

# *A Voyage to the* Antarctic Peninsula

Text and photos by Michael Aw

At 2:00 am, it is already daylight on Pléneau Island, a place where floating icebergs become grounded, a graveyard of diverse towering structures of ice articulated in extraordinary forms. In a quintessential snowy landscape, snowflakes of perfect shape fall over me, a moment of utter isolation. I am the only one awake among the few that have chosen to sleep on ice with a sleeping bag, our way of bonding with the final wilderness—Antarctica, the last of our planet's pristine milieu.





Penguins head for the water to feed; Expedition members spent the night in sleeping bags on solid ice; Chinstrap penguins keep close bonds with their young

The mere mention of Antarctica triggers the imagination and evokes stunning images of a majestic frozen continent laden with resident penguins, polar bears and whales. In the real world, there are no polar bears in the Antarctic, and there are no penguins in the north Arctic. Though both the Antarctic and Arctic are high latitude, freezing polar regions, the similarities end there. The enormous Antarctic is an un-colonized continent covered with ice, whereby the north Arctic is comprised of a frozen ocean at the North Pole, surrounded by land masses to the south of which some are heavily populated by humans.

Once the domain of explorers who had fallen under its mystical enchantment and of appalling whalers and sealers who came

to exploit the rich bounty of its frigid waters, Antarctica continues to weave its magic, profoundly alluring the modern day adventurer to its freezing shores. My journey began with a three-day flight and transits to Ushuaia, the southernmost city of the world, about 3,300km south of Buenos Aires.

Indeed, this picturesque town endowed with a unique landscape of high snow-capped mountains, sea, glaciers and forests is a fitting gateway for nature tourists on their way to Antarctica. From here, it is purported to be a dreadful 50 hours crossing the Drake Passage, which has earned a place in history as having some of the roughest sea weather in the world.

Drake Passage is dominated

by fast flowing southern ocean waters squeezed between the land masses of South America and Antarctica.

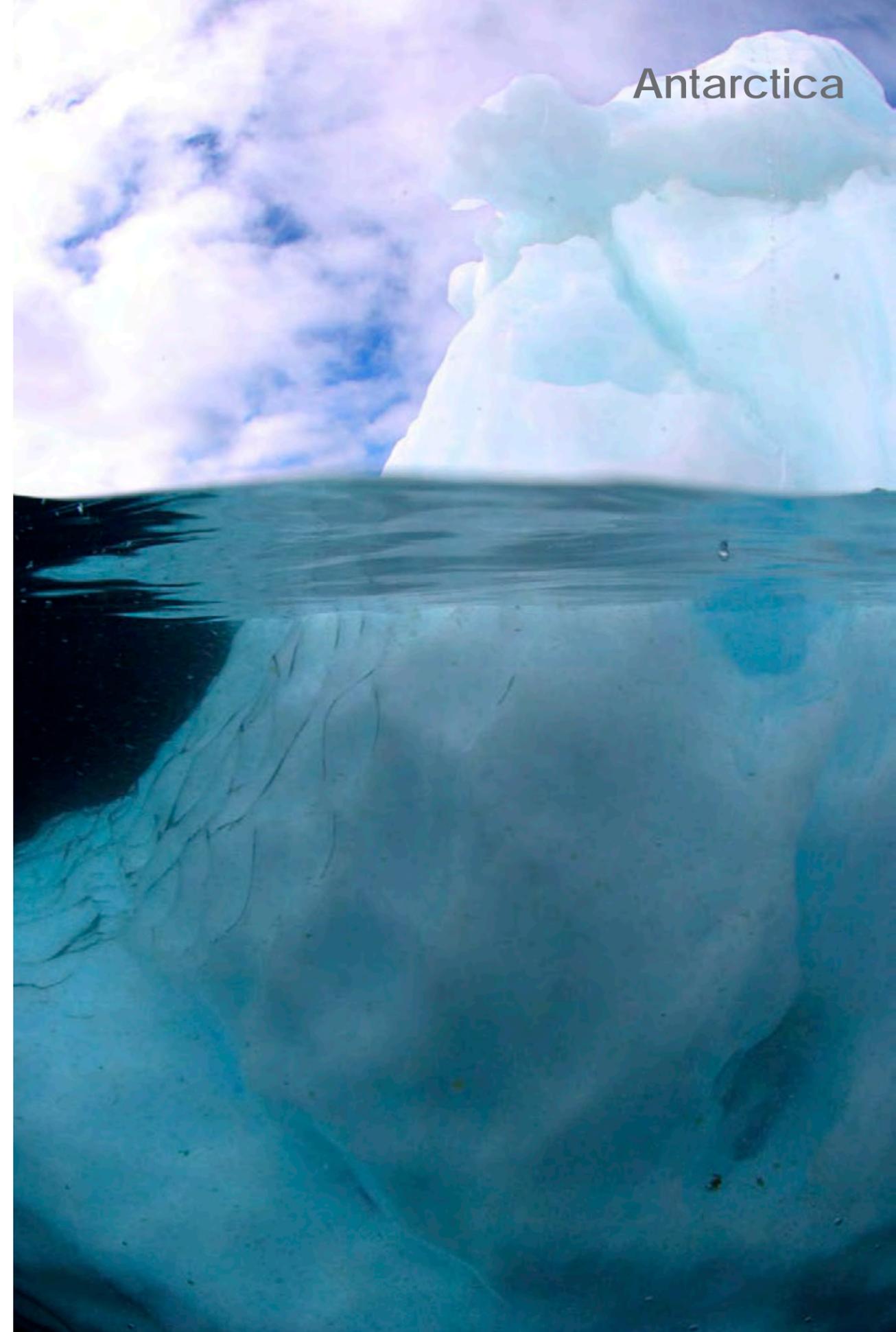
Storms frequently whip the ocean into a gloomy gray tumultuous, heaving mass of water, notorious for sinking many ships. My crossing with the *Polar Pioneer* was to be a lucky one; riding with the southwest wind of 24 knots, the vessel averaging 12 knots, crossing the Antarctic Convergence to see the first icebergs on the second morning. We were in Antarctic water.



Late afternoon, the third day of the voyage, we made landfall and landed on Aitcho Island, named for the British Admiralty's

Hydrographic Office, which I read was covered with extensive beds of moss and lichens. There was hardly any in sight. Instead, there was a Middle Kingdom-like landscape with an expanse of ice inhabited by thousands of Gentoo and Chinstrap penguins.

Much like the animals on Galapagos, these flightless birds have no fear of human



THIS PAGE: Ice! Views of the ice structures and icebergs of Antarctica

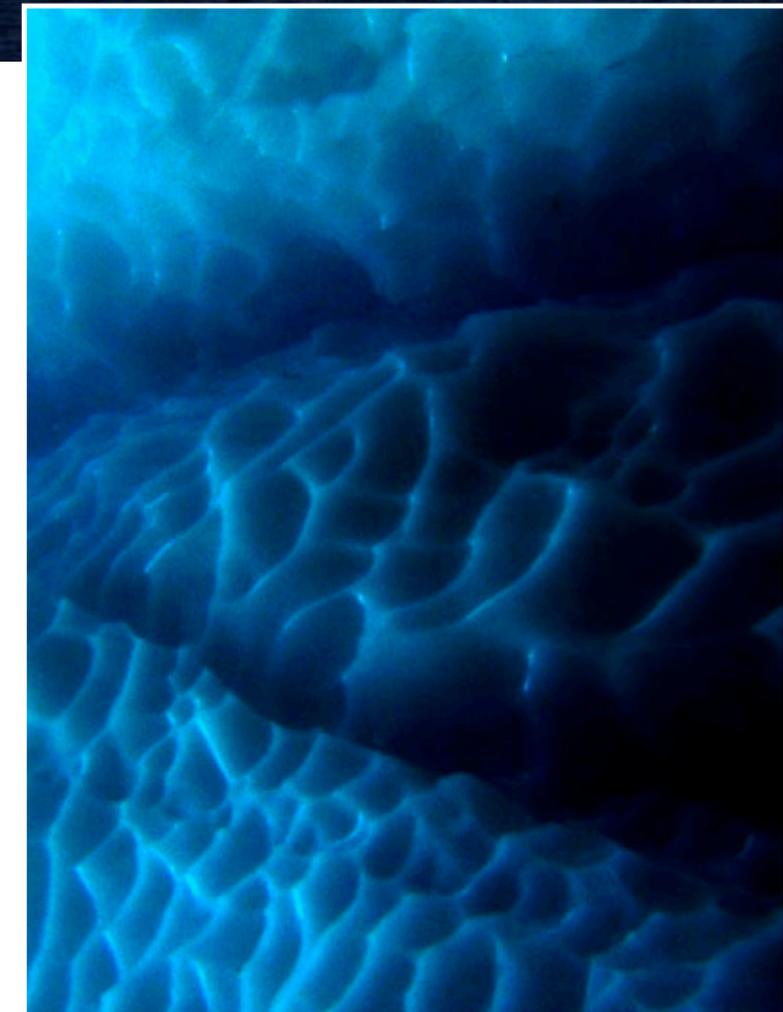
intrusion; they happily go about squawking away and doing little penguin chores, from inflating their chest and pointing beaks towards the sky, letting loose a huge lunch-whistle call to mates, to rearranging pebbly rocks for a brand new nest. Whilst we respectfully stayed at a distance, at most times, it's the birds that approached us so close that we could smell their fishy breath.

I walked right to the far side of the island, up the saddle between two hills to take in the panoramic view of Whalebone Beach in the midst of a spectacular vista tainted with little gray blobs of elephant seals, sea lions and penguins. A few of them, seemingly emerging from a snow storm, were staggering up hill towards me.

### Antarctica

Though there is lots of snow and ice around, Antarctica is really a desert environment with less than 4mm of precipitation monthly making it the driest continent on earth. The amount of moisture received by the polar continent is comparable to that falling on the world's hottest deserts. Antarctica is also the coldest continent on Earth. The lowest temperature ever recorded was minus 89.2°C at Vostok, at the Australian Antarctic Territory, in 1983. More than 98 percent of Antarctica land mass is covered with an enormous ice cap with an averaging thickness of 2.2km deep.

The continent itself, which is the size of the United States and Europe combined, is comprised of 5.4 million sq miles, but in the



Split view of iceberg above and below the water's surface; Life on Antarctica—expedition member plays music for the locals; Territorial disputes are bound to erupt amongst close neighbors



backpack and dive gear from the dive deck to join the shore excursion group at the bow! I came to conclude that it was not freezing water of the polar region or the reptilian-like leopard seal that is dangerous, but the thoughtlessness of a

dense expedition leader. Nevertheless I persevered, grasping on every window of opportunity to encapsulate the splendor of Antarctica's magnificent wilderness. With an intensity unfelt since puberty, I fought to retain the

infinite impressions that flooded the senses.

Towering mountains rose abruptly out of the sea, shrouded with steep glaciers plundering down to deep freezing waters. Superlatives necessitate a new meaning. Sunsets expand the consciousness with colors that I have never seen before, bizarre and vivid, tinted in delicate shades of rose, orange, lavender and gold that never seemed to end.

Icebergs came in a myriad of sizes from the colossal to the petite in fanciful shapes and impossible hues of aqua, palest blue to mint green

Austral winter of June to October, the environ of surrounding heavy pack ice increases in area to more than seven million square miles. If these were to melt with the current trend of increasing global temperature, seven million cubic square miles of water would be released, resulting in the ocean rising between 45 to 60m! This catastrophic event would not only flood numerous coastal cities, but the entire world's weather would be thrown into irreversible mayhem.

### Shooting in Antarctica

My personal objective for participating in a photography and dive expedition was to capture a sample of an above and below portfolio of the Antarctica Peninsula. I soon realized that I was too ambitious. For the shoot, I had to carry a 30kg backpack of cameras, a pole cam for each landing, and I had to fight with

an expedition leader who had a mission in life to make sure I failed.

Shooting in Antarctica is a challenge for the photographer and equipment to survive the elements; sub-zero temperatures, melting ice, powdery snow and volcanic ash don't really go very well with cameras. To pursue better quality time with the animals and a space to work without the tourists, arrangements were made for me to go off on my own during shore excursions. On every occasion, the expedition leader-from-hell would disrupt the plan, and in one instance, he had me scamper in icy conditions suited up in a dry suit, lugging a polecam, underwater housing, 30kg





## Antarctica



Adelie penguin (*Pygoscelis adeliae*) peeks into the camera; Common seal raises his head; Colony of Emperor Penguins

floated on mirrored waters like rough-cut diamonds sculptured by artisans from heaven. Antarctica fulfills the childhood dream of adventure, exploration, and fantasy with its ethereal landscape. It shimmers with a savage beauty, unique wildlife and raw power exceeding any expectations. The term, *immense*, took on a new-found significance, as I obstinately attempted to freeze the moment onto film. I could only try.

### Abundant life

One morning at Charlotte Bay, while the divers got their first taste of diving in sub-zero water temperature, I managed to find a quiet locale to work on an over and under picture of an ice flow. Nearby, there were two Weddell seals, and a few Gentoo penguins ambled by, going somewhere, going nowhere. In the

distance my lens, fell upon a leopard seal sun-basking on an ice flow right in the vicinity of the divers. That would have made an awesome over-under picture.

Despite the apparent hostility of Antarctica, the coastal region, especially at the peninsula, teems with a profusion of wildlife. However, the animals are highly specialized, and whilst diversity is relatively low, overall densities of individual species are in astronomical numbers; there are tens of millions of penguins alone.

In this most fundamental of environments, this sheer number of wildlife flourishes each spring and into the late summer as the Antarctic Peninsula "reawakens" from its cold dark slumber. As my trip began at the end of November, this was the time for the penguins, seals and birds to start to convene to court and

breed for the next generation.

This proliferation of nature was astonishing to watch as it took place in the frozen, unforgiving landscape, which harbors it. Yes, I did capture quite a few frames of mating Gentoo —my first of penguins doing naughty things. Along with the Adélies and Chinstraps, Gentoos belong to the genus *Pygoscelis*, meaning "brush-tailed" and so-called because of their long paint-brush shaped tails. But really there are only two kinds of penguins in the Antarctica—the white ones walking towards you and the black ones walking away from you. Penguins are mostly white-breasted with a black back!

Though I remember my fingers were numb beyond comprehension submerged for those over and under shots, I was too immersed in enthusiasm to feel the pain and the





THIS PAGE:  
Scenes from  
colony life of  
the Emperor  
penguins  
(*Aptenodytes  
forsteri*)

cold. But as I am writing this back home over a cold Australian winter, how I wish I was born a penguin.

Those tuxedoed birds are a resourceful bunch when it comes to dealing with cold weather; they are able to make their own heat and carry it with them wherever they go. Like seals and sea lions, penguins are also endowed with a natural layer of blubber developed from a diet of krill, squids and planktonic oils. This thick layer of blubber is an excellent insulator and also serves as fuel for the long, cold breeding season. This is nature's evolutionary design in natural heating technology.

We all know that air is the best insulator; any one spending time on the ski field will recognize the

significance of wearing many layers of clothing with plenty of air between them. All outdoor cold weather-wear is borne of this concept.

Now the penguin's equivalent of a PATAGONIA polar suit are their tightly overlapping, ruffle-resisting feathers, which trap a layer of warm air against its skin. Each feather is also fluff down at its shaft, and the down layer provides added insulation. The feathers are also shiny, long, curved and overlapped liked carefully laid roof tiles. So to speak, penguins are ingeniously air and water tight.

### Exploration

Six days into the voyage, we sailed into Galindez Island to visit Vernadsky<sup>1</sup>, the Ukraine Antarctic

Center (UAC). Originally, it was the British Antarctic Survey (BAS) Faraday station first built during the British Graham Land Expedition (1934-37). Vernadsky to date is the oldest operational station in the Antarctic Peninsula area, and it is here where the hole in the ozone layer was first discovered.

I met with the resident marine biologist, Andrei Utevsy, who regularly dives beneath the ice in a 7mm wet suit and is still using some 1950's camera system for his research. Now that is tough, putting those of us in our place who dive in drysuits in 20°C water. His passion is overwhelming, especially to be working 24/7 in one the loneliest outermost posts at the bottom of the





LEFT TO RIGHT: Snow on the deck of the ship; The rugged ice and awesome scenery of Antarctica; What in the world are they thinking?

world. The station is snowed in for about eight months of the year and only receives 250 days of snowfall and barely 800 hours of sunshine—i.e. about 70 days in a year! I am sure he is glad that it's only a 13-month posting.

Human beings are relative newcomers to Antarctica. The search for the continent was the last great achievement of global exploration—an epic tale spanning centuries of high adventure, from the “unknown southern land” of the ancients to the first recorded

sightings in 1820. Of course, Antarctica was finally explored, and plundered, during the Age of Discovery by senseless men through the ages, and it did not take long for our species to take advantage of trusting, defenseless wildlife and ruthlessly plunder the continent's biological richness to the point that the whales and fur seals were commercially extinct. Whaling activities continued into the mid-1980's.

Through the enthusiasm of the great explorers, Robert Scott, Ernest

Shackleton, Douglas Mawson and Ronald Amundsen—who ventured deep into the vast whiteness of the interior in search of the final “holy grail” of discovery, the South Pole—Antarctica did much to generate interest in the frozen continent. The lessons of the 18-month-long International Geophysical Year (1957-1959) shed indepth knowledge on Antarctica, which steered an era of scientific and conservation movements.

The continent's history reached a pinnacle with the signing of the

Antarctic Treaty<sup>2</sup>, protecting the last continent for centuries and future generations. The 1961 treaty is abided by 12 nations: Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, the Soviet Union, the United Kingdom and the United States. It recognizes that in the interest of all humankind that Antarctica should continue forever to be used exclusively for peaceful purposes and should not become the object of international discord. Well, that was done with good intent.





Family of Chinstrap Penguin (*Pygoscelis antarcticus*)

Adelie penguin feeds youngster; Spreading their wings at the bottom of the world (below)  
NEXT PAGE: Chinstrap penguins climb up huge hill to reach their nesting sites



**Deception Island**

On the eighth day, we reached Deception Island to land at Bailey Head. Here lies one of Antarctica's biggest Chinstrap penguin rookeries; there are more than 200,000 mating pairs—a magnitude beyond words, beyond imagination. Whatever compels the little penguins to establish nesting sites, some up to 2km up hills, is beyond human comprehension. Especially since it is life's greatest inconvenience, as every so often, it is necessary for them to totter down a 'pink' highway to the sea, porpoise madly for food, returning with a hop, splash on the beach, shake, shake and step, step... and waddle back up the beaten track to their nest.

The penguin highway, as I see it, is the most amazing wildlife phenomenon I've ever seen. As I watched, I stood humbled by the power of nature's resourcefulness. The hundreds and thousands of

Unlike expeditions undertaken by the early explorers, the advent of modern day air travel and special interest agents have made organizing a voyage to Antarctica a relatively easy feat, albeit an expensive one. Compared to some of my diving expeditions, which take sometimes up to a year to organize, an Antarctica voyage is like a walk in the park. All it takes is booking an airline ticket to Ushuaia and a reservation with one of the expedition companies such as Aurora Expeditions aboard the *Polar Pioneer*.

Literally, it is really that simple, and you do not need to have the fitness of an Olympian either; a 12-year-old can do it, as well as a 75-year-old. The average age on board on one of these tourist boats is 50. As such, for the last two summers, approximately 14,000 tourists were carried to Antarctica by 14 IAATO<sup>3</sup> member companies. And if you are one of those who just wants to brag about having been there, there is always the easy, economical couch-potato option of booking a 12-hour turn-around flight from Sydney, Australia, to see Antarctica in the comfort of a Boeing 747.



travel

Antarctica



CLOCKWISE FROM LEFT: Ominous cliffs of an iceberg; Reclining fur seal; Antarctic landscape; Emperor penguins wary of hunting sea lions cautiously enter the water



inscribed into the UNESCO World Heritage list. All competitive feats should be banned. Humans do not have a good track record when it comes to treatment of the ocean; our very existence is very dependent on the world's most isolated continent—the engine room for much of the world's weather. The future of this sensitive region depends on our diligence to protect and manage the wildlife and preventing pollution and contamination of the land, sea, air and ice.

Nature tourism should be carefully reviewed, restricting vessel capacity to 50 or less. Mass tourism of 500 on a cruise ship is making a joke out of our planet's final pristine frontier. Perhaps some rich American should replicate Antarctica right on the Las Vegas Strip, along side the mockeries of the Eiffel Tower and the Pyramids—which



observation point up on the hill, I spotted some birds approaching the shore. I picked out one and watched the swell dump it up onto the beach. It stood erect and step, step, step and halt. Shake. It joined the endless flow of penguin traffic highway, uphill on the left, downhill on the right.

I timed the journey; it took the bird 70 minutes to reach his colony. The hike up that mountain was quite a trek even for the

penguins making the trek from their nests in the hills down to the sea to feed required the agility and strength equivalent to a triathlon competitor. From my

average person. How a bird the height of my calf and with legs the size of my toe can do it is sheer bewilderment.

As if we need to be reminded

of the errors of the past, after Bailey Head, the *Polar Pioneer* sailed around the corner, negotiated the narrow Neptune's Bellows passage and landed on Whalers Bay, an old whaling station located in the inner caldera of Deception Island—a bleak landscape of decaying buildings, fuel tanks and boats that once supported the outpost of human brutality. The place is a very clear paradigm of human exploitation of the land and the sea; thousands of whales were slaughtered at Whalers Bay during the station's operation. I felt ashamed of the human race.

**Afterthoughts**

I perceive Antarctica in a different light after the voyage. Rather than a destination to conquer, or to prove that one has earned his manhood by reaching the South Pole, or to ski cross-continent, Antarctica should be protected and be



seems to satisfy the simple-minded. The preservation of this magical part of our planet is dependent on its remoteness, far away from human encroachment and exploitation. It is an international treasure, a biosphere that we must preserve for future generations. Will I be back? Absolutely, it is a spiritual experience, a place to see before one dies! ■

*NOTES: <sup>1</sup>Vernadsky is the first Ukrainian Antarctic station. It is operated in the field of Upper Atmosphere and Climate Science. Data is collected and analyzed in several scientific disciplines: ionospheres, magnetospheres, geomagnetism, meteorology, glaciology and ozone research. Several of these data sets are the longest continuous runs in Antarctica. According to the Memorandum of Understanding between the UAC and the BAS, Ukrainian scientists will continue and supply BAS and buy all science results of the long-term measurements of total ozone layers, magnetic, meteor and ionosonde data.*

*Michael AW is an internationally published author and photographer. He is a Fellow of the Explorer Club in New York and a Fellow of the International League of Conservation Photographers. He is also Ambassador for Seacam. For more information, visit: [www.MichaelAW.com](http://www.MichaelAW.com) ■*



Chinstrap penguins (below) battle the the surf on their way feed on fish, squid and krill up to 50 miles off shore. RIGHT: Map of Antarctica

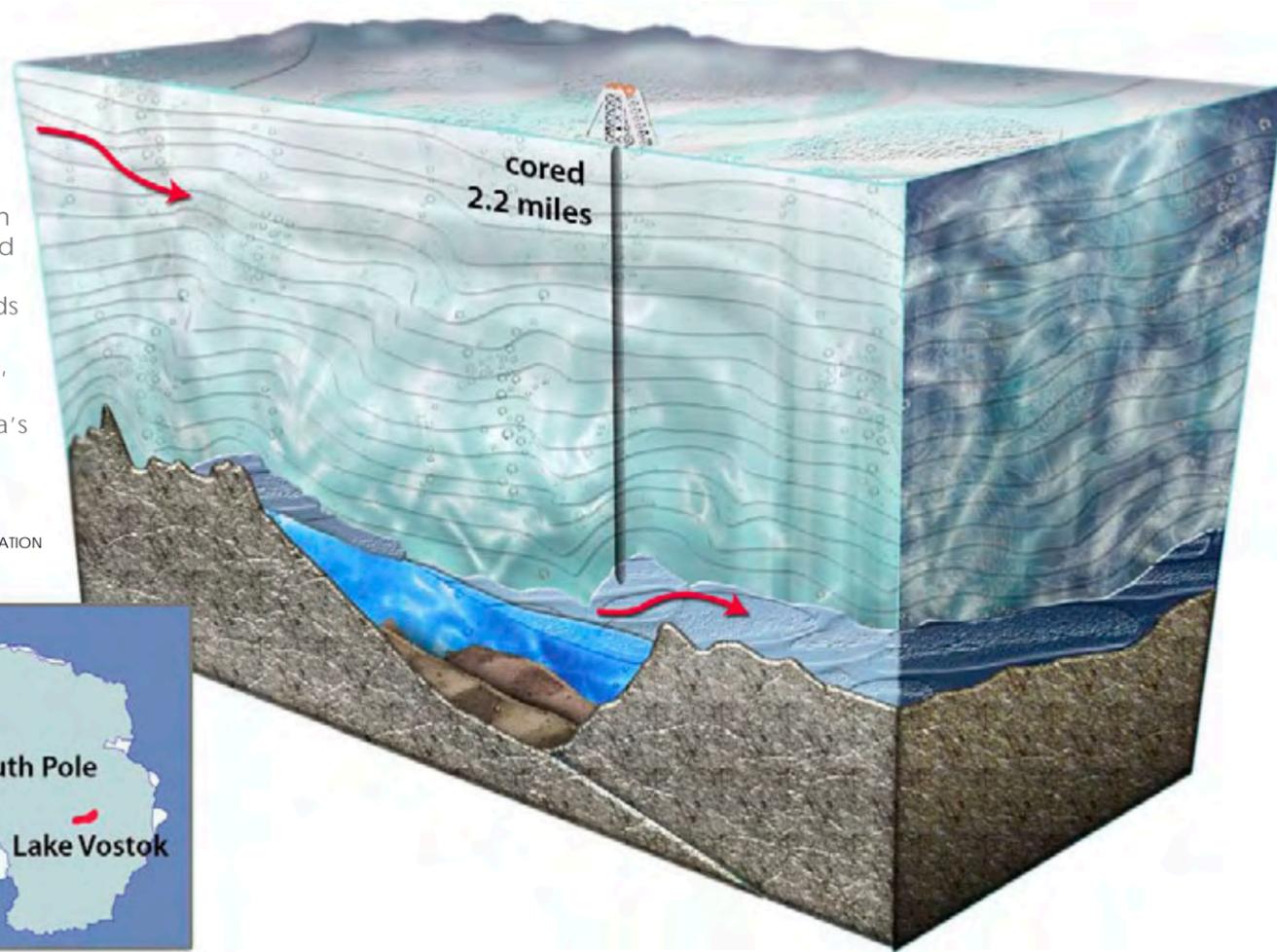


Views of icebergs from under and over the water's surface

# Huge lakes and rivers lie hidden under Antarctic ice sheet

An artist's cross-section of Lake Vostok, the largest known subglacial lake in Antarctica. Liquid water is thought to take thousands of years to pass through the lake, which is the size of North America's Lake Ontario

NICOLLE RAGER-FULLER / NATIONAL SCIENCE FOUNDATION

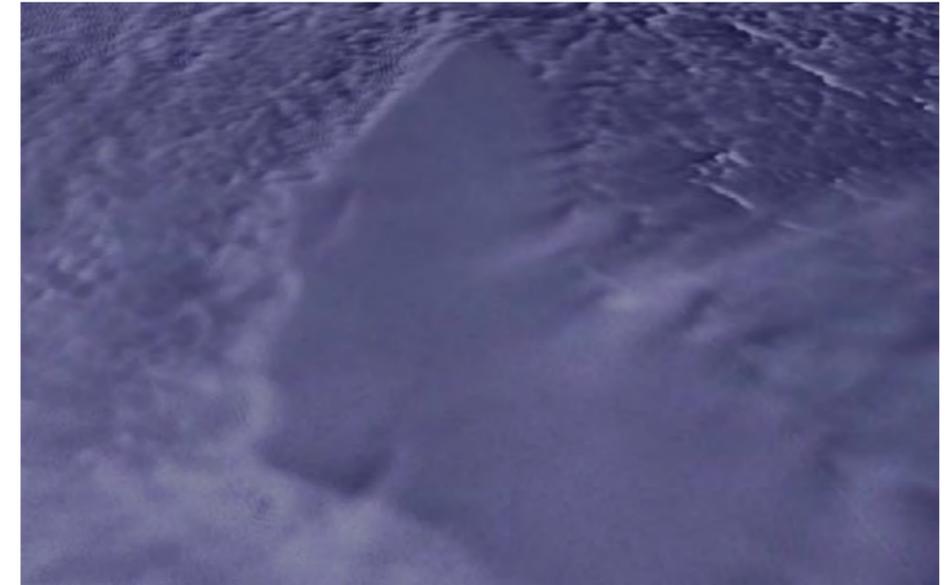


when talking about the movement around glaciers, which tend to move very slowly. But one lake that measured about 30 by 10 kilometres caused a 10-metre change in elevation at the surface when it drained over a period of about 30 months, Fricker said.

Further research will now be undertaken to survey and monitor the subglacial system and its connection to movement of the ice sheet. ■

RADARSAT dataset of Antarctica, another view of Lake Vostok

NASA/GODDARD SPACE FLIGHT CENTER SCIENTIFIC VISUALIZATION STUDIO AND CANADIAN SPACE AGENCY, RADARSAT INTERNATIONAL INC.



Lying beneath more than two miles of Antarctic ice, Lake Vostok may be the best-known and largest subglacial lake in the world, but it is not alone down there. Scientists using NASA's ice cloud and land elevation satellite identified a network of rapidly filling and emptying lakes. More than 145 other lakes trapped under the ice have been identified. Until now, however, none have approached Vostok's size or depth.

Lasers beamed from space have detected what researchers have long suspected: big sloshing lakes of water underneath Antarctic ice.

These lakes, some stretching across hundreds of square miles, fill and drain so dramatically that the movement can be seen by a satellite looking at the icy surface of the southern continent.

Glacial lakes have been found

before in Antarctica, but researchers from Scripps Institution of Oceanography at the University of California found a system of fast-flowing rivers and reservoirs underneath the ice.

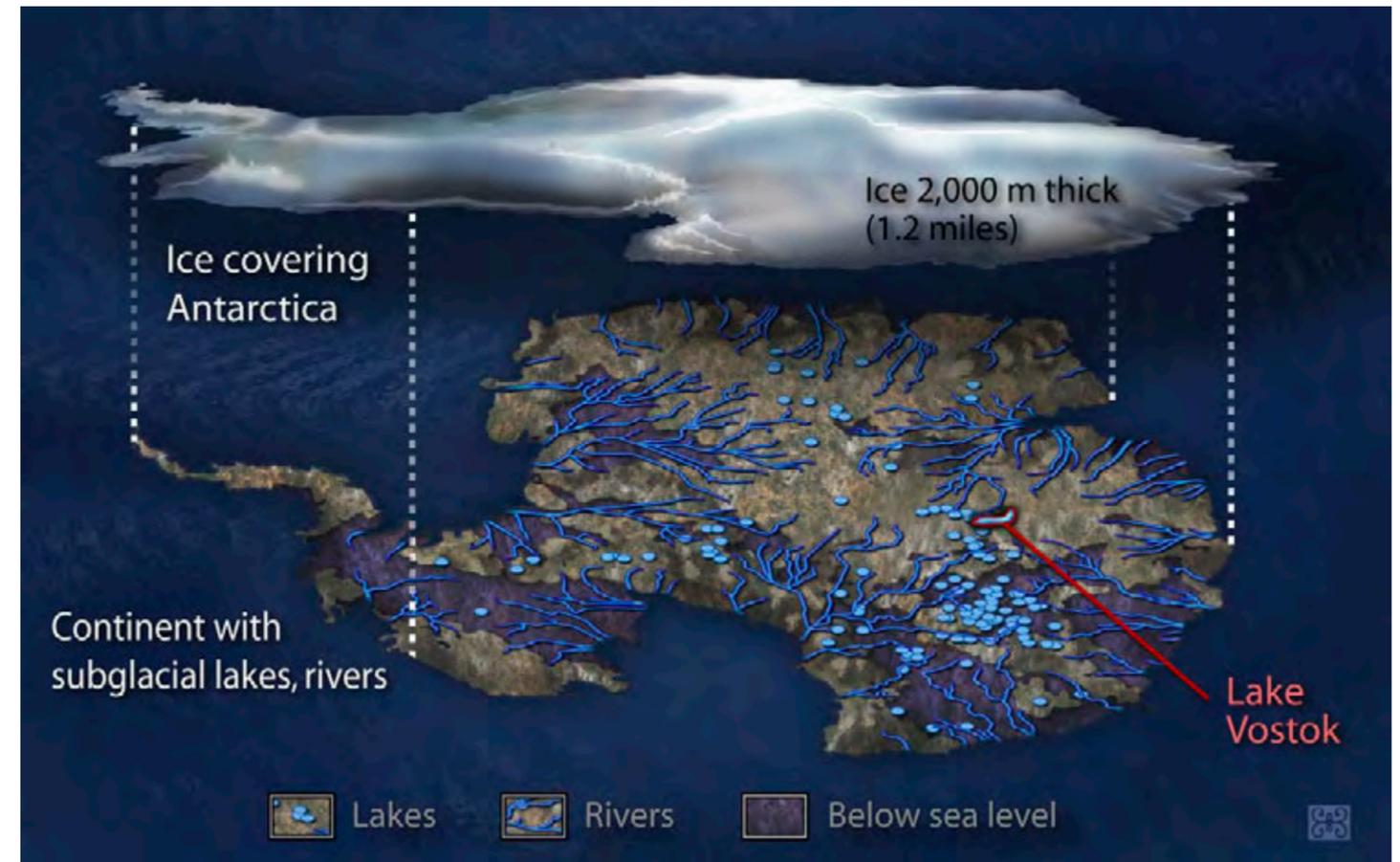
Scripps says it seems the rivers transport the majority of the water from the deep interior of the ice sheet out to the ice shelves, and ultimately to the ocean.

Dr Helen Fricker, a glaciologist at

Scripps Oceanography, said: "We didn't realise that the water under these ice streams was moving in such large quantities, and on such short time scales.

"We thought these changes took place over years and decades, but we are seeing large changes over months. The detected motions are astonishing in magnitude, dynamic nature and spatial extent."

"Quick" can be a relative term

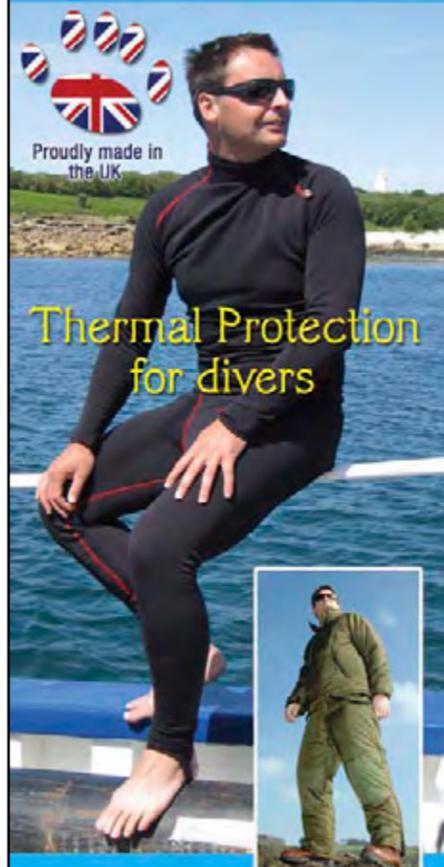


An artist's representation of the aquatic system scientists believe is buried beneath the Antarctic ice sheet

ZINA DERETSKY / NATIONAL SCIENCE FOUNDATION



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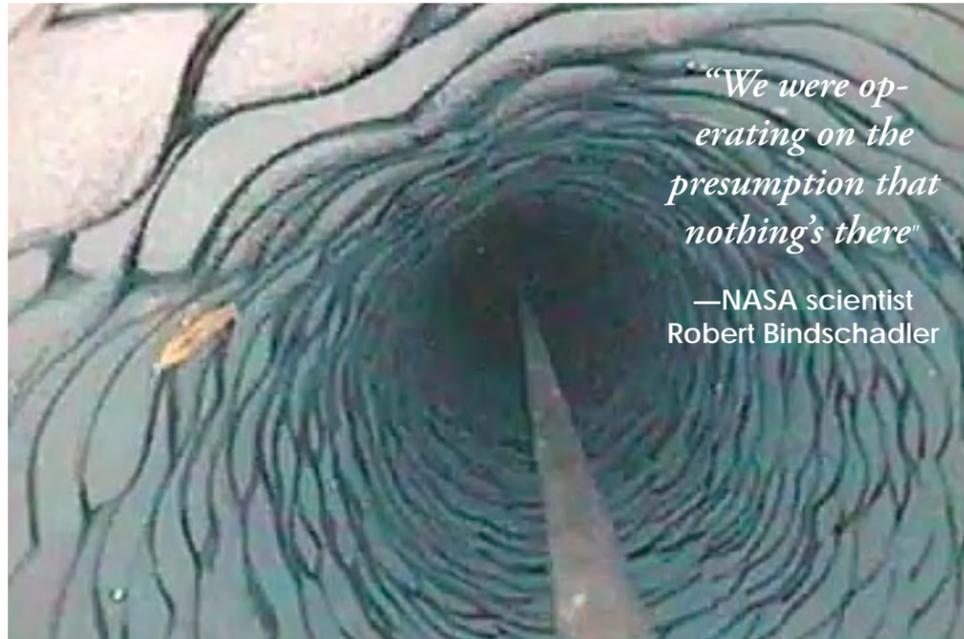
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# Lakes found beneath Antarctic ice sheet could contain unique ecosystems

Lake Vostok may be the best-known and largest subglacial lake in the world, but in February 2006 scientists from the Lamont-Doherty Earth Observatory described for the first time the size, depth and origin of two ice-bound lakes referred to as 90°E and Sovetskaya for the longitude of one and the Russian research station coincidentally built above the other. The scientists' findings also indicate that, as suspected with Lake Vostok, an exotic ecosystem may still be thriving in the icy waters 35 million years after being sealed off from the surface.

A NASA team was surprised when it lowered a video camera to get the first long look at the underbelly of the ice sheet in Antarctica, and a shrimp-like creature went swimming by and then parked itself on the camera's cable. Scientists also pulled up a tentacle they believe came from a foot-long jellyfish.

Stacy Kim of Moss Landing Marine Laboratory was the first biologist to see the video and immediately recognized it as a Lyssianasid amphipod. It was about three inches long and Kim concluded that this meant there was quite an extensive biological community under the ice—even so far (20 miles in this case)



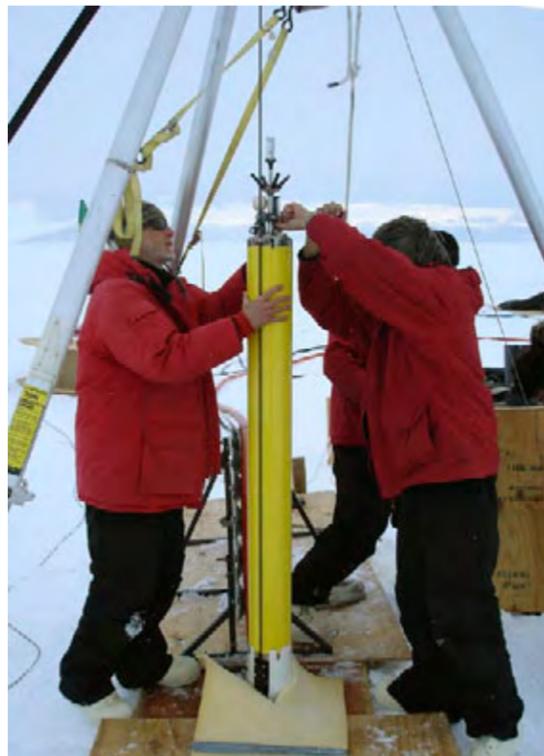
*"We were operating on the presumption that nothing's there"*

—NASA scientist Robert Bindschadler

The Lyssianasid Amphipod is not a shrimp, just a distant relative that looks like one

from open water.

The camera was lowered nearly a full kilometer down, but it did



not reach the sea floor and very little else was seen—just the deep blackness of the water sub-ice environment. An additional biological tease appeared as the camera was reeled back in—not on the monitor, but on the cable itself. A tentacle was noticed attached to the cable as it returned to the surface.

The video is likely to inspire experts to rethink what they know about life in harsh environments. And it has scientists musing that if shrimp-like creatures can frolic below 600 feet of Antarctic ice in subfreezing dark water, what about other hostile places? What about Europa, a frozen moon of Jupiter? ■



Bright coral beneath the ice — click to play video

## Alien species invading Antarctic

Scientists are calling for action to prevent foreign species from taking hold in Antarctica and wrecking the continent's unique ecosystems.

Despite Antarctica's inhospitable environment, non-native species introduced by tourists, scientists and explorers are gaining a foothold. More than 26,000 international tourists visit Antarctica each year and numbers grow by the thousand each season.

"Antarctica has long been considered as an isolated continent with a harsh environment. So the general perception has been that we don't need to worry about non-native species. We know better now," Dr Niel Gilbert, environmental manager at Antarctica New Zealand, told BBC News.

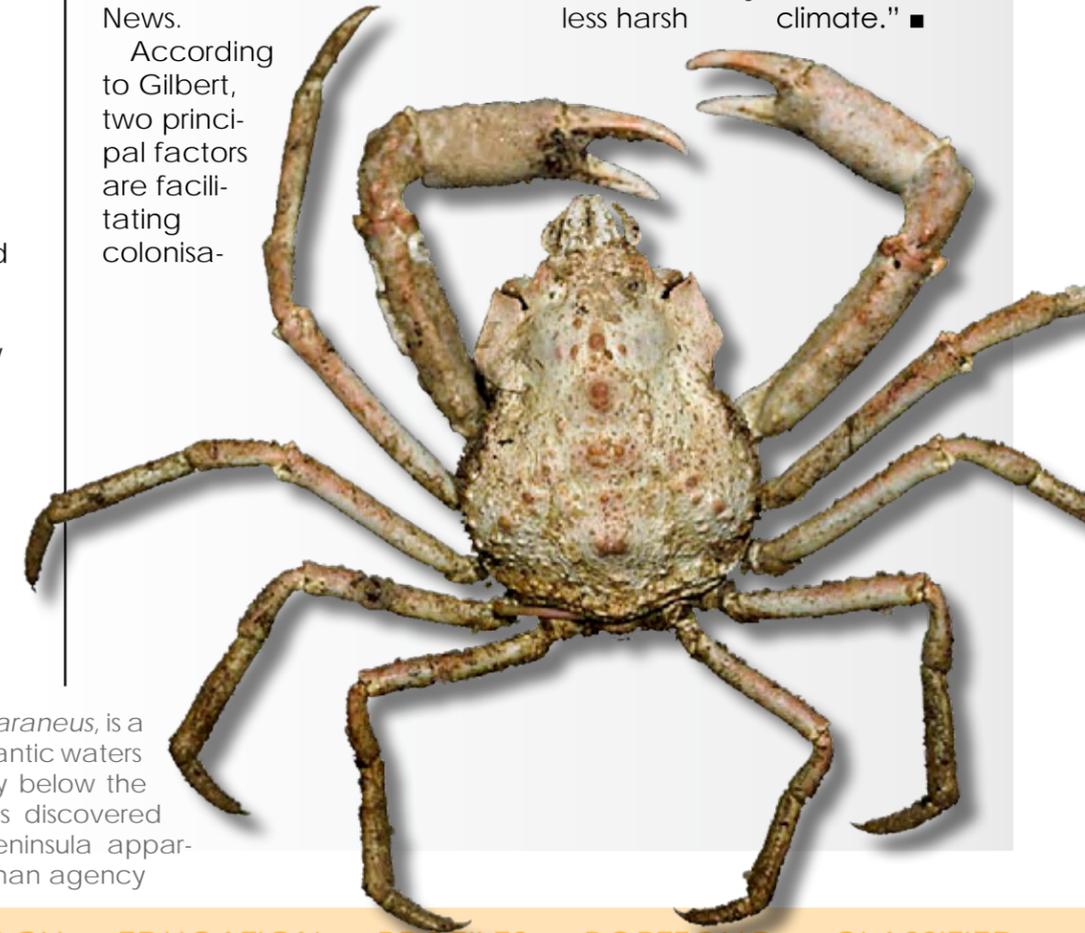
According to Gilbert, two principal factors are facilitating colonisation

of Antarctic habitats by foreign species: the increased numbers of people travelling to the continent and climate change.

### Visitor growth

"There are more and more people going to Antarctica, and we know that people and ships and planes carry plant seeds and other non-native species," Gilbert explained.

"The Antarctic Peninsula region is warming more quickly than anywhere else on the planet. Those species capable of surviving in polar climates are more likely to survive in a less harsh climate." ■



The great spider crab, *Hyas araneus*, is a species of crab found in Atlantic waters and the North Sea, usually below the tidal zone. In 2003 it was discovered around the Antarctic Peninsula apparently transported by human agency

# How Penguins and Seals Survive Deep Dives

KATHI PONGANIS, SCRIPPS INSTITUTION OF OCEANOGRAPHY AT UCSD

**Jessica Meir from Scripps Institution of Oceanography went to extreme environments to learn how birds and mammals thrive in conditions that humans cannot tolerate.**

Her recent doctoral dissertation focused on the diving physiology of some of the most accomplished diving animals: emperor penguins and elephant seals. Her work, funded by the National Science Foundation (NSF), has revealed extraordinary physiological responses and adaptations that contribute to the diving abilities of these animals.

## **A two-hour dive**

Emperor penguins can dive for almost 30 minutes on a single breath, and the record dive of a northern elephant seal is almost two hours. Both species can also dive to great depths—greater

than 457 meters (1,500 feet) for the emperor penguin, and almost 1,524 meters (5,000 feet!) for the elephant seal. It is well-documented that animals that can dive well have enhanced oxygen-storage capability in their bodies, a feat accomplished by increased blood volumes and higher levels of hemoglobin and myoglobin—the proteins that carry oxygen in the blood and muscle.

## **Three beats per minute**

For example, one study revealed that diving emperor penguins have heart rates significantly lower than that of their heart rates at rest. During one emperor pen-

guin's impressive 18-minute dive, its heart rate decreased to as low as three beats per minute, with a rate of six beats per minute lasting for over five minutes during the dive. As heart rate is a very good indicator of how much oxygen is utilized, decreased heart rates during dives correspond to conservation of oxygen, enabling the animals to dive for a longer time.

## **Exceptional tolerance**

To provide a direct look at oxygen depletion, Meir also measured the levels of oxygen in the blood during the dive using an oxygen electrode. This electrode continuously measured the amount of oxygen in

the blood, documenting the rate and extent of oxygen depletion during the dive and providing us with knowledge of how these animals manage their oxygen stores.

Both emperor penguins and elephant seals can tolerate exceptionally low levels of oxygen in their blood, far below the limits of humans and other animals. This assists them in managing oxygen efficiently and contributes to their ability to dive and obtain food. Combined with their en-

hanced oxygen stores, other physiological responses like reduced heart rates, and factors such as swimming styles and their hydrodynamic body shape—these animals are well-adapted to flourish in underwater environments. ■



JESSICA MEIR, SCRIPPS INSTITUTION OF OCEANOGRAPHY

The opening of a new frontier

# Spitsbergen

80°north

In 2007, Norwegian dive operator, Strømsholmen, launched another spectacular diving experience—liveaboard cruises to Svalbard (Spitsbergen), Norway's northernmost outpost in the high Arctic.

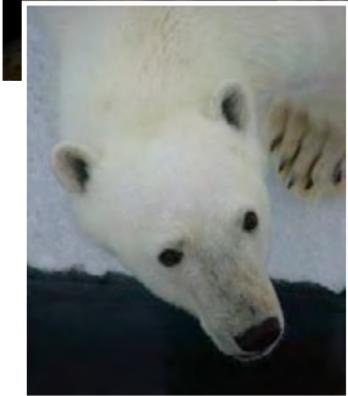
The exclusive trips, which are only conducted in August, offer the guests unparalleled opportunities to dive close to icebergs, snorkel with belugas and possibly encounter big whales such as the bluewhale, narwhals, bowhead, fin and seiwhale as well as the always enchanting humpbacks. Itineraries start at Longyearbyen and move outside Prins Karls Forland to Ny-Aalesundal; then they onto to Danskoeya, Moffen,

Widjefjorden, on the way to Hinlopen and Gyldenoeyane. Next, are different locations around Nordaustlandet before moving on to Sjuoeyane and returning back to Woodfjorden. From Woodfjorden there's a return back to Ny-Aalesund and Longyearbyen. During this leg of the trip, several stops are made for both diving and topside adventures. [www.stromsholmen.no](http://www.stromsholmen.no) ■

The 90-foot *M/S Sula* is certified to carry 12 guests who can be accommodated in two cabins with four beds, five cabins with two beds and one cabin with three beds. The cabins have upper and lower beds except one cabin. There is one lounge with sitting areas, room for diving-equipment, space for drying clothes and suits, washing machine and tumble dryer. There are three toilets and two showers onboard. All cabins have a wash basin, warm and cold water, and 220V electricity



Svalbard is an archipelago in the Arctic, located about midway between mainland Norway and the North Pole. Spitsbergen is the largest island, followed by Nordaustlandet and Edgeøya. The administrative center is Longyearbyen, and other settlements, in addition to research outposts, are the Russian mining community of Barentsburg, the research community of Ny-Ålesund and the mining outpost of Sveagruga. The archipelago is administered by the governor of Svalbard



# Greenland

*Realm of Arctic Ice*

Text and photos by Morten Beier

Recently, I had the pleasure of joining a team of media production professionals on a trip to Greenland—a German crew from Nord Deutscher Rundfunk (NDR—North German Television) working on an underwater ‘road movie’ and a wildlife photographer from Denmark. The adventure started in Sisimiut just north of the polar circle and finished in a load of ice cubes up north somewhere in Disco Bay.

I’d dived several times before in the Arctic waters of Greenland, but it would be very interesting to witness the making of a film on that very topic.

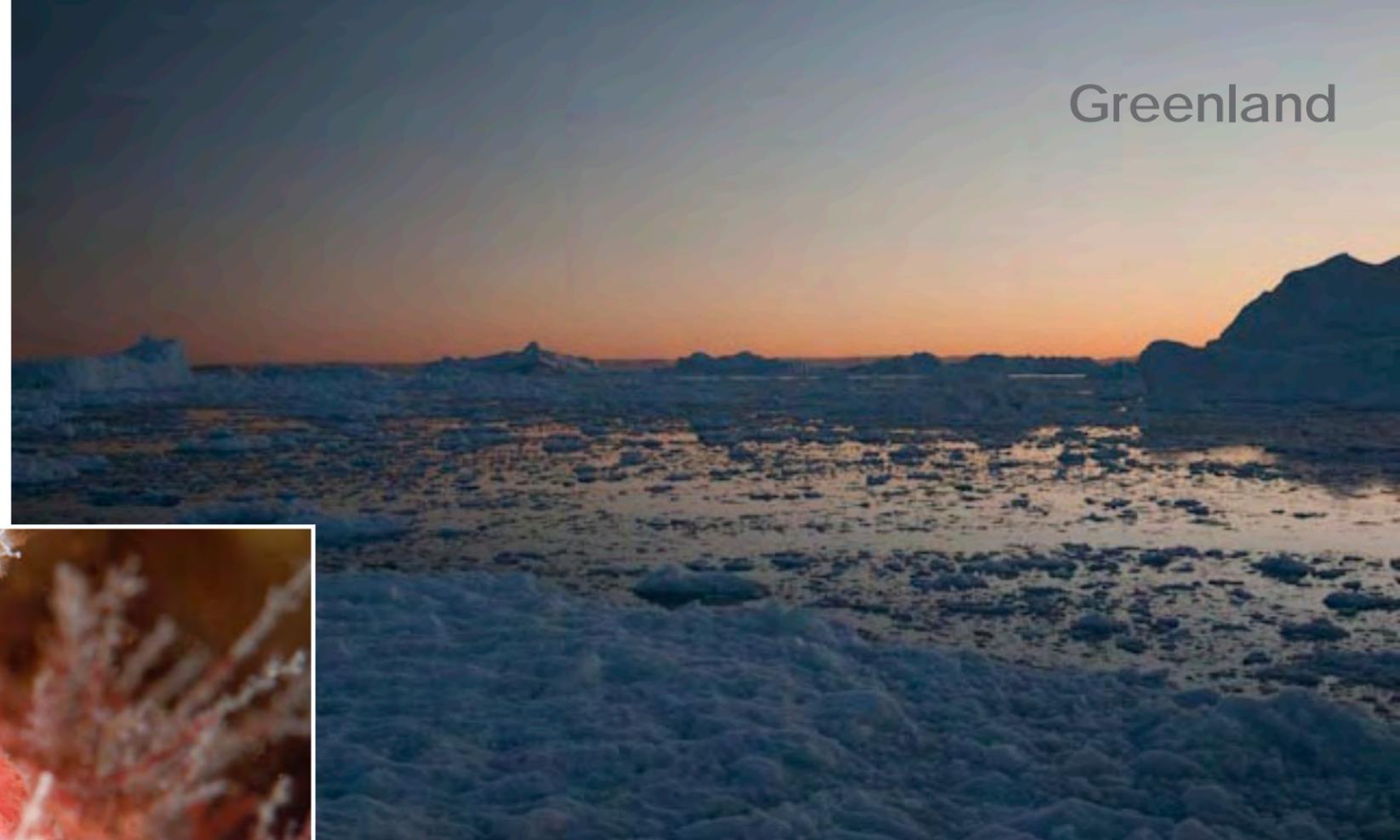
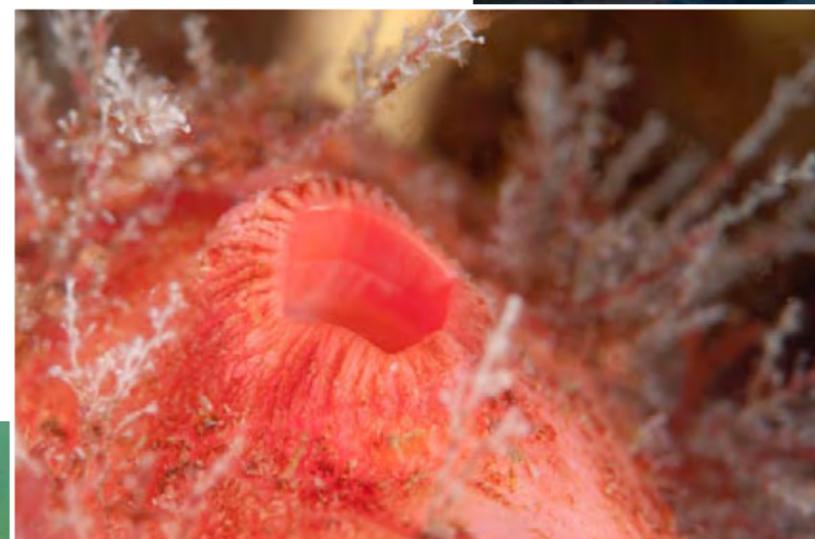
The NDR crew and I met Sara Lindbæk, the photographer, in Kangerlussuaq Airport (don’t try to pronounce it without local guidance). Sara had already spent some days in the snow, taking pictures of things she didn’t intend to... that’s how it goes, but the results were stunning! By the way, the rest of the crew were Thomas (editor and cameraman), Wolfgang (cameraman), Andreas (topside cameraman) and Ulrich (cameraman).

Arriving in Sisimiut, we found out that the sonar system had given up a few hours earlier. Sailing in Greenlandic waters,

RIGHT TO LEFT: The Greenlandic landscape; Soft coral and polyps; Bleached whale bones

where we often went into uncharted territories, was no joke, and sailing without a sonar was an absolute no-go.

After lunch in the newly opened café in Hotel Sisimiut, we said hello to the chopped-off heads of two walruses at the bulwark, as we went on board the boat, *VEGA*—traces of wildlife... for Sara.



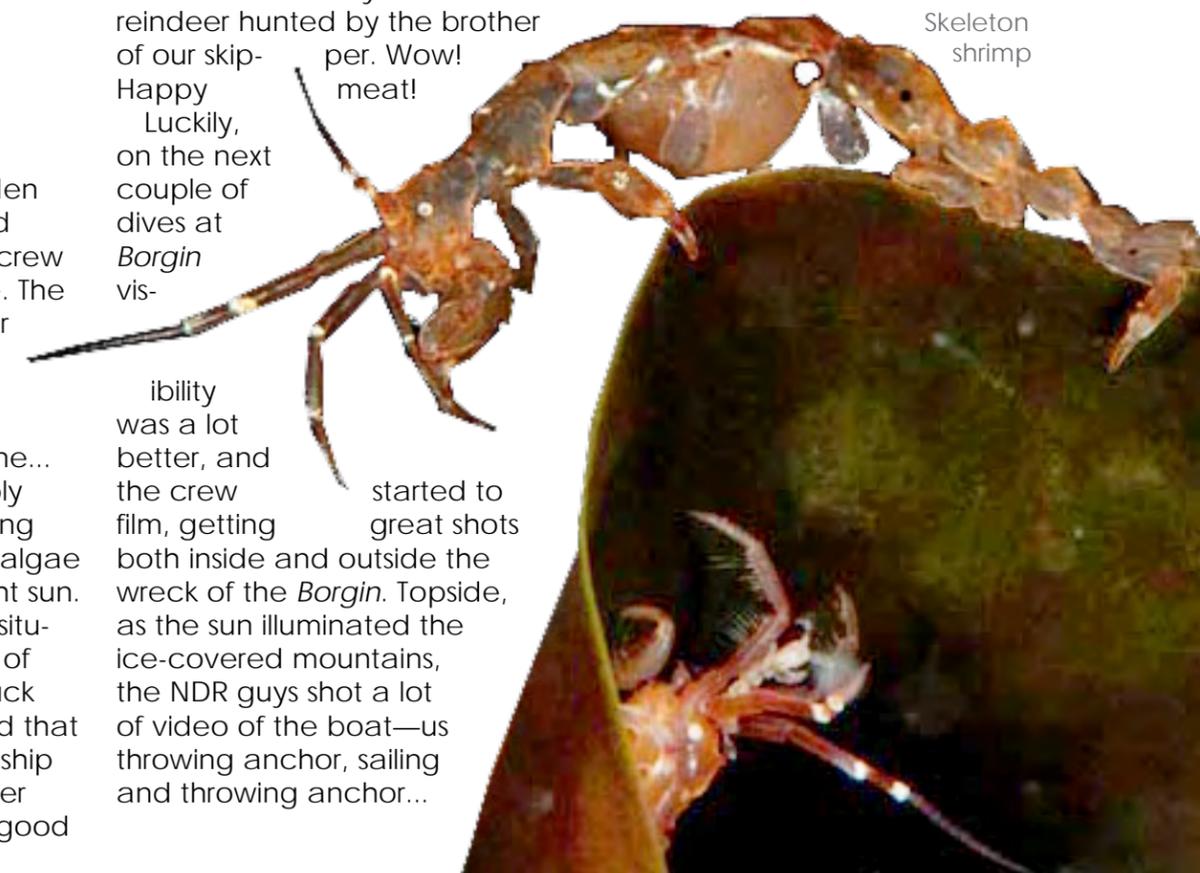
## Borgin

*Borgin* is the wreck of a wooden schooner that caught fire and went down in 1954 while the crew were having a party on shore. The wreck lies in a natural harbour well-protected from the sometimes very harsh, icy environment.

Quite a bad dive this first one... disappointing visibility probably caused by melt-water dragging sediment from the fjords and algae producing rays of the midnight sun. Hoped this would not be the situation on all our dives. On top of this, the anchor chain was stuck on one of the masts. I guessed that someone had to liberate the ship and our vessel from each other the next morning. But on the good

side we had a very nice dinner—reindeer hunted by the brother of our skipper. Wow! Happy meal! Luckily, on the next couple of dives at *Borgin* vis-

ibility was a lot better, and the crew started to film, getting great shots both inside and outside the wreck of the *Borgin*. Topside, as the sun illuminated the ice-covered mountains, the NDR guys shot a lot of video of the boat—us throwing anchor, sailing and throwing anchor...



Skeleton shrimp



A village in Greenland (left); Close-up of unidentified fish in Greenlandic waters (below)

# Greenland

village as if abandoned. With 600 inhabitants, this village was one of the largest settlements in Greenland. Photographer, Sara, clicked off a shot of a polar bear with skin flapping like laundry in the breeze. Still no people.

But then the sun came out. First, children, and then, the rest trickled out of their homes

to start the daily grind. Back in the harbour, NDR got an interview with an old ex-fisherman. Thomas wanted to know about the climate change and how it affected a fisherman's life, but this old geezer only wanted to talk about the closing of the local Royal Greenland fish factory and the tough times ahead.

Royal Greenland is the biggest company in Greenland, employing close to 3 percent of the workforce, thus having a major influence on Greenlandic society.

## Capital of whaling

We wanted to find the whale graveyard near Aasiaat, and after a bit of poking around

## A few days on land

Travelling Greenland underwater is fantastic, but don't forget to "come to the topside, Luke". The film crew spent a few days shooting footage back in Sisimiut—the church, the view, the landing dash of seven aircrafts, life from the harbour and Tele Island, where traces of the Saqqaq culture going back some 4,500 years can be seen. We even found some traditional graves a few hundred years old, the crouching corpses staring out to sea.

Sara and I continued out to the edge of town, to the area of the dogs. This is where all the townsfolk kennel their hunting and sled-dog dogs. When you smell and hear it, you understand why it's on the edge of town. It seemed that hunters and people with sled dogs were not all that keen on pho-

tographers—maybe due to bad experiences, but after a while, most people seemed friendly enough.

## Nature dives

Just outside Sisimiut, we continued diving at Lighthouse Island, and yes, there was a lighthouse, plus loads of macro life—nudibranchs, anemones, amphipoda, hydroids, kelp, fishes and sea cucumbers dressed in vivid red. Unfortunately, there were no wolffish this time.

We cooked out on the open sea, a challenge for my stomach standing below deck chopping dead pig and onions. But dinner was served without any unexpected additions to the recipe. Later that night (don't forget that midnight sun), we were going to dive Mussel Island where the Isortoq Fjord ends. I really loved this place, steep slopes, life and the jungle of giant kelp sway-

ing towards the light. Thomas, the editor, agreed, euphoric after his dive deep into the kelp forest. There were lumpsucker, scorpionfish, nudibranchs and ghost shrimps.

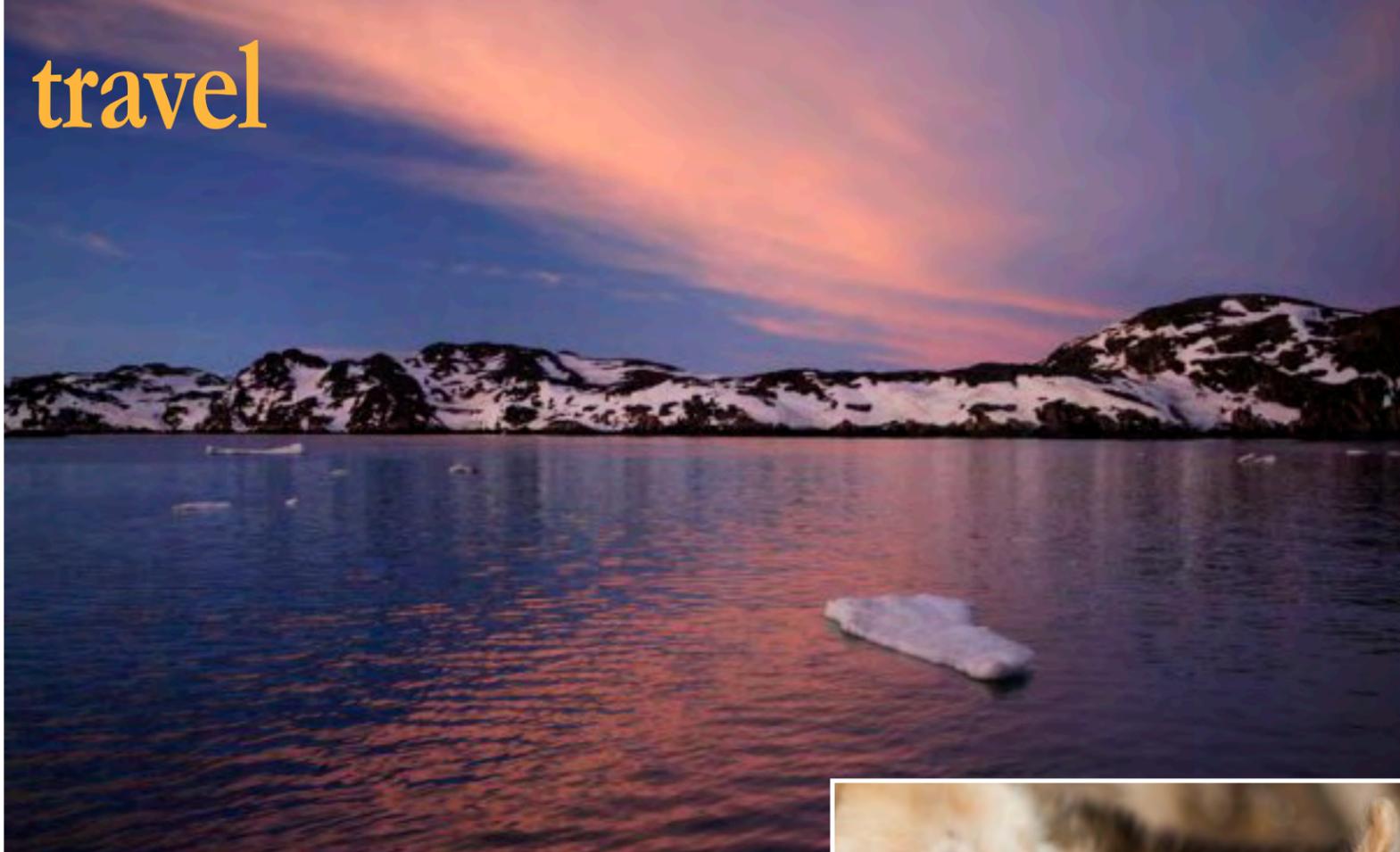
A bit north of Isortoq Fjord, we sailed into a turquoise cove, anchoring for the night between the carcass of an unlucky freighter and a lonely hunting shack. Dinner was Skipper Bo's special seafood chowder—excellent for the waistline, using just two liters of cream.

## The settlement visit

After a long trawl up the coast finding only icebergs too small or too unstable for diving, our moods were not the best.

Kangatsiaaq might as well have been the end of the world. There were no people, but there were snowmobiles, sleds and the detritus of life scattered through the





Neon lights in the Greenlandic night sky reflected in icy waters

Greenlandic sled dogs (left); Dive boat mooring off shore

in the dingy, I found it. On land, under water, trapped in the grip of ice, the bleached bones of these once majestic leviathans bared pale witness to the local lunch.

Appropriately, this being Fox Island, there was a polar fox running around on the island. Sara went ashore to get acquainted.

We overnighted in Aasiaat harbour, and the following morning, I tried to get Sara back to Fox Island in the dingy. It's a short trip, but the ice was just too solid. There was no way we could make it in the dingy.

A friendly guy in the harbour offered to help. Alas, we didn't have a common language, so after the customary misunderstanding and two hours in an open boat getting colder and colder on a directionless sightseeing detour... well, one can guess.

Meanwhile the TV crew had

gone into town with Bo as a tourist guide to tell the history of this former whaling capital. In the 18th century, Dutch whalers had big business in this area. Bo sure knew what he was talking about having lived his whole life in Greenland, always sailing and working at sea. At 38, he was owner of two boats taking care of everything from sonar mapping, sales and service of boat engines to charter tours and both commercial and recreational diving—a good character for the screen.

We decided to have a proper look at the whale bones, and as we glided through the skeletons, I was tense with melancholy thinking of how beautiful they must have been, these huge intelligent



lords of the sea. I'm sure I caught a faint echo of their glorious songs. But here they were. There was a massive skull of a fin whale jewelled with sea urchins and cucumbers.

you're down there listening to the air escaping the ice and hearing, even feeling, the crackling from this monstrous frozen fortress, you feel small, very small.

Ilulissat is the place for icebergs. Every day between 40 and 100

## Icebergs

And now for something completely different. I had been looking forward to showing the TV crew this, and what a great feeling it was to dive an iceberg. It's not the easiest of dives with so many precautions and safety procedures, but when

million tons of inland ice shears from the glacier to crash into the sea. Well, it used to. Nowadays, the glacier moves so fast, probably due to global warming, and splinters on land, resulting in smaller icebergs in much greater quantities.

While John Travolta is very cool, Disco Bay was frozen. Ice, ice, ice. I had never seen anything like it. I'm glad we were sailing with Bo who was cautious but not adverse to giving it a go through the complicated bits. And Andreas (the topside shooter) was also game. Far away from home and his wife, he twisted our arms with a gin and tonic or two celebrating his wedding anniversary. We toasted him in the midnight sun.

## Ah, well

So, after six hours in the ice and marginal progress towards the tar-

get, we had to give up. Ilulissat—so close and yet so far.

In order to keep on schedule, we had to send the crew and Sara on a plane from Aasiaat to Ilulissat. After two hours max in dreamland, we reached Aasiaat just in time to catch their plane with the 170 kilos of overweight in the tiny Dash 7 aircraft. In a way, it illustrated the theme of the production—the greatness of nature, the unpredictability of it and how small we are in the great wild.

Two days later, I met the crew and Sara in Kangerlussuaq. They had gotten all that they had wanted—more interviews and pictures of the ice fiord. Incidentally, I passed the Danish Crown Prince Frederic in Sisimiut Airport, where many of the citizens were waving flags and shouting welcoming words to him. Well, well... anything can happen in Greenland. ■

# The Russian Arctic

*History & Development*

The Arctic (from the Greek “αρκτικός”, which means “northern”) is the northern polar region of our planet, which includes the northern reaches of the Eurasian and North American continents and nearly the whole Arctic Ocean with all its islands (excluding the Norwegian islands) as well as joining parts of the Atlantic and Pacific oceans. The Arctic covers the arctic geographical belt and part of the sub-arctic belt. Its area is about 25 million sq km. Of that amount, 10 million is occupied by land and about 15 million sq km is water surface. The Arctic land areas are comprised of parts of the Russian territory (the northern districts of the Murmansk, Arkhangelsk and Tumen regions, Krasnoyarski krai, Saha Yakutia republic and the Magadan region), and Canada (the Yukon and northwestern territories, Quebec and Newfoundland), as well as possessions of the United States (Alaska), Denmark (Greenland) and Norway (Spitsbergen).

Text prepared by Svetlana Murashkina. Pictures by Vladimir Grishenko

## Fauna

Arctic fauna is not very diverse—northern deer and musk-ox. Then, there are those of smaller size—the arctic foxes, lemmings, hares, ground squirrels and shrews as well as white owls, crows and ivory gulls. Polar seas host marine animals like seal, walrus and white whale. Many of the species are included in the Red Book of protected species. The symbol of the Arctic—the polar bear—is experiencing difficulties nowadays, resulting from global warming and reduction of sea ice. Bears, which usually spend a lot of time on drifting ice, have to cover vast distances, often by swimming, in search of food. The media often reports cases of bears (known to be good swimmers) not able to succeed in covering marathon distances and consequently drowning.

## History of human settlements

According to accepted official sources, the first human settlements originated in the Arctic about ten thousand years before our era—the Proto-eskimo culture in the Far East’s northern territories. Some sources declare that around 30–15 thousand years BC, Arctic climate was warm and mild. It was a very place where the motherland of the Russian civilization was situated—Hyperborea (directly beyond the Boreas, which means “northern wind”).

This group and other peoples lived for thousands years on the shores



of the cold northern seas, providing fully for themselves by taking from environment and staying in harmony with it. In modern times, the image of the Arctic is nearly always and everywhere severe ice desert, which one must reach on foot, with sled dogs, or on skies, or in koches (Russian word for a special boat used in the region), via ice-breaker, helicopter, plane, dirigible or

balloon. And then, one must survive like a hero of legend, and return, preferably, a winner.

Not all manage to return. Reports and expedition stories are rich with notes like “perished ... could not reach ... were missing ... did not return”. Remains of many who were lost in the white desert were frozen, and their best lot was to become part of a glacier. The history of Arctic



THIS PAGE: Historic photos of Russian scientists and explorers in action on and under the ice of the Arctic

expeditions is full of tragedies and white spots. Even Robert Piri's discovery of the North Pole in 1909 sometimes was doubted. Geographical names in the Arctic are mostly after explorers and regal persons such as Anzy, Barents, Bering, Vilkitskii, Wrangel, De Long, Laptev, Nordensheld, Cheluskin, Frantz-Joseph, George, Alexandra and Queen Elizabeth.

## The Northern Sea Route

The Northern Sea Route (NSR) played an important role in the development of the Soviet Arctic and the conception of exploration, management and provision for this navigable waterway. It travels along the northern shores of Russia via

the seas of the Arctic Ocean—Barents, Kara, Laptev, Eastern Siberian, Chukchi and Bering seas—that connect European and far eastern Russian ports as well as the mouths of the navigable rivers in Siberia and the united transport system.

The advantages of the NSR are evident: the route is twice as short as the other sea routes from Europe to the Far East. Compare the distances from St. Petersburg to Vladivostok along the NSR, which is 14,289km; from St. Petersburg to Vladivostok via the Suez channel, which is 23,200km; and around the Cape of Good Hope, which is 29,400 km.

The length of the main iceway of the NSR from Novaya

## Russian Arctic

Zemlia straights to the port of Providence is 5610km; the length of navigable river ways flowing into the NSR is 37,000km. But one must consider the difficulties in shipping in high latitudes: long and severe winters, and nearly no summer; and ice that does not melt completely even during the warmest months. Ships can go through these ice bodies only with the assistance



of ice-breakers.

The history of the Northern Sea Route starts with first Pomor voyages in the 11th and 12th centuries, and the idea of using this route—before the beginning of the 20th century, it was called North-Eastern Sea Pass—was expressed by Russian diplomat, Dimitri Gerasimov, in 1525.

Siberian Cossacks and "trade people" developed the sea shore and Arctic navigation. They sailed along the whole Siberian shore with sea sail boats called "koch". In 1648, the sea voyage of Yakut Cossack Semen Dezhnev and partners from the mouth of the Kolyma River to the Anadir River proved that Eurasia and America were separate. It also proved the

existence of a sea way from the Polar ocean to the Pacific. Further contribution to this knowledge were made by two Kamchatka expeditions under the leadership of Vitus Bering; the high-latitude expedition lead by Vasili Chichagov; the north-eastern expedition by Joseph Billings and Gavriila Sarichev; the Yst-Yana and Kolyma expeditions led by Peter Anzy and Ferdinand Wrangel; and the expedition to Novaya Zemlia by Fedor Litke, Peter Pakhtusov and August Tsvolko. Results of these research trips predetermined the question of the possibility of navigation along the Northern Sea Route.

Since 1877, episodic expeditions to the Kara Sea were conducted with the aim of exporting Siberian agricultural products and mineral riches via the Kara Sea to the world market. Since 1911, one ship sailed annually from Kolyma to Vladivostok. But these Kolyma voyages did not become

regular because of the fact that the NSR was not properly equipped enough.

Overcoming obstacles has always been a part of Polar research and seamanship—and of the Russian people. In our country, this characteristic especially flourished after the Great October socialist revolution of 1917, and was a key factor in the planning of the development of the Northern Sea Route, which was declared an urgent economic task. Since 1921, Soviet Kara expeditions were successfully carried out, and since 1923, Kolyma voyages prepared the background for the opening of regular navigation along the entire Northern Sea Route.

In 1932, an expedition on the ice-breaker type ship *A. Sibirskov*, under the leadership of Otto Schmidt, was the first to cover the whole way from Arkhangelsk to the Bering Strait in one navigation trip, without wintering, and proved the real possibility of NSR exploitation. The *Tcheluskin* (1933) and *Litke* (1934) voyages once again



THIS PAGE: Historical photographs of Russian research activities in the Arctic including an aerial photo (above) of a research station on drifting ice



THIS PAGE: Historical photographs of Russian scientists working in the Arctic

confirmed that NSR was prepared for cargo voyages, which began in 1935. In 1932, the agency, Glavsevmorputi—Chief Administration of the Northern Sea Route—was organized. Its task was to finally establish the route from White Sea to the Bering Strait, equip this route, maintain it in operating condition and provide safe shipping navigation along this way.

In the following years, the agency maintained works for the creation of a special ice-breaker and cargo fleet, carried out hydrographic and aviation supply of arctic navigations as well as geologic, hydrologic, meteorological and geographical research. The Arctic ports of Igarka, Dikson, Pevek and Providenia were constructed during the 1930's and 40's.

The state of the Northern Sea Route in modern times is ambiguous. On one

hand, the main northern transport waterway is experiencing a serious crisis because of the lack of funding for the fleet of the main carriers that work above the Polar circle. The *Northern* and *Murmansk Sea* steamship lines have become too aged; there is a lack of ice-breakers; the technical state of the port household is not adequate as well as the hydrographical navigation systems, hydro-meteorological service and navigation routes, etc.

On the other hand are excessive port fees (forced fees for dredging, construction and reconstruction of mooring places passed onto ship owners and businesses). There is also considerable warming (the highest on record taking place during the last four years). There are doubts regarding the necessity of ice-breaker pilotage, at least during most favorable summer time.

## Drifting ice stations

*North Pole (NP-1 to NP-36).*

In Russia, the abbreviation for the North Pole is SP (Severnyi Polius). Development of the Northern Sea Route and forecast of meteorological and ice conditions demanded the network of polar stations. It was evident that the need for Arctic navigation and aviation demanded the study of geophysical phenomena including the planet's magnetic field, ionosphere and polar lights. So far, regular hydro-meteorological observations of the Arctic Ocean have been made by a rare chain of polar stations on shore and on

some Arctic islands. That's why the whole Arctic basin, with an area of 5-6 million square kilometers, has remained an uncharted "white spot".

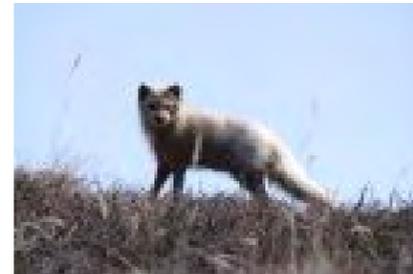
The Arctic scientific research institution—now the State Scientific

Center of the Russian Federation: Arctic and Antarctic Research Institute (AARI) of the Russian Federal Service for Hydrometeorology and Environmental Monitoring—was organized in 1920. At that time, there was already the intention





THIS PAGE: Historical photographs of polar bear cubs, Arctic fox and aquanauts working under and over the ice in the Russian Arctic



## Russian Arctic

to explore the Arctic with the assistance of drifting stations and aviation. This idea was in great harmony with the time of heroism and the development of aviation. So in 1936, the Soviet government declared a special initiative to create research stations on drifting ice.

In the year after the special expedition of the *Glavsevmorputi* led by Otto Schmidt, was the organization of drifting scientific-research station *North Pole-1* started; it was the first one in the history of polar research. On 21 May 1937, the first heavy plane, *TB-3*, piloted by polar aviator, Mikhael Vodopianov, landed on floating ice in the North Pole district.

The first soviet drifting station worked for nine months and covered about 2,599 kilometers from the North Pole to the southern part of the Greenland Sea, where it finished work on 19

February 1939 and was taken off to the ice-breaker ships.

Ivan Papanin, Peter Shirshov, Eugene Fedorov and Ernst Krenkel became all time heroes. But it was evident that only one station, limited by the route of forced drift, was unable to research, during a short period of time, the vast territory of the Central Arctic.

The idea of operative aviation landings—from several hours to several days—on ice flows, was carried out. In March of the following year's expedition on four-engine plane *USSR N-169* made three landings on the drifting ice in the district of the pole of inaccessibility, and geophysical and oceanographical works were made. Thus, started broad scale scientific research in the Central Arctic.

These works, cut short by of the World War II, were renewed in 1948. Every expedition

included several parties, which in turn, consisted of small groups of people. From 1948 to the 1950's, during high-latitude aviation expeditions conducting vast geophysical and oceanographical research on the immense territory of the Arctic Basin, important geographical discoveries of the 20th century were made including the Lomonosov, Mendeleev and Gakkel Ridges. The main features of the underwater topography of the Arctic Basin were studied.

The disadvantages of these expedition methods were the short observation time and short season (April – May). Regular year-round observations as well as permanent ice patrols along the Northern Sea Route were needed. That's why in April 1950, according to the Soviet government decree, the drifting scientific research station *NP-2* was organized on drifting ice-flows about 600km to



the northeast of Wrangel Island.

After a year, when the station was free of ice, it immediately moved 640km to the north, covering more than 2,500km via a rather sinuous drift trajectory. After

all of this research, the decision to organize year-round working scientific-research stations on drifting ice was made.

In 1954, after a three-year break, works for the exploration

of the Arctic Basin were recommenced. In March-May, complex explorations on the vast area were conducted by the six high-latitude aviation expeditions, "Sever-6". That expedition set

up two drifting stations *NP-3* and *NP-4*. Since that year and up until April 1991, two drifting stations worked permanently on the floating Arctic ice, conducting annual high-latitude expeditions. Meteorological data, upper atmospheric conditions, state of water and ocean ice were transmitted regularly to the mainland.

During the 1980's, technical equipment of the expeditions changed. They became more complex: polar oceanography, meteorology, ice-related investigation, geophysics and environmental protection. Scientific-research drifting stations worked successfully until 15 June 1991, when the current station *NP-31* was shut down.

On the eve of the 65th anniversary of the NP stations, AARI—where coordination and a major part of research preparations were made—prepared statistics from the first research hands. During the period from 21 May 1937 to 25 June 1991, there were 88 shift changes of drifting station teams. The total duration of NP drift was 29,726 days; ice flows covered the distance of 169,654 km; average drift speed was 71km per 24 hours; and 2,009 persons took part in year-long research cycles.

During the whole period, 211,383 regular meteorological observations were

made; 3,366 deep hydrological stations, which determined temperature and salinity on standard horizons, were set; tens thousands of samples were taken; and various analysis were made. A total of 727 ground samplings were made; 47,070 ocean depth measurements were recorded; and 32,859 aero-sondes were launched.

Aside from the 'standard' program, a large amount of special studies in heat exchange between the ocean and the atmosphere were made. In addition, the fine structure of oceanic waters was observed, and examinations were made of the underwater relief of sea ice.

After a 12-year break, the national flag of Russia was again hoisted in the Central Arctic on 26 April 2003 on the first Russian drifting station, *NP-32*. The aim of the station was to do research and record weather observations. One of the expedition tasks was to study climate changing processes. During the ten months, the station drifted 2,750 km. Now, *NP-36* is in operation.

## International Polar Year (IPY)

The year 2007 marked the 125th anniversary of the First International Polar Year (1882-1883), the 75th anniversary of the Second Polar Year (1932-1933) and the 50th anniversary of the International



Russian Arctic

Historic photo shows typical dive gear used by Russian researchers in their dives below the ice of the Arctic

Geophysical Year (1957-1958). The IPYs and IGY were major initiatives that resulted in significant new insights into global processes and led to decades of invaluable polar research. But since that time, many changes have taken place—as people say, much water has flowed... and ice has melted. Hence, came the time to focus efforts on the polar regions again. Due to the Russian initiative, the new IPY—the first one in the 21st century—was organized.

The concept of the International Polar Year 2007-2008 involves an international program of coordinated, interdisciplinary scientific research and observations in the Earth's polar regions to explore new scientific frontiers, to deepen our understanding of polar processes and their global linkages, to increase our ability to detect changes, to attract and develop the next generation of polar scientists, engineers and logistics experts, and to capture the interest of school children, the public and decision-makers.

The official period of the IPY was from 1 March 2007 until 1 March 2009. This period allowed observations during every season and the possibility of two summer field sessions in each polar region. The geographic focus extended over latitudes from approximately 60 degrees to the pole, both north and south.

## DAMOCLES

The DAMOCLES project started in 2006 in the Arctic Ocean. DAMOCLES—Developing Arctic Modeling and Observing Capabilities for Long-term Environmental Studies—is a modern European program and the main input of the EC to the International Polar Year.

Within its framework, a great number of experts in Arctic Ocean studies are united, including Russia, of course—including the Arctic and Antarctic Research Institute in St. Petersburg, the Shirshov Institute of Oceanology, the Russian Academy of Science in Moscow and some others. Complex expeditions took place; various research studies were completed; data are being processed today and forecasts are being made. Exciting and useful conclusions are expected.

## To whom belongs the Arctic?

Unlike the Antarctic—which, according to the formal international agreements, is now a designated "natural reserve devoted to peace and science"—the Arctic today looks like to become the arena of initial, and probably, very sharp disputes among the countries whose territories lie adjacent to the Arctic Ocean. In these modern times, the Arctic is divided into five sectors: Russian, American (USA), Canadian, Norwegian

and Danish. The frontiers of these sectors meet at the North Pole, which is considered the internationally accepted neutral point.

These sectors are not regarded as full value national territories (though in the USSR, the maps had dotted lines from the country's borders to the North Pole, thus marking our Arctic zone, according to the Government Decree in 1926).

Recently, Denmark appealed to the international court of the United Nations and other international legislative bodies with documents in which it claims that the North Pole must be included into Denmark's territory. Territorial demarcation in the Arctic will cause problems. The main reason is resources: fisheries—more importantly—oil and gas reserves on the continental shelf, which are not yet explored.

Russia is interested in being present in the Arctic for scientific, economical and strategic reasons. These include meteorological observations from the "weather kitchen"; the shortest transpolar aviation routes, connecting Europe with USA and Japan; ice conditions information for the ships, going along Barents and Kara seas along the Northern sea route. In the Arctic lies about 16 thousand of the state frontiers of the Russian Federation. ■



Image from historical archives of the Russian Arctic

# Diving in the Central Arctic



Text by Svetlana Murashkina with Vladimir Grishenko

Every generation makes its own discoveries. And sometimes people forget that these discoveries were made already by somebody else before them. That's why, when another heroic dive in the Arctic—and especially one at the North Pole—is announced, the word “first” must be treated very carefully.

*“... One must stress, on one hand, that the extremely low temperatures of sea water and air, as well as the constant presence of young ice cover, make rather difficult the very maintenance and expansion of underwater research in Arctic waters. Nevertheless, up to the present moment, for example, underwater research for various programs were made with about 20 expeditions carried out by the USSR, USA and Canada.”*

*—from the Manual for methodics and management for underwater research in the Arctic, compiled by V.D. Grishenko, Leningrad. Gidrometeoisdats, 1984*

THIS PAGE: Russian divers study the surface of the ice under the water

It is May 2006. Summer has come to St. Petersburg, and it is difficult to imagine how any person would volunteer for nearly a whole year to leave the city for the place where the polar night lasts for half a year; where in winter, frost exceeds  $-50^{\circ}\text{C}$  with heavy winds; where there is no single blade of grass or a green leaf... Admiration and amusement overwhelms me from the first words I hear, strengthening and transferring sustained pride in me for the pioneers of the 1970's, living and working on drifting stations, doing research studies under the ice in the Central Arctic.

We are visiting polar researcher, Vladimir Dimitrievich Grishenko, in his common St. Petersburg apartment. There are no polar bear skins on the floor, but lots of pictures—pictures of all white, sparkling snow and ice. We listen to his stories

about diving and shooting photography. Grishenko shows us old documentaries, transferred to modern video, of Antarctica, the Arctic and the North Pole.

## Diving the North Pole

The music in the film is typical for those years, heroic. The diver goes to the depths under the ice. We hear his regular breathing. It is a movie, of course, but a documentary, too. A serious and proud narrator's voice of the film declares: “On the 20th of April 1967, the group of scientists from the Arctic and Antarctic Research Institution made the dive at the point of the North Pole.” In the next scene, on the surface, the group leader and candidate of geographical science, Vladimir Grishenko, says, smiling: “We have beards for increased buoyancy. Our work is part of a vast complex research study that sci-

entists are carrying out on the drifting station, watching complicated processes of atmosphere-ice-ocean interaction.”

Grishenko told us that he did not get any special feeling when he did that North Pole dive. The Arctic is the Arctic, he said. It is difficult to impress Grishenko; he has sailed and dived so many, many places before.

How did it happen? Did the job seek the person, or vice versa? Evidently, the process was mutual. Grishenko first went underwater when he was 19. During regular military service with the Black Sea Fleet, he participated in rescue and commercial diving from the 1950's on. After army service, he entered the School of Hydrometeorology (“Hydromet”) in Leningrad. His profession became oceanography.

The Laboratory of Underwater Research





THIS PAGE: Historic photos of researchers preparing for ice diving in the Central Arctic

## Central Arctic

biology. When the ice flows broke, stations were evacuated and reestablished in a different location.

On average, during the year-long residency of the NP station, 600 to 650 measurements of ocean depth were made; 3,500 to 3,900 meteorological observations were recorded; 600 to 650 launches of radio-sondes were conducted; and 1,200 to 1,300 temperature measurements and samples of sea ice for chemical analysis were taken. In addition, magnetic, ionospheric, ice and other observations were documented. This data was regularly transmitted to research centers.

If a station drifted via the North Pole region to the strait between Spitsbergen and Greenland (two to three years after its drift had begun), it was evacuated, and a new one was estab-

lished in the initial region. If the station got into so-called anti-cyclonic round drift—that's the counter-clockwise circulation of ice in the ocean sector close to the north of Greenland, the Canadian Arctic archipelago and Alaska—it was kept operational until Russian polar aviation could reach it.

Usually, these stations drifted away from Soviet shores for 1,500 to 1,800km and operated for three to four years. After that, they were evacuated.

NP stations were set up with the assistance of airplanes, usually in April-May, and with icebreakers in October-November. Average live-work periods on the station was 26 to 28 months (minimum, nine months, and maximum, 48 months).

NP station crew personnel usually consisted of two to five oceanographers and glaciologists; two to six aerologists, meteorologists and actinometrists; three to five geophysicists and also a doctor; two to



was organized within the department of oceanography. Students went diving in the Kaspian, Black and Baltic Seas. That's why when Grishenko began working in the Arctic and Antarctic Research Institution (AARI), he already possessed reliable underwater experience. That's also why he was directed to complete the most important dives. The backbone of the underwater group on the drifting ice was comprised of four persons, and two of them, including Grishenko, received their underwater education at "Hydromet".

### On the drifting ice

"Chances are always against the explorer in the Arctic," said the American polar explorer, Robert Piri, who spent 36 years preparing his successful expedition to the North Pole. In the USSR, scientists did not agree with that idea—the duty to bend nature to the will of the Soviet man, including that of the Arctic. And, for this reason, the Soviet state established—in demon-

stration to the whole world—long-term research stations on floating ice, where a big percentage of the time and often heroic efforts were spent just surviving.

Projects like these were not carried out by any other country. Americans considered drifting stations a Russian know-how, like matreshka-dolls or drinking tea "vprikysku" (having tea without sugar, and biting a piece of sugar at the same time). Back then, Americans did not understand how (and for what purpose) people could live under such extreme conditions.

The Soviet North Pole, or NP, stations (in Russian, SP, or Severni Polus, stations) were drifting research stations established on drifting ice in the deepest parts of the Arctic Ocean. They carried out a program of complex year-round research studies in oceanography, ice-exploration (the physics and dynamics of ice), meteorology, aerology, geophysics (observation of the ionosphere and magnetic field), hydrochemistry, hydrophysics and marine



three mechanics; one to two radiomen and a cook. Aside from these people, temporary research personnel of around ten to 20 individuals arrived for short-term observations (of several months) usually in the spring.

NP station camps consisted of portable living quarters and housing, research facilities (in houses and special semispheric tents), a salon, electro and radio stations, meteoradiolocator, basic and rescue lofts. The airstrip was made on a flat surface of solid ice.

## Underwater research on NP stations

Grishenko drifted on an NP station about ten times. According to his approximate calculations, he spent five to six years on the ice. The first and second times were on station NP-18. This station drifted for more than two years: from 9 October 1969 to 24 October 1971, drifting 1,110km.

Grishenko worked three times on the station NP-22. It was the longest running station. The station went to the Anticyclone Circle and rotated more than nine years! It was based on an ice flow 5km long and 2.2km wide, with an ice thickness of more than 30 meters.

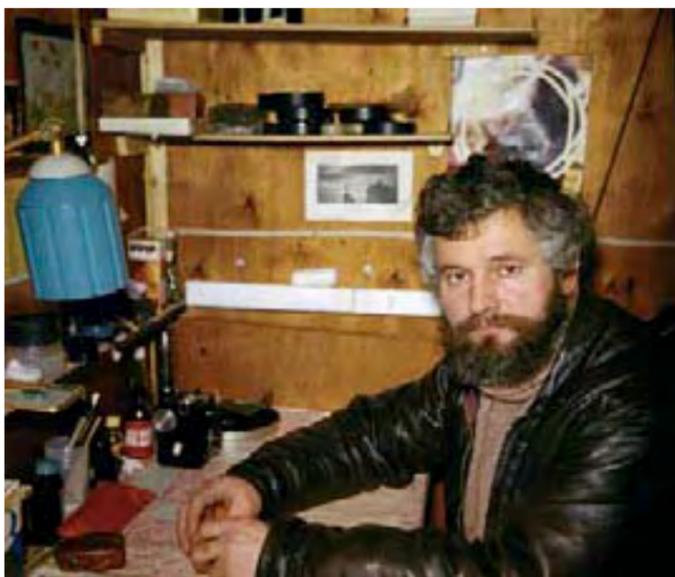
Scientists believed that the iceberg was a piece of a glacier, which had broken off from the Canadian Arctic archipelago, or came from Greenland. It lasted until the last Soviet station NP-31 closed in July 1991.

People have always been curious about what's under water, especially under the ice. Even when Russian admiral Makarov went to the north of Spitsbergen on the ship, *Ermak*, the crew captured pieces of broken ice with a winch, turned them upside down and examined the bottoms.

It is known, that in the Central Arctic basin, if we look at the indepth his-

tory, a diver was on the crew of expeditions on the *Yamal* and *Vaigach* ships. If some special works were needed, like changing the propeller, for instance, the diver went underwater from the deck of the ship.

Later, on station NP-6 (1956-1959), young men from "Hydrophysin" (The Hydrophysical Institution of Sebastopol) dived in old primitive gear—green suits with glasses ("They were smart guys... hydrophysicists," said Grishenko)—went into a hydrological hole in the ice and were put



under an apparatus measuring ice gradient currents. They did not swim underwater, but made several dives.

Long, planned underwater dives, according to Grishenko's program in the Central Arctic, were first made by Grishenko's group on station NP-18. On 1 June 1969, Grishenko received a postcard from the expedition leader, Romanov, who wrote: "Happy birthday to you, and congratulations on the first ocean sampling!"

## Underwater photography

Photographs were taken, but not for beautiful shots of ice archways. Very often, photography was the

main instrument used to collect data on the underwater relief of the ice, the shapes of which are so fantastical, they can hardly be described in words. Underwater photography in the central Arctic has been produced since 1957, when one of the employees of AARI made a range of observations of the underwater portion of ice-hummock structures. Images were captured with the assistance of a stereo photo-camera; it was placed under the ice on a special beam and was remotely operated.

On the NP stations, they used various camera makes including models by Leningrad (the Russian Leica), Salute, Zenith, Liubitel (amateur cameras), Konvas, Krasnogorsk, Kiev-163 and Admira in underwater housings such as YKP and the KPF housing for Zenith cameras. They also made housings themselves for a 16mm film camera by Krasnogorsk. Various negative and positive black and white and color photo film were used—typical for that time.

One drift usually resulted in a whole box of film being shot—several hundred rolls, at least.

Shooting images while working was quite common, and was often carried out by a diver. The legs of a common tripod were hammered into the ice, the camera with three axis of rotation was attached, and images were taken using a tripod, with long aperture times.

Shooting cinema was much more complicated and demanded a complex crew and lighting. They used the headlights of the airplanes and zinc batteries.

Once on station NP-23, researchers had to participate in the shooting of a popular scientific film in color, *Arctic Above Us* (1978), which was about the nature of the Central

Historic photo of Russian scientists testing equipment and procedures  
BELOW: Russian polar scientist Vladimir Dimitrievich Grishenko at work on the drifting NP station



# feature

THIS PAGE: Some of the diving and underwater photography gear used by the researchers on the drifting NP stations



Arctic, the underwater world and research studies underwater. A cameraman from the Tsentrauchfilm Studio, Vladlen Kruchkin, and his assistant were on floating ice for the first time, so all the divers' technical support was on Grishenko's shift. The group was very coordinated; everything worked well. The only problem was that they had to carry out the underwater research program as well!

## Equipment

*"The diver must use the following thermal underwear as a set: wool pullovers – 2 pieces; wool pantaloons – 2 pieces; wool socks – 1 pair; fur socks – 1 pair; wool stockings – 1 pair; wool double gloves (for three fingers is better) – 1 pair; foam-rubber hood underwear – 1 piece.*

*—from the Manual for methodics and management for underwater research in the Arctic compiled by V.D. Grishenko, Leningrad. Gidrometeoisdats, 1984*

However, Grishenko tells us, "it was not cold."

Soviet military diving equipment was used, but it was difficult to get, such as the AVM-1 regulators. Common regulators, Ukraine and AVM-5, were not good, said Grishenko; they froze

and remained free-flowing, or stopped working altogether.

## Life on the ice-flow

Life and work on the ice-flow was regulated and casual. After about three months, this very unique life on the ice was regarded as real life, and home was somewhere far away.

Grishenko said that the atmosphere on the team was always great. Rascals usually did not stay long; they were driven out immediately. Once a month, all birthday parties were celebrated—collectively. Celebrities were placed at the head of the table and special cakes were made. When it was time, they had elections with the rest of the Soviet nation; they nominated an election committee, etc., as was required.

One of the important tasks was to make an airstrip. In those days, airplanes required at least 1.5km of runway. People worked with spades and "leveled" the surface with explosives.

Explosives were, by the way, later forbidden for ecological reasons. One must admit that in the USSR, if they ever considered ecology, it was in a very special way: drifting stations were left in the Arctic with all their garbage, fuel and iron refuse.

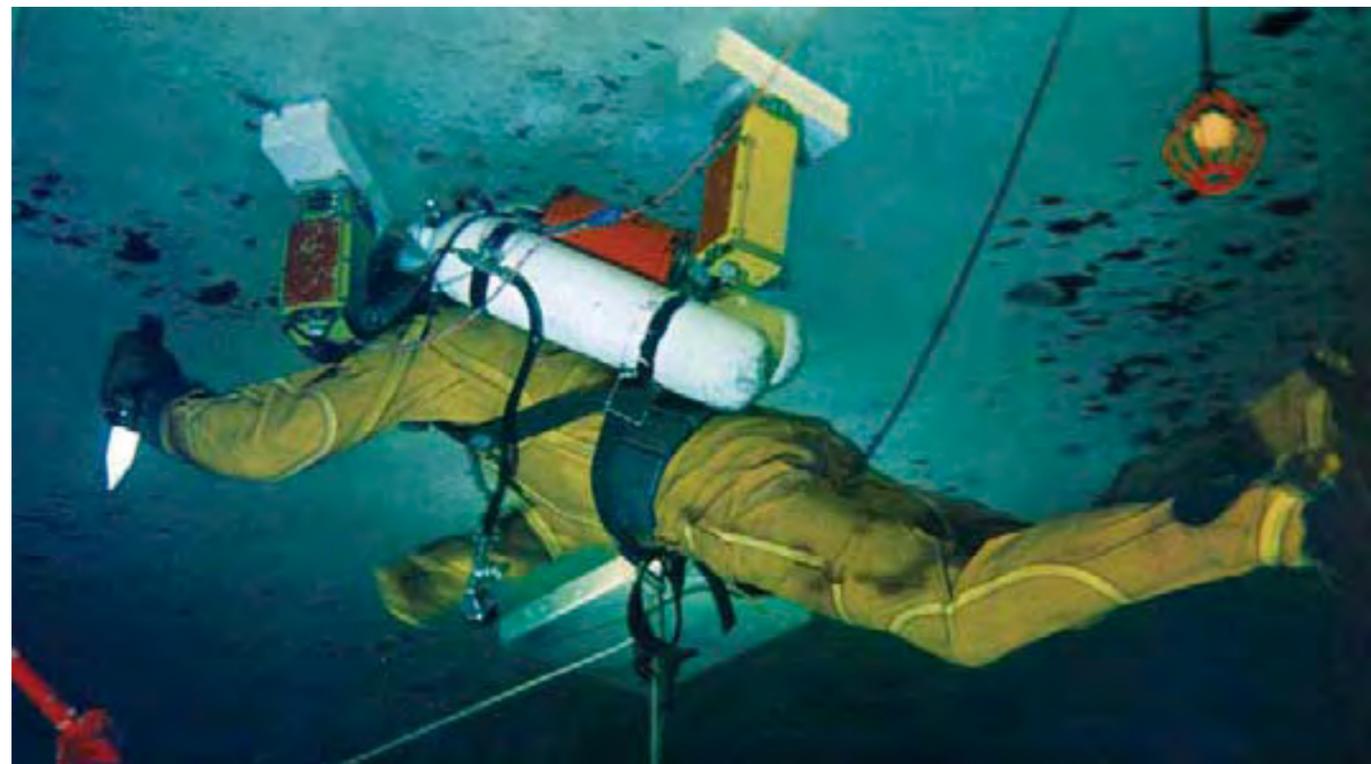
In August, planes made flights around the entire Arctic region; they flew over the station, dropping mail and brooms for the Russian "banya", or sauna. On New Year's Eve, the staff always took a Christmas tree under



the ice and a small table for taking pictures, and drank champagne in scuba gear, under the ice, of course.

When asked about state awards, Grishenko just says that "there were some". In fact, he was awarded the coveted Soviet order "Znak pocheta of the USSR", the Russian order "Znak pocheta", and prestigious medals and badges such as "Honorable Polar Man" and "Honored Worker of Hydrometeorological Service".

Researchers and polar scientists know Grishenko through expeditions, his work for AARI—including more than ten years as Deputy Director for Science—and his articles and thesis on the morphology of ice cover. Divers know him through his publications in *Sportsmen-podvodnik* and other Soviet periodicals. ■



## Central Arctic