

## HELICOPTER OPERATIONS OF THE ARGENTINE AIR FORCE IN ANTARCTICA 1968 - 2015

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### Abstract

This paper is a very brief summary of the operations of the Argentine Air Force (AAF) helicopters in the Argentine Antarctic. It is a transcription of a Power Point Presentation of the lecture that was given on June 26, 2015 during the X National Helicopter Forum 2015 held at the Institute of Aviation in Poland.

Keywords: Argentine Air Force, helicopter operations, Antarctic.

### 1. INTRODUCTION

The Antarctica is a hostile and deserted territory with extremely low temperatures. Winters are long and in summers sometimes the weather conditions do not allow for air operations to last longer than a few hours per day.

However, it is possible to operate helicopters safely, following certain guidelines and having the right equipment which is not always very sophisticated.

Helicopter operations in the Antarctica are very risky and for that reason their preparation has to be very careful in order to make the as safe as possible.

It is essential to have fuel, lubricating oils and fluids suitable for low temperatures as well as well-trained people.

### 2. BRIEF DESCRIPTION OF THE ANTARCTIC CONTINENT

Fig. 1 the Antarctic continent, where the South Pole, is located is in the south hemisphere from parallel 60° South.

The Antarctic Continent has a surface of 14 millions of km<sup>2</sup>. During summer the area free of ice is only 280 000 km<sup>2</sup>. The average ice thickness is 2 500 m.

The average temperature of the warmest month does not exceed 0°C, the lowest temperatures ever recorded were in the Russian Antarctic station Vostok, on July 21, 1983, when the thermometer showed -89.3°C.

In July 31, 2013 at a site near the Dome Argos was recorded the historical record of the lowest temperature on Earth -93°C.

The distance between Argentina and the Antarctic Peninsula is about 1 000 km.

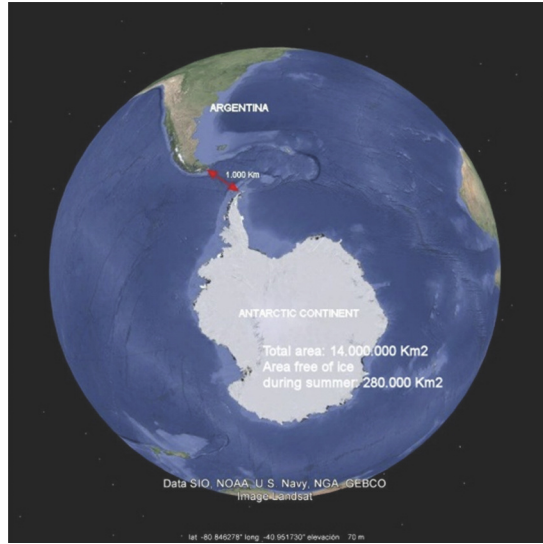


Fig. 1. Image [1]

### 3.COUNTRIES THAT CLAIMED TERRITORY IN THE ANTARCTICA

The Antarctic at the moment is occupied by 7 countries (Fig. 2): Argentina, Australia, Chile, France, Norway, New Zealand and the United Kingdom.

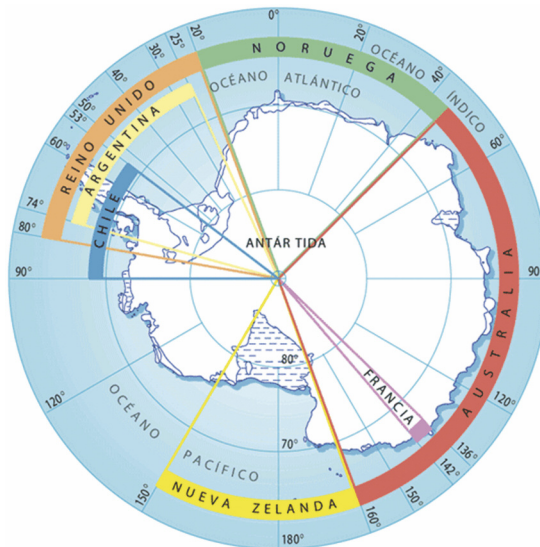


Fig. 2. Image [2]

52 countries signed the Antarctic Treaty in 1959, only 29 are advisors. Poland is an advisory country but has not claimed territory. It has one research station **Henryk Arctowski** on King George Island (Isla 25 de Mayo for Argentina).

Argentina is the country that has occupied the Antarctica for longest and uninterrupted time of 111 years now (since 1904).

Argentina has 13 bases in the Antarctica. 6 are permanent and 7 are temporary. They belong to the Army, Navy, Air Force and Antarctic National Direction.

The AAF has 2 bases: 1 permanent, Marambio Base and one temporary Matienzo Base (Fig. 3). The most important is Marambio, which has the only runway operative for wheeled planes in The Antarctica all year round.

The runway is 1 260 m long and 30 m wide with all the facilities for IFR landings. The capacity to be operable 365 day a year is a very important support for the Antarctic Bases.



Fig. 3. Image: Ministerio de Defensa de la Rca Argentina

**NOTE:** A new runway was opened at Marambio Base on July 14, 2015. This new runway, with another orientation adapted to the prevailing winds, is 1 600 m long and 45 m wide and also is operable throughout the year for aircraft equipped with skids.

#### 4. MODEL OF HELICOPTERS USED FROM 1968 TO 2015

**Helicopter Bell UH-1H (Fig. 4)**

**Velo Max:** 120 kts (222 km/h)

**Cruiser Speed:** 100 kts (185 km/h)

**Range:** 280 Nm (518 km)

**Service Ceiling:** 5 600 m

**Engine:** Lycoming T53-L13

**Power:** 1 300 shp (969 kW)

**Max to Weight:** 4 310 kg

**Internal Cargo:** 1 700 kg

**Cargo Hook Max Sling Weight:** 1 800 kg



Fig. 4. Photo: Guillermo S. Posadas, 1969

With this helicopter, the Argentine Air Force (AAF) started to fly in the Antarctica. It was used in operations from 1968 to 1978.

I mentioned only some technical characteristics, but one of the most important one is the weight that is carried in operations. This amount of kilograms was and still is the key to transfer the supplies fast and on time.

In the case of the Bell UH-1H, the cargo hook is hanged of about 600 to 700 kg, equivalent of 4 to 6 drums of 200 liters of fuel.

**Helicopter Hughes 369 HM (Fig. 5)**

**Velo Max:** 156 kts (288 km/h)

**Cruiser Speed:** 110 kts (203 km/h)

**Range:** 220 Nm (407 km)

**Service Ceiling:** 4 800 m

**Engine:** Allison 250-C20B turbo shaft

**Power:** 420 Horsepower

**Max TO weight:** 1 300 kg

**Internal cargo:** 400 kg



Fig. 5. Photo: Armando Buira, 1970

This helicopter was used in the winter of 1970 for a rescue task, because of his versatile capabilities and internal capacity of 400 kg.

**Helicopter Sikorsky S-61R 12 (Fig. 6)**

**Velo Max:** 130 kts (240 km/h)

**Cruiser Speed:** 120 kts (222 km/h)

**Range:** 780 Nm (1 444 km)

**Service Ceiling:** 5 300 m

**Engine:** GE T58-5

**Power:** 2 x 1 500 shp (2 237)kW

**Max TO weight:** 10 000 kg

**Cargo hook Max Sling weight:** 3 650 kg



Fig. 6. Photo: Editorial Avialatina, 2008

In 1976 the AAF bought the helicopter Sikorsky S-61 R12, and it was used during the 1977/1978 campaign. The helicopter multiplies more than twice the amount of cargo to carry and provides safety now when it is flown with 2 engines.

The weight hanged from the cargo hook is about 1 000 to 1 200 kg, equivalent to 10 to 13 drums of fuel.

**Helicopter Bell 212 (Fig. 7)****Velo Max:** 120 kts (222 km/h)**Cruiser Speed:** 100 kts (185 km/h)**Range:** 240 Nm (444 km/h)**Service Ceiling:** 5 600 m**Engine:** Pratt & Whitney PT6T Twin-Pac**Power:** 1 800 shp (1 342 kW)**Max TO weight:** 5 080 kg**Internal cargo:** 1 700 kg**Cargo hook Max Sling weight:** 2 200 kg

Fig. 7. Photo: Fuerza Aerea Argentina. Ministerio de Defensa de la Rca Argentina

For the campaign of 1978 the AAF received the Bell 212. They were taken for the first time to Antarctica in the transport of the ship “Bahia Aguirre”.

The Bell 212 did not increase the capacity of cargo considerably in comparison with the Bell UH-1H but it improved the safety of the flights because of the 2 turbo-shaft engines.

**Helicopter Chinook CH 47 C (Fig. 8)****Max Speed:** 170 kts (314 km/h)**Cruiser Speed:** 130 kts (240 km/h)**Range:** 400 Nm (740 km)**Service Ceiling:** 5 600 m**Engine:** 2 x Lycoming T55-L11GS**Power:** 3 750 shp (2 796 kW) each**Max TO weight:** 22 600 kg**Internal cargo:** 12 700 kg**Cargo hook Max Sling weight:** 12 000 kg

Fig. 8. Photo: Hernan Longoni – www.helis.com

In 1981 the Air Force introduced the helicopter Chinook CH 47 C. This was another step forward that reduced the time of work and the flight hours because the big capacity in the cargo hook of this helicopter.

From the cargo hook “drums fuel” or “pillow fuel” tanks of 3 000 kg to 5 000 kg are hanged.

**HelicopterMil Mi-171-E (Fig. 9)****Velo Max:** 133-122 kts

(depending on gross weight)

**Cruiser Speed:** 120 kts (222 km/h)**Range:** 585 Nm (1 083 km)

(with 2 external tanks + 2 000 kg cargo)

**Service Ceiling:** 5 600 m**Engine:** Klimov TV3-117 VM**Power:** 2 251 shp (1 678 kW) each**Max TO weight:** 13 000 kg**Internal cargo:** 4 000 kg**Cargo hook Max Sling weight:** 4 000 kg

Fig. 9. Photo: Guillermo Sentis, 2013. Revista Gaceta Aeronautica, 26-12-2013

In 2013 the air force started to use the helicopter Mil Mi-171-E with good capacities for the Antarctic tasks. It came fully equipped for polar flights and with a capacity of hang cargo similar to the Sikorsky S-61 R, between 1 000 and 1 200 kg.

### Transfers of helicopters to Antarctica

Right: Because of the distance from the continent to Antarctica between the years 1968 to 1980 all the transfers of the helicopters to Antarctica were made by ship of the Argentine Navy like the ice-breaker “General San Martin” (Fig. 10).

This ice-breaker also carried the supplies and fuel for the Antarctic bases.



Fig. 10. Image [3]

This icebreaker has capacity for carrying 2 bell UH-1H helicopters or equivalent, with a flight deck of 20 by 10 meters (Fig. 11).



Fig. 11. Photo: Guillermo S. Posadas, 1970

Other ship that was used to carry big helicopters, was the Dock Ship “Candido de Lasala”, in which helicopter Sikorsky S-61 R12 was transported (Fig. 12).

Because the deck of the ship does not have full roof, the helicopter had to be washed every 2 days with sweet water to take out the marine salt accumulated in the fuselage.

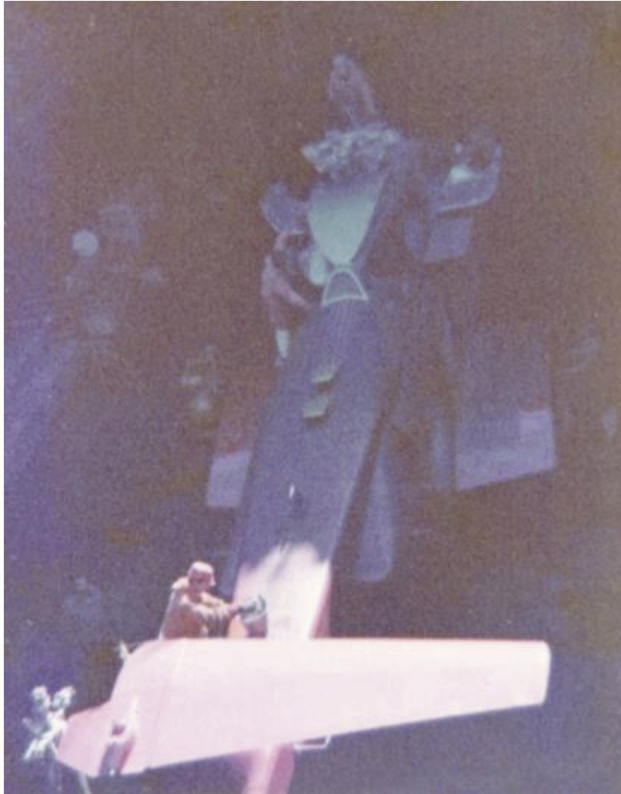


Fig. 12. Photo: Guillermo S. Posadas, 1977

In 1980 the AAF decided to transport the helicopters in “Hercules” C-130 and leave them in Marambio Base for the whole summer, i.e., from October/November to March/April.

One helicopter Bell 212 was transported in each flight (Fig. 13).



Fig. 13. Photo: Fuerza Aerea Argentina. Ministerio de Defensa de la Rca Argentina

## Crossing Chinook CH 47C

For the campaign 1980-1981 the AAF decided to send to Antarctica 2 Helicopters Boeing Vertol CH 47C Chinook.

Those helicopters were the first ones to cross from the mainland to the Antarctic Continent by air. This was done on November 30, 1980.

They flew a total distance of 715 nm (1 325 km) between Rio Grande (Mainland) to Marambio Base Antarctica in 06:00 flight hours (Fig. 14). During the flight they had the support of 1 “Hercules” C-130 and ships of the Argentine Navy.

They crossed the “Drake Stretch” flying at between 500 152 m and 2 000 feet 609 m because of clouds with ice.



Fig. 14. Photo: Fundacion Marambio, 2005

## Crossing Mi 171 (Fig. 15)

On December 20 of 2013, 2 helicopters Mil Mi 171 E also flew from the mainland to Antarctica.

Like the flight of the Chinooks, they were also supported by 1 “Hercules” C-130 and some Argentine Navy Ships as well as some Chilean Navy ships.



Fig. 15. Photo: Guillermo Sentis, 2013. Revista Gaceta Aeronautica, 26-12-2013



## Equipment

In general, no special equipment was used with the helicopters, all of them were operated as they came from the factory.

## Floats

On very few opportunities (if there was need to fly over water), floats with the bell UH-1H were used (Fig. 16), because they add a lot of drag (more fuel used) and was very unstable. When on land, we have to be very careful not to enter in lateral “resonance”.

The other helicopters came with their own float systems.



Fig. 16. Photo: Guillermo S. Posadas, 1970

## Covers

Canvas covers were used to protect the sensitive parts of helicopters when they had to “sleep” outside hangars (Fig. 17).



Fig. 17. Photo: Guillermo S. Posadas, 1970

**Skis**

In general, skis are not used with helicopters by Argentine Air Forces. The only one that was used the Chinook (Fig. 18), but also on very few occasions.



Fig. 18. Photo: Fundacion Marambio, 2013

**5. OPERATIONS WITH HELICOPTERS OF ARGENTINE AIR FORCE IN THE ANTARCTICA**

In general, operations with helicopters in Antarctica could be divided into 3 main groups (Fig. 19-21):

**Supply**



Fig. 19. Photo: Guillermo S. Posadas, 1970

**Scientific**



Fig. 20. Image [4]

**Rescue**



Fig. 21. Photo: Armando Buira, 1970

In order to make those operations possible, good planning and highly qualified personnel were necessary.

From the very first moment an operation is started, the supply of spare parts or fuel is very critical and in the case something is not available this problem can stop the operation for some period of precious time, because the time for work are only few summer months and liable to the adverse weather of Antarctica that can reduce the work flight hours.

During operations, the helicopters have normal/simple fails, normal programmed inspections are performed, but in a few cases the most serious problem was water in the fuel that produced fungus in fuel tanks. That problem was solved with good cleaning in the place and later conveniently treated. For future operations special care was taken to avoid the water in the fuel by using for re-fueling special filters.

There were no problems with “O” rings or gaskets of the systems in the helicopter because of cold weather. In some cases heaters were used, when available, to defrost parts of the helicopters or engine intake.

The first Antarctic operation with helicopters of the AAF was made in 1968 with one helicopter UH-1H that was transported on board of ice-breaker “General San Martín”.

The main mission was to collect soil samples and carry out measurements and observations in the area of Marambio island so that later the AAF could build “Marambio Base” and the runway for wheeled aircrafts, as mentioned earlier.

### **Fuel and supplies**

The main task of helicopters in Antarctica was to take fuel and supplies from Antarctic ice-breaker or transport ships to the bases.

The best way to do this job was using the cargo hook of the helicopters and slings in most of the flights and transport delicate cargo inside the helicopter.

Why were the hook and slings used so extensively? In order to avoid the effort and risk to land and take off in a reduced flight deck and allow to do the operations faster. Also the operations reduced fuel consumption.

We always need to remember that the time available for those tasks in the Antarctic is critical (Fig. 22).



Fig. 22. Photo: Guillermo S. Posadas, 1969

### Other tasks

Another important operation is a transfer of scientists and the supplies for their work to research camps and collection of geological samples as well as moving personnel from one base to another (Fig. 23, 24).



Fig. 23. Photo: Guillermo S. Posadas, 1969



Fig. 24. Photo: Guillermo S. Posadas, 1970

## Rescue

During 1970 the AAF realized a very complex operation. For the task, 2 helicopters Hughes 369 HM were transferred to Antarctica in “Hercules” C-130 (Fig. 25).



Fig. 25. Photo: Armando Buira, 1970

June of 1970 in the Antarctic winter was a period with very bad weather and few hours of sun light. At that time the chief of Admiral Brown Base was very seriously ill and needed to be transferred urgently to hospital.

The AAF transferred 2 helicopters Hughes 369 HM to Marambio Base. They arrived by C-130 with the start of the day and were very soon assembled and refueled. Immediately, they flew to Matienzo Base about 180 km Southwest.

The meteorological conditions were good, but with wind from  $200^{\circ}$ - $220^{\circ}$  at 45/65 km/h. They landed in Matienzo Base, refueled and rapidly took off heading Brown Base, 140 km to the West of Antarctic Peninsula (Fig. 26).



Fig. 26. Image [5]

In the middle of the way, they found bad weather that reduced the visibility, which forced them to search for another route and finally arrived at Brown Base.

One of the helicopter picked up the patient and both helicopters departed from Brown Base to Matienzo Base.

The helicopters arrived with the last rays of the sun at 4.00 p.m., they were refueled and spent the night in the base (Fig. 27).



Fig. 27. Photo: Armando Buira, 1970

The next day they departed with the first light of the morning to Marambio Base where the sick person and the helicopters were charged in the C-130 and flew to the mainland.

The good epilogue was that the sick person's life was saved and we learned more about how to operate helicopters in Antarctica and demonstrated the ability of our pilots and technicians.

<sup>1)</sup>Major (R)VGM Guillermo S. Posadas, Argentine Air Force



Logo of Antarctica with wings:  
photo Guillermo S. Posadas, 2015

Major Posadas participated in 5 Summer Antarctic Campaigns between the years 1969 and 1994, he flew in Antarctica more than 500 hours in operations as a crew member of helicopters.

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## **OPERACJE HELIKOPTEROWE ARGENTYŃSKICH SIŁ LOTNICZYCH NA ANTARKTYDZIE 1968 - 2015**

### **Streszczenie**

Artykuł ten przedstawia krótkie podsumowanie prowadzonych operacji helikopterowych Argentyńskich Sił Lotniczych (AAF) w argentyńskiej części Antarktydy. Jest to transkrypcja wykładu przeprowadzonego w oparciu o prezentację sporządzoną w Power Point, jaki został zaprezentowany 26 czerwca 2015 roku podczas X Krajowego Forum Wiroplątowego zorganizowanego w Instytucie Lotnictwa w Warszawie.

Słowa kluczowe: Argentyńskie Siły Lotnicze, operacje helikopterowe, Antarktyda.