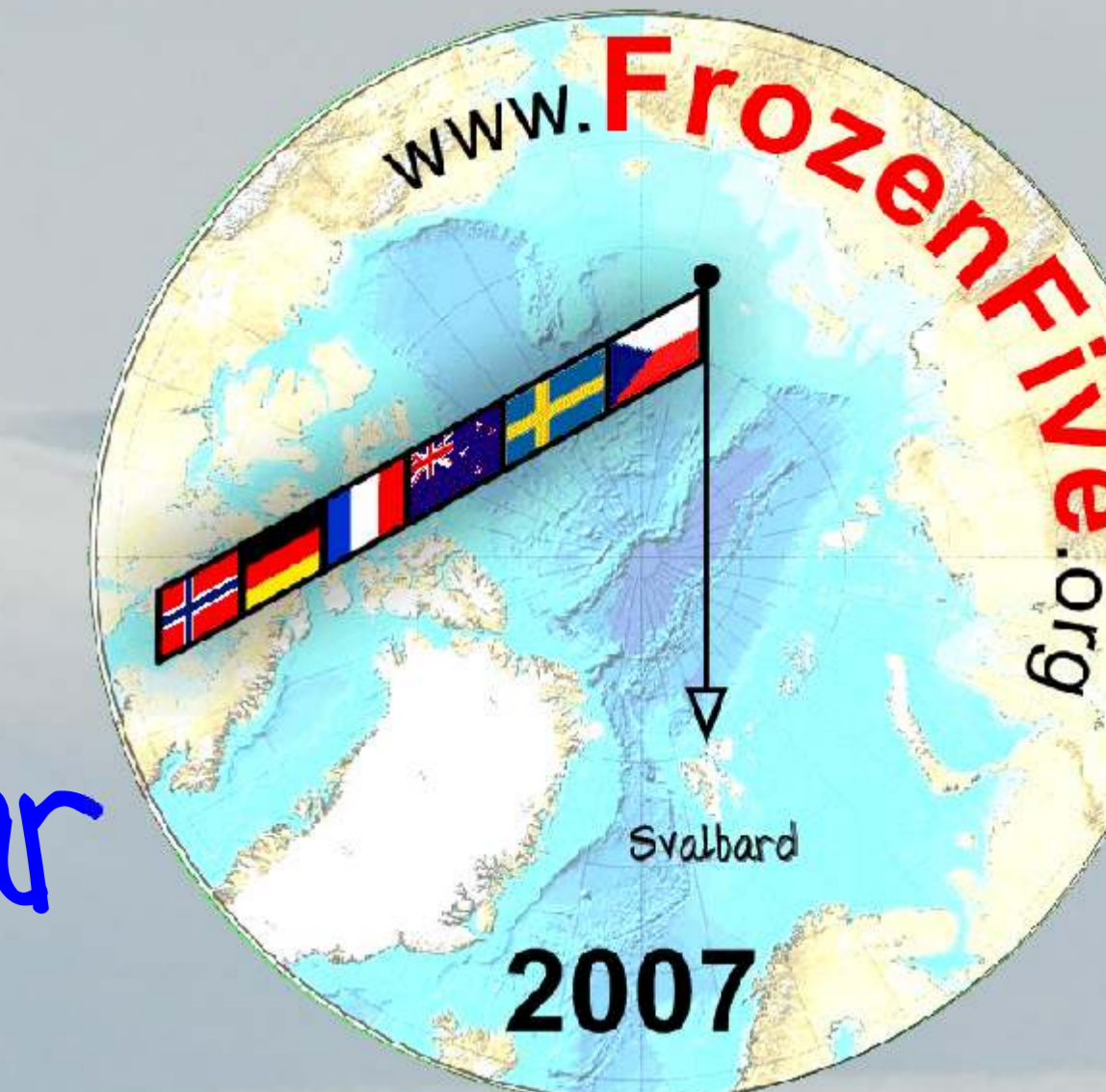


# Arctic Expedition of the Frozen Five:

an Alternative way of Education & Outreach during the International Polar Year



## Abstract

In March 2007, a group of international students of the geosciences will embark on a two month expedition across the wilderness of Svalbard. The journey will involve traversing up to 1000 km of high Arctic glaciers between 76° and 80°N, reaching both the southernmost and northernmost capes of Spitsbergen, Svalbard's largest island. We expect to be frequently camping at -30°C, as well as having a high probability of encountering polar bears, crevasses and arctic storms during the expedition.

Through this expedition, we wish to promote the multi-disciplinary approach required in modern-day science. Our team, young and energetic, has already demonstrated a strong research interest in the Arctic and is ready to share their passion with the general public. Presentations by the various team members focus on the enhanced climate change and related processes witnessed at high latitudes. The concept of alternative energy, including solar power and kites used while en route, is given a high priority throughout.

Here we present the education and outreach framework of the project, as well as introducing the research background of the team. We highlight current progress on the integration of this expedition in high schools around the world. The Frozen Five expedition runs in close collaboration with New Zealand's Youth Steering Committee, a major IPY project, aiming to network young polar researchers and promote the study of the polar regions to potential scientists.



## A word of thanks

This project would not be possible without our numerous partners, supporters and friends. The enthusiasm of the NZ YSC committee members, particularly Melanie Raymond and Daniela Haase, is greatly appreciated. Last, but not least, thanks to the patient audiences during our pre-expedition talks, the enthusiasm of which prompted us to share our experiences with a larger audience. This poster utilises cartoons from the Google Images library. Full supporter's details can be found at [www.frozenfive.org](http://www.frozenfive.org).



## Expedition

The Svalbard Scientific Skiing Expedition, promoted as the Frozen Five to the general public, is an exciting project developed by a group of like-minded students of the geosciences in order to fulfil their dreams in skiing across the full length of Svalbard. This project has many "firsts" to its name, including the first Czech-German-French-Swedish expedition to attempt anything on Svalbard, let alone cross its entire length (Fig. 1).

Our adventure will start on the 29th of March 2007, in Longyearbyen, the only real town of Svalbard. Heavily loaded with food and gear to survive the rough Arctic climate, we will leave the civilisation for 2 months! During the expedition, we will have to make our own track along the snowy valleys, glaciers and over sea ice, facing Arctic weather and storms. Polar bears, reindeers, walruses and seals will be our only neighbours! During the expedition, we will interact with the Polish scientists at Hornsund, the French research vessel Vagabond and with each other, giving the expedition a truly human and international spice.

Besides achieving one of the longest possible route, our goal is to share our interest for the Arctic with the general public and young students through an educational programme. The Arctic has fascinated us for years, and the time has come to share our passion for this good cause. Our team stands for the youth, the internationalization of the world and, of course, the necessity for multi-disciplinarity in the world of science.

## Education

The Frozen Five expedition has made education about the Arctic one of its primary aims (Fig. 2). As scientists, we have realised that there is a wide rift between researchers and the general public. It's all too easy to talk science with fellow colleagues but, if no-one else understands it, what's the point? There is nothing duller than a boring lecture, especially if the sun is shining outside. This long-term dilemma is especially critical at the present time when there is an unprecedented demand for earth scientists with the facing climate change issues (Fig. 3). It is the current high school generation, students aged from 11 to 18 yrs, that will have to understand the Earth's systems in order to be able to live on this planet. And it is precisely this generation that the Frozen Five focus on, aiming to:

1. Educate the students (as well as the general public) about the role of the Arctic in the global climate system and its implications
2. Demonstrate that not all scientists wear white coats and sit in unorganised and overflowing offices, thus providing an incentive for high school students to pursue a scientific career.

The timing of this project couldn't have been better, perfectly coinciding with the start of the International Polar Year (IPY). This massive undertaking of the Earth's scientists aims to carry the flag of the International Geophysical Year, last held in 1957-1958, a project that involved more than 80,000 scientists from 67 different countries. The aim of the IPY is to make the general public aware of the issues facing the polar regions, and improve our scientific understanding on how the polar regions operate, especially on the feedback mechanisms linking these areas with global climate. One of the major projects under the wide IPY umbrella is the Youth Steering Committee (YSC), a global movement amongst budding young polar scientists to form a world-wide network of interested students and researchers that will greatly facilitate future collaboration.

The Frozen Five expedition is involved in New Zealand's YSC project, entitle Polar Contests, that will involve a polar-themed competition to run in New Zealand's high schools throughout 2007 (see [www.ipyyouthnz.org](http://www.ipyyouthnz.org)). Preservation of educational materials, our expedition's motion picture documentary and the networking system will ensure a legacy of this project well past the 2007-2009 time period of the IPY.

Through the Frozen Five expedition, we wish to pass our enthusiasm of the Arctic science to the younger generation, the 11-18 year olds that will have to deal with these upcoming problems. We believe that our project will motivate them to become scientists and strongly augment their interest in the polar regions. Through presentations at high schools located throughout the globe, as well as talks given to the general public, we will raise awareness of the problems the scientists in the Arctic are facing. At the same time, we will be able to demonstrate the fact that science is actually a pretty interesting, worthwhile and noteworthy career opportunity.

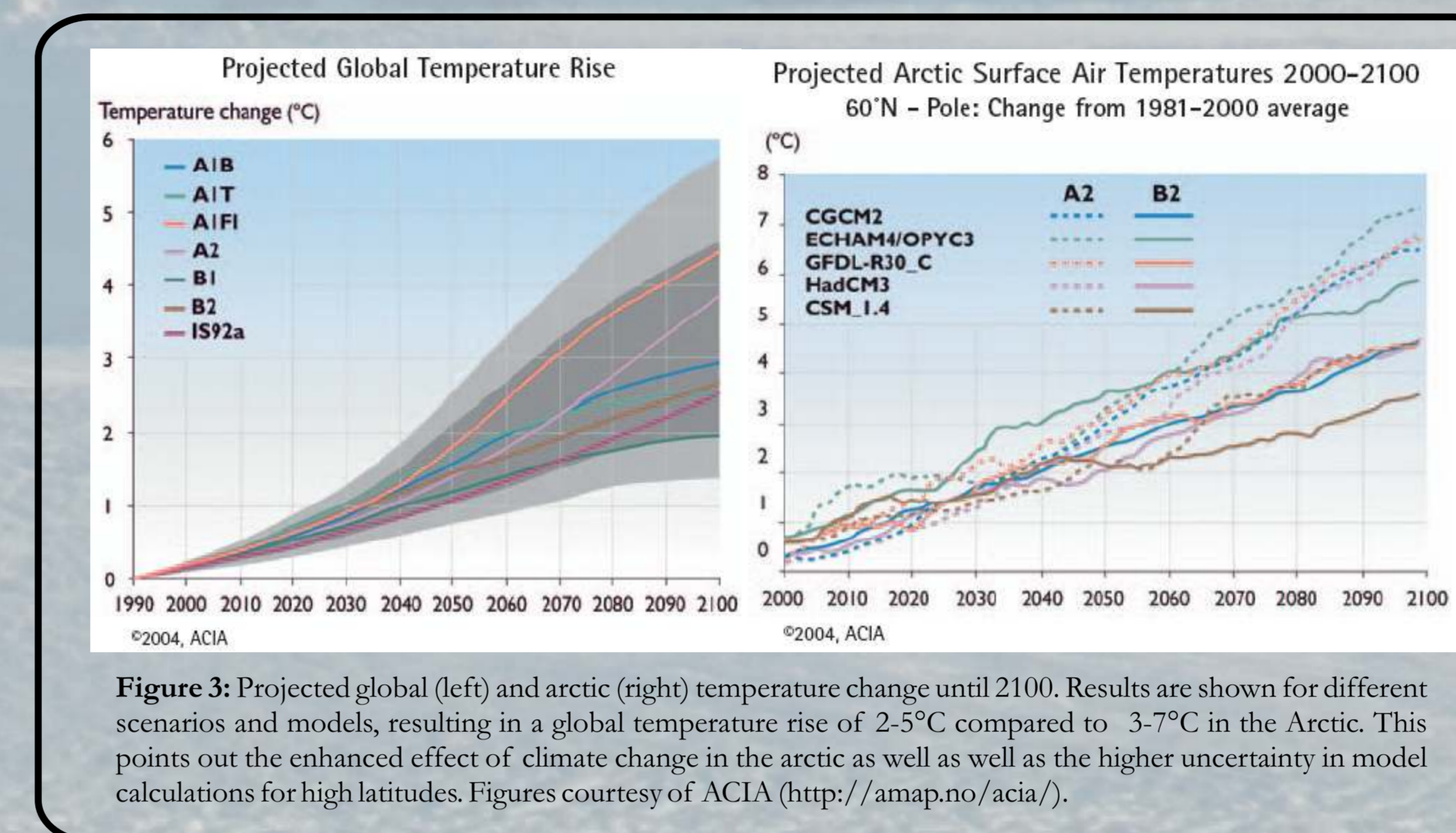


Figure 3: Projected global (left) and arctic (right) temperature change until 2100. Results are shown for different scenarios and models, resulting in a global temperature rise of 2.5°C compared to -3.7°C in the Arctic. This points out the enhanced effect of climate change in the arctic as well as the higher uncertainty in model calculations for high latitudes. Figures courtesy of ACIA (<http://amap.no/acia/>).

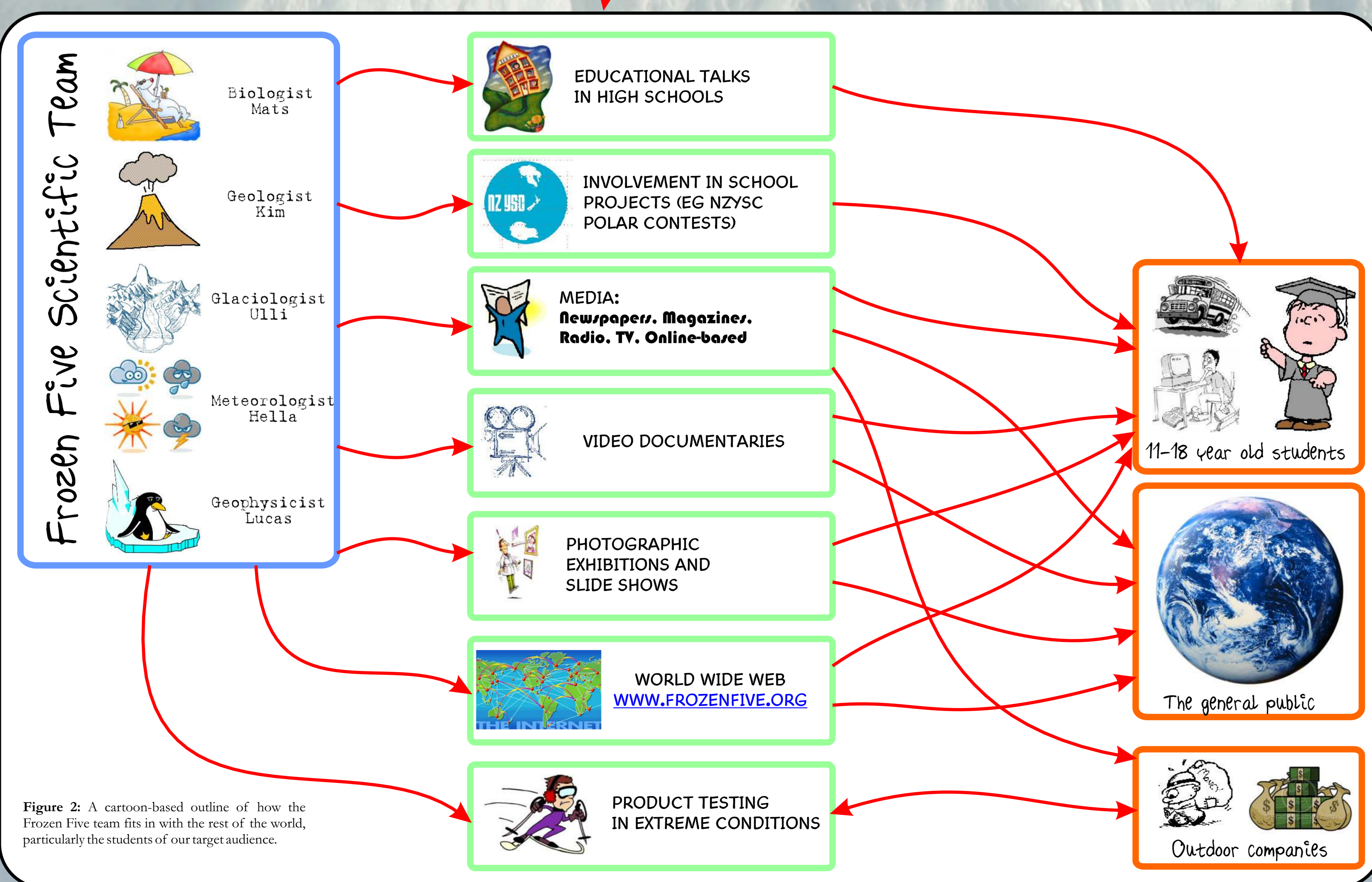


Figure 2: A cartoon-based outline of how the Frozen Five team fits in with the rest of the world, particularly the students of our target audience.

## The Team

As well as perfect timing, the Frozen Five project has the perfect team. Full of energy, the 5 scientists stand for what is arguably the most important aspect in modern-day science, multi-disciplinary research. The times of simple one-sided studies are gone, with complex systems only understood through collaboration between the different fields of the Earth's sciences. A climatologist, for example, is dependant on geologists to provide an idea of past climatic fluctuations. Geologists, in turn, depend on climatologists to understand solid earth-atmosphere interactions. On our team, we have the expertise of glaciologists, climatologists, atmospheric scientists, geologists, glaciologists and even an economics student to keep us within budget. Our research interests, mostly formed during the "Svalbard year" but extended to present projects, focus on the effects of climate change on various global processes, including sea-ice deformation, dissociation of gas hydrates at high latitudes, ozone depletion over the mid-latitudes, mass balance of Svalbard glaciers and CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O fluxes through snow pack in northern Sweden.

Our team spirit, formed through multiple arctic trips and a shared life philosophy, distinguishes us from other success-driven expeditioners for which the goal is everything. For us, the opportunity to spend 2 months in one of the harshest environments of the world with some of our best friends, all for a worthy cause, is simply incredible. This is us:

**Mats Björkman**

- A Biology student focusing at Biosphere-Atmosphere interactions as a Master student in Atmospheric science at the Universities of Göteborg (Sweden) and Helsinki (Finland)
- Experienced long-distance skier, having completed a 1400km journey along the mountains of the Swedish/Norwegian border
- Mats is also an educated guide and instructor in the Nordic way of Outdoor-life, he also makes his own skis and other outdoor equipment like sleeping-bags, jackets and kayaks
- Mats' role on the F5 team includes being a doctor, a snow-guru and a chef: preparing Swedish meatballs

**Lucas Girard**

- Master student in mechanics, focusing on sea-ice dynamics at the 'Laboratoire de Glaciologie', Grenoble and 'Université de Technologie de Belfort-Montbéliard', France
- Experienced arctic explorer, having spent almost 2 years on Svalbard, guiding and participating in numerous multi-day skiing expeditions
- Lucas is responsible for maintaining the F5 website, securing grants for the project and making sure we have plenty of high-quality French cheese at the food depots
- Contact Lucas at [lucas.girard@gmail.com](mailto:lucas.girard@gmail.com)

**Hella Garny**

- Climatology graduate student at University of Munich and the National Institute for Water & Atmosphere (NIWA) in Lauder, New Zealand
- Hella has participated in numerous multi-day skiing expedition on Svalbard and has even biked, solo, a distance of >4000km to return home from Svalbard
- As the girl on the team, Hella's main responsibility will be to keep the rest of the team civilised, balance the team's composition, provide expert climatological opinion and prepare some Bavarian culinary specialities
- Contact Hella at [hellagarny@googlemail.com](mailto:hellagarny@googlemail.com)

**Ulli Neumann**

- Glaciology student at the Universities of Svalbard and Oslo
- Ulli's experience on Svalbard, stemming from living up there for the majority of the past two years, makes him a great addition to the expedition
- Ulli is able to fix virtually anything with his leatherman, his philosophy regarding polar bears, and his ability to communicate with anyone will ease the everyday life of the F5
- Contact Ulli at [gualfff@yahoo.de](mailto:gualfff@yahoo.de)

**Kim Senger**

- Geology graduate student at the University of Otago, New Zealand
- Kim is a keen outdoors-man, interested in mountaineering, skiing and, above all, arctic travel
- Together with Jirka Lichteneger, Kim has crossed Oscar II Land, Svalbard (June/July 2005), becoming the first Czechs to complete the traverse
- Kim's role on the F5 centers on seeking sponsorship, helping organise equipment and oversee the education aspect of the project, as well as frying up some Czech specialities for his frozen friends
- Contact Kim at [senger.kim@gmail.com](mailto:senger.kim@gmail.com)



**A calculated risk!**

To keep the numerous polar bears at a comfortable distance, we will use explosive crackers. A trip-wire system will be erected around the camp each and every night, a system that will wake us up if we have unexpected and unwanted visitors. Each team member has undertaken a course on dealing with polar bears and will have a particular role to play in all bear scenarios. This way, the chances of harm to the bear or one of us will be minimal. In addition, the team will be carrying satellite communication devices, should external assistance be required.

**Animals in the Arctic**

The desolate and inhospitable environment of the Arctic is nevertheless full of life. The marine environment, in particular, is an important part of the arctic ecosystem. The "King of the Arctic", the polar bear, is often considered in studies that try and predict climate change effects in the high latitude. Relying on the sea-ice for its hunting, a diminishing sea ice extent could have dire consequences for the polar bear. In addition, we might run into seals, walrus, reindeer and arctic fox. The F5 documentary aims to introduce the arctic ecosystem to the target audience.