.

is much windier and drier than the Arctic. Cold is a factor in all cases, but there may also be some microstructural damage to the skin, possibly caused by loose fabric flapping in the wind and whipping the skin. Others blame wool underwear and possible bacterial contamination. It usually involves the anterior thigh, but the calf and other areas have also been reported. The injury initially looks like a non-freezing injury, which develops skin ulcerations and eventually necrosis, often requiring skin grafts. Fortunately, none of us lost any skin to the environment.

The end of the journey

We were travelling through a moon-like landscape—dead and deserted but also pristine and breathtaking. One day, it culminated in a beautiful atmospheric display. The ice crystals in the air reflected the sun's light to produce a fantastic double sun dog. This was straight out of a science fiction movie in a far-away galaxy!

We continued our journey home, travelling 203 km one of the days. I was kiting along, enjoying the speed, when I glanced left and saw my friend flying high above his pulk (the kite had lifted him off the ground), with arms flailing in the air to keep his balance. This wasn't good. He landed very hard in soft snow (good), but the pulk was still travelling at 35 km/h towards him (not good). Then, just before running over him, it veered to the right and stopped next to him. We were still several hundred kilometres from home, and any significant trauma would have been a major challenge. After confirming that he wasn't injured, I asked him to repeat it so I could get it on camera. He declined...



Image above: A double sun dog created by ice crystals in the atmosphere reflecting the sun's light.

Image right: The sense of accomplishment is enhanced by the difficulty of the journey.



The rest of the journey was relatively uneventful, but with good wind and an amazing variety of snow conditions: wood-hard snow with one-metre-high sculpted waves and even some beautiful, smooth powder. We had to stop kiting in strengthening winds and eventually walked the last 5 km into camp, pulling the pulks.

Relieved to be back in one piece, I reflected on what we achieved. We wanted to reach and climb a spectacular mountain (quite possibly the most isolated on Earth) via a new style of travel. There was a fair bit of suffering along the way and many opportunities for things to go wrong, but fortunately, they didn't - and I loved every moment!

"The secret to happiness is flow. The best moments usually occur when a person's body or mind is stretched to its limits in a voluntary effort to accomplish something difficult and worthwhile."

– Hungarian psychologist Mihaly Csikszentmihalyi

References

1. Lundgren L, Brorsson S, Osvalder AL. Comfort aspects important for the performance and safety of kitesurfing. *Work*. 2012;41 Suppl 1:1221-5.
2. van Bergen CJ, Commandeur JP, Weber RI, Haverkamp D, Breederveld RS. Windsurfing vs kitesurfing: Injuries at the North Sea over a 2-year period. *World J Orthop*. 2016;7(12):814-20.
3. Bourgois JG, Boone J, Callewaert M, Tipton MJ, Tallir IB. Biomechanical and physiological demands of kitesurfing and epidemiology of injury among kitesurfers. *Sports Med*. 2014;44(1):55-66.
4. Russell KW, Imray CH, McIntosh SE, Anderson R, Galbraith D, Hudson ST, et al. Kite skier's toe: an unusual case of frostbite. *Wilderness Environ Med*. 2013;24(2):136-40.
5. McIntosh SE, Freer L, Grissom CK, Rodway GW, Giesbrecht GG, McDevitt M, et al. Wilderness Medical Society Clinical Practice Guidelines for the Prevention and Treatment of Frostbite: 2024 Update. *Wilderness Environ Med*. 2024:10806032231222359.

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