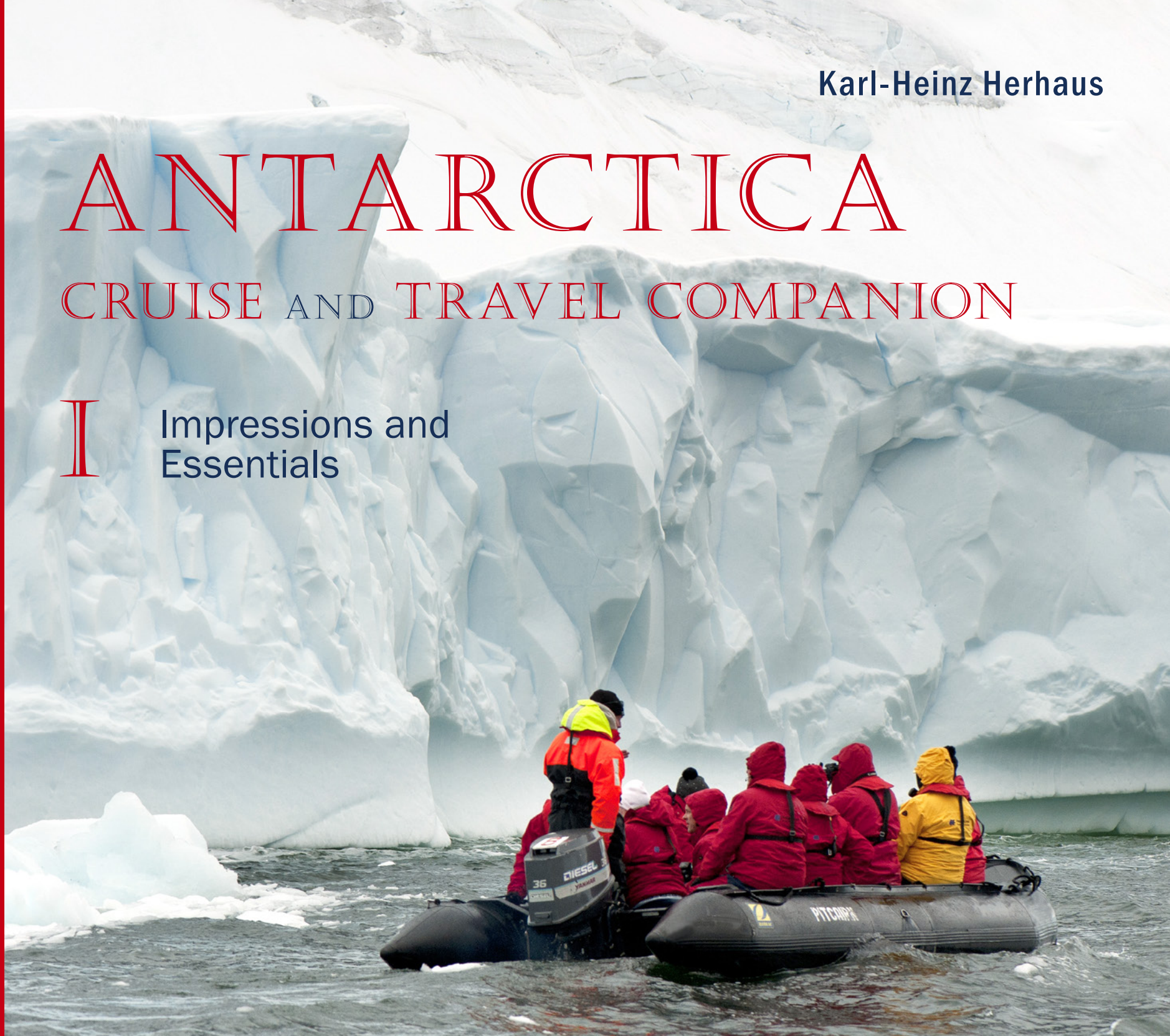
Karl-Heinz Herhaus

ANTARCTICA

CRUISE AND TRAVEL COMPANION

I Impressions and Essentials




For Ingrid


“We do not remember days, we remember moments.”
Cesare Pavese

Karl-Heinz Herhaus

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Gentoo penguin

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Antarctic Peninsula in moody early morning light

Foreword

To me, Antarctica is much more than just another continent. It is like a foreign planet. Antarctica's landscape is too diverse, too beautiful and too overwhelming to be measured by normal human standards. The immense power of nature captivates me every time we arrive in South Georgia. At Gold Harbour, I often find myself standing in awe amidst the thousands of king penguins that populate the beach all the way to the horizon. I encourage our guests not to get carried away with taking photographs, but rather to immerse themselves fully in this spectacle of nature. It makes me proud of my profession to see that at least some of our guests are deeply moved by the experience.
What makes this region so unique is that only a few nautical miles away from Gold Harbour, we encounter a completely different facet of Antarctica. As captain, I often have the honour of commemorating the Anglo-Irish explorer Ernest Shackleton in the cemetery of the abandoned Grytviken whaling station. Shackleton died of a heart attack in South Georgia and did not go down in history as a successful discoverer. His claim to fame is that in the face of disaster and against all odds he managed to bring home his entire crew – by no means a given during the Heroic Age of Antarctic Exploration. Even as captain of a modern ship, I am always aware that in Antarctica one does what one can, not what one wants.

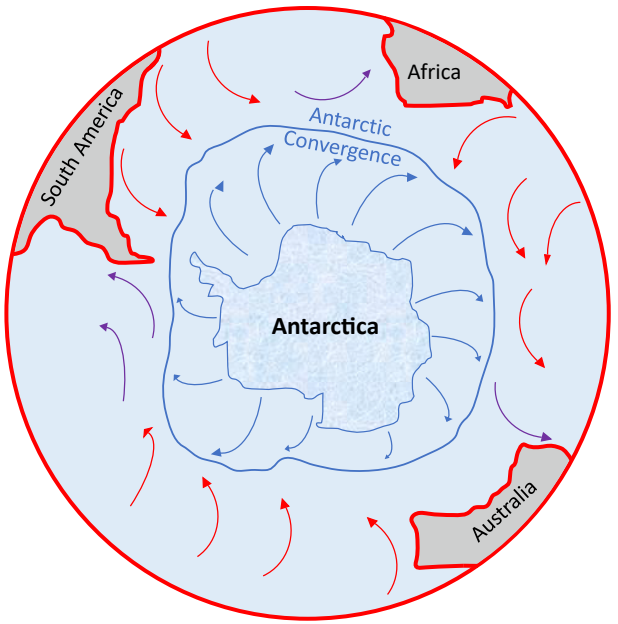
Captain Mark Behrend

King penguin chick

Amazing Antarctica

Antarctica is a continent of superlatives. It is the coldest, driest, and highest place on Earth, with the largest glaciers and mightiest icebergs. It experiences storms with wind speeds over 300 kilometres per hour, is home to wildlife with no innate fear of humans, and has no permanent human settlements. The Antarctic polar region includes the sixth largest continent and the surrounding Southern Ocean. In the past, the Antarctic region was defined as everything south of the Antarctic Circle (66° S). However, this delineation artificially excludes the northern tip of the Antarctic Peninsula, which also happens to be the area most frequented by tourists. As defined by the Antarctic Treaty System, the Antarctic region encompasses everything south of 60° S latitude. The Antarctic Convergence is the most widely accepted ecological border of the Antarctic polar region.

The Antarctic Convergence is the transition zone between the cold waters of the Southern Ocean and the milder waters to the north. Depending on weather, season and topography, this ecological boundary generally lies between 53° S and 60° S. The cold and denser waters of the Southern Ocean submerge under the warmer subtropical surface waters of the Atlantic, Pacific and Indian oceans. The Antarctic Convergence is a dynamic and invisible boundary (blue line on map). The transition zone extends as far north as 46° S in the South Atlantic between South America and Antarctica.



Antarctic Convergence

South-west of Tierra del Fuego, the Antarctic Convergence pushes as far south as 62° S.

When crossing this boundary on a ship, a rapid change in water and air temperatures is noticeable. Cold polar waters are forced to sink to a depth of about 800 metres under the warmer and lighter waters from the north. Within a distance of only 100 kilometres, surface temperatures can drop by up to 6 °C. Once south of the convergence, the average surface water temperature is around 2 °C. The Antarctic Convergence is also referred to as Meinardus Line, after the German climatologist and oceanographer Wilhelm Meinardus (1867–1952).

The Falkland Islands are located distinctly north of this transition zone and have a climate primarily influenced by the South Atlantic Ocean. In contrast, the island of South Georgia, located to the east and a little further south, is strongly influenced by cold polar waters and icebergs. A total of 46 Subantarctic islands lie south of the Antarctic Convergence, including South Georgia, the South Orkney Islands, Joinville Island and Campbell Island. Another 30 Antarctic islands are located even further south and closer to the continent. Alexander and Berkner Islands are the largest Antarctic islands. Technically, Antarctica refers exclusively to the continent or Antarctic mainland – even though there are very few locations at which one can see "land" per se. Ninety-eight percent of the continent's land area is covered by ice. The Antarctic ice sheet contains 70 percent of Earth's freshwater. If all of Antarctica's ice melted, we could fill all the Earth's rivers and lakes with water four times over or raise the global sea level by 60 metres. This increase in sea level would be enough to inundate the Netherlands, the Mississippi Delta, Bangladesh and all other low-lying coastal areas worldwide.

The Antarctic continent covers an area of approximately 13.5 million square kilometres (25 percent larger than Europe). Exact determination of the land area is difficult because thick ice sheets obscure the coastline in many sectors. In contrast to the global average elevation of land surfaces (745 metres above sea level), Antarctica has an average elevation of 2,250 metres, making it the highest continent. The continent's highest peak is Mount Vinson (5,100 metres). Antarctica's lowest point lies 2,496 metres below sea level in Bentley Subglacial Trench. It is well-established that Antarctica is not a contiguous land area but rather a conglomeration of several land masses and mountain ranges which would protrude out of the sea individually if the glacial ice sheets did not exist.

Stranded iceberg with sculpted ice

Antarctic Sound with tabular icebergs

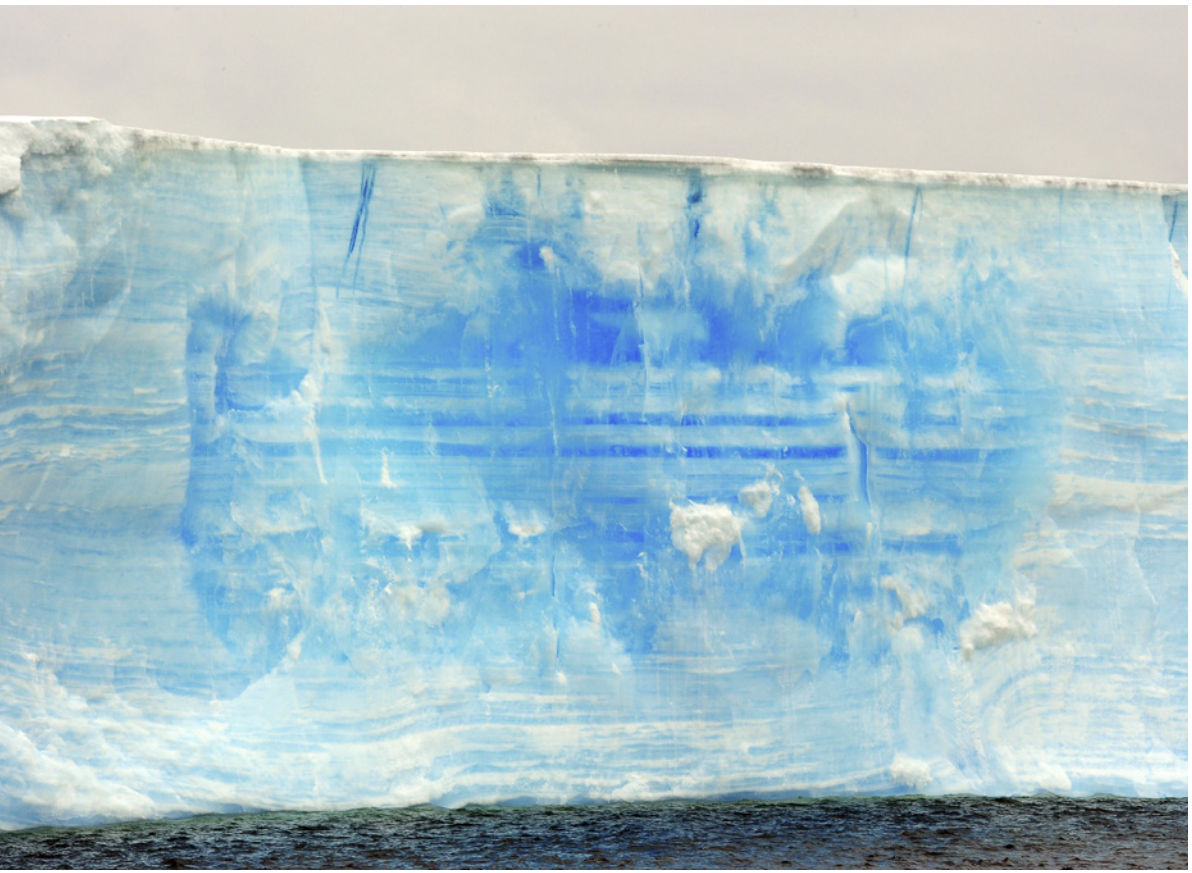
Expansive ice sheets up to 4.8 kilometres thick dominate the interior of the continent and gradually flow downhill toward the coasts. In many bays, these ice sheets and glaciers continue to flow over the ocean, becoming ice shelves. Over the course of thousands of years, ice shelves are shaped by winds, currents, snowfall, melting and their own mass. Periodically large pieces break off (calve), forming huge tabular icebergs that can drift for thousands of kilometres in the Southern Ocean until breaking up into smaller icebergs and finally melting. It can take decades for the largest iceberg fragments to melt. Hair-raising proposals have suggested using tugboats to tow huge icebergs to regions of the world experiencing freshwater shortages. To date, ship engines are not strong enough to keep multi-million-tonne tugboat convoys on course in the face of winds and currents. Although all past initiatives have failed at the planning stage, this topic will in all likelihood resurface in the future.

The Earth's sixth largest continent is also the driest, averaging 166 mm of precipitation per year. Antarctic's vast snow and ice surfaces have a high albedo value, meaning that most of the incoming solar radiation is reflected and not absorbed. Correspondingly, Antarctica's climate is the coldest on Earth, with an average annual temperature of -55 °C in the elevated interior and -10 °C along the coast. The lowest air temperature ever measured by

Long edge of a tabular iceberg large enough to hold ten soccer fields.

a weather station was -89 °C at the Soviet Vostok Station in July 1983. Cruise ship passengers never experience such extremes because temperatures along the coast of the West Antarctic Peninsula are generally above freezing during the Antarctic summer. In winter, temperatures rarely drop below -20 °C in this region. Inspired by frequent summertime temperatures above 10 °C, British researchers refer to the western coast the Antarctic Peninsula as the „banana belt“.

The Antarctic is the windiest region on Earth. This applies to both the continent and the surrounding Southern Ocean. The names given to weather phenomena at various latitudes by generations of seafarers are hair-raising enough to make even the most adventurous souls think twice about booking



The steep sides of tabular icebergs reveal layers of glacial ice accumulated over many decades. The darker the layer, the lower the oxygen content of the ice.

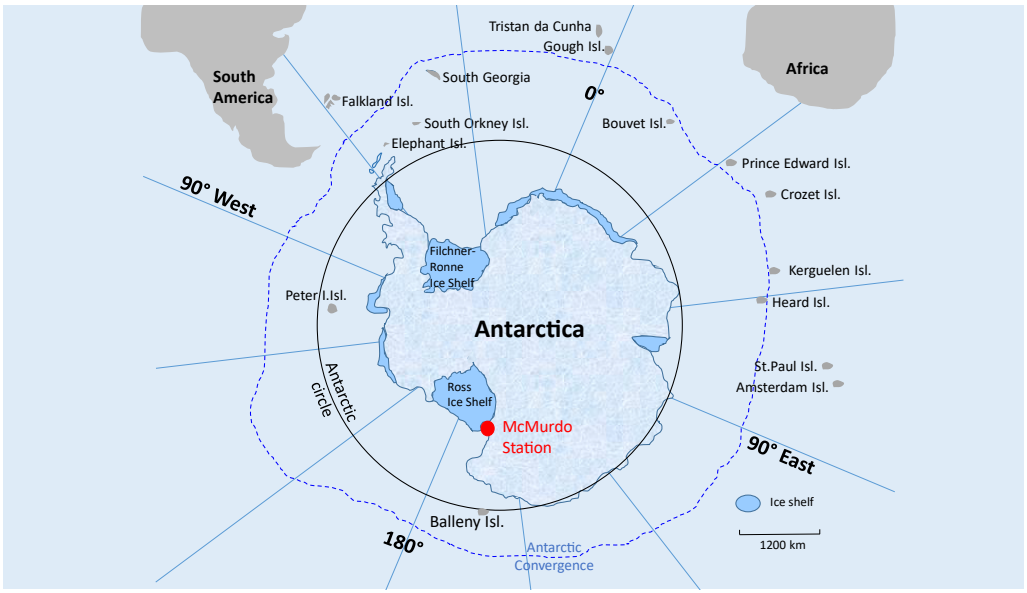
a cruise to Antarctica: roaring 40s, furious 50s and screaming 60s. The Southern Ocean rarely experiences moments of calm because strong westerly winds are unhindered by land masses. A continuous procession of storm systems circles around Antarctica from west to east, with approximately three-day intervals between storms.

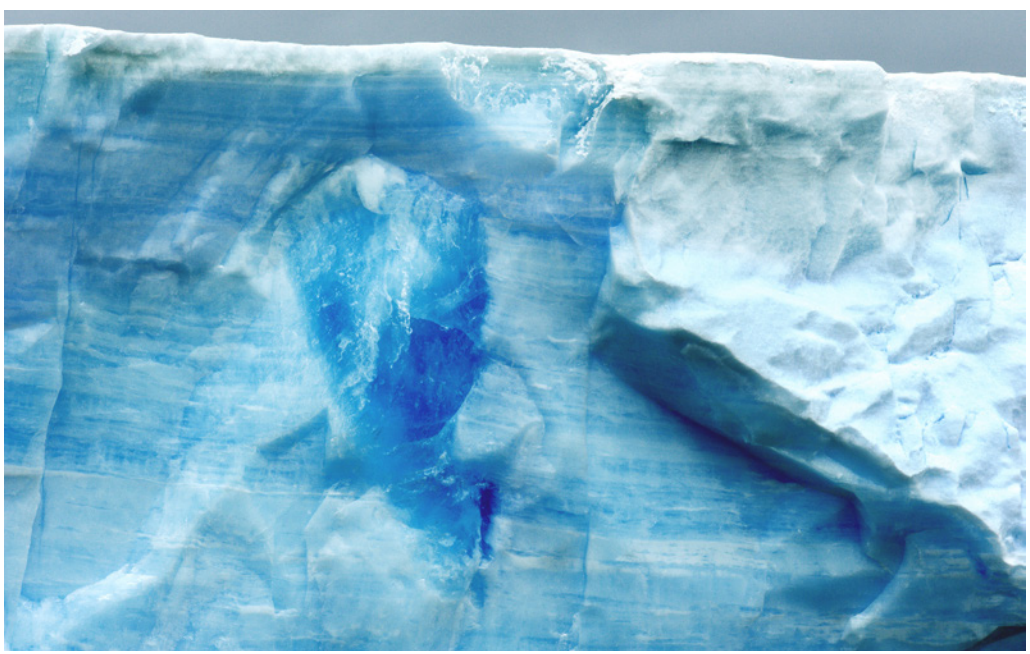
Powerful winds can also develop on the Antarctic mainland. Katabatic winds can reach speeds of over 300 kilometres per hour. The term katabatic comes from the Greek word *katabatikos* meaning „descending or flowing down". In contrast to anabatic winds, katabatics are fall winds that carry high-density air (from a high elevation) downslope under the force of gravity. In Antarctica, high-density cold air develops by radiational cooling over high-elevation ice sheets. The dense air falls downwards, warming adiabatically as it descends. Large-scale fall winds can occur across Antarctica's ice sheets when air cools down at high elevation on clear days and flows toward the coasts. Antarctic coastal valleys are home to the world's strongest katabatic winds. On South Georgia, local fall winds flow from the island's central glaciers to the open sea via coastal valleys. Katabatic winds are not unique to Antarctica. They are found around the globe. In the Mediterranean, the mistral flows off the Rhone estuary and the gusty bora blows in the eastern Adriatic. On the Aleutian Islands, katabatics are called williwaw, whereas the Greenland Inuit call them piteraq. The Norwegian fjords have elvegust and the reshabar blows in the Caucasus.

Antarctica's extreme climate contributes to its isolation from the rest of the globe. No place on Earth is more distant. The only congregations of humans are found in some 80 fortress-like research stations built to defy nature. These stations are oases in a cold, icy desert. Separated by hundreds if not thousands of kilometres, the intervening land is vast and untouched by mankind.

In winter, a ring of sea ice up to a thousand kilometres wide surrounds Antarctica. During this season, the continent cannot be accessed by ship. The polar night lasts many months and all life on Antarctica descends into a state of stasis.

The nearly 4,500 people who spend the summer on Antarctica benefit from the basic comforts provided by the research stations. In winter, only 1,250 researchers remain on the continent. Since establishment of the first Antarctic stations in the 1950s, at least 11 children have been born on the mainland, primarily in Argentinian and Chilean stations. The American McMurdo Station is the largest research station in Antarctica, with around 250 winter residents (a third of whom are women). Twice a year, special events break up the daily research and maintenance routine in Antarctica. The Icestock Music Festival is held on or around New Year's Day (in mid-summer). The Antarctica Marathon, first held in 1995, takes place annually on King George Island in late February or early March. Between 1961 and 1972, McMurdo Station was home to Antarctica's first and only portable nuclear reactor. After the facility closed, the decommissioned reactor and over 10,000 cubic metres of substrate were removed from the continent. Access to the area remained restricted until 1979.





Antarctic Sound early on a December morning. The sound separates the Joinville Island group from the north-east end of the Antarctic Peninsula.

With the exception of research stations, there are no human dwellings on Antarctica. Humans are not the only species to have failed to settle the Earth's southernmost continent. In the past millions of years, only a small number of terrestrial animal and plant species have been able to traverse the belt of cold currents isolating Antarctica. Of the propagules that made it all the way to Antarctica, only the hardiest established permanent populations on the inhospitable land. Lichens and mosses are sufficiently cold and drought resistant to survive under snow, ice and rocks. Dark and mineral-rich volcanic rocks, such as those found at Brown Bluff in Antarctic Sound, form an oasis in this frozen de-

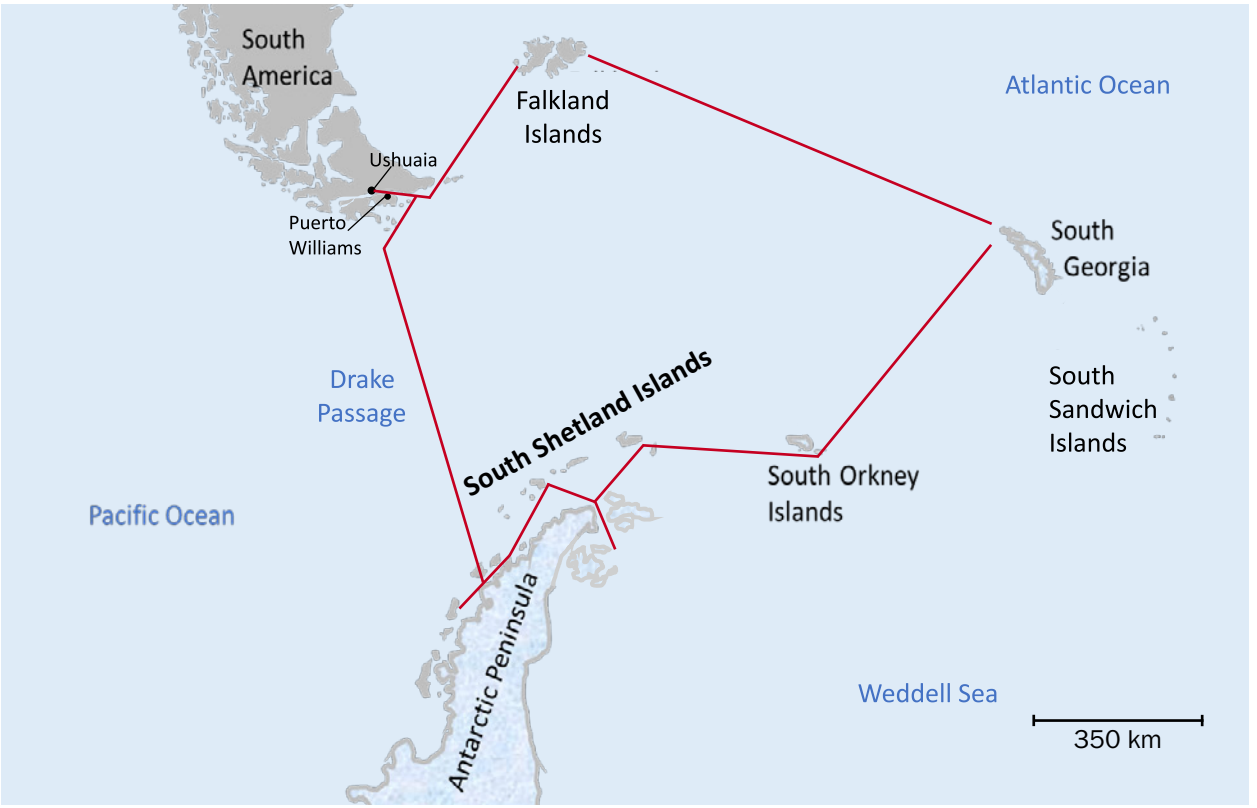
Lichens growing on volcanic rocks at Brown Bluff

sert. On the north-facing bluffs, brilliant orange and yellow lichens grow so profusely that they can be seen from many kilometres away. Only two species of flowering plants are native to Antarctica: Antarctic hair grass and Antarctic pearlwort. *Belgica antarctica*, a tiny wingless midge, is the continent's largest land animal.

In contrast, the marine environment surrounding Antarctica harbours a plethora of fascinating species. The diversification of Antarctic fish over millions of years in the Southern Ocean is a textbook example of adaptive radiation. The extremely cold waters of Antarctica are home to hundreds of species with special morphological and physiological adaptations enabling survival and reproductive success despite allowing them to survive and reproduce despite the challenging environment. Antarctica's unique underwater food chains support the abundant wildlife that so fascinates visitors.

We humans have only visitor status in Antarctica. If we adjust our behaviour appropriately, we can sojourn and marvel at the grandeur. Antarctica is at once stunningly magnificent and devastatingly desolate.

The Southern Ocean in photographs



Route frequently taken by expedition cruise ships

One of the most popular cruise itineraries in the Southern Ocean starts in Ushuaia, Tierra del Fuego at the southern tip of South America. After one and a half days at sea, the first destination is the Falkland Islands (300 nautical miles). From here, the voyage continues in a south-easterly direction, reaching South Georgia after approximately two days at sea (795 nautical miles). After several days exploring the island, course is set to the next destination – the South Orkney Islands (740 nautical miles). The final destination on the itinerary is the Antarctic Peninsula and its offshore islands. Expedition cruise ships spend up to a week exploring the coast of the peninsula and then head north across the Drake Passage back to South America.

Top: Whereas Argentines call Ushuaia the „southernmost city in the world“, Chileans claim this title for Porto Williams on the south shore of the Beagle Channel. **Above**: Beagle Channel and southern foothills of Tierra del Fuego

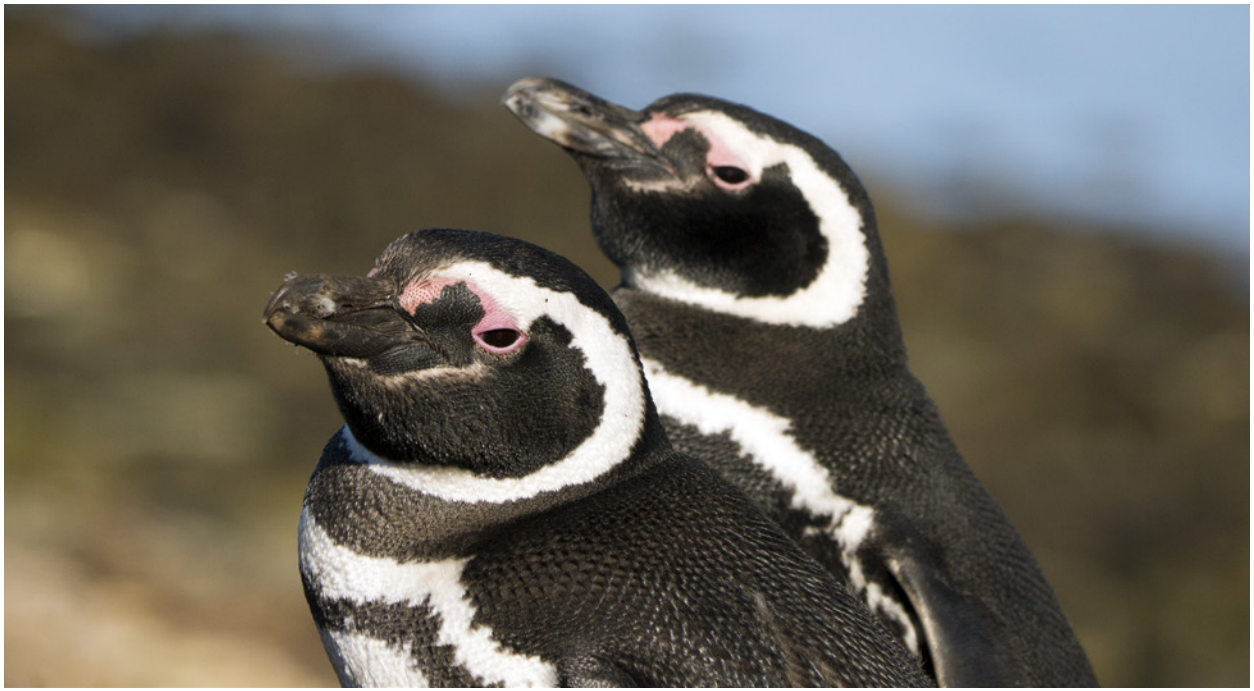
Falkland Islands – Galápagos of the South Atlantic

Most frequented landing sites on expedition cruises to the Falkland Islands

Coat of arms of the Falkland Islands

South-eastern foothills of the Andes mountain range in Tierra del Fuego
Inset: Southern giant petrel

Magellanic penguins belong to the group of banded penguins. In contrast to other penguins, banded penguins are found in the temperate zones of South America and Africa. On the Falklands, Magellanic penguins nest in burrows dug into peat, ringed by grasses and red crowberry shrubs (also called diddle-dee).



Above left: Kelp geese

Above: Cormorant

Left: Magellan geese

Southern elephant seal on Barren Island undergoing moult on land after many months in the cold waters of the Southern Ocean.

Above: Gentoo penguins on Barren Island, Falkland Islands

Left: Southern giant petrels breed on the ground and are extremely sensitive to disturbance during nesting. Visitors must maintain a precautionary distance of 50 metres to ensure that the birds do not abandon their chicks.

Blue-eyed shag on Barren Island

Above: Bleaker Island, Falkland Islands

Left: The ubiquitous tussac grass on Subantarctic islands serves as a nesting habitat for birds and comfy sleeping platform for seals. This grass grows in large tufts and can live for over 200 years.

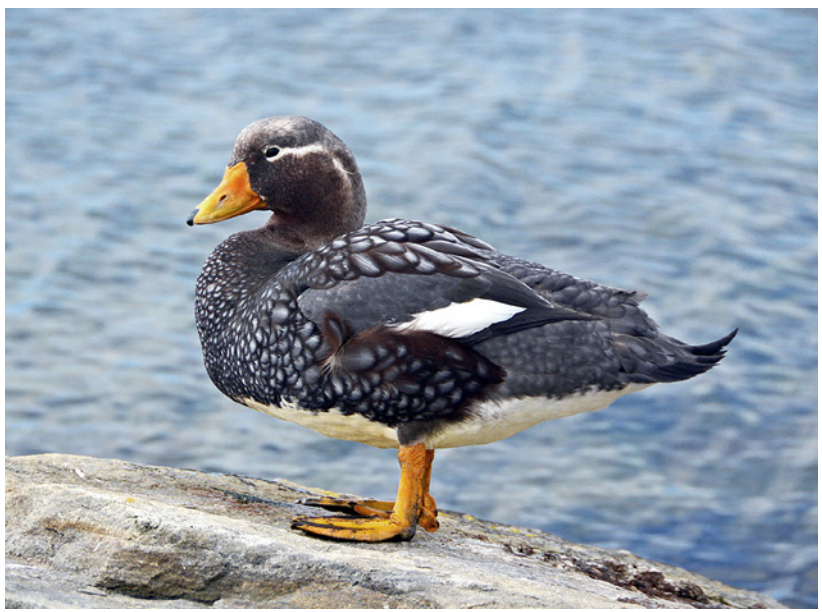
King cormorants nesting on Bleaker Island

Above: Rockhopper penguin on tussac grass

Left: Rockhopper penguin during the breeding season

Rockhopper penguin

Rockhopper penguins have characteristic spiky yellow and black feathers on the head, Bleaker Island.



Top: Imperial shag **Above:** Falkland steamer duck (Photo: Maria J. Clauss, PhD)

Top: Brown skua **Above:** Magellan geese

Pair of black-browed albatrosses performing a greeting ceremony on New Island, Falkland Islands

Black-browed albatross chicks quickly outgrow their domed nests, New Island.

Top: Turkey vulture in Coffins Harbour, New Island

Above: Rockhopper penguin, New Island

Top: Kelp goose, Carcass Island

Above: Magellanic oystercatcher

Striated caracara, Carcass Island. This member of the falcon family breeds only on the Falkland Islands, Tierra del Fuego and the Chilean fjords.