

Climate Change Impact on the Canadian Arctic Archipelago

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Introduction

The North Arctic, which spans 22 million km², is regulated by international law and consists of lands, internal waters, territorial seas, exclusive economic zones, and **international water**. This law governs the area among the eight Arctic coastal states: Canada, Denmark, Finland, Iceland, Norway, Russia, the United States, and Sweden. Above the Arctic Circle, there is international water (the high seas), and this water and sea bottom have not been confirmed as an extended continental shelf for any country yet. Accessing this area was very difficult before climate change, but after ice melting, access has become easier, and conflicts over this area have increased. The international law indicates that a country has a ten-year period to make claims to an extended continental shelf, which, if validated, gives it exclusive rights to resources on or below the seabed of that extended shelf area. This may lead to conflicts over claiming this area^{3,9}. This is one impact of climate change on the Arctic region, and Canada is one of the countries that involved by diplomatic tension with other arctic countries.

Canada has 1.4 million km² in the north arctic, which makes it one of the most affected countries by climate change and global warming. The impact of climate change in the Canadian Arctic leads to **exacerbated global warming, reduced productivity and possible starvation of organisms, and increased conflicts and competition for natural resources**.

Figure 1: Arctic Claims by the Arctic Countries

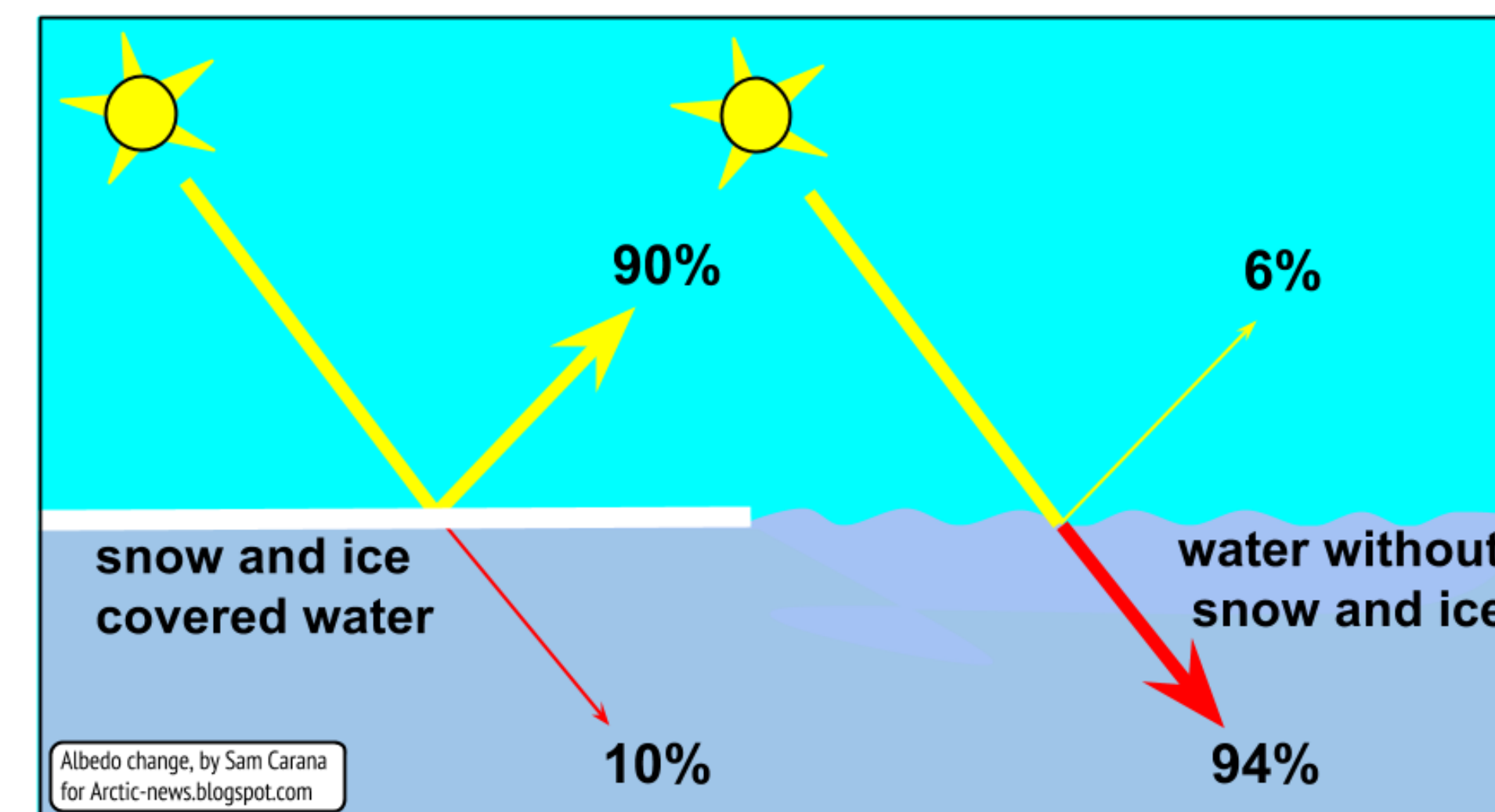


(CTV News, 2019)

Climate Change Impacts on the Geographic Structure of the Canadian Arctic Archipelago

Receding glaciers and melting sea ice are exacerbating global warming in the Canadian Arctic Archipelago. As the climate warms, the Arctic region is experiencing more frequent and severe ice melting, which is causing significant changes to the landscape and ecosystem of the Canadian Arctic. Glaciers protect the Earth from a large amount of sunlight by reflecting it and making a phenomenon called Albedo. Albedo is the fraction of light that a surface reflects, and this is due to the white color of the glaciers. The melting of glaciers and ice sheets in the Arctic is reducing the reflected visible radiation⁵. The bigger issue is the expansion of the surface area of the ocean, which absorbs sunlight because of its dark color. This leads to make the Canadian Arctic Archipelago warmer which creates a positive feedback loop in the Canadian Arctic Archipelago, where warming causes more ice to melt, which in turn leads to more warming⁵.

Figure 2: Albedo Phenomenon



Credit: ("Albedo, latent heat, insolation and more," 2012)

The rising demand to access Arctic resources and shorter trade routes has led to an increase in shipping in the Canadian arctic region due to the receding sea ice. However, this surge in shipping poses a significant threat to the Arctic ecosystems and wildlife, such as air and underwater noise pollution, heavy fuel oil spills, and the further melting of the remaining ice. These consequences lead to exacerbating global warming².

Figure 3: Potential Trade Routes and Estimated Undiscovered Resources



Credit: ("Arctic maps," 2018)

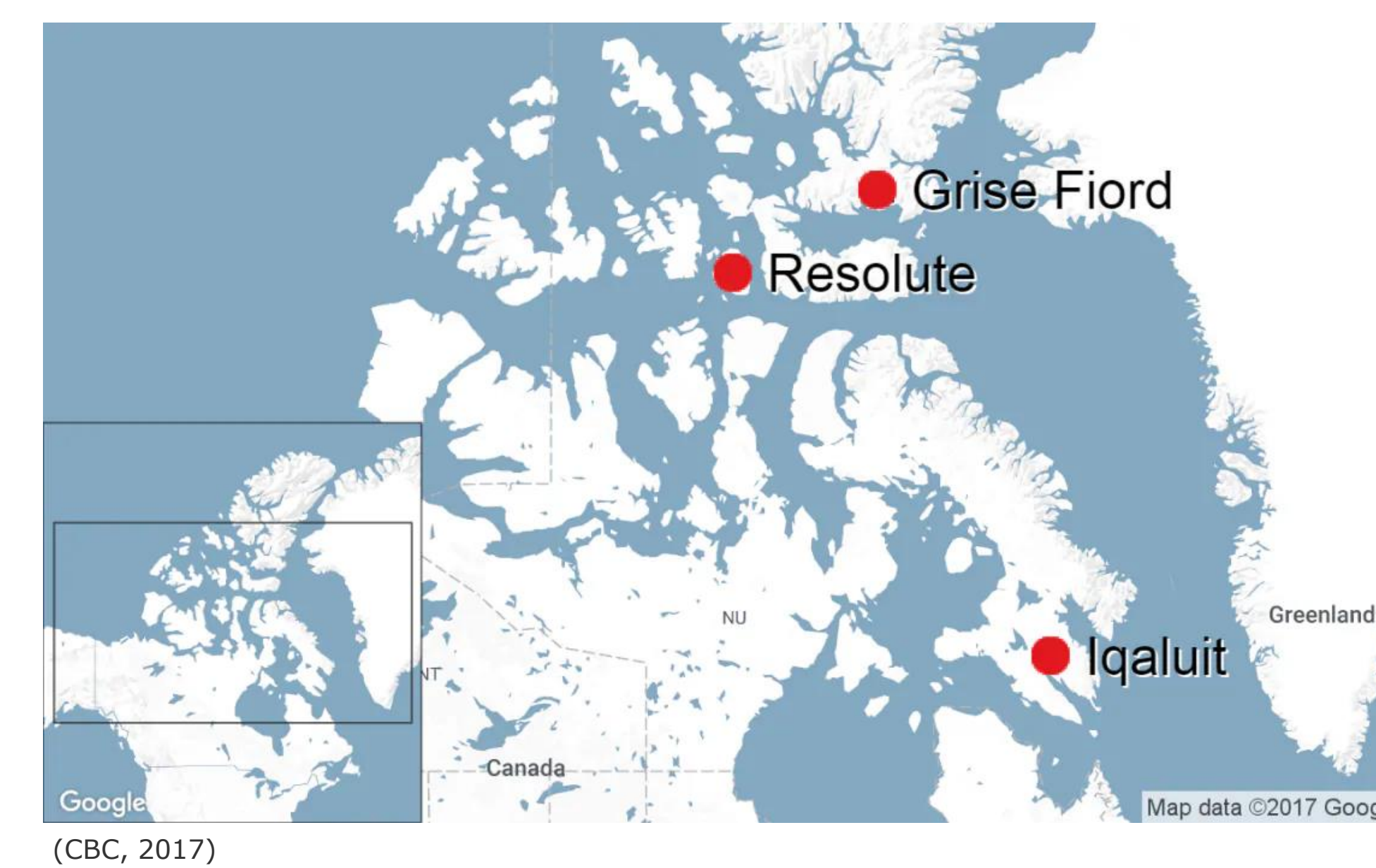
Climate change impacts the survival of the Arctic's organisms in north Canada.

Climate change impacts the survival of the Canadian arctic's organisms. The melting of sea ice is contributing to changes in the Arctic ecosystem. As the ice melts, the habitat for Arctic wildlife because they depend on favorable snow conditions to survive, such as polar bears, narwhals, and seals, is changing, and the food chain is being disrupted. By 2100, in the far north of Canada, polar bears could face starvation and reproductive failure. We can see these kinds of changes for the wildlife now in the north of Canada while southern Arctic species, such as orcas, are pushing further north. Fish are also changing their ranges which is the source of food for several animals in the north².

Climate change is affecting indigenous people life in North Canada and threat their food sources. People who live in the arctic or indigenous people depend on traditional sources of food such as whales, fish, seabirds, seals, and caribou. Indigenous peoples in the Arctic have a deep connection to the land and rely on the environment for food, cultural practices, and spiritual wellbeing. The changing climate is disrupting traditional ways of life and threatening the availability of key food sources.

As temperature increase and the sea ice melts, these species are becoming harder to find, making it more difficult for Indigenous peoples to access traditional food sources, while tundra is greening also, the range of the wildlife species in northern Canada is changing. This is leading to food insecurity, malnutrition, and a loss of cultural practices. Climate change in this region endanger indigenous people' and animals' lives because of unexpected weather condition⁷.

Figure 4: The Northern Communities in Canada



The impacts of climate change on Indigenous peoples in North Canada go beyond food sources. Changes in the environment can also impact cultural practices, community wellbeing, and mental health. For example, the loss of sea ice and changes in weather patterns can make it more difficult for Indigenous peoples to travel, hunt, and gather traditional resources. This can lead to feelings of disconnection from the land and a loss of cultural identity².

The Political and Diplomatic Conflicts That the New Arctic's Climate Brings

Due to global warming and the decrease in the level of ice, huge quantities of rare earth metals have been discovered in the Arctic, as well as large quantities of oil and natural gas. These discoveries have brought attention to the North Pole as a major source of metals and energy, leading to conflicts between Arctic countries. Most of these conflicts are a result of climate change and the expectation that the receding ice level and increasing temperatures in the region will facilitate access to these resources^{5,8}.

The Arctic consists of international waters until it is determined which continental shelf it is affiliated with. With the increase in the severity of climate change, ambitions in this region are growing. We can see that conflicts have started to emerge around the area, and some countries are conducting new military activities, alleging that this region belongs to them⁴. Canada has also commissioned research teams to determine if this area belongs to the Canadian shelf, while other countries are searching for the extension of this area⁸.

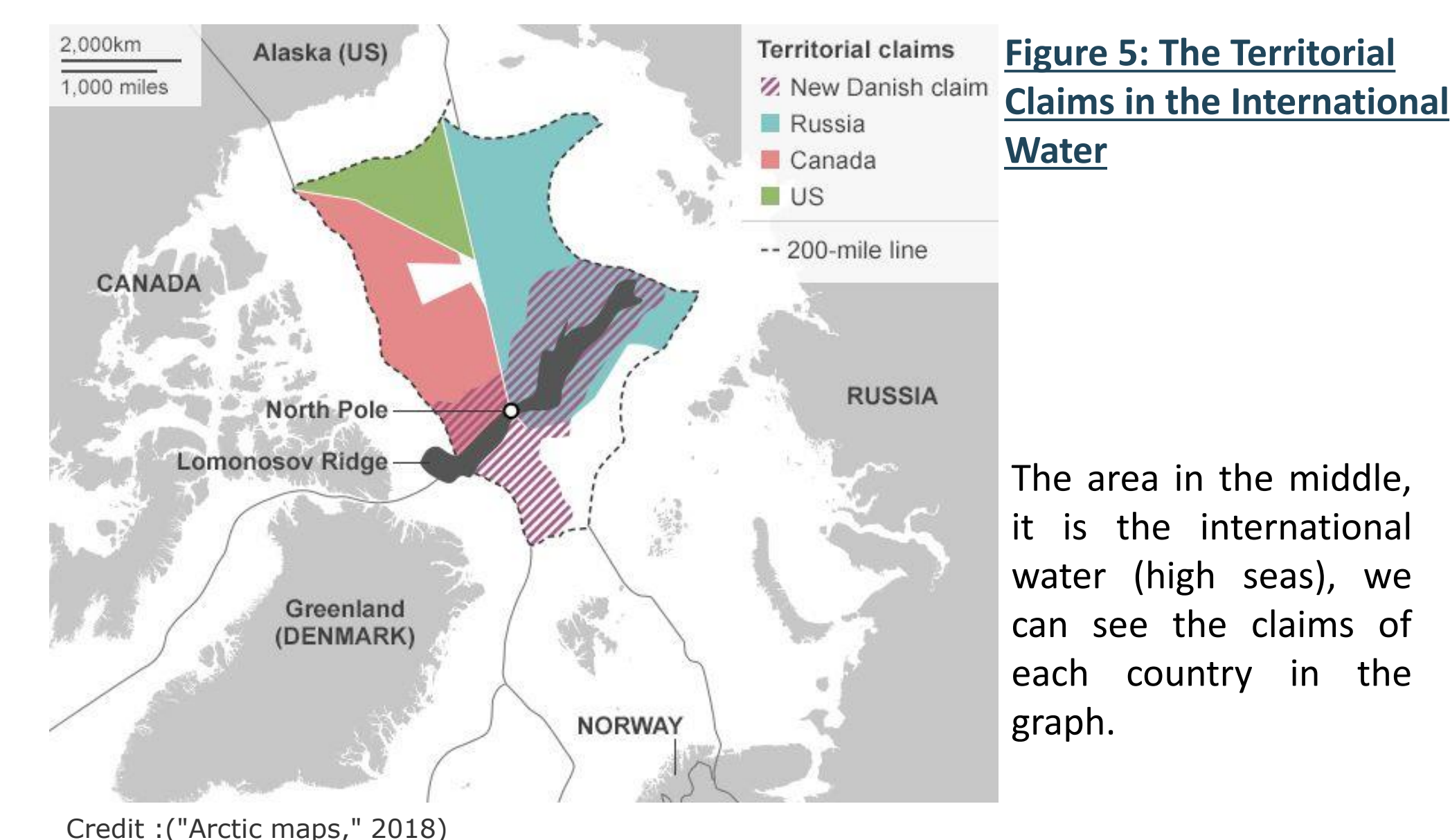
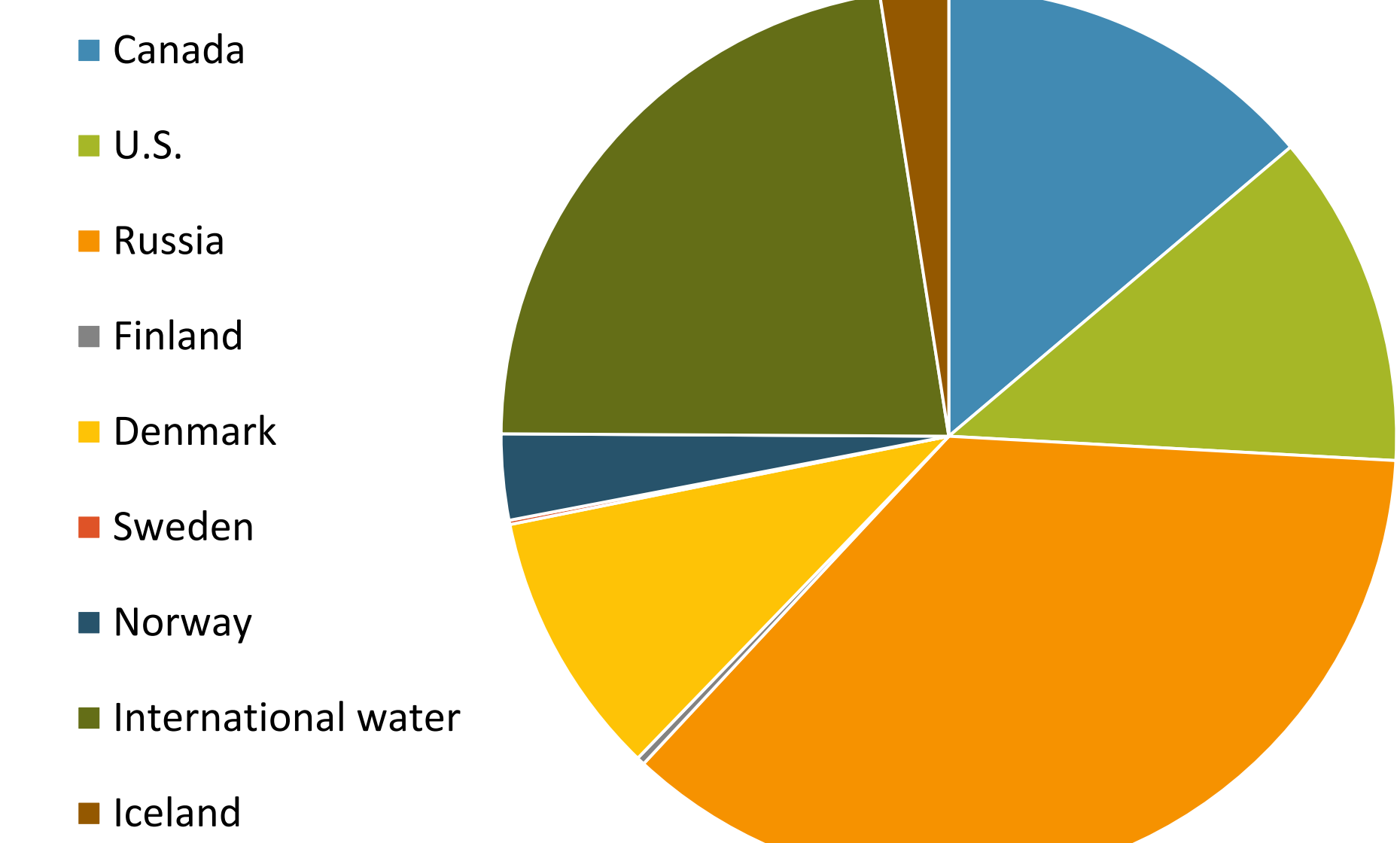


Figure 5: The Territorial Claims in the International Water

The area in the middle, it is the international water (high seas), we can see the claims of each country in the graph.

Also, there are some disagreements over defining the waters between the Canadian archipelago, as they are considered strategic passages, especially between Somerset Island and Devon Island, and between Melville Island and Banks Island. According to the location of this water between Canadian islands, it is Canadian water, but the U.S. and some other countries, like Russia, don't agree. They see the Northwest Passage as an international strait that any ship should be free to cross. Canadian scientists are working to chart Canada's claims in the Arctic. The water in this region is frozen most of the year and the indigenous people of Canada hunt and live on it, making it an extension of Canadian territory⁸.

Figure 6: The Distribution of the Arctic Between the Arctic Countries



Global climate change is a serious issue that threat all the world and the arctic countries are getting the most effect. Specifically, Canada is one of the most effected country by climate change, for several reason. Because of its long extension along the Arctic Ocean, and the presence of archipelagos extending to the borders of international waters, which make Canadian waters the focus of attention of polar countries such as America and Russia. The extension of the Canadian islands gives it the right to claim a large part of the international waters and secure its borders. Global warming affects the lives of thousands of indigenous peoples in northern Canada and threatens their way of life. It also threatens wildlife in all its forms, with the threat of extinction of some species. On the other hand, some countries are concerned about the gains that they will achieve from this disaster, completely ignoring the threat that will befall them and the impact of the crisis on the whole world.

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