

Aberystwyth University

Kamchatka Expedition

2011

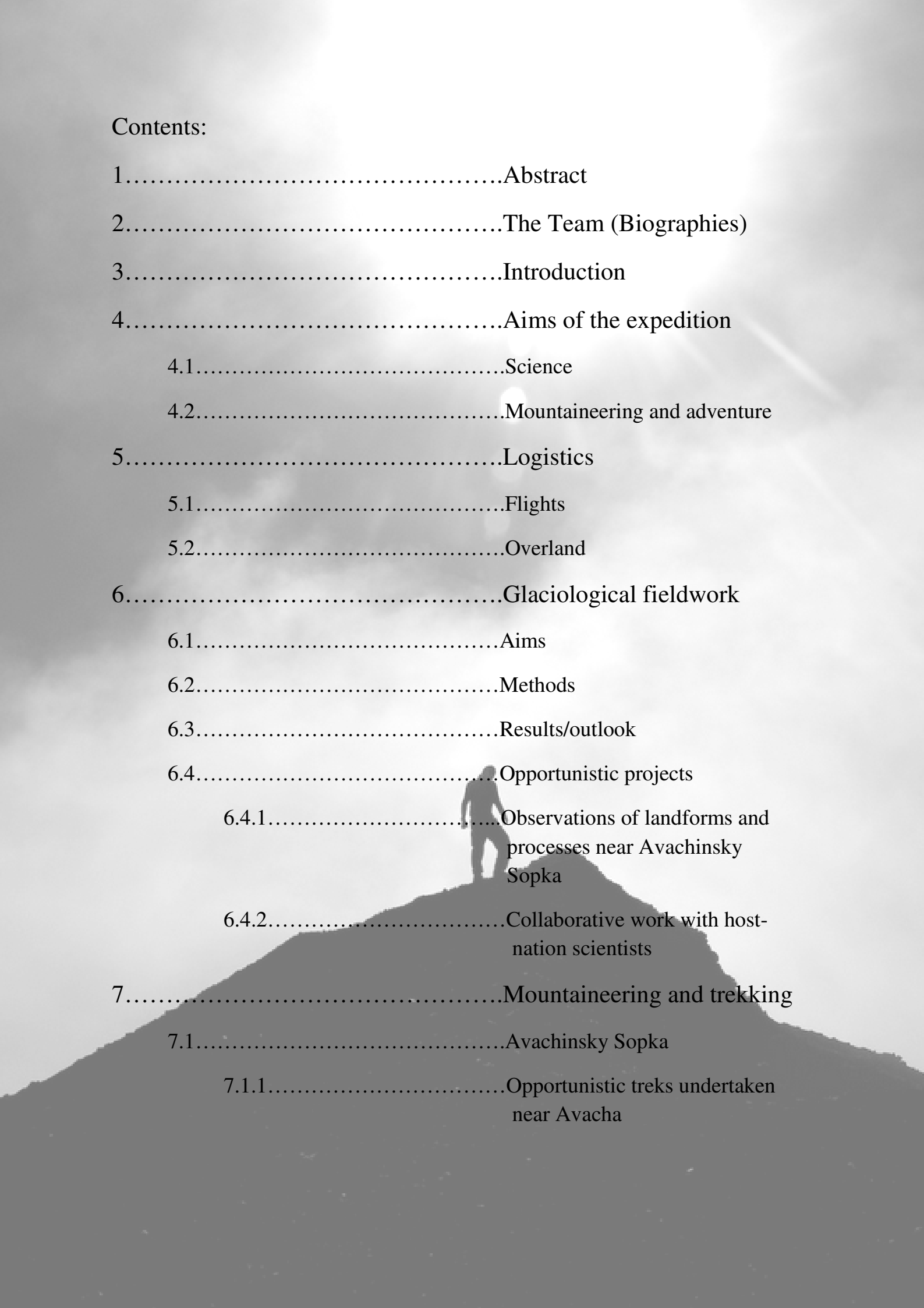
Final Report



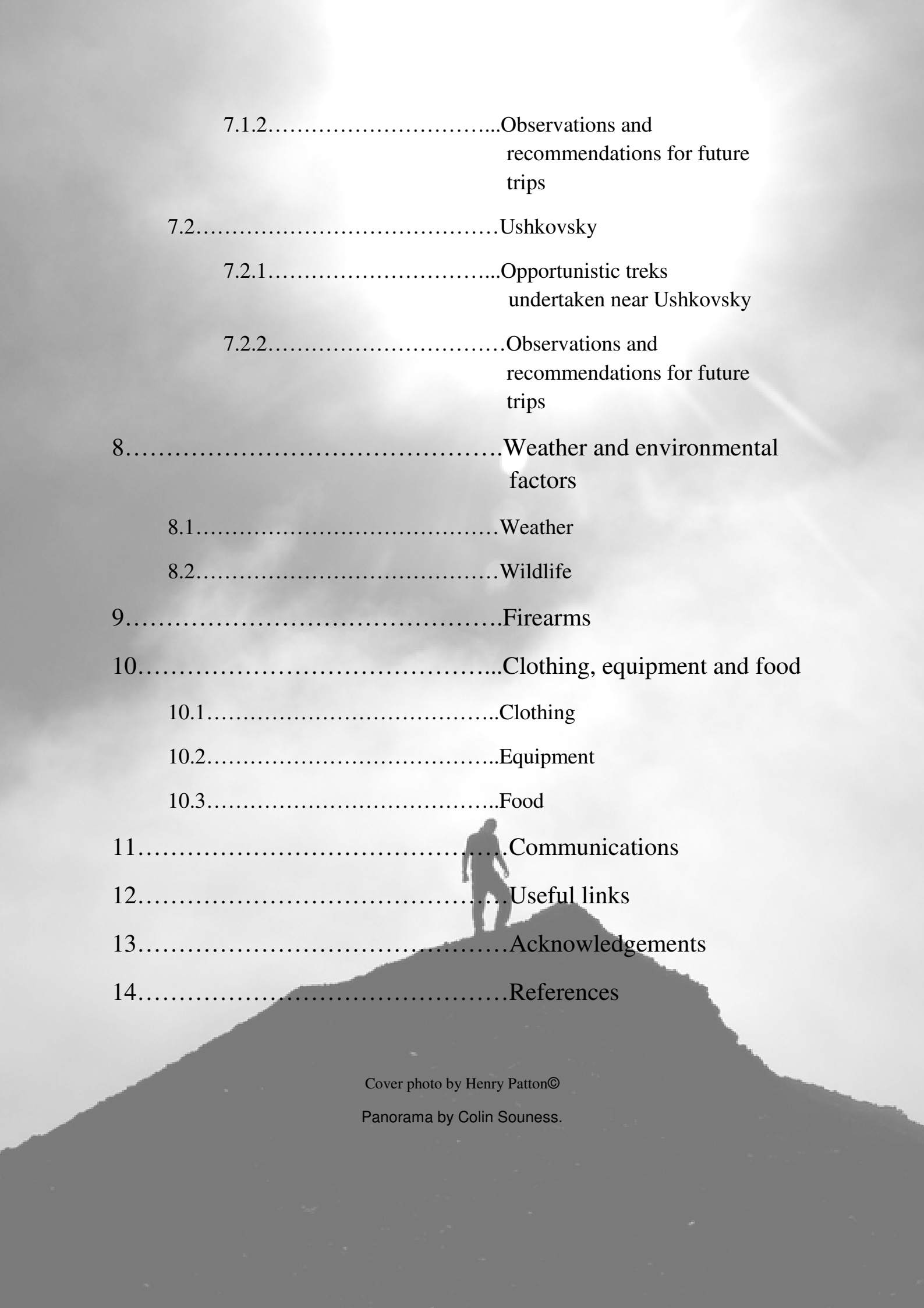
Mr Colin Souness (Expedition Leader)

Mr Henry Patton

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Panorama by Colin Souness.

1. Abstract

The Aberystwyth University Kamchatka Expedition took place between 18th August 2011 and 10th September 2011. During this period Colin Souness and Henry Patton travelled from the U.K. to the Russian Federation's far-eastern Kamchatka Peninsula with two aims. These were to first conduct Mars-analog glaciological research on the ash-covered glaciers that characterise the slopes of many of Kamchatka's volcanoes, and secondly to complete ascents of two of these volcanoes: Avachinsky Sopka (2741 m) and Klyuchevskaya Sopka (4750 m), the latter being the highest active volcano in Eurasia.

The expedition was a success. Valuable observations were made of Kamchatka's unique glaciers and Avachinsky Sopka was successfully summated on the 22nd of August, 2011. Unfortunately an ascent of Klyuchevskaya Sopka was not possible due to the heightened risk of rockfalls (The expedition coincided with the period following a prolonged eruption [March 2010 – December 2010]). However, the expedition's party of two were able to ascend one of Klyuchevskaya's neighbouring peaks; Ushkovsky (3943 m). This ascent of a rarely climbed peak was completed on August 31st, 2011, and proved to be one of the most memorably rewarding undertakings of this mountaineer's career to date.

The expedition party were also provided with the opportunity to work for a short time with a small team of Russian geo-scientists from the Russian Academy of Sciences (Moscow). Thus, following completion of our own objectives, we assisted in the recovery of measurements from data loggers recording temperature in volcanic scoria-based permafrost layers on the slopes of the Tolbachik volcano.

This report details the organization of the expedition, as well as results from fieldwork and accounts of the mountaineering undertaken. Based on our experiences, a number of recommendations are given for future travellers to Kamchatka.

The compilers of this report and the members of the expedition agree that any or all of this report may be copied for the purposes of private research.

2. The team

The Aberystwyth university Kamchatka Expedition team consisted of two persons: Mr Colin Souness (Expedition Leader) and Mr Henry Patton. Both members are currently (and were at the time of the expedition) full-time glaciology PhD students at the University of Aberystwyth.

Below we present short biographies on both team members. These were personally written by the members themselves and are included in order to further achieve our aim of fostering a spirit of adventure and exploratory ambition within both the geosciences and amongst young scientists as a group. We hope by introducing ourselves to give a little information on our backgrounds and to offer some insight into how we came to be interested and involved in undertakings such as this.

Colin Souness (Image 1) (29), originally from Lochgilphead in Argyll and Bute, became fascinated with the mountains and glacial landscapes of Scotland earlier than he can remember. Moving away from the West Highlands when still very young, he went on to attend high school in the Scottish Borders town of Peebles and later studied Geography at Edinburgh University. It was during these studies that he discovered the full extent of his love for glaciology and cold, icy places.

Colin Graduated from Edinburgh University in 2004 with a 2.1, having specialised in glacial geomorphology and physical geography fieldwork. In his honours year Colin undertook group fieldwork in Iceland, before leaving for a season in west Greenland where he conducted his dissertation research studying sub-glacial bedrock erosion features known as 'p-forms'.

Following his graduation from Edinburgh, Colin spent five months crewing a yacht with glaciologist Alun Hubbard in and around Antarctica before joining the Royal Air Force as a junior officer. However, missing all things glacial, Colin left the RAF in 2007 to re-commence his studies, enrolling as a Masters student in glaciology at Aberystwyth University. Graduating from this MSc in 2008, Colin is now working towards his PhD researching the glacial landscapes of Mars.

Colin's interest in Russia began during high school, most likely thanks to the flair of his history teacher, Mr Peter Waller. Having studied the Russian Revolution in his final year at Peebles High School Colin resolved to visit Russia at some point. This did not occur until 2006 when he and a friend travelled to Moscow and St Petersburg in the depths of a – 35° Russian winter. However, with just one visit Colin was hooked, fascinated by both the Russian people and their overwhelmingly huge landscapes. This country was clearly somewhere where a young Brit could really find adventure! Over the course of 5 subsequent visits Russia has never disappointed.

Today, Colin's mountaineering and wilderness experiences include an ascent of Mt. Olive in Argentinean Patagonia, several field seasons in the Swiss Alps, two field seasons in west Greenland, one field season working on the Eyjaffjallajökull glacier in Iceland, a solo ascent of north Africa's highest peak; Mt. Toubkal (in winter conditions, a season's fieldwork in the Nepalese Himalayas and a lifetime of activities in the Scottish highlands. Colin has also crewed a sailing yacht on a trans-Atlantic crossing from west Greenland to Scotland and, in the Russian Federation, has visited Murmansk on the Russian Arctic coast, Labytnangi in northern Siberia and the Caucasus Mountains. Here, in the Caucasus, Colin has led successful mountaineering ventures to the summits of both Mount Elbrus and Mount Kazbek, the former trip approaching from Nalchik in southern Russia and the latter from Tbilisi in the former Soviet state of Georgia.

Colin also works as a crewman on his local lifeboat and enjoys caving, climbing, riding his motorcycle and generally getting outdoors as often as he can.

Henry Patton, (Image 1) (26), is currently a postgraduate student at Aberystwyth University. In his spare time he is an active caver in Wales and beyond, and keen explorer under- and over-ground.

Henry, born and raised in rural North Devon, started caving in 2003 with Reading University Caving Club and quickly embraced the sport, becoming president of the club the following year. After graduating and moving to Wales to continue his studies, Henry joined the Aberystwyth Caving Club and Bristol Exploration Club, through both of which he is actively involved organising and leading groups underground most weekends. Henry now regularly goes 'digging', pushing the limits of known subterranean exploration often in the far end of some of Britain's largest cave systems. Not content with just local caves, Henry has crossed the Irish Sea three times now with different groups on expedition to help 'push' caves in County Clare and County Fermanagh. His active involvement within the caving community has led him to become a member of cave rescue teams in North and South-Mid Wales (the NWCRO and SMWCRT), and regularly attends rescue training sessions, as well as participating in real emergency situations.

Now researching a PhD in glaciology, Henry has had the opportunity to study and explore in glacial regions around the world including Iceland, Svalbard, Greenland, Kamchatka and the Alps. Keen to combine his two major interests and push the boundaries of exploration further, Henry has involved himself with several forays into glacial karst. In 2010 he travelled to the Greenland Ice Sheet with 400 metres of rope with the aim of breaking the record descent into ice. Although unsuccessful, the trip has stimulated other adventures. More recently he joined a small band of cavers to the Gornergletscher in Switzerland to explore the internal drainage system of the glacier. With conditions looking promising, a return trip is being planned to make an attempt at diving some of the sumped passages found. Henry is of course no stranger to the mountains either. One bonus of studying in deepest Wales is the stunning collection of hills right on the doorstep. Further afield, Henry has climbed volcanoes in Kamchatka, ice-locked ridges in Svalbard, and snow-blasted Munros in the Scottish Highlands.



Image 1: The team: Colin Souness (left), the expedition leader, sailing in Nova Scotia, Canada, and Henry Patton (right), deep underground in full caving apparel.

3. Introduction

The Aberystwyth University Kamchatka Expedition was originally conceived in order to explore the unique glacial environment that exists on the flanks of Kamchatka's colossal volcanoes. This desire to explore came from both an outdoor, adventurous attitude deeply rooted in both team members and from a desire to advance both science in general and our understanding of the natural world as it exists here on Earth and elsewhere in the Solar System.



Image 2: Koriaksky volcano as seen from the north western slope of Avacha. Photo by Colin Souness.



Image 3: Composite image of Henry walking on the plateau, Ushkovsky in the distance on the left and Klyuchevskaya and Kamen volcanoes emerging from cloud on the right. Photo by Colin Souness.

4. Aims of the expedition

4.1. Science

The expedition leader, Colin Souness, is engaged in research into the nature of glaciation in the mid-latitudes of the planet Mars. Most of this work is highly interpretive and depends largely upon comparison with the glaciers found here on Earth. Unfortunately, Mars' glaciers are very different to ours, one major difference being that they are all buried beneath a layer of dust and rocks. A similar environment exists in Kamchatka's glaciated areas. Here, where eruptions still occur on a regular basis – Kamchatka being part of the extremely active Pacific ring of fire – glaciers are regularly buried under a layer of volcanic debris (Image 4), including both fine ash deposits and larger, basaltic blocks and lava bombs. It was hoped that by exploring these areas in Kamchatka and by inspecting the smaller-scale landforms that can be observed atop the glaciers here we might better equip ourselves to understand the morphology of Mars' glacial landforms. As surface landforms can be used to make inferences about mechanical processes occurring within terrestrial glaciers, any similarities that exist between Kamchatka's glaciers and the glacier-like forms (GLFs) observed in Mars' mid-latitudes may help us to understand how Mars' glaciers formed and how they behave today.

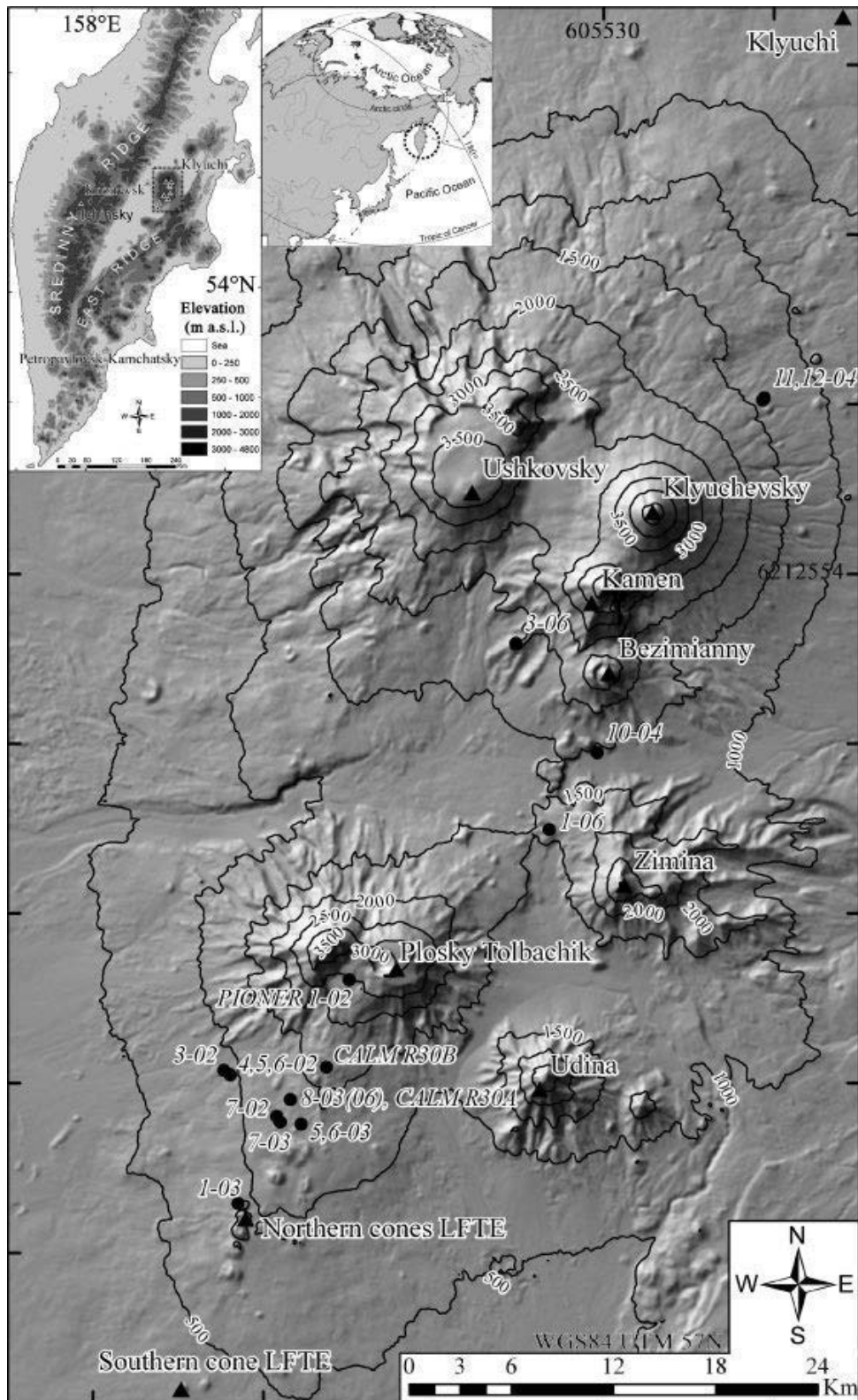


Image 4. An example of a volcanic debris-covered glacier in Kamchatka (lat, 53.2913, lon, 158.8147). This particular glacier flows from the northern slope of Avachinsky Sopka, the closest active volcano to Kamchatka's capital; Petropavlovsk-Kamchatsky. Notice the various colours on the glacier's surface where ash of different mineralogy has been incorporated from different parts of the volcano's slopes. Image by Colin Souness.

4.2. Mountaineering and adventure

Being active adventure sportsmen both (see Section 2.), the two team members were also inspired by Kamchatka's unique and wild landscape (Images 2 + 3). Thus, it was also our intention to explore the mountaineering and hiking potential offered in this most eastern of Russia's wild lands. We set our sights on Avachinsky Sopka – a moderately high and accessible but active volcano close to Kamchatka's capital city – Petropavlovsk-Kamchatsky – and Klyuchevskaya Sopka (see map 1); altogether a more serious prospect at 4750 m, making it the highest active volcano in either Europe or Asia. The first of these, Avachinsky, is accessible on foot after only a 20 km walk from the nearest road. Klyuchevskaya on the other hand is somewhat more remote, the summit being almost 50 km (as the crow flies) from the nearest village. Thus, Klyuchevskaya posed a very tempting opportunity to escape the beaten track and experience Kamchatka's wilderness whilst Avachinsky offered a simple but attractive acclimatisation and orientation venture. Both mountains however promised truly epic views and a chance to really get to grips with an emphatically foreign and unspoilt land like no other.

Another of our aims was to publicise our venture as widely as possible within the university, within our scientific sphere and within the mountaineering community in general, the intentions being to foster a more adventurous ethos within the geosciences and young scientists more generally, and also to promote a more open attitude towards Russia generally, possibly encouraging more co-operation between our nations both in the realm of science and elsewhere.



Map 1: The locations of Kamchatka (top middle inset), Petropavlovsk-Kamchatsky (top left inset) and Klyuchevskaya Sopka (Klyuchevsky / Klyuchevskoy). From Abramov et al., (2008).

5. Logistics

The expedition was planned and executed almost entirely independently, thus expenditure on planning, transportation and documentation (permits etc) was minimised. Transport options, routes and local services were researched independently with minimal external assistance. The only concession to host-nation support was made in arranging visa registration. This was done through Martha Madsen at 'Explore Kamchatka' tour operators in Yelizovo (near Petropavlovsk-Kamchatsky [henceforth 'PK']), who were also kind enough to let us billet in their barn whilst based in the area. Visa registration can be completed at the immigration office, but in this case, given the militarised nature of the area, we opted to have this documentation secured through a tourist operator.

5.1. Flights

Our outbound flights from the UK (Heathrow to Moscow) were purchased through www.Expedia.co.uk and were with Lufthansa, changing in Frankfurt. From Moscow we flew to PK via Khabarovsk with Vladivostok Air. These flights were purchased through 'e-dreams' (www.edreams.com). The return route to Moscow from PK was the reverse of the outbound, while the final leg to the UK was with Brussels Air, changing in Brussels, Belgium.

5.2. Overland

The expedition used public transport for almost all movements. Local busses in and around the PK area were very cheap and easily used. Travel to the start of the Avachinsky Sopka approach route was arranged by taxi. Upon our descent from the mountain several days later we hitch-hiked and then used service busses in order to get back to Yelizovo.

Getting to Klyuchevskaya Sopka first required that we travel to the village of Kozyrevsk which lies 350 km north of PK. A public service bus (number 216 [image 5]) makes this journey every day and tickets can be bought from the main bus station in PK (lat, 53.0717, lon, 158.5921). These cost the equivalent of approximately £20.00. Note that tickets cannot be bought from the bus station in Yelizovo, although the bus does stop here en route north from PK. The journey takes almost 9 hours and stops at several points, although only twice for any substantial length of time; in the town of Milkovo and at the river crossing just south of Kozyrevsk. Note however that this journey time may decrease in coming years as the road is slowly being paved (currently only the first 80+ km are paved) and a bridge is being built over the Kamchatka River, whereas at the time of our expedition this river was crossed via a floating pontoon towed alongside a worn-looking tug (image 6).

From Kozyrevsk, we secured carriage through the woods (approximately 20 km) to the treeless plateau which surrounds the Klyuchevskoy mountain cluster. This transportation was arranged privately through one 'Natalya' whom at the time of the expedition could be found in the shop 'Magazine Barz' at the southern end of Kozyrevsk's main drag. The ATV was an ex-military 'ZIL' 6x6 truck with seating for at least 16 people (Image 7), plus a driver naturally (Image 8). The cost was equivalent of ~ £300 each way. This is expensive, even for Kamchatka, but is more manageable if split with others or amongst a large group. Regardless, any reservations you may have about the cost will quickly evaporate when (and you almost certainly will at some point) you see your first bear.

The ATV journey to 'Stolik' or 'stools' takes over 3 hours and from there onwards its an on-foot job. Your ATV driver might offer to take you further. Refuse. The Klyuchevskoy area is a wilderness of tundra that does not regenerate quickly, therefore tracks will last for an extremely long time – likely decades or more.



Image 5: Two busses parked during the stopover in Milkovo, approximately halfway between PK and Kozyrevsk. Photo by Colin Souness.



Image 6: The crossing of the Kamchatka River: achieved courtesy of one very tired looking barge, an equally tired looking tub and a some absolutely superb HGV manoeuvring skills. Photo by Colin Souness.



Image 7: Our very capable 6x6 Russian-manufactured 'ZIL' ATV. Photo by Colin Souness.



Image 8: The ATV driver: Alexander. A solid character if ever I met one. Photo by Colin Souness.

6. Glaciological fieldwork

6.1. Aims

It was our intention to visit the Bogdanovitch glacier (the dominant ice body flowing south from the Klyuchevskoy massif [see Map 2]) and make observations initially to establish whether these debris-covered glaciers could be used as analogs for Martian glacier-like forms and subsequently to record the surface morphology of the glacier so as either to facilitate such analog-based work or simply to record the nature of the supraglacial terrain on these unique glaciers.

6.2. Methods

Upon arrival at our highest camp at 2200 m two days were spent conducting a simple visual survey of the upper Bogdanovitch glacier.

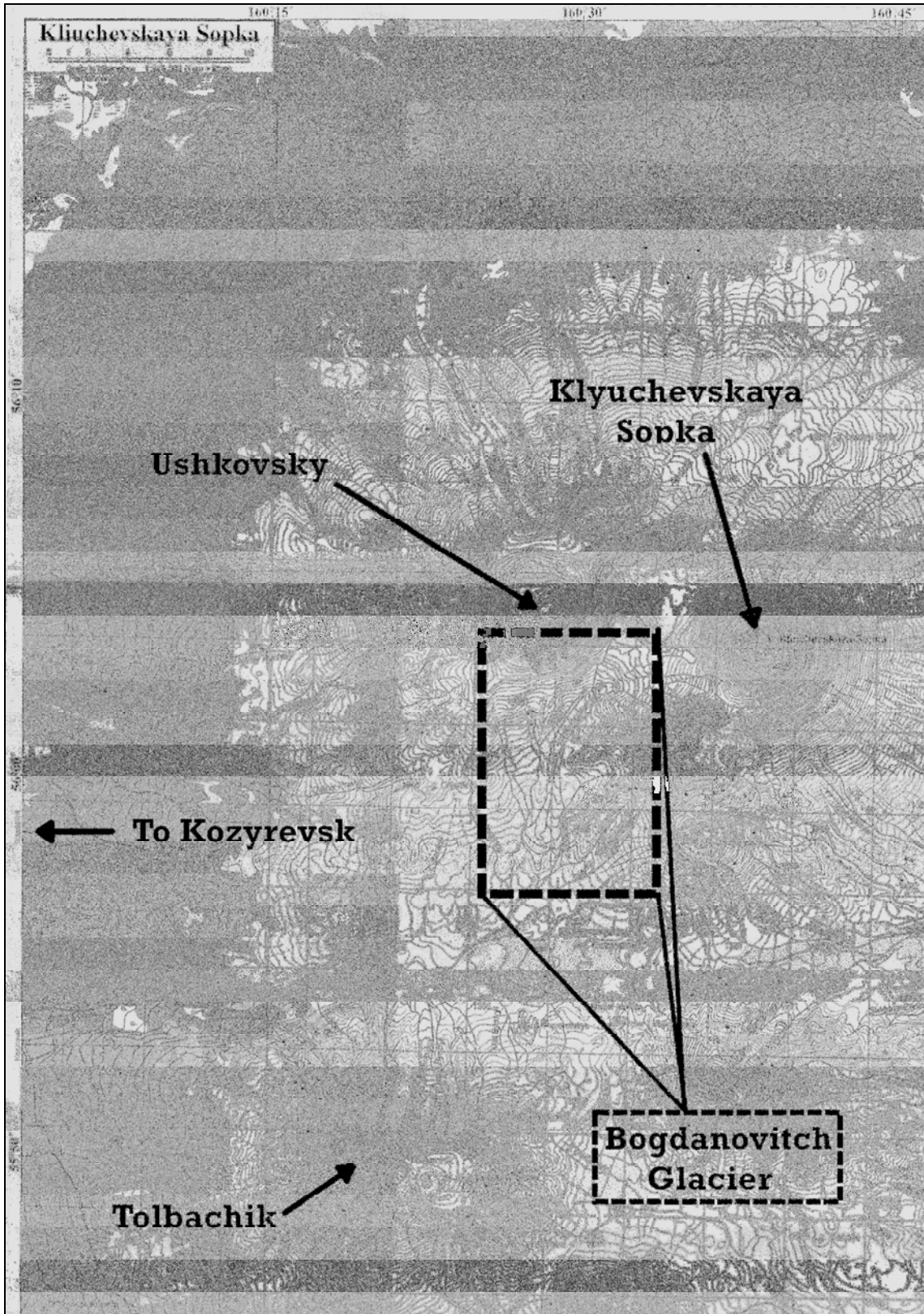
The survey was conducted by eye, assisted by a compass, a GPS, satellite imagery (ASTER image 2011055) and a map of the area. Detailed maps (1:100,000 scale) of the area were kindly supplied by Andrey Abramov from the Russian Institute of Sciences, Moscow. Simple morphological sketch maps of the glacier's surface were drawn, characterising the meso-scale ice formations and textures visible from the adjacent moraines, as well as the nature of the overlying debris and the orientation of intraglacial topography and crevasses. These sketch maps, along with satellite imagery and a number of digital photos taken of the surface, will be used to inform the production of more detailed morphological maps at a later date. These maps will then permit the comparison of the dominant surface morphologies of the Bogdanovitch glacier to Martian glacier-like forms.

A number of photographs were also taken of the Bogdanovitch glacier from various vantage points along the western lateral moraine and neighbouring mountain buttress. The purpose of these multi-angle shots was to permit construction of a digital elevation model (DEM) utilising photogrammetric techniques. This DEM will hopefully permit quantitative, as well as qualitative, analyses and comparisons to be drawn. A basic Canon EOS 500 digital SLR camera was used to gather these images.

Unfortunately, weather conditions were poor and our fieldwork was somewhat curtailed when low cloud set in and obscured the glacier (and everything else for that matter) for 36 hours. By the time this weather cleared time constraints demanded that we move on to fulfil our other objectives.

6.3. Results/outlook

The data from this venture has yet to be processed. However, a poster presentation is in preparation for display at the 42nd Lunar and planetary Sciences Conference in The Woodlands, Texas, in March 2012. This will be a collaborative work between Colin Souness of Aberystwyth University, UK, and Dr Andrey Abramov from the Russian Academy of Sciences (RAS), Russian Federation.



Map 2: The location of the Bogdanovitch glacier relative to Kozyrevsk, Klyuchevskaya Sopka, Ushkovsky and the Tolbachik glacier. Adapted from 'Kamchatka Map and Guide' published by EWP expeditions, 2003.

6.4. Opportunistic projects

Much to our satisfaction, the landscape of Kamchatka, as well as a chance encounter with some researchers from the RAS, furnished us with the opportunity of both making observations and gathering tentative data beyond that which was outlined in our original expedition proposal, as well as assisting the afore-mentioned Russian party in their research and thus aiding us in fulfilling our subsidiary objective of fostering a more co-operative attitude between our two nations and promoting international collaboration in science (Images 9 + 10). Details of these opportunistic ventures are given below.

6.4.1. Observations of landforms and processes near Avachinsky Volcano

The loose scoria deposits that line the sides of Avachinsky and its neighbouring peak; Koriaksky, house a great many gullies and debris fan deposits. These bear a striking similarity to many gullies and comparable debris forms often found in association with GLFs in Mars' mid-latitudes. In particular, the almost amphitheatre-shaped gullies observed in these scoria deposits closely resemble the 'valleys' in which many GLFs are observed to have formed. This similarity can be seen in both overall relative (not absolute) dimensions (proportions) and in the apparent sinuosity and spacing.

A quantity of images and some numerical observations were taken for possible future analysis.

6.4.2. Collaborative work with host-nation scientists

Upon our return from the Klyuchevskaya volcanic area we encountered and befriended a team of three Russian scientists from the RAS who had been studying permafrost deposits and thermal behaviour in the Klyuchevskaya area. Their team leader, Dr Andrey Abramov, asked us if we would assist him in recovering data from loggers that had been placed on the flanks of the nearby volcano Tolbachik. We gladly accepted the offer and spent a day in the field assisting him on Tolbachik's slopes (Images 9, 10 + 11). This proved to be a thoroughly interesting day in a truly spectacular environment. We also forged a friendly relationship with Dr Abramov and later travelled back to Moscow with him.



Image 9: Dr Andrey Abramov (left) and the ATV driver, Alexander, unearthing a buried temperature probe and data logger on the lower slopes of Tolbachik. Photo by Colin Souness.



Image 10: Dr Abramov and Alexander with Tolbachik behind. Photo by Colin Souness.



Image 11: Henry admiring the view from one of Tolbachik's smaller craters. Photo by Colin Souness.

7. Mountaineering and trekking

The mountaineering and trekking opportunities offered by Kamchatka proved to be nothing short of phenomenal, and the views and vistas we were lucky enough to gaze upon over the course of our expedition were truly breathtaking.

7.1. Avachinsky Sopka (2741 m; lat 53.256, lon 158.834)

After arriving in Yelizovo on the 19th, Henry and I spent the following day orienting ourselves, recovering from jet-lag, purchasing some essential foodstuffs and briefly exploring Petropavlovsk-Kamchatsky. This done, we got a good night's sleep and woke up on the morning of the 21st ready to approach Avacha.

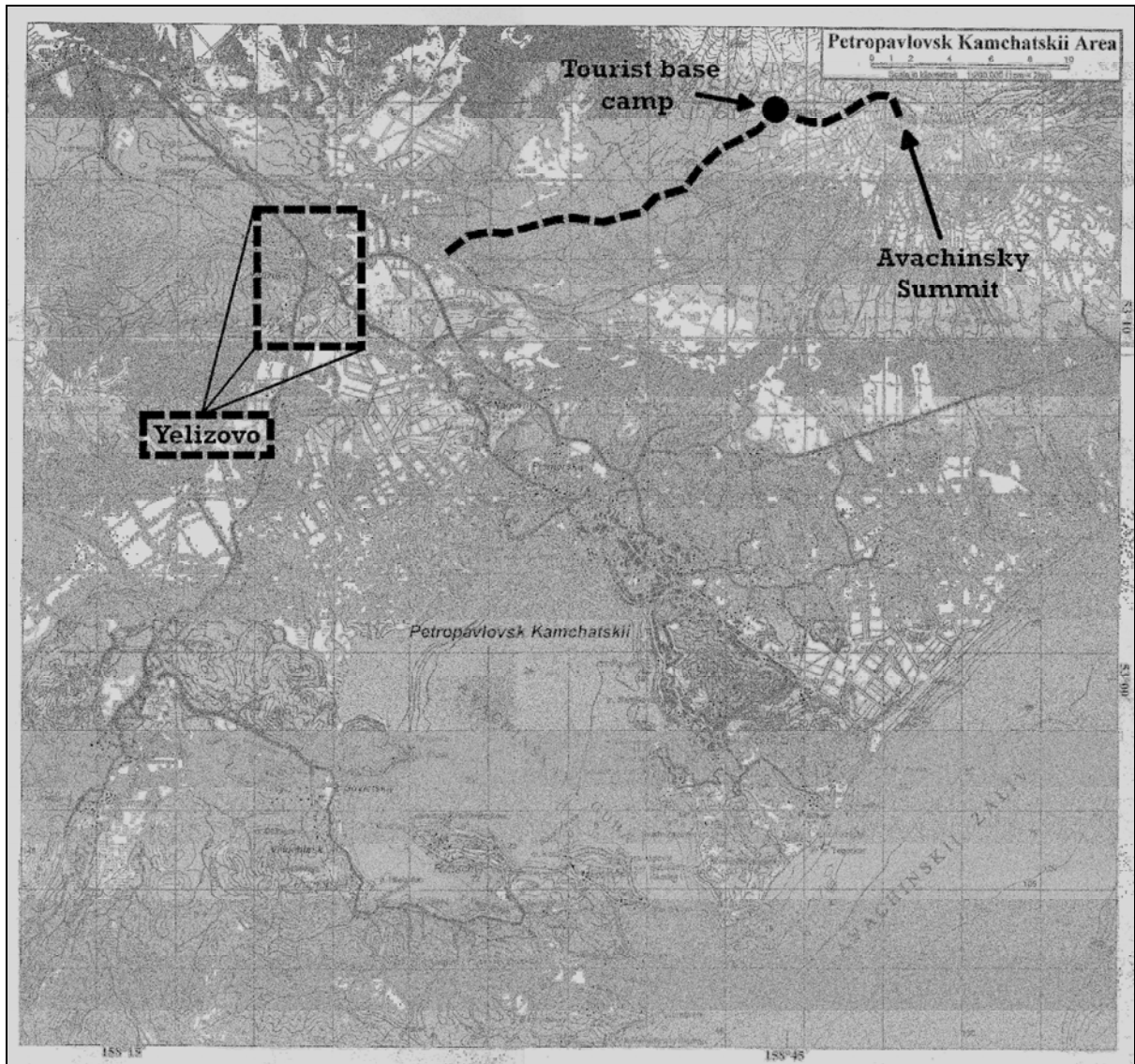
We used a local taxi to get us to the start of the approach route before shouldering our packs and setting off on foot along a seasonally dry riverbed in the direction of Avacha base camp. This is approximately a 15 km hike over good ground (Map 3). The route is frequented by 4x4 owners and large ATVs packed with tourists also heading to the slopes of Avacha. This makes it very hard to get lost as there are always tracks visible. However, the route is not so busy that you do not feel quite alone most of the time. Even more so as there are still bears around. We encountered one set of very recent prints (see Image 25 in section 8).

This approach hike was finished after only a few hours but in hot weather and with full packs weighing over 20 kg each it was quite tiring. We reached base camp in the early afternoon but settled down for the remainder of the day to rest and enjoy the scenery. We intended to be fit and prepared for an attempt on Avacha the following day.

The following morning the wind was blowing strongly but the sky was clear, as it had been on the previous two mornings we had spent in Kamchatka thus far. However, we had seen that visibility on the summit of Avacha tended to decrease towards late morning and into the early afternoon; therefore we were keen to get going early and hoped that the wind would ebb with the rising sun. This did not happen until well into the morning and our progress up Avacha's lower slopes was marred by severe winds which whipped us around on the often narrow approach ridge. Eventually however, as we passed approximately 2000 m, the wind did indeed let off and we slowly ascended the final, steep, few hundred metres of Avacha's broad, steaming cone.

Although not the first to attain the summit that day (a local mountain rescue volunteer had literally jogged past us already) the crater was deserted when we got there, offering unobstructed views over the spectacular surrounding landscape (Image 12). Although clouds formed intermittently we had plenty of opportunity to appreciate the panorama before they eventually set in properly about an hour later. To the east the Bering Sea stretched clear and blue, whilst to the west Koriaksky struck violently up through the horizon like a directional marker to the heavens (see Image 12). Immediately south was PK and Avacha Bay with Viluchik volcano beyond. Everywhere: wild nature. This was augmented by the excitement of standing in what is essentially still an active volcanic crater! Geological activity is still very much apparent with billowing fumaroles that constantly bellow huge clouds of sulphurous steam into the frigid air (Images 13 + 14). These can be seen even from Yelizovo, 32 km away, but when on the top one can walk right up to them (Image 14). Don't step too close however, as the steam really is searingly hot.

The crater can be crossed on foot, however the loose rock (Image 15) in the centre depression is extremely unstable and sharp, and great care must be taken. We climbed and scrambled into the eye of the beast before deciding that it was just too unpredictable underfoot and that we therefore ought not to hang about.



Map 3: The location of Yelizovo, Avachinsky Sopka, the tourist base camp at which we also pitched our tent, and the route followed, all relative to Petropavlovsk-Kamchatsky. Adapted from 'Kamchatka Map and Guide' published by EWP expeditions, 2003.



Image 12: The view west to Koriaksky volcano over the bright red scoria deposits on the summit of Avachinsky Sopka. Photo by Colin Souness.



Image 13: Steam rises into a frigid, sun-rent sky from a deep fumarole in the rim of Avacha's sulphurous crater. Photo by Henry Patton.



Image 14: Colin gets close to the action near one of Avacha's several fumaroles.
Photo by Henry Patton.



Image 15: Patterns in the rock; fractured lava in the Avachinsky crater. Photo by Colin Souness.

Having successfully made the summit and taken in the views in fine weather we descended at a good pace, returning to camp in the early evening. In all, the day's climb had taken almost 10 hours, and we thoroughly enjoyed our dinners that evening. A map of our route on this climb is included (Map 3).

The following day's activities are recorded below (section 7.1.1.), and we returned via the same route by which we arrived on the 21st of August, re-attaining the paved road on foot and afterwards getting back to Yelizovo by hitch-hiking and public service bus.

7.1.1. Opportunistic treks undertaken near Avacha

We had originally scheduled a weather day in case conditions forced a postponement of our ascent of Avacha. As it happened, the weather was very good and we were able to head for the summit on the first day after arrival at camp. This left us a day in hand which, fortuitously, also happened to be a good weather day. Thus, in no great hurry to return to PK (we had already booked our bus tickets north to Kozhyrevsk therefore were unable to bring that part of the trip forward), we decided to explore the immediate area a little more.

We trekked northwards over the scoria deposits that coat the pass between Avacha and Koriaksky, taking observations and photographs of gullies and debris fan deposits for possible later analysis. We also ascended two moderately-sized crags (Image 16), the first of which was known as Camel Rock. Some notable sights along this route are the black scoria desert itself (Image 17), the strange arid land vegetation that inhabits it and the view northwards.

7.1.2. Observations and recommendations for future trips

We were surprised how busy this area proved to be. Future trips should be aware of this. Avacha is not a remote ascent by any means. This suited us as it was intended only as an acclimatisation and orientation venture. Nonetheless, be under no illusions. Although the vast majority of other hikers and campers are Russian locals, you will not be alone if you stop at the main camp area at 900 m. A little further however on the scoria pass you will be very much alone, albeit without a water supply.

An interesting and worthwhile venture might be to continue northwards via this camp, passing over the scoria desert pass and beyond into what appears to be a truly wild expanse.

Finally, as always, be cautious of bears. One was sighted and chased away from the camp area not long before our arrival, and we personally saw fresh tracks on the approach route as mentioned previously. Only a few weeks before we landed in Yelizovo two people were killed by a bear very close to the city. So, just because you are near PK do not make the mistake of assuming you are safe. This is Kamchatka, and bears really are almost everywhere.



Image 16: Colin 'cragging' north of Avachinsky base camp. Picture by Henry Patton.



Image 17: Henry crossing the scoria desert. Picture by Colin Souness.

7.2. Ushkovsky (3943 m, lat 56.070, lon 160.471)

As covered earlier in this document (Section 4) our initial objective had been to complete an ascent of Klyuchevskaya Sopka – Eurasia’s highest active volcano. As such, and given the limited information we had been able to gather on the Klyuchevskoy area prior to arrival in Kamchatka, we sought expert council from Kamchatka’s professional mountain rescue service (located in PK just off the somewhat deserted seeming ‘Bezimiani’ bus stop). Here we had an audience with local mountain veteran Feodor Feodorovitch who filled us in on all the salient details. It was his strong recommendation that we not attempt Klyuchevskaya as it was always (and particularly at that time following a severe eruption 6 months previously) prone to unpredictable and unavoidable rockfalls. Only a few months before a seasoned guide had been killed in just one such rockfall on the flanks of Klyuchevskaya.

Given our situation, our small group (2) and the lightweight (minimal equipment and thus weight to carry) nature of our venture, we concluded that to proceed with an ascent of Klyuchevskaya in spite of Feodor’s professional warning would be irresponsible. Thus we re-planned and decided to ascend Klyuchevskaya’s neighbour – Ushkovsky; an altogether less unstable mountain but with equally world-beating views, and possibly somewhat less well-known and less often visited.

After a 9-hour bus journey north (see Section 5) we arrived in Kozyrevsk where, in between frantic mosquito evasion efforts, we found camping facilities at ‘Maria’s’ (see Section 7.2.1.) and arranged ATV transport (Image 18) through the bear-infested woods and up onto the 1000 m plateau which surrounds the Klyuchevskoy volcanic group. We arranged to be dropped off at ‘Stolik’ (stools) where there is an obvious bothy-style hut in which you can stay on basic plank beds for free if need be. From here we would be walking.



Image 18: Alexander and our ZIL truck. Photo by Henry Patton.

From our de-trucking point (about 1 mile short of Stolik as it happened, for our 6x6 ZIL got stuck!) we trekked across more than 27 km of open tundra, initially in variable fog, navigating by map and compass. As a precaution against bear attack we would never remain on site at an eating stop for any more time than necessary. This meant stopping briefly for lunch and then doing likewise for dinner, packing up and moving on a further few miles before setting up camp at the end of the day. This reduced the risk of food aromas attracting unwanted visitors. At camp we kept all food (sealed) outside, and slept with flares and mace handy.

On the night of the first day we made it to almost the snout of the Bogdanovitch glacier (see map 4 for approach route and camps). On day two, after a fearful night's sleep (the first of many), we moved up the western lateral moraine and into the lateral meltwater stream's gorge. We followed this up to an elevation of 2200 m where the gorge petered out and the ice plateau began to spread. The whole way from Stolik to this 'high camp' we saw frequent bear prints and other evidence of bear activity such as freshly dug pits near rodent burrows and the occasional bear stool. The weather was, by this point, good, and we spent the remainder of the day orienting ourselves and making some initial observations of the route up Ushkovsky as well as taking photographs of the glacier's surface for later analysis.

On day 3 we conducted fieldwork, inspecting the glacier from the vantage point of the southward-protruding spur (Map 4) which leads along the glacier at an altitude of approximately 2300 m, above but parallel with the moraine. Unfortunately the weather on this day was very variable, with the glacier regularly being obscured by cloud. This compromised the quality of the data we were able to gather (see Section 6). The trek was nonetheless thoroughly enjoyable, with intimidating cliffs facing westwards and a sighting of an ermine by Henry (Image 31).

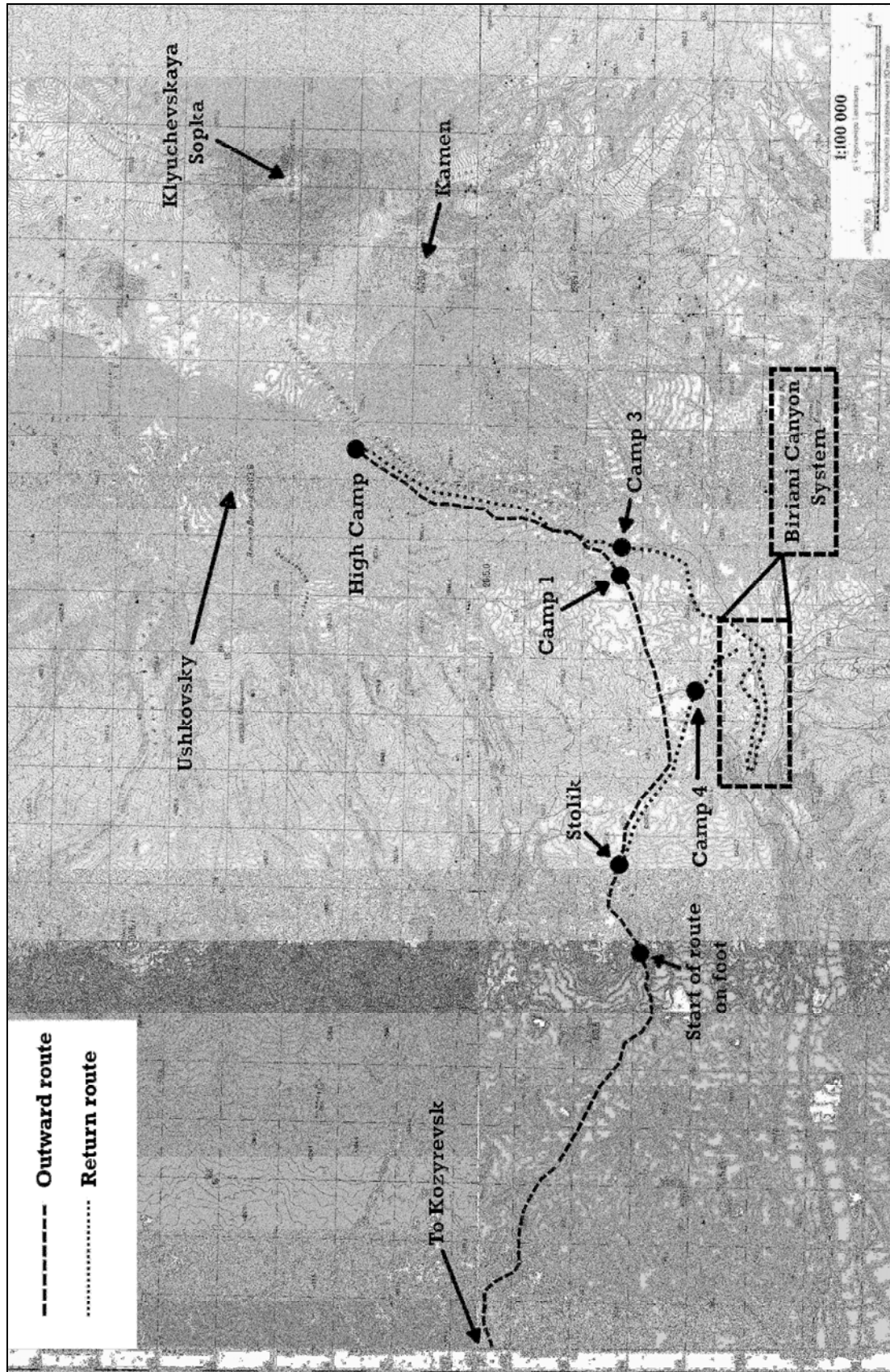
Day 4 was completely written off by dense fog that settled on our camp, restricting visibility to less than 5 m for most of the day. Only towards late evening did it clear sufficiently to see the glacier below. By 1 am however the sky was clear and the stars were out, promising a good day for the following day's climb.

And a good day it was! We roused ourselves at 4 am under a crisp night sky and after an anxious night in our sleeping bags (almost 36 hours in our sleeping bags actually). As soon as breakfast had been prepared and scoffed we headed for Ushkovsky's lower slopes, selecting one of the lava ridges as our approach route (see map 5 for route up Ushkovsky). The weather was cold and clear, and the ground was comfortably frozen solid underfoot, making for good walking. We donned crampons after perhaps only 90 minutes and from there onwards progress was made on often steep snow and ice. The ground was fresh and completely un-trodden by the foot of man and we felt privileged to be here, breaking virginal ice with each step.

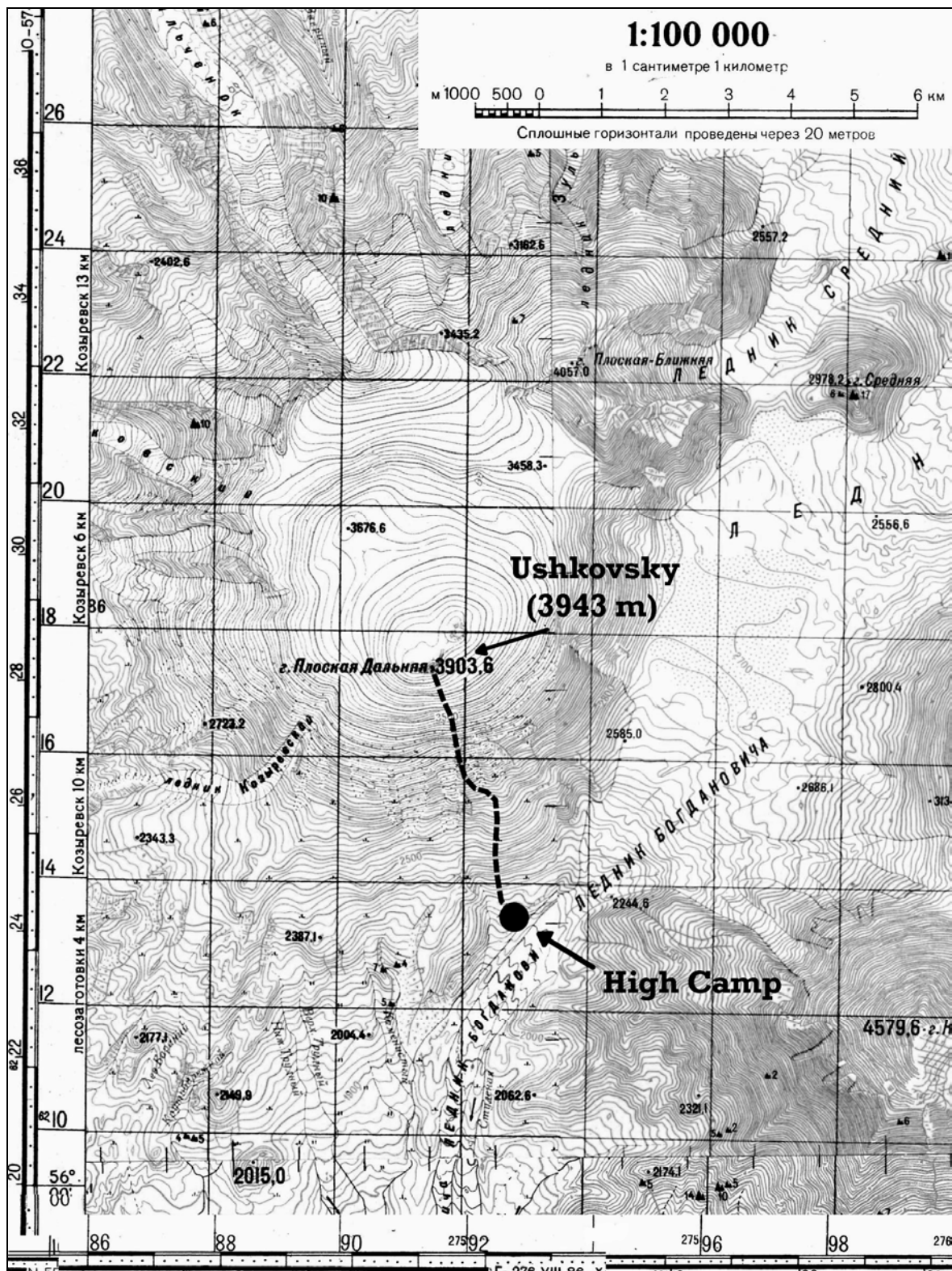
As the sun rose it cast colours over the landscape that truly defy words (see images 19 + 20). The early light burned the clouds around Klyuchevskya's summit a bloody red, reminding us of Tolkien's Eye of Sauron. As these faded in time the rest of the sky inherited a glowing bronze shade which slowly leaked over the summit of Klyuchevskoy, spilling like liquid gold over the icy plateau and the Bogdanovitch glacier (Image 21). This view is perhaps the finest I have ever seen.

We could have stood for a lifetime watching these views, however very quickly, several lenticular clouds began forming over the summits across the ice from us (Image 22), heralding a drop in pressure and winds to come. We decided that time was of the essence if we were to make the summit so tore ourselves away from the staggering vistas (Image 23) and continued upwards. We reached the top at around midday after completing the last stage of the ascent over snow-covered glacier ice.

The wind on the summit was fierce, at a guess approaching 80 mph, so strong that the eddies caused pressure variations sufficient to cause fluctuations of more than 40 m in the readings from my altimeter. Suffice to say that we did not stick around, especially as the view from the very top was



Map 4: Approach route and return route to Ushkovsky in the Klyuchevskoy Park area. Also shown are Stolik, our campsites, the summits of Ushkovsky, Klyuchevskoy and Kamen, and the location of the Biriani canyon system. Composite of 1:100,000 scale USSR RSFSR survey sheets N-57-9; N-57-10; O-57-141; O-57-142. 1980.



Map 5: The route taken up and down Ushkovsky. Both high camp and the summit are indicated and the route is shown as a dashed line. For a photo of the leading ridge route see image 24. Please note that the longitudinal gridlines and scales do not match exactly. This is because the map is a Composite of 4 maps: 1:100,000 scale USSR RSFSR survey sheets N-57-9; N-57-10; 0-57-141; 0-57-142. 1980.

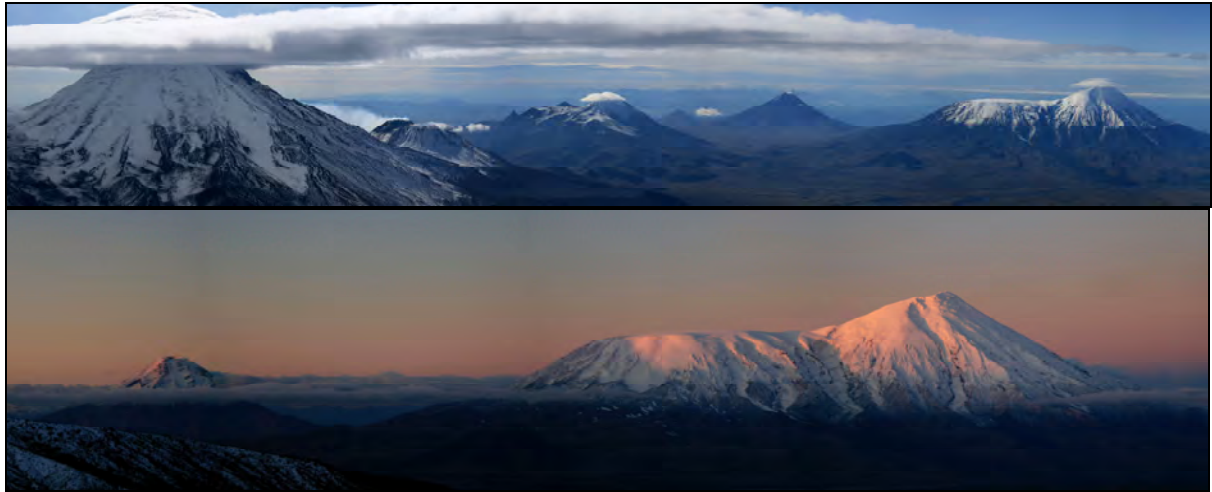


Image 19: south from Ushkovsky at dawn (bottom) and after it (top). Tolbachik is to the right of both images.
Photos by Colin Souness.



Image 20: The dawn's light casts blood-red rings around the summit of Klyuchevskoy. Photo by Henry Patton.



Image 21: Looking south over the Bogdanovitch glacier. Photo by Colin Souness.



Image 22: Henry climbs on as formidable clouds begin to form over Klyuchevskoy.
Photo by Colin Souness.



Image 23: Colin drinks in the view as the Sun rises over Klyuchevskoy. Picture by Henry Patton.

now obscured by light cloud. We took a celebratory picture and began our descent eastwards and back to high camp.

Unfortunately, by this time the air temperature had risen and the ground was no longer frozen. This made the descent much longer and far more hazardous than we would have liked. The loose volcanic deposits that make up the slopes of the volcano were absolutely treacherous. Filled with air spaces by years of freeze-thaw activity, once warmed the scoria slips underfoot like liquid mud making progress painfully slow with or without crampons. Snow deposits were little better. We spent some time indeed traversing the upper reaches of one particular glacier. Fortunately however, after many hours of painstakingly picking our way back down the mountain, we re-gained high camp and settled down to a well-earned dinner of Ainsley Harriot's 'World Kitchen' Cous Cous (Image 26).

The following day we headed back down the moraine to the snout of the Bogdanovitch glacier. This took all day over bad ground and with heavy loads. Towards the end of the day progress was also slowed by poor visibility. We became a little way-laid by the lateral meltwater river and were forced to ford it at a shallow point (see image 27). Many various prints were seen along this river, including both bear and wolf. Extreme caution and alertness were called for frequent evidence of bear activity was everywhere.

After another night of tenuous sleep we awoke to thick fog. However, we opted to move on regardless, aided by our map, compass and GPS. The alternative of sitting and eating inside the tent in active bear territory was not attractive.

Progress was slow on this particular day but eventually we found our objective: the entrance to a long network of basaltic canyons. We spent the remainder of this day exploring these canyons before heading back up onto the plateau and camping out in a shallow river gully.

The next day – day 8, we woke to a visit from a particularly attractive and bold red fox. This made for some very cute photo opportunities (Image 29). Soon enough however we were forced to shoo the visitor away as he was becoming a little TOO confident. We then quickly had breakfast before completing our return trek to Stolik where we settled down and awaited the arrival of our driver on the following day. With an actual door and solid walls between us and the bears, this was the best night's sleep we had had for some time.

7.2.1. Opportunistic treks undertaken near Ushkovsky

During our interview at the mountain rescue post in PK prior to our journey north Feodor had alerted us to the presence of the well-developed basaltic canyons at the foot of the Biriani Creek (see Map 4). As both Henry and I were active cavers, and in all likelihood we would never have the opportunity to visit this place again, we decided to figure a round-trip of the canyons (actually 2 canyons that divide and then re-converge some km down-stream) into our return plans.

This venture proved to be very satisfying, if initially difficult to achieve given very poor visibility which made finding the canyons hard work. The extent to which roaring meltwater has incised this hard volcanic rock is truly impressive and the river bed and walls have been scoured into some exceptionally beautiful shapes. Although one can only walk along the edge of the active southern channel the ferocity of the water its self makes for a memorable sight even aside from the carved rock. The dry northern channel however offers some scrambling opportunities near the eastern end of the canyon. All well worth seeing (see image 28).



Image 24: Our route up Ushkovsky via a leading basaltic ridge. Photo by Colin Souness.



Image 25: Henry negotiates the upper slopes of a small glacier in slushy, slippery conditions.
Photo by Colin Souness.



Image 26: Henry appreciating some tasty food! Klyuchevskoy behind. Photo by Colin Souness.



Image 27: Henry fording a meltwater river after we strayed somewhat off route. Photo by Colin Souness.



Image 28: Henry puts his caving skills to good use exploring the winding clefts of the basaltic Biriani canyons.
Photo by Colin Souness.

7.2.2. Observations and recommendations for future trips

For treks and hikes aside from the mountains, we can recommend the canyon system described above in Section 7.2.1. To be fair though, the sky is the limit here!

To arrange ATV passage as an independent and un-supported group see Natalya, who works in a shop called ‘Magazine barz’ at the far southern end of the main drag in Kozyrevsk. She did at the time of our expedition anyway. Alternatively seek advice from Maria, who owns a small but very pleasant and hospitable guest house (it is signposted, so you shouldn’t miss it) with chalets and camping facilities on Bezimiani Prospekt. She speaks only Russian but is very friendly and helpful. Failing both these options, just ask around. Kozyrevsk is small and everyone knows everyone else. However, when the road bridge over the Kamchatka river is finished things will change I am sure. Kozyrevsk will likely become far less isolated and there may be more options available to travellers very soon.

Running water is readily available on the tundra plateau beneath the peaks and also on the lower slopes of the volcanoes themselves (during the melt season at least). This may not be the case during winter, but at that time plentiful snow and ice will provide a ready source, though the glacial streams will be heavily silt-laden.

Bears, bears bears! Always be wary of bears. Seek guidelines on travelling in bear country and follow them. Also, we strongly recommend sourcing bear mace and also flares. These, if nothing else, are a valuable psychological crutch. We fortunately never had cause to test their effectiveness directly.

The hut at Stolik is well built, cosy and often has non-perishable food supplies for the needy to partake of. We recommend stopping here on your way in / out of the Klyuchevskoy Park. It is also a good place to meet other trekkers, climbers or sightseers of various nationalities. This could be helpful for ‘ride sharing’ or simply gathering information on climbing conditions and environmental factors on the mountain.

Finally, bring LOTS of mosquito repellent and a net hat. Kozyrevsk, during peak bug season, is indescribably bad for mozzies. It is reputed as being the worst place in Kamchatka for mosquitoes, and that is saying something. If trying to save money you may consider camping by the river. Don’t. Just don’t even think about it. We went for a stroll and lasted little more than 5 minutes. Any area of bare skin exposed for more than a few seconds will be stuck and sucked before you are even aware of whats happening. Truly awful. However, mercifully, the plateau beneath Klyuchevskaya is clear of these horrid little creatures. Well, at least it was for us.

8. Weather and environmental factors

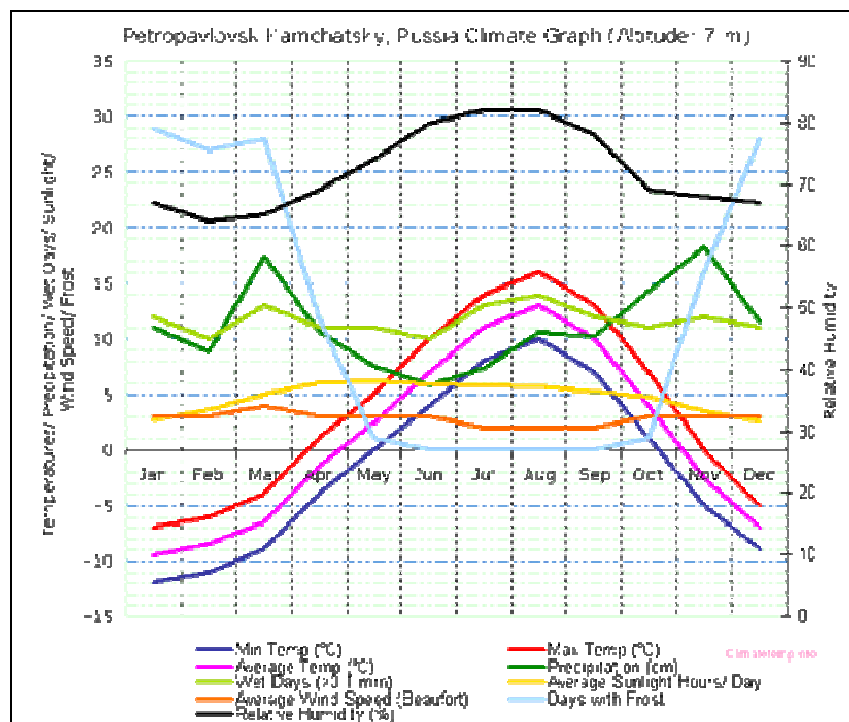
8.1. Weather

The weather during our stay in Kamchatka was for the most part good. In and around PK over the first week or so it was spectacular, with clear blue skies everywhere except on the summits most of the way through the day. It is worth noting however, for climbing in particular, that summits were, even on the best days, generally obscured from late morning into early afternoon and beyond. The early morning offered the best chance of cloud-free views.

Weather in the PK area later in the trip (early September) was overcast and misty with a fair amount of rain. These weather systems seemed to last for several days rather than the day-to-day variability common to the united Kingdom.

Weather in Kozyrevsk is variable, although we experienced no extremes. In the Klyuchevskoy park however conditions are very volatile. In particular, be well prepared for low visibility on the plateau. Fog can descend very quickly and can leave you with almost zero visibility. We met one individual who became separated from his colleagues and was not re-united with them for almost 6 hours. Even putting your bag down for a few moments can be risky. Therefore, a GPS is strongly recommended.

Conditions on the summits are what one might expect; changeable. Winds up at 4000 m can be brutal, but in general the normal rules of thumb apply. If it's a clear night (though not too clear) you are probably in for a clear day.



Annual weather chart for Petropavlovsk-Kamchatsky (above)
and basic weather stats for Kamchatka (below) (from www.explorekamchatka.com)

Location	Mar 1-May 31	June 1-Aug 31	Sept 1-Nov 30	Dec 1-Feb 28
Petropavlovsk-Kamchatsky	March -6°C 120 mm precip	June +8°C 40 mm precip	Sept +10°C 80 mm precip	Dec -6°C 100 mm precip
	April -2°C 80 mm precip	July +12°C 40 mm precip	October +4°C 120 mm precip	Jan -9°C 100 mm precip.
	May +3°C 60 mm precip	August +14°C 80 mm precip	Nov -2°C 120 mm precip	Feb -10°C 80 mm precip
Kozyrevsk near Klyuchevskoy group of Volcanoes	-4°C 40 mm precip	+14°C 110 mm precip	0°C 160 mm precip	-18°C 100 mm precip
Esso	-4°C 110 mm precip	+13°C 140 mm precip	-2°C 100 mm precip	-16°C 280 mm precip

The best piece of advice is, as always, be prepared for any eventuality. Expect the worst and make good of the best. Kamchatka weather can be as miserable as you are likely to encounter anywhere. Likewise however it can be spectacular. Make sure you have good, functional and durable equipment. If you go it alone (i.e. without a guide or trekking company) you will certainly never be left in any doubt of the fact that you really are getting to grips with the wilderness.

8.2. Wildlife

Bears

As has been alluded to many times (and hell, its worth saying again), watch out for bears! Take bear protection. Don't leave ANY food lying around. Make noise. Stay alert. Don't let your guard down. This is tiring, but necessary. Seek professional guidelines on how to behave in bear areas / encounters.

General

Kamchatka has many beautiful and varied creatures living wild and naturally in its lands. In the north the native Chukchi still herd huge numbers of Reindeer, moving with them nomadically through the seasons. Further south the native ways are less obvious, but wildlife still abounds. You may see foxes, ermine, wolves (if you are lucky), elk, moose, and many varied species of bird.



Image 29: A bear print on the approach route to Avacha. Photo by Colin Souness.



Image 30: A foxy friend en-route back from Klyuchevskoy. Photo by Henry Patton.



Image 31: A stoat spotted near high camp on Ushkovsky. Photo by Henry Patton.



Image 32: A gopher / ground squirrel near Avachinsky. These little guys are everywhere and you will grow to know their different calls, including the alarm call, which could be useful for avoiding bears...
Photo by Henry Patton.

9. Firearms

As a non-Russian national you will not be able to legally acquire any firearms, either on rental or to purchase. We did look into this for anti-bear reasons, but the only way to get a gun is if you are with a commercial hunting or trekking company. As independent travellers, don't investigate too thoroughly, especially before you secure your visa. Drawing attention to yourself is not recommended.

10. Clothing equipment and food

10.1. Clothing

As discussed above, bring light but functional, and above all durable clothing. The Kamchatka environment can be unforgiving and, in all likelihood, you will be living remotely, so ensure you have the gear to survive. If you really want to blend in (both into the surroundings and into society) ex-military camouflage clothing is great. Most Russian men in Kamchatka aged 20 – 50 seem to wear military fatigues, whether in the services or not, so you will certainly look the part.

10.2. Equipment

This expedition was supported by DMM climbing Wales™, and both expedition members carried DMM ‘Cirque’ ice axes. We were also received support from Kahtoola™ crampons and both wore Kahtoola KTS Steel crampons. The tent used was a Vango™ ‘Banshee’, and both expedition members slept in North Face™ ‘Blue Kazoo’ sleeping bags.

For cooking we used a primus stove (Image 33) which we ran on petrol bought at a petrol station in Yelizovo. This stove was extremely economical; a single fuel bottle’s worth of petrol, costing less than the equivalent of £1 provided heat for 8 days worth of dried meals and drinks.

We also carried a small, 1-man Trangia™ and two bottles of meths in case of emergencies or in case the primus became unserviceable.



Image 33: Henry fires up the primus. Photo by Colin Souness.

10.3. Food

The main concerns for us in selecting foodstuffs were that they be light, be quickly prepared using minimal fuel and water, be tasty (for morale), have a high carbohydrate content (for energy) and be as odourless as possible in order to reduce the likelihood of bear attack.

Our field rations (see Image 34) consisted primarily of packaged cous cous sachets (Ainsley Harriot's world kitchen range brought from the UK, which were very tasty), dehydrated mashed potato, simple packs of instant noodles bought locally in PK, beef jerky and biltong (brought from the UK), nuts and seeds, shredded beef suet far added fatty content (brought from the UK), Porridge oats (bought locally), dried fruits (bought locally), dried octopus (bought locally) and cured sausage (bought locally).



Image 34: Some of the delicacies enjoyed by Henry and myself during the expedition.
Photo by Colin Souness.

11. Communications.

Due to the remote and isolated nature of Kamchatka's terrain we acquired a satellite phone prior to departure from the UK. This was carried throughout our time in the field (Image 35). We also had mobile phones, however signal was very unpredictable out with the towns and city. However, with a Russian sim card it is possible to get signal even up amongst the Klyuchevskaya peaks!

If buying credit for a satellite phone in the UK we recommend purchasing from an American, US-based company and not from a British one. For one month's line rental including 70 minutes of call time a UK-based firm would have charged us approximately £150. I bought my sim from X-Sat global in the US state of Georgia and including priority international shipping, the cost came to less than £100. Therefore, if you have time to await postage (the sim came in 4 days) buy US.



Image 35: Colin orders morale-boosting pizza using the satellite phone. Photo by Colin Souness.

12. Useful links

The expedition:

<http://henrypatton.org/2011/fire-and-ice>

Tourism:

<http://www.wildkamchatka.ru/eng/>

<http://www.explorekamchatka.com/index.html>

Government:

<http://rusemb.org.uk/?aspxerrorpath=/Default.aspx>

UK Foreign Office on Russia:

<http://www.fco.gov.uk/en/travel-and-living-abroad/travel-advice-by-country/europe/russian-federation>

13. Acknowledgements

The Aberystwyth University Kamchatka Expedition would like to thank:

The Mount Everest Foundation;

The Earth and Space Foundation;

Kahtoola Crampons;

DMM Climbing, Wales;

Martha Madsen at 'Explore Kamchatka';

Maria in Kozyrevsk;

Andrey Abramov, the Russian Institute of Sciences, Moscow;

Godzillaz Hostel, Moscow;

Dr Alun Hubbard, for loan of a satellite phone;

Dr Bryn Hubbard, for his patience;

Alex Messenger at 'Summit Magazine' for his assistance;

Andrew Weiloehowski at EWP expeditions for advice;

Our friends and families for their constant support and understanding.

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14. References

Academic references

Abramov, A., Gruber, S. and Gilichinsky, D. 2008. Mountain permafrost on active volcanoes: Field data and statistical mapping, Klyuchevskaya volcano group, Kamchatka, Russia. *Permafrost and Periglacial Processes*, 19. 261-277.

Hubbard, B., Milliken, R. E., Kargel, J. S., Limaye, A. and Souness, C. 2010. Geomorphological characterization and interpretation of a mid-latitude glacier-like form: Hellas Planitia, Mars. *Icarus*, 211. 330-346.

Souness, C., Hubbard, B., Milliken, R. E. and Quincey, D. In press. An inventory and population-scale analysis of martian glacier-like forms. *Icarus*.

Souness, C. and Hubbard, B. In press. Mid-latitude glaciation on Mars. *Progress in Physical Geography*.

Maps

Kamchatka: Map and guide. Published by EWP Expeditions, Wales, UK. 2003.

USSR RSFSR survey sheets N-57-9; N-57-10; 0-57-141; 0-57-142. 1:100,000. 1980.

Websites

www.explorekamchatka.com

www.henrypatton.org



Henry Patton (left) and Colin Souness (right) on the summit of Ushkovsky.

