

## Life in Antarctica

### Moving in Antarctica

How is it possible to live and work in Antarctica? Which sagacities must be used for a research? After understanding the motivations scientists research in this continent, we will look for the answers of these questions. Antarctica is a very isolated continent with extreme climatic conditions so that even reaching it is not an easy task. In fact it was the last continent to be recognized as one.

The part that is nearest to the inhabited continents is the Antarctic Peninsula, it is very close to the Tierra del Fuego, which is 950 km away. However, in order to reach this sector of Antarctica by ship, the tract of sea that has to be crossed is extremely turbulent and is characterized by violent storms almost all year round.

The other coasts of Antarctica are thousands of kilometres away from the closest land, the Italian base in the Terra Nova Bay, for example, is over 3,000 km from the coasts of New Zealand, and the French base of Dumont d'Urville is approximately 2,500 km from Australia, and so on. In order to reach Antarctica, therefore, there are only two choices, either by plane or by ship. Both modes of transport are characterized by both advantages and disadvantages.

The climatic conditions are such that Antarctica can be reached only during the "summer" period (i.e. when it is winter in the Northern Hemisphere), because otherwise the darkness, the cold and the extension of the ice make it practically impossible to reach the coasts.

### Transportation by ship

Transportation by ship has the advantage that it is economic and large quantities of material and heavy equipment can be transported, which is not possible by plane. However the disadvantage is that the trip is long and many days of navigation are needed (Italica, the ship used by PNRA takes 7 to 10 days of navigation to reach Antarctica from New Zealand).

The ships must be specially equipped to travel in a sea that may be covered with ice and therefore must also be able to break the pack and open a way in the ice (these ships are icebreakers), or must be able to stand the impact when they hit large floating ice and must be able to break through the thinner layers of the ice pack. Furthermore, near the Antarctic convergence, a region in which the cold currents, which are found around the continent, clash with the warmer water of the oceans, there are always big storms with waves that easily exceed a height of ten metres.

Near the Antarctic coast, the ships often anchor to the pack. Therefore in every season the place to dock varies, depending on where the limit of the pack is that year, a different location every year, which can vary various kilometres from one year to the next.

### Air transportation

The other way to reach Antarctica is by plane. Due to the distance, however, the plane must have sufficient autonomy to fly over great distances, and this, in turn, requires a very long runway. The construction and maintenance of a runway for planes is not easy in Antarctica, therefore often a clever trick is exploited, and the planes are made to land on a natural runway, i.e. on the frozen sea!

In this way the runway is made by smoothing the level of the pack and planes can land on the sea ice that formed the previous year. Obviously accurate checks must be made in order to guarantee that the ice can bear the weight of the plane, and for this a series of holes are bored in the ice and the thickness is checked constantly, making sure the pack is at least two metres thick.

In the case of internal transportation instead, helicopters are used. They are very convenient because they enable transport exactly to the desired location, and they do not need much space in order to land, alternatively small planes equipped with skis to land on snow can land in short spaces even in areas where real runways do not exist.

In alternative, snow tractors are used; these can drag sledges equipped like real laboratories and lodgings. Some researches are carried out by staff using these convoys equipped with various instruments, also known as “sleepers”, that cross the Antarctic continent .

In order to move across the pack and on the snow, snow mobiles are used. Obviously they cover shorter distances and can transport less materials.

On the sea ice all terrain vehicles can be used and in case of need, lorries and operating machines.

The characteristic and picturesque packs of sledge dogs, instead, are no longer used. In fact, there are rules stating that no live animals can be brought to Antarctica, to avoid contaminating the environment with any animal-conveyed microbes, viruses or parasites.

## An uncontaminated place

Many years have passed since when Polar expeditions were high risk adventures, in which the survival of the explorers wasn't certain.

Today activities in Antarctica are carried out in absolutely safe conditions, practically with all the standards encountered in day to day life, as only in this way people can dedicate themselves to their work peacefully.

Some discomforts or difficulties may still be present but these are minimal compared to the risks encountered by the first expeditions, and specially, there are never conditions that are dangerous or risky. There is a fundamental rule which is respected in Antarctica (which perhaps should be respected a little more in the rest of the world), when working and more simply when “living” at the base.

The rule is not to disturb the environment in any way. In fact Antarctica is a unique continent. Since it is surrounded, as we have already seen, by a series of natural barriers, Antarctica is one of the few areas that are still uncontaminated, an area where man has still had very little influence. Therefore it is an immense natural reserve in which it is possible to observe phenomena and organisms that are still in an undisturbed state.

Therefore it has become compulsory to preserve this environment as intact as possible, for purposes connected with the studies being carried out and also to preserve it unchanged for the future generations.

This attention is paid when carrying out work and during everyday life in the bases. Some sites (as for example Mount Melbourne, which is a still active volcano, situated near the base, or Cape Washington, where there is a colony of Emperor Penguins) are natural reserves to all effects, and can be visited only with particular precautions. On Mount Melbourne, where particular ecosystems are present, staff that disembark in the area must wear special suits in order to be sure not to contaminate the environment.

When coming into contact with the Antarctic environment, normally some simple fundamental rules are applied. No one can go close to the animals so as not to disturb them and not to risk contaminating them. For example, it is absolutely prohibited to touch them to avoid transmitting microbes they are not used to (in fact Antarctic animals are not used to contact with men and therefore have not developed all the biological defences to protect themselves from the diseases that we might pass on to them).

Waste products cannot be abandoned and must be brought to the base where some will be shipped to Italy, after adequate organization of the waste products).

Some waste is incinerated by means of a special system with a very low environmental impact, and waste water is first treated in a purification plant before being poured into the sea

## The bases

The image of Polar explorers living in tents or barracks with no comforts at all during their expeditions, belongs to the past. Today the Antarctic bases are well equipped, they have every comfort and especially, they are safe. The tents, as we will see, are still used, but for particular purposes.

The Antarctic bases can be classified into two main categories, the **summer base camps** and the **winter base camps**. The summer bases only operate during the warmer months and in the winter season are closed and sealed, so that they

can be opened again the next season. The winter bases instead can shelter a small group of people all year round, and therefore even during the colder season.

An Antarctic base, be it a winter base or a summer base, must be self-sufficient. Supplies from the continent arrive only few times a year, therefore maintenance and emergency work must be carried out at the site, and the bases must be equipped to face all kinds of events. If the heating system or any telecommunication equipment or the power supply system break down, these must be repaired immediately without waiting for spare parts to arrive from the continent. For this purpose the bases are equipped with specialized workshops and trained staff (apart from a well stocked warehouse), in order to be able to face all kinds of emergencies.

## What does a base look like?

As an example, let us take the Italian base, Baia Terra Nova, which was recently named after Ing. Mario Zucchelli. Here the staff of Programma di Ricerca Nazionale in Antartide (the Italian national research programme in Antarctica) have been living and working for the past twenty years. The original nucleus, which was smaller, has been enlarged and improved over the years.

The **base** consists of a **central unit** that does not rest directly on the ground, but is kept raised by some “feet”, which help adapt to any small movements of the ground.

In the central unit there are lodgings for the staff – there is accommodation for over 100 people, who may be either technicians or scientists. The rooms have 4 beds each, they are heated, and have a cupboard and a window.

In the same building, obviously, there are the bathrooms, with showers and hot water, there is a canteen and a kitchen (the menu varies every day, and fresh bread is made every morning by the cooks), a small bar and a first series of laboratories for the chemists, biologists, geologists, physicists and other scientists.

On the upper floor there are more rooms, the computer equipment operating room, the computer room for staff use, a library, a meeting room, a radio room, a room with equipment for the geologists and the management offices. There is a secretary's office, the base director's office, the expedition leader's office, and one floor above these there is the operations room, where the persons in charge coordinate the various operations that are conducted around the base and control all the activities that can be carried out hundreds of kilometres away. For this, they are helped by the meteorology office, that issues weather forecast bulletins every day

Outside, there are two big hangars that contain the workshop for all the vehicles (where repairs are carried out and also the maintenance of all types of vehicles such as off-road vehicles, snow mobiles, lorries, snow tractors), the workshops, the carpenters workshop and the warehouse where the spare parts are stocked, for the base operation.

Outside, there are also a series of containers used as warehouses for the various activities, a series of containers that are adapted as laboratories and a series of buildings where the primary base operations are carried out.

In fact, in order to be able to operate, the base requires electricity and heat that must be produced at the site.

Electricity is provided by some motor generators that operate in an alternating mode so that there is always a reserve in case of any emergency. Heat for hot water and the heating system instead is provided by a power station. There is a water purifier – drinking water is provided by taking water from the sea and distilling it. There are also an incinerator and a purification plant so that waste water at the base is purified before being discharged into the sea.

And last, there are refrigerators to store food.

At a safe distance, about a hundred metres away, there are large tanks containing fuel for the base to operate. These are filled once a year when the ship arrives from Italy.

## Life at the base

Life inside the base is comfortable. The base is heated and therefore no one suffers the cold, there are all the instruments required to carry out the different jobs, and there is technical support for whatever one may require.

Obviously, though, since most of the material is brought to the base by ship, once a year, advance orders must be made of instruments that may be required, because due to the distance and the difficulty in arriving, material cannot be ordered

once you are in Antarctica. Meals are always plentiful, and varied due to the ability and effort of the cooks who work every day. Fruit and fresh vegetables and also yoghurt are perishable foodstuffs that cannot be stored for a long time, therefore these are the only foodstuffs that are sent to the base by air. When a cargo plane comes from New Zealand there is much rejoicing because at the table there finally are tomatoes and salad!

A day at the base is marked by work-hours, starting at 8 a.m., when the various activities begin, and ending at 7.30 p.m. In the morning all go to their work places, near the base or far away, in areas that can be reached only by helicopter, plane or other vehicles. Those who work at the base or near the base can return for lunch, otherwise a quick packed lunch allows the others to carry on to the end of the day, till they return to the base for dinner.

After dinner people at the base can relax watching a film, taking a book from the library, or simply chatting with the others. Or, as often is the case, preparing material for the next day or completing the work of the day gone by. Communicating with Italy is not difficult either, even if the camp is over 15,000 kilometres away; in fact it is possible to send and receive e-mails and use the telephone.

## Remote camps

There are a number of reasons for stopping for a number of days to work far from the base. For this purpose camps, known as remote camps, made of tents, are set up.

Depending on the place, the duration of the camp and many other reasons, two types of tents can be used. Either the classic tents, made with poles and a fabric stretched around, similar to the Red Indian tents, that can hold two people, or much larger tents, with an aluminium structure, can be mounted. Inside these a heater can be set up to heat the tent inside, and a camp stove can be used to cook meals.

Instead, a special tent is always used as a bathroom.

When leaving for a remote camp, it is necessary to bring along all that is necessary because during the period at the remote camp there is not always the possibility of receiving supplies by means of a supply plane. Therefore it is necessary to carry all the material required for the work to be carried out, any spare parts, food supplies and the fuel required for the cooker, for the heating and for the generator that produces energy for the lighting and the radio.

Life at a camp is Spartan but not uncomfortable. In fact the equipment provides sufficient safety and comfort, so that those at the remote camp do not miss the base, but rather, working on a remote camp is a fantastic, pleasant experience. In some cases the remote camps are built of more resistant structures, for example in locations in which researches have been carried out for many years consecutively, and which require long periods of stay away from the base. This is the case of the researches conducted near the penguin colonies that require long periods of observation.

In this case plastic incorporated by fibreglass tents are used. These are better known as dome tents, and are rigid structures that are more comfortable and resistant than the normal tents. Obviously as these are prefabricated structures they are more difficult to transport and therefore are set up with a semi-permanent function.

When it is possible, the water for cooking, washing, and all the other needs, is obtained from the ice or the snow that are melted on a stove. In this way it is possible to avoid having to transport large loads to faraway places.

## Living in the open air

The main concern of people who must go out in the open air in Antarctica, is safety. There are two aspects that must be borne in mind, when working near to the base and even more when working far away, in locations reached by helicopter (which may return only after many hours).

The first is that even the smallest accident, like a sprain or a bump or a small cut can become extremely troublesome or even dangerous. In fact many hours may pass before there is the possibility of returning to the base and to a doctor's care. In this lapse of time the temperatures may drop and the safety of other people may be put at risk.

The other factor to be taken into account is that the weather may change extremely rapidly. In fact the meteorologists are unable to foresee the climate perfectly. Weather, in fact, is unstable by nature, and to understand this, it is sufficient to

think of how precise weather forecasts are in Europe where meteorologists have a number of monitoring stations available. Antarctica is as big as Europe and there are many less monitoring stations.

## Rules that must be observed

For this reason there are some fundamental rules that are observed. When moving away from the base, there must always be at least two people, so that one can help the other, and whatever may happen there is a person who can call for help. A radio is always at hand along with a spare battery so that one is always sure of being able to communicate with the operations room. It is necessary to always report where one is going, with whom, at what time one is leaving and at what time one intends to return so that the control staff are informed of the whereabouts of the persons and can warn them in case it is necessary and also they may be able to notice any anomalous conditions. Furthermore contact is always kept at pre-set times, with the operations room, to make sure that all is well.

When going outside, in one's backpack, one must always carry an extra pullover or a covering in case of wind, because the sun could be covered and the wind could increase in only few minutes.

Also a slab of chocolate and a thermos full of hot tea are a good measure to fight the cold at any time. In fact even if the sun is shining, it must be pointed out that only rarely the temperature reaches 0°C, often it is lower and therefore working out in the open air one can get cold, specially if the work to be carried out implies remaining still.

Sun glasses must always be worn, because the sun's glare on the snow, even when it is cloudy, is very strong and may cause severe damage to the eyes, even if one is concentrating on the rocky surfaces, and therefore on a surface that has no snow, around there is ice or snow so there is glare anyway.

Furthermore it is important always to protect the skin of one's nose, face and hands with sun creams because the atmosphere is rarefied and the ultraviolet rays are very strong. One could get severely burnt, so it is better to use sun creams with a sun filter.

When, instead, one is accompanied to a particular place by a helicopter, one must always transport an emergency bag, because when one is far away an unexpected event may take place and one might not be able to return because of worsened meteorological conditions, so one must be prepared to spend the night outdoors. In the bag therefore there must be all that is necessary, such as a tent, sleeping bags, mattresses, a camp stove and food for some days.

On the plateau the same precautions must be taken, bearing in mind that it is much colder in this area and therefore clothing must be much heavier and one must be more careful in protecting oneself from the cold and the sun's rays.

Furthermore, since the surface of the plateau is not at sea level, (for example, the Dome C base is at a height of 3000 m) before starting to work for long periods of time, it may be necessary to take some days to get used to the climate.

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