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appeared in DIVER September 2003

Antarctic Diving



WHY IS DIVER LOOKING AT ANTARCTICA THIS MONTH? Mainly because it's so damned good to look at!

For most of us, this supplement or documentary films are as close as we'll come to the icy base of the southern hemisphere, but for the many coldwater divers among you who hanker for something far more extreme than a quarry in January, such a trip is no longer an impossible dream.

If you can consider spending thousands of pounds to dive in an exotic Pacific reef location, Antarctica is now equally within your reach. It all depends on how badly you want to go. One thing's for sure - any trip to Antarctica will provide material on which to dine out for years to come.

We asked four divers who have visited Antarctica to share their impressions of their trips. John Liddiard weighs in with advice on what equipment and clothing to pack for your trip, if you do decide that diving among icebergs is for you, and we

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answer some frequently raised questions.

There are also contact details for those ready to take the next step - and we hope some of you will want to take it. If not, relax, and just enjoy the words and pictures.



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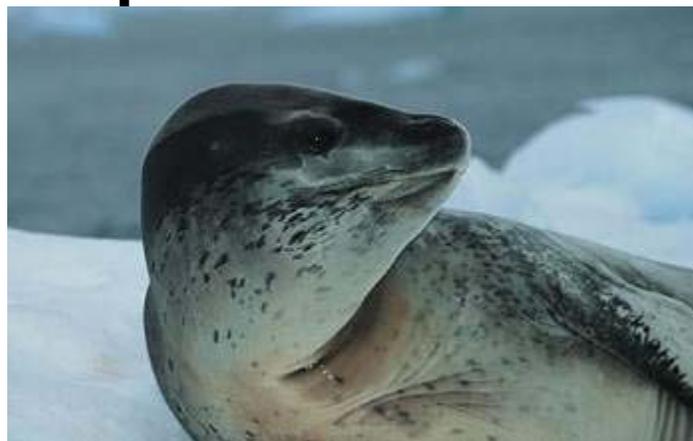
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Antarctic Diving

Lair of the leopards



Leopard seals have long been regarded as vicious towards penguins but playful with humans, though a recent incident has marred this reputation. For [Yvette Cardozo](#), in Antarctica for the first time, it was big animals like these that made the diving experience so special

We were so entranced by the wall of fluted ice at our fingertips that we never saw the dark shadow behind us. Slowly, it grew closer, emerging out of the dusky blue and stopping behind our backs. One of the divers happened to turn round, and there, just inches from his mask, was a set of furry nostrils.

It was a leopard seal, and it wasn't our first. The seals had been with us almost from the moment we hit the water. We had hoped to see them perhaps once on our trip. Who knew that they would show up on almost every dive?

Leopard seals get their name from their spots - and their viciously predatory nature. But they eat penguins, not people - at least, not usually.

On that dive, the huge old bull circled curiously until his face was hardly a foot from mine. I could count the hairs on his cheeks. He poked his nose practically into my mask, darting forward in a feint that dive guide Adam Rheborg later explained was not so much a threat as a signal: "Hey, I'm bigger than you."

He certainly was.

Dive leader Goran Ehlme once spent an entire summer filming leopard seals. He said that he nearly had a stroke the first time one of them pulled this trick, but gradually realised that



Cruising through grounded icebergs off Pleneau Island



diving at Pleneau

they simply wanted to play. In the end, he so bonded with one female that by the end of the season she was nuzzling his neck and bringing him half-dead penguins as gifts, like a cat bringing her kittens mice.

(I wasn't to know at the time that in late July a British Antarctic Survey scientific diver called Kirsty Brown would be pulled under water by a leopard seal and die while on a routine snorkel near Rothera Research Station. The attack was almost unprecedented.)

I'm not sure what our group of divers expected to find under water in Antarctica. A bit of soft coral, perhaps. Some sponges, some starfish and a glimpse of penguins flying by. We knew that it wasn't going to be National Geographic Goes Under Ice, because all those films were made closer to the South Pole and involved technical diving. We were diving alongside, not under, the ice.

But no one expected the leopard seals, or the sheer beauty of the ice, not to mention the brilliant topside scenery.

We would slide into the water and spend our 30-40 minutes, and when we came up what greeted us was a wall of snowy rock, fissured glaciers flowing to the waterline and huge towers of ice that sometimes collapsed before our eyes.

The ice here is bigger, bolder and flatter than in the Arctic. Chunks of glacier the size of houses, of city blocks, of entire nations cleave off the continent and float like steroidal ice cubes.

We were there in late February, almost the end of the austral summer, and fresh snow dusted the mountains.

The farther south we went, the colder it became. The plus-seven temperatures of South America gave way to freezing the moment we crossed the 60th Parallel. And by the time we hit the Antarctic Circle at 66.5° south, we were in gale-force winds.

But most of the time it was sunny, if not particularly warm. And under water, the temperatures hovered at zero and sometimes sank to -1.5°C (salt water can stay liquid almost to -2°C).

We had left Ushuaia, at the southern tip of an island lying off the southern end of South America, on 28 February, and after two days crossing the Drake Passage, reached the Antarctic Peninsula. We spent a week there, travelling along the entire peninsula to the Antarctic Circle, with the chance to do two dives a day. But with so much also to see on land, it always came down to a choice - dive or hike?

All 15 divers chose to visit Neko Harbour, one of the few penguin colonies with chicks this late in the season, and our only chance to set foot on the Antarctic mainland rather than offshore islands. The birds spread across a rising slope of snow furrowed with ditches worn by thousands of penguin feet.

It was almost too good to be real, with obliging penguins on the beach, some sunning themselves, some preening, many moulting, with patches of down still fluffing across their bodies.



leopard seal encounter



a surfacing humpback whale, recognisable from its fins, which can reach a third of body length

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Adolescent chicks, larger now than their parents, chased mums for food. Two Weddell seals lay on the beach and a leopard seal lurked just offshore. More penguins swam twitchily across the glass-smooth water. Behind all this, walls of square-cut ice rose in cracked columns that avalanched regularly, sometimes bringing down a 30m-wide face.

As the setting sun turned all this snow gold and then pink, we motored in the Zodiacs to the far end of the bay, where three humpback whales floated.

They blew clouds of fishy breath our way and rumbled like elephants. They were so close that we could count the bumps on their noses.

One dive was to the half-submerged wreck of an old whaling ship. The bow jutted 5m from the water and the rest of it went down to 18m, where the prop sat among anemones, nudibranchs, tiny starfish and a collection of whale-bones.

Another day, we dived Lemaire Channel at Deloncle Bay. Blades of kelp a metre wide waved in our faces. Behind this woven blanket lay a wall packed with life - large sunstars with dozens of arms, crinoids, sea cucumbers and basketstars, small as your palm in purple and neon orange.

Antarctic tourism has reached the point at which scuba trips are almost routine. It's fewer than 40 years since the first cruise ship began unloading the elderly rich at penguin rookeries. Even 10 years ago, a simple cruise here was the ultimate in exotic.

Now companies take skiers to the South Pole, climbers to interior peaks, kayakers along the peninsula and at least eight companies offer scuba.

Last season brought nearly 12,000 tourists to Antarctica. But while Lonely Planet guides now offer helpful hints on how to keep your eight-year-old amused between penguin visits, it's also true that fewer than 500 of the yearly throng even make it to the Antarctic Circle.

Between diving and penguin colonies, we visited research stations. At Vernadsky, a Ukrainian station taken over from the UK for £1 (the coin is embedded in wood at the station bar), we learned that the average temperature here had risen 3°C over the past 60 years.

The scientists at Vernadsky love tourists. The newly arrived winter-over crew explained that in two weeks five ships had visited, dropping £1300 for souvenirs. During peak season, it's two ships a day. It helps pay the bills.

Nearby was the original British station, now a museum, left just as it was in the 1940s. The pantry was still stocked with old packs of biscuits, tins of art deco tuna and an ancient can of Ovaltine, along with the original typewriters, slide-rules, goggles and crampons.

At night aboard ship, the staff gave lectures. Goran told his leopard seal stories; Adam drew incredible birds on the chalkboard, then described them. Every spare minute was spent on deck or in the wheelhouse watching for birds, for icebergs and the occasional rainbow.

Our ice dive was at Pleneau Island, in a graveyard of ice chunks. Some were bigger

than houses, but grounded, so there was no danger of them rolling onto us. We cruised the 'bergs, threading the Zodiac around sculpted blocks with deep blue furrows and feathered edges. Then we anchored next to one, dropped into the water and slid to the bottom at 25m.

The side was dimpled like a golfball and sunlight sparkled off the irregular edges. There were spires of white and small pockets of cobalt, all of it glistening as if it had been rubbed with oil.

And of course, there was the leopard seal.

He spiralled out and up, then back in, twisting and circling around us. Every second or third pass, he would zoom right into my face, hold it for seconds, then dart off. This went on for a good 10 minutes - icebergs, shafts of sunlight and leopard seals (another had joined in).

Could it get any better? Well, yes. Just as we surfaced, two penguins torpedoed by, leaping out of the water and bouncing, like so many skipping stones.

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Antarctic Diving

Tourism in the New Antarctica

appeared in DIVER September 2003

The family juggled their travel gear in the customs line, happily chatting away about their wonderful week in Antarctica.

The parents photographed penguins, the kids toured restored historic research stations. And the eight-year-old even kept up with his violin practice.

This isn't your father's Antarctica. Things have changed since Lars-Eric Lindblad started taking rich old folk to gawk at penguins in 1966.

Even at '60s prices, trips still cost at least £6200. The only two ships, *World Discoverer* and *World Explorer*, were cramped by cruise-ship standards but the service was luxurious.

Only the very rich could afford this and, even into the '90s, the number of tourists hardly climbed above 5000 a season.

Today, there are museums, research on tourist impact, large cruise ships, guided mountain-climbing expeditions, scuba trips and a Lonely Planet guide.

At its peak, during the 1999-2000 austral summer season, nearly 14,000 visitors went to Antarctica. Even last year, amid global economic troubles, the number was 11,500.

Vessels these days range from tiny sailing ships to 1,300-passenger Holland America ships, complete with casinos, night-club acts and midnight buffets. These cruise by and don't do Zodiac landings.

But most Antarctic tourism is done aboard decommissioned Russian research ships with ice-hardened or ice-breaking hulls and small numbers of passengers (50-90). Their more rugged itineraries include hiking, kayaking and scuba-diving.

Most tourists visit the Antarctic Peninsula, a long, jutting finger of land that brings Antarctica within a two-day sail of South America and has relatively hospitable weather (temperatures around 5°C or so) during the austral summer (December-early March).

There was an hotel at the Chilean station on an island here in the '80s, and in 1989 Antarctic tourism companies adopted guidelines to manage visits. But it was the collapse of the USSR and all those Russian ex-research ships that led to today's boom.

Tourist conduct is governed by the (International Association of Antarctica Tour



There are reckoned to be about 300,000 breeding pairs of gentoo penguins in Antarctica



The Port Lockroy research station

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Operators (IAATO), a Colorado-based trade group with 32 member-companies. Its rules say you don't go closer than 5m to the penguins (though they are allowed to approach you, nibble you etc). The rule with fur seals is 14m, because they can get aggressive.

You leave nothing behind, and that includes modesty trips behind a bush. "Go before and hold it in," said one tour guide.

And while there was a period in the early '90s when tourists were unwelcome at some research stations because they were seen as disrupting their work, this attitude has changed, especially among smaller stations run by smaller nations and relying on tourist dollars for funding.

Vernadsky, a Ukrainian station, sells everything from pins and T-shirts to coldweather gear and maps. And several former research stations have been turned into museums.

Port Lockroy closed in 1962 as a British research station and reopened in 1994 as "Historic Site and Monument No 61". It, and the even older Wordie station nearby, were restored to how they looked at their peak and are staffed throughout the summer.

Not to sit idle between the 100 or so visits (we were ship No 93 of the season), the resident biologists at Port Lockroy have been conducting a study of tourist visits and gentoo penguin hatchings. They divided a nearby island into visit and non-visit areas and then sat back to see what happened.

Curiously, said Amanda Lynnes, a British penguin biologist, the eggs were slightly more successful in the visit area. The working theory is that tourists scare off the predatory skuas.

There are researchers who would close Antarctica to tourists or restrict their numbers, but many feel that the visits do no harm because of the strict rules.

"When you land at Goudier Island [near Port Lockroy and one of the most visited spots in Antarctica], just imagine the number of people who... have been there before you... probably 6000 this season alone," said Pete Milner, one of the two researchers manning Port Lockroy.

"Just have a look. There's no litter, the water is completely clean. This is because people adhere to the environmental standards for tourism.

"And it's important for people to see what is effectively the last pristine wilderness we've got. There isn't one after this. If we mess up this one, it's too late." - Yvette Cardozo

The big questions

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Antarctic Diving

Touchdown on a distant planet



Unearthly viz, rolling icebergs with minds of their own, gigantism among marine life - Kate Richards visited Antarctica as part of a professional TV expedition, but even the stories of those who had been before couldn't prepare her for the reality

Underwater photographer Chris Riley is talking about his most insane diving experience to date. "We were metres away down an icy cavern and totally oblivious to the fact that a war had broken out over our diving hole," he grins.

"Two young male Weddell seals were fighting over this new territory, showering our diveline tenders in a salt ice slurry and leaving blood and fur in and around the hole. Fortunately, it was all over before we had to emerge."

His timing is impeccable. I am preparing for a plunge in the coldest, windiest, harshest and most remote continent in the world, with an environment so hostile that dives are unpredictable and equipment malfunctions common.

I am unlikely, however, to encounter warring seals. My dive is far away from sea ice, on a relatively small iceberg that rises 8m from the water's surface.

The dive is part of an underwater filming



An old blue-green iceberg.

expedition organised by the Japanese broadcasting company NHK. We had voyaged from Hobart, Australia, across the Roaring Forties, through the Furious Fifties and finally into the Screaming Sixties, to film as much marine animal action as we could in a month.

Down below, the first thing that hits you is the numbing purity of the water. It is mid-December, and the visibility has just started to turn. From the surface you can make out the soft orange glow of kelp 40m below. Yet the members of the dive team are disappointed. They have seen better.

In early spring (October to November), there is no algae to taint the particles of water. That's when visibility can reach for miles.

Jeannie Ackley, a contributor to the classic Antarctic TV documentary *Life in the Freezer*, had dived under the Ross Sea Ice Shelf on a previous expedition. "We could see the light shining through from an ice runway at Cape Armitage, half a mile away. It was crystal-clear," she recalls.

Chris Riley waxes lyrical after filming in the Ross Sea: "We were hanging at 30m. Below us the bottom was 1500m and inky black. Like a spaceship the ROV cruised out from beneath the rounded, planet-like ice flutes of the Erebus Glacier Tongue, 300m below.

"East of us, sunshine was shafting down a tide-crack one mile away, and the tiny specks we could see rising into the shaft were Weddell seals using the crack for a breathing hole."

Riley remembers the experience as a total visual and sensory overload - he calls it his "inner-space walk".

According to Paul Goldsworthy, a researcher who has completed more than 200 dives for the Australian Antarctic Division, visibility can change dramatically towards the end of summer. "At the start of the season, the water clarity is exceptional, but by mid-January the plankton has bloomed and visibility can be as low as 2m, so we often need assistance to relocate the dive-hole or dive-boat," he explains.

For my dive, 40m is more than enough. I can see our "small" iceberg dropping away to a living bottom, silver ice cod perched in its electric-blue crevices.

We follow the pockmarked wall down to the iceberg's anchorage point. It has stuck fast and I am relieved. Jeannie Ackley had told me how she had just reached the bottom to shoot an iceberg's grinding point when everything turned pear-shaped.

"I was looking through the viewfinder trying to focus and the berg looked really weird - then I realised it was rolling, so I just started finning backwards." She made it to the surface with the film intact as the iceberg, 15m deep and 2m above water, continued to roll away from the divers.

To dive an iceberg is to dive what appears to be a living, breathing entity. Bizarre currents can form along its edge and you find yourself suddenly sucked up or down several metres, propelled by an unseen force.



A dive tender retrieves divers from among pack ice



Jeannie Ackley and diveliner Ed Mickelson at a Weddell seal hole in pushed-up sea-ice



ROV and Weddell seal at the Mount Erebus glacier tongue - Weddells use their teeth to keep the ice open

Drifting up towards the atmosphere are tiny bubbles of ancient air, trapped when the water first froze. The silvery globules stick to the camera lens and play constant havoc with its focus.

This 'berg has fixed itself firmly to the substrate, rocks embedded deep inside its base. The surrounding kelp is a mixture of rich maroons, golden yellows, bright green flushes and starfish pinks. People who state that the Antarctic has few colours have never dived here.

Above these rich fields, we see the strange form of the sea-butterfly, a free-swimming pteropod. Many of the marine invertebrates appear to be on steroids. We find nudibranchs the size of a man's fist and sponges that span several metres. Gigantism is a feature of some of Antarctica's sea creatures.

Twenty minutes into the dive, however, my fingers are screaming with pain and I make my way back up. My wetsuit gloves, though thick and many-layered, are no match for -1.8°C waters, and my fingertips are swollen and as useful as lumps of wood, and remain sensitive for days afterwards. Dry gloves (as I found out the hard way) are the preferred choice.

Full-face masks are warmer but in free-flow situations it is far easier to swap regulators while wearing a normal face mask. Special full-faced neoprene hoods can be used, while Vaseline smeared over bare facial skin helps.

Underwater camera-operator Brady Doak remembers one expedition on which a team member failed to take adequate precautions:

"One diver had been down more than an hour. He returned with a bright red face which looked sunburnt, and days later the skin began to peel off."

High-flow regulators with sealed first stages are prerequisites, though the first stage often returns to the surface looking like a giant ice-cube. The greatest problem, however, is caused by a diver's breath. Droplets of condensation can slowly build up and freeze inside the second stage, causing the regulator to free-flow.

I encounter this on every dive, which is why we all have two tanks and two independent sets of regulators, complete with computer and separate air and depth gauge.

We also have a safety diver with several surface attendants and a dive supervisor, kitted-up ready to go at any moment. But the above-water environment is generally harsher than under water, and the people here are left exposed to the changing conditions.

"It's often much more comfortable being the diver than being the surface attendants, standing on the ice in the chilling wind with wet hands and icy feet!" says Paul Goldsworthy.

Perhaps one of the biggest causes for concern are the Katabatics, gravity-driven winds that rush down from the polar plateaus towards the sea. These can quickly reach 70 knots-plus and add a terrifying windchill to the already freezing environment. Blizzard-like conditions will easily cancel a diving day.

[Our expedition has a recompression unit](#)



Diving an iceberg at Cape Evans



diver with giant cup sponges at 27m under 2m-thick fast ice at Cape Evans, Ross island, near Scott Base

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onboard, but tourist vessels often do not have this luxury. For Goldsworthy this is a concern: "Diving in Antarctica includes several known precursors for DCI, such as cold water, anxiety, dehydration and unfamiliar gear. Without a recompression chamber on board each vessel, there's a long trip back to the nearest port for treatment."

To minimise the risk, tourist vessels offering diving try to avoid areas with high concentrations of ice, preferring icebergs and small ice floes, but even small icebergs are not always safe.

So why would any sane recreational diver seek to dive in such an inhospitable environment? Well, in a landscape so void of life above water, the underwater contrast is huge.

The foreign squeals, rumbles and whistles of a Weddell seal; the spiralling trail of bubbles left by a penguin; the colours and shapes of icy underwater grottos and stalactites; the diversity and rich colours of fields of kelp; the benthic assortment of sponges, seastars, amphipods and soft corals - it all adds up to an unforgettable experience.

"There's a thriving community underwater," says Brad Doak. "Everything works in slow motion, though - it's not busy like a tropical reef."

Ultimately there are many factors that will decide whether you will experience the southernmost seas on the planet. Among them are your level of diving experience, ice and weather conditions, opportunity and money, but for those who are passionate about their sport, it's like visiting another world.

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Antarctic Diving

Warming up for a coldwater trip



When you get into Antarctic waters you may find that they are below zero, so it's smart to be well-prepared. John Liddiard consults the experts on coldwater diving

REGULATOR In water near freezing point, CE markings on regulators are meaningless. The standard requires testing only down to 4°C; a reasonable limit for normal recreational use, but tropical compared to Antarctic conditions.

Another standards consideration is that a very expensive regulator testing machine could ice up and break!

I asked around among divers who should know. The British Antarctic Survey uses Poseidon Cyklon regulators and says it has no problems with first-stage ice-up, although the second stages do occasionally freeze and free-flow in the Antarctic winter (BAS divers are the only ones who work through the winter).

Divers in Scandinavia who regularly dive in near-zero temperature gravitate towards either Poseidon or Apeks regulators. When I mentioned brands with piston first stages, they just laughed. My preference is for an old Conshelf 14.

Whichever regulator you use, the best defence against freezing is to keep it absolutely dry until you get in the water. Some divers also reduce the inter-stage pressure by 2 or 3 bar, trading an increased work of breathing for less expansion and hence less cooling in the second stage.

Yvette Cardozo says she went to Antarctica toting Sherwood's Maximus and Blizzard

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regulators and liked the way they worked. "I used the Maximus as my primary and the Blizzard as my safe second. The Maximus breathed easy, even when I was sucking air like a marathon runner. At no time during eight dives in water hovering around -1°C did either regulator freeze or free-flow, including the time I purposely purged both second stages in shallow water to try to simulate a free-flow.

"In studies done in Antarctica by the US Antarctic Program, the Maximus outperformed the Blizzard plus 16 other regulators," she says. "USAP then adopted the Maximus as its official regulator, and over the following two years and 2000 dives, reported no failures."

DRYSUIT Even the smallest leak can make a major difference to warmth, so get up to date with puncture repairs and ensure that seals, zip and boots are all in good condition.

My contacts are split between neoprene and membrane, with those into longer, more technical dives preferring membrane suits made by Polar Safety (often badged as Dive-Rite) with an integrated hood. I usually prefer a neoprene drysuit, but in really cold water switch to a membrane with a Weezle undersuit and an extra layer of thermals underneath. (Yvette Cardozo didn't wear a Weezle but says: "After watching one guy actually sweat on a dive, I ordered one as soon as I got back!")

The BAS currently uses full thickness commercial-grade neoprene suits from Northern Diver with flectalon undersuits.

Hood Hoods integrated with drysuits are very popular in Scandinavia. My preferred item is a full-face hood with a hole cut for my mask and a slot through which a regulator can poke. It's almost as warm as a full-face mask, requires no special training and is a lot less hassle. However, it isn't practical for a full-face hood to be integrated with a drysuit, and it does make me look like Hannibal Lecter.

The BAS uses standard neoprene hoods with no modifications and no full-face masks.

GLOVES Dry gloves may be extremely popular with extreme coldwater divers, though they are not used by the BAS as they are not robust enough for dives involving a lot of hand work.

Next on the list after dry gloves are three-finger mitts of 5mm or 7mm neoprene. The BAS uses full mitts in 7mm neoprene.

There are definite tricks to tasks such as fitting a mask, manipulating camera controls, tightening straps and all the other things divers need to do without thinking about it while wearing dry gloves or mitts. You don't want to spend the first few dives of a very expensive trip learning, so a few pool and quarry dives before departure are advisable.

MASK A mask has to both fit your face and match the hole in your hood to leave minimal or no bare skin exposed. The shock of a mask flood or, in the worst case, having to do a mask removal and re-fit in zero-temperature water is painful. Nevertheless, it is something with which you may have to contend, especially if you are wearing a full-face mask and a regulator freezes.

The best opportunity to practise is at the bottom of a UK quarry at the end of January, when water temperatures can get down to 2°C.

BC Make sure that your BC fits comfortably on top of your drysuit and all the extra underclothes you may be wearing. BC and drysuit feeds can freeze in the same way that regulators do. Get your weight right and eliminate unnecessary use of feeds during the dive. Practice emergency disconnects with gloves on.

DIVE COMPUTERS Battery performance drops in low temperatures. Some types perform better than others, but with most dive computers you have no choice as to which battery to use. The best you can do is start a trip with a fresh battery.

CAMERA & FLASHES I once had a partial camera flood that I traced back to a small crystal of ice forming on the main housing O-ring from a drop of moisture. Whenever your camera is open, make sure the O-ring is dry before closing it again.

When you load a camera in a warm humid atmosphere, then take it diving in cold water, there is a good chance that fog will form inside the lens or housing. This may not clear until 30 minutes into a dive. One trick is to leave the camera in a bucket of water for half an hour before the dive, but that won't work if the fog freezes inside the housing. And chilling the batteries down may be counterproductive.

I generally try to load cameras well before a dive, and wedge a small sachet of silica gel in a corner of the housing.

I use nickel-metal hydride (ni-mh) batteries in my flashes and have never had any problems arising from cold flash batteries. Once I start taking pictures, the batteries generate enough heat to keep working happily.

With camera batteries, the current drain is so low that no heat is generated. I have found that while cheap alkaline batteries work well most of the time, they occasionally lead to cameras seizing up in cold water. My current coldwater preference is for the new Duracell Ultra batteries in the camera body.

I have had no problems with film behaviour in cold conditions. The British Antarctic Survey says it makes no special allowances for the effects of cold on film speed.

When bringing a "dry" camera indoors, the BAS recommends placing it inside a large plastic bag so that condensation forms on the inside of the bag rather than on the outside of the camera.

REBREATHERS A rebreather offers the attraction of breathing warm moist air. Weighed against this are reduced scrubber efficiency and the prospect of electronics not behaving in the cold.

A neoprene glove fitted to the scrubber canister helps to keep it warm. Pre-breathing before a dive to get the scrubber warmed up is always a good idea, but especially important in very cold conditions.

With warm humid air inside the breathing

loop and icy water outside, far more condensation than usual will form within the rebreather. This is unlikely to freeze while it's in use, but could do so when equipment is removed after a dive and left to stand in the cold.

Between dives it is best to get a rebreather inside and thoroughly drain and dry it. Change the scrubber well inside the normal interval.

CONSIDER THE AIR TEMPERATURE While seawater temperatures can drop to -2°C, air can be much colder. Regulator hoses become fragile and easily gouged by the metal crimps at the ends. Some plastics become brittle.

Batteries can get so cold that they stop working.

Between dives, nothing will dry if left outside. Moisture will freeze then slowly sublime, but not in any useful timescale. I have known divers having to crack the ice on their diving suits and undersuits to get them flexible enough to put on.

You need to get all your equipment inside and thoroughly dry between dives.

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Antarctic Diving

Respect for the 'bergs



"One afternoon, as we cruised alongside one fairly large 'berg, we heard a massive underwater explosion, followed almost immediately by a strong, underwater pressure wave..." Diving among icebergs requires care and attention, say [Michael Salvarezza](#) and [Christopher P Weaver](#)

WE HAD BOARDED OUR RESEARCH VESSEL in "the City at the End of the World"- the Argentine port of Ushuaia. The Polar Pioneer is a Russian ice-strengthened research ship built in 1983 and refurbished in 2000 to accommodate passengers in comfort for travel to the polar regions. We would live aboard her for 12 days.

The ever-present sea birds were our only companions as we sailed for two days across the notorious waters of the Drake Passage. Wandering albatrosses, Wilson's stormy petrels, Cape petrels and brown-browed albatrosses (try saying that quickly!) kept us entertained us with their flights across the waves.

The true masters of the polar oceans, they accompanied us all the way from Cape Horn to the first icebergs, and on to the South Shetland Islands of the Antarctic Peninsula.



It was time to take our first plunge. From a small but sturdy Zodiac, we gazed across the ocean surface, which was covered with thick brash ice. Then we looked at each other, and shivers ran down our spines.

We weren't strangers to cold water and we were wearing drysuits with an integrated glove system and using dry-hoods with ice caps. We also had extremely warm thermal undergarments with environmentally protected regulators but, man, that water looked so... cold!

We slipped in slowly, making sure that our equipment was functioning properly. While on the surface, we noted the serenity and stillness. Besides our pounding hearts, the only sounds were the crinkling and hissing of the icy slush that surrounded us, and the occasional boom of huge hunks of ice tearing off distant glaciers.

Then we cautiously entered the underwater world of Antarctica. At 7m or so, we glanced upwards for a moment.

It was a complete white-out, except for the ghostlike silhouette of our boat.

The chunky slush appeared an eerie bluish-white as it moved up and down in the gentle swells.

Our dive site was Hydruga Rocks, a small cove alongside one of the islands in the Gerlache Strait. Below us the seabed was strewn with small boulders and overgrown with beds of brown kelp.

As our eyes became accustomed to the low ambient light, we noticed colourful starfish in dazzling shades of yellow, red and purple.

We swam deeper along the gently sloping bottom, and encountered some of the unique fish life of this region - a small spiny plunderfish and a beautifully coloured crocodile dragonfish, bottom-dwellers that have adapted to the extreme cold.

At 20m, we found a flat, sandy plain inhabited by more starfish and an occasional sea anemone. We were constantly amazed by the amount of marine life we encountered.

Antarctica is about expedition diving. Although most of ours was along small islands and in protected bays, the sites were unexplored. That's a rare thrill these days.

Hydruga Rocks was a prelude to diving excitement elsewhere along the peninsula.

One evening, as twilight faded, we decided to dive on a 1900s whaling factory ship, the Governor.

The wreck's rusting, malformed skeleton was half-submerged and half-marooned on the shore. Most of the midships section had collapsed and was unsafe to penetrate. Because of the sharp rusting metal everywhere, we had to exercise extreme care not to puncture drysuits or dry-gloves. This was a fascinating dive into the history of whaling in Antarctica, and the bleached bones of some of the unfortunate whales captured by this vessel were still strewn alongside the wreck.

At Cuverville Island, at the mouth of the Errera Channel, we dived beside and beneath massive icebergs.

Above the water, icebergs reveal their



The crocodile dragonfish is one of the stranger-looking denizens of Antarctic waters



the spiny plunderfish is a bottom-dweller



Diving off Pleneau Island



Starfish and urchins

various whites, blues and purples and strange shapes and sizes. From below, however, they are awe-inspiring. Here the ice appears as smooth as glass, and frequently scalloped from interaction with the water. Often it is a light blue colour, with occasional bits of rock embedded in the frozen mass. As we dived alongside these majestic creations, we felt dwarfed by them and captivated by their beauty.

Icebergs need to be given respect, too. One afternoon, as we cruised alongside one fairly large 'berg near Pleneau Island, we heard a massive underwater explosion, followed almost immediately by a strong pressure wave.

The adrenaline began pumping as we struggled to swim away from the iceberg as fast as possible. Nearby, a large section of ice had broken off from a different 'berg, creating this frightening underwater disturbance.

Later in the week, at Cuverville Island, a massive piece of ice fell into the water directly in front of us, again highlighting the risks of exploring these structures. Still, the dives around and under these huge formations were the highlight of our journey to the frozen continent.

Our diving included encounters with fur and leopard seals, and often we found ourselves diving alongside penguin rookeries, where visibility could exceed 10m.

Antarctica is a continent isolated by strong and violent oceans, great distance and an extremely unforgiving climate. Still, man has had an impact here, and although no nation can lay claim to this continent, several still dispute ownership of various parcels of land.

This issue may become important in years to come as mineral deposits and other natural resources are discovered, as may the impact of the increasing number of tourists visiting the continent. Despite all this, Antarctica remains a wilderness for explorers and adventurers.

Perhaps the following question, posed in 1908 by French explorer Jean-Baptiste Charcot, captures the mystery of Antarctica: "Where does the strange attraction to the polar regions lie, so powerful, so gripping that on one's return from them one forgets all weariness of body and soul and dreams only of going back?"



colourful anemones and sea whips



a wandering albatross

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Antarctic Diving

The Big Questions

How do I get there?

Contact the specialist tour companies or travel agents listed below. Diving expeditions depart by cruise ship or expedition vessel from South America as well as Australia and New Zealand. From the UK, fly to Buenos Aires in Argentina, and transfer to Ushuaia, Tierra del Fuego with Aerolineas Argentina.

Do I need a visa?

Visitors to Argentina must have a passport with 90-day validity. British, US and Canadian citizens do not need a visa for visits up to 90 days. Passports are collected on the boats and used when visiting research stations in Antarctica.

Am I qualified to dive?

Tour companies normally require those taking part in dives to have advanced diving qualifications and experience with drysuit diving. A check-out dive is conducted before arrival to ensure that the diver is competent in the water and that his or her equipment is working satisfactorily. There is normally no opportunity for technical ice-diving for holiday-makers, however.

When is the best time to go?

The cruise season runs from November to March, the austral summer, and that's the only time it's possible to visit Antarctica. Diving conditions vary, but the best visibility occurs early in the season before the plankton blooms of late summer.

Can I stand the cold?

In the Antarctic summer, air temperatures can range from 0 to 4°C. Daylight hours extend from around 4am to 10pm, with even longer days in the peak summer months of December and early January. Sudden snow squalls, windy conditions and temperature drops are common. The air is very dry, so you'll need to drink lots of water and use skin moisturiser. Also, the sun is very strong, so sunblock is essential. The seas rarely fall below a toasty -1.8°C, so drysuits are the only option.

What should I bring?

Divers are responsible for bringing all their own equipment, apart from tanks and weightbelts. This includes two sets of regulators with freeze-protected first and second stages.

Are there restrictions on diving?

Dives are often limited in depth and time to minimise the risk of decompression illness, normally to 15-18m for 30, perhaps 40 minutes. Dive sites are chosen for accessibility, water clarity, underwater attractions and

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safety.

Any site with high concentrations of sea ice is generally avoided. Drift-dives and diving in drifting pack ice are also avoided. Icebergs chosen as dive sites are usually either hard aground or well clear of brash or loose ice.

Diving takes place at a reasonable distance from penguin colonies and no interference with benthic marine life (starfish, anemones etc) is permitted.

How dangerous is it?

The most significant risk is the remoteness and isolation of Antarctica. Medical emergencies, including diving accidents, often require an air evacuation back to South America, either to Chile or Argentina. Otherwise the stormy ocean conditions of the Drake Passage can test the best seasickness medicines, but shipboard doctors can provide assistance.

Is language an issue?

English is widely spoken on ships exploring Antarctica.

Who should I contact?

Check out the websites of these companies that offer diving in Antarctica:

Operators

Aurora Expeditions, Australia
(www.auroraexpeditions.com.au, 0061 29252 1033)
Oceanwide Expeditions, USA (www.ocnwide.com, 001 800 453 7245)
Quark Expeditions, UK (www.quarkexpeditions.com, 01494 464080)

Agents

Adventure Associates, Australia
(www.adventureassociates.com, 0061 29389 7466)
Big Animals Photography Expeditions, USA
(www.biganimals.com, 001 415 923 9865)
Discover the World, UK (www.discover-the-world.co.uk 01737 214250)
Dive Worldwide, UK (www.diveworldwide.com, 01794 389372)
WILD WINGS, UK (www.wildwings.co.uk)
World Expeditions, UK (www.worldexpeditions.co.uk, 020 8870 2600)

How much will it cost?

Your fare to Argentina, Australia or New Zealand, the normal cruise cost (anything from £2300 upwards) plus an additional £300 for diving.

Check out

The British Antarctic Survey website,
www.antarctica.ac.uk

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