

Dear the Newnham US Committee,

In Summer 2020, I hope to take part in the Juneau Icefield Research Program in Alaska. I am currently studying for my MPhil in Polar Studies at the Scott Polar Research Institute, having completed my undergraduate degree in Geography. I am writing to apply for the US Travel Bursary generously given by the Newnham US Committee in order to fund my participation this prestigious research program.

My academic interests lie in the mapping of glaciers. For my undergraduate dissertation, I used a combination of fieldwork and remote sensing (i.e. the analysis of satellite images) to map how the rock debris cover on the surface of a glacier in the Italian Alps evolved between 1999 and 2018. It received a First Class mark, and was awarded the Ruth Cohen prize. The two week field campaign to collect data for this research was an unforgettable experience, which I enjoyed immensely, despite the exhausting task of manually digging over 350 debris pits to measure the debris thickness over the glacier (see picture celebrating digging the last one!).



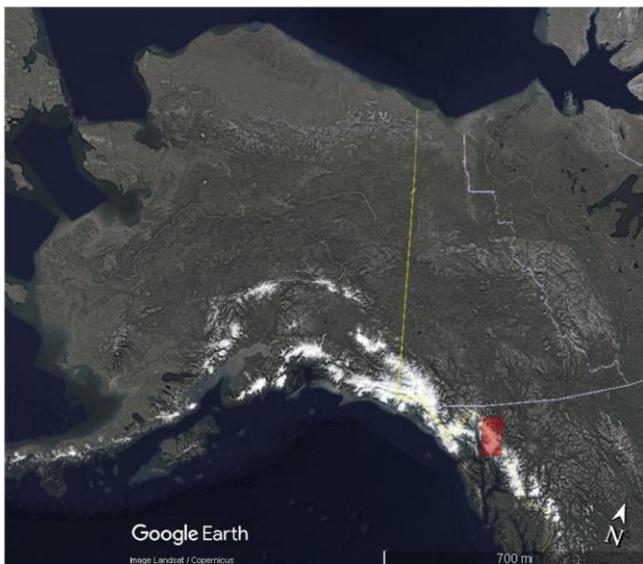
Since this fieldwork, I have been yearning to return to a glaciological setting to continue researching. My current MPhil thesis builds upon my academic interest in mapping debris-covered glaciers. It aims to determine the controls on the distribution of debris cover by defining the relationship between glaciological characteristics (slope, aspect, curvature, velocity) and surface debris thickness. A quantitative understanding of how these characteristics control the spatial distribution of debris is essential to improve predictions of the likely nature of debris cover evolution in the future. This is essential because the thickness of debris cover on glaciers determines how fast they melt - we need to fully understand how debris cover evolves to be able to more accurately predict how glaciers will respond to climate change. However, given the timeframe and scope of the project, the research will be entirely remote sensing based, and so the opportunity for fieldwork has not presented itself.

In the near future, I aspire to complete my PhD in the field of glaciology. I hope that my PhD will allow me to continue to map glaciers and how they have changed over time, and how they will respond to climate change. However, I hope to place a greater importance on the collection of primary data in

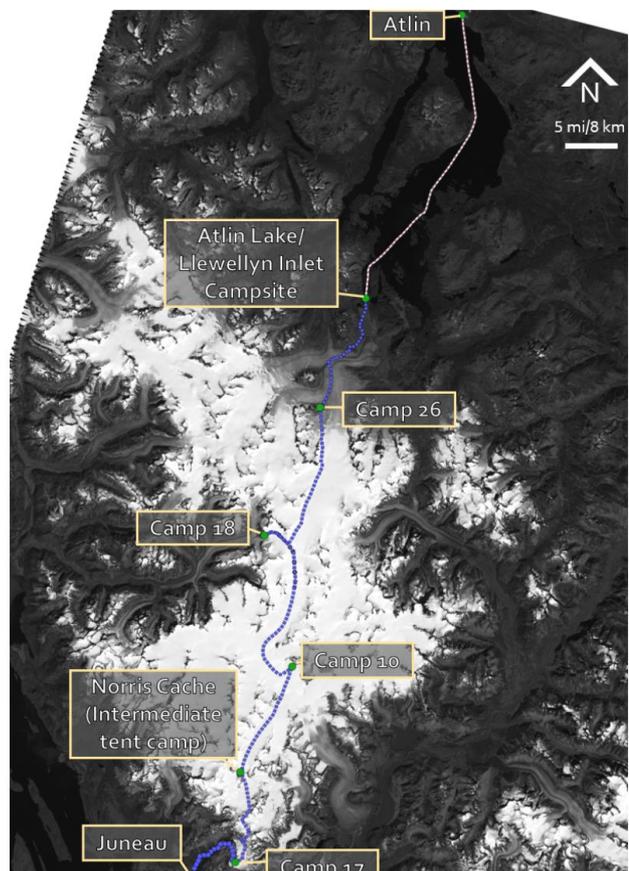


the field, given the limitations of *inferring* data from remotely sensed data. Therefore, I am applying for this generous funding so as to give me the opportunity to take part in the Juneau Icefield Research Programme to support this aspiration, not only by enriching my academic understanding of glaciers and how they respond to climate change, but also providing the necessary experience to carry out effective and enjoyable fieldwork in a glacial environment.

The Juneau Icefield Research Program (<http://juneauicefield.org>) is an extremely competitive and unrivalled educational and expeditionary experience in Alaska. I have been offered a place to take part in the summer 2020 expedition. This is a great achievement in itself and I am excited by the opportunity, given the prestige the programme holds in glaciological circles. It is a two-month immersion in the wilderness of the Juneau Icefield. Mountain safety training is received, alongside academic lectures. Fieldwork is conducted from four different camps, in aid of existing faculty research and for the purpose of my own independently devised project. Upon completion of my research project, I will have the opportunity to communicate the results of my research to local residents during a public presentation.



**Location map of the Juneau Icefield, SE Alaska**



**A map of the Juneau Icefield traverse and the major Icefield camps**

Therefore, the Juneau Icefield Research Programme appealed to me, not only due to the opportunity to immerse myself in Alaska's unrivalled beauty, but also due to its commitment to contribute to both my academic knowledge of glaciers, in addition to safety and technical training in carrying out fieldwork in a glacial environment. I believe both of these aspects will be vital to my development as a researcher in the future.

This expedition will give me the chance to carry out an independent research project. My research thus far has focused on debris-covered glaciers, so I am interested in exploring the effect of dust and black carbon on the melting of the Juneau Icefield. The thin dusting of debris on the Juneau Icefields is likely to have the opposite effect on glacier melt to the thick rock debris I have studied up until now. The thickness of debris/dust on the surface of a glacier is fundamental when determining whether its presence will enhance or inhibit the melt rate of the ice. The



presence of thick debris, as observed in the Italian Alps during my undergraduate dissertation, inhibits the melting of a glacier surface because of the insulating effect the debris has. However, the presence of a thin layer of dust, as observed on the Juneau Icefields (Nagorski *et al.*, 2019; see picture), will likely enhance the rate of melt. This is attributed to the lower surface albedo of dark debris/dust-covered ice compared to that of light, clean ice. Therefore, I am very interested to map the presence of surface dust on the Juneau Icefield, and measure its melt rate to determine the relationship between the two. This is particularly important research because Juneau Icefield is experiencing some of the highest glacial melt rates on Earth (Bertheir *et al.*, 2018). We need to understand why this is, so that we can most accurately predict its behaviour in the future, in order to best mitigate against the issues that may be posed as a result.

This opportunity to take part in the Juneau Icefield Research Program is an extraordinary opportunity, and an achievement in itself, given its position as a well-known and prestigious research program amongst glaciologists. I hope that it would help me develop my technical capabilities and confidence in carrying out fieldwork in harsh, glaciological settings. Moreover, it would provide me with the opportunity to complete an independent research project that allows me to explore my interests relating to the changing surface characteristics of glaciers and the corresponding effect on their melt rates, in addition to broadening my understanding concerning this unfamiliar territory. However, the program is exceptionally expensive to take part in and so it is something I will not be able to take part in without contribution to the costs. Therefore, I do very much hope you consider funding my participation in this project. I have studied glaciological processes for three years at university, and am now completing my MPhil on the topic. My motivation is driven by my interest in the glaciological landscape and processes. I am ready to experience life in the field and be immersed in the landscape that I have learnt about for so long.

Yours faithfully,  
Karla Boxall

# Karla Boxall - Budget for Juneau Icefield Research Program

## Overview

NB: all currency exchange using \$1.3/£1 (correct as of 18/01/20)

Program fee	\$	9,100.00	£	7,000.00
Estimated cost of flights	\$	1,769.00	£	1,360.77
Equipment costs	\$	1,082.90	£	833.00
<b>Total</b>	<b>\$</b>	<b>11,951.90</b>	<b>£</b>	<b>9,193.77</b>

NB: I am also applying to the BB Roberts fund and the Andrew Croft memorial fund to contribute to the cost. If enough money is raised through funds, the rest of the cost will be covered by personal savings.

## Detailed break down

### Program fee

Field fee	\$	7,342.00	£	5,647.69
Tuition fee	\$	1,758.00	£	1,352.31
<b>Total programme fee</b>	<b>\$</b>	<b>9,100.00</b>	<b>£</b>	<b>7,000.00</b>

This covers a portion of the costs of operating on the Icefield for six weeks. Operating costs include food, fuel, helicopter support, This includes tuition for six upper division Earth and environmental science credits through either the University of Maine.

<http://juneauicefield.org/students/costs>

### Travel costs

Return flight (London / Juneau)	\$	1,755.00	£	1,350.00
Visa (ESTA)	\$	14.00	£	10.77
<b>Total</b>	<b>\$</b>	<b>1,769.00</b>	<b>£</b>	<b>1,360.77</b>

<https://www.skyscanner.net/transport/flights/lond/jnuu/200614/200805/?adultsv2=1&childrenv2=0&cabinclass=economy&rtm=1>

### Equipment costs

	To buy	To rent/fortnight	To rent/2 months	Already own?
<input type="checkbox"/> Large backpack				✓
<input type="checkbox"/> Skis	£ 300.00			
<input type="checkbox"/> Ski boots	£ 150.00			
<input type="checkbox"/> Ski bindings	£ 70.00	£ 350.00	£ 1,400.00	
<input type="checkbox"/> Climbing skins	Can rent from JIRP			
<input type="checkbox"/> Ski poles	£ 30.00			
<input type="checkbox"/> Ski leashes	£ 5.00			
<input type="checkbox"/> Ski strap				✓
<input type="checkbox"/> Ice axe	£ 50.00			
<input type="checkbox"/> Crampons	£ 90.00	£ 41.00	£ 164.00	
<input type="checkbox"/> Climbing helmet	£ 35.00			
<input type="checkbox"/> Hiking boots				✓
<input type="checkbox"/> Climbing harness	£ 20.00	£ 10.00	£ 40.00	
<input type="checkbox"/> 4 x locking carabiners	£ 20.00			
<input type="checkbox"/> 5 x non-locking carabiners	£ 25.00			
<input type="checkbox"/> Sleeping bag				✓
<input type="checkbox"/> Sleeping pad				✓
<input type="checkbox"/> Large dry bag/stuff sack				✓
<input type="checkbox"/> 4-6 small-med stuff sacks				✓
<input type="checkbox"/> 50'/15m utility cord/p-cord	£ 5.00			
<input type="checkbox"/> 50'/15m 6mm cordelee	£ 5.00			
<input type="checkbox"/> 8'/2.5m 1"/2.5cm webbing	£ 3.00			
<input type="checkbox"/> 120 cm dyneema sling	£ 11.00			
<input type="checkbox"/> 5 x trash bags				✓
<input type="checkbox"/> 4-6 x qt/gal ziploc bags				✓
<input type="checkbox"/> Cup				✓
<input type="checkbox"/> Spoon/spork				✓
<input type="checkbox"/> Tupperware				✓
<input type="checkbox"/> Pocket knife/mul-tool				✓
<input type="checkbox"/> Headlamp + extra batteries				✓
<input type="checkbox"/> 2 x water bores/bladder				✓
<input type="checkbox"/> 2 x lighters				✓
<input type="checkbox"/> Compass				✓
<input type="checkbox"/> Watch				✓
<input type="checkbox"/> Glacier glasses	£ 25.00			
<input type="checkbox"/> 3-4 tubes SPF lip balm				✓
<input type="checkbox"/> Sunscreen				✓
<input type="checkbox"/> Duct tape (a whole roll!)				✓
<input type="checkbox"/> Permanent marker				✓
<input type="checkbox"/> Journal and writing material				✓
<input type="checkbox"/> Personal hygiene kit				✓
<input type="checkbox"/> USB flashdrive				✓
<input type="checkbox"/> First aid kit				✓
<input type="checkbox"/> Camp shoes				✓
<input type="checkbox"/> 2-3 prs liner socks				✓
<input type="checkbox"/> 3 prs midweight socks				✓
<input type="checkbox"/> 3-5 prs underwear				✓
<input type="checkbox"/> 3 x sports bras				✓
<input type="checkbox"/> 2 x long underwear boom				✓
<input type="checkbox"/> Shorts				✓
<input type="checkbox"/> Fleece/wool pants				✓
<input type="checkbox"/> 2 x light shirts				✓
<input type="checkbox"/> Midweight insulation top				✓
<input type="checkbox"/> 2 x lightweight insulation top				✓
<input type="checkbox"/> Heavyweight insulation jacket				✓
<input type="checkbox"/> Rain jacket				✓
<input type="checkbox"/> Rain pants				✓
<input type="checkbox"/> Bandana/buff				✓
<input type="checkbox"/> Brimmed hat				✓
<input type="checkbox"/> Warm hat				✓
<input type="checkbox"/> 2 prs liner gloves				✓
<input type="checkbox"/> Midweight gloves				✓
<input type="checkbox"/> Gaiters				✓
<input type="checkbox"/> Overmis/waterproof gloves				✓
<input type="checkbox"/> Small bag/daypack				✓
<input type="checkbox"/> Shower supplies (soap, etc.)				✓
<input type="checkbox"/> Laundry detergent				✓
<input type="checkbox"/> 1-2 sets of street clothes				✓
<b>Subtotals</b>	£ 669.00	£ 41.00	£ 164.00	
<b>Total equipment cost</b>	£ 833.00			

<https://static1.squarepace.com/static/506e663fe4b04973cfff68e47/t/5cb8ac990852290fe55>

Equipment costs do not take into account the possibility of borrowing equipment, eg from SP

To rent all: <https://snowboardexperts.co.uk/shop/ski-touring-hire/> To buy skis:

To buy: skis - <https://www.skatepro.uk/c744.htm>

To buy: boots <https://www.skatepro.uk/c749.htm>

To buy: bindings <https://www.skatepro.uk/c753.htm>

To buy: poles <https://www.skatepro.uk/c334.htm>

To rent: <https://www.outdoorhire.co.uk/prodpages/easy-mountaineering-package.php>

To buy: axe <https://www.outdoorhire.co.uk/prodpages/easy-mountaineering-package.php>

To buy: crampons <https://www.decathlon.co.uk/neve-pro-crampons-id-8334724.html?gclid=>

To rent: <https://www.outdoorhire.co.uk/prodpages/black-diamond-aspect-harness.php>

<https://www.climbers-shop.com/climbing-equipment/non-locking-carabiners>

<https://www.amazon.co.uk/Inet-Trades-GmbH-15-outdoor-camouflage/dp/B00K690KMS/ref>

<https://www.cotswoldoutdoor.com/p/dmm-120cm-x-11mm-dyneema-sling-F1822059.html>