

Flying Operations — Weddell Sea

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Flying operation in the Antarctic region has been the main role of the Indian Navy, ever since the first expedition was launched in 1981. The naval pilots have been flying the indigenously built single engined *Chetak* helicopters during every Antarctic summer, to the machine's limits. Till the onset of the first Weddell Sea expedition in 1989, the pilots of the Fleet Air Arm had logged over 2000 hrs of accident free flying, over Antarctica, displaying a high degree of professionalism.

With such a creditable record of supporting the scientific teams in Antarctica it was but obvious that the Navy would be given the privilege to form part of the India's maiden venture to the Weddell Sea. Flying in D.G. and Maitri areas had, over the years, become less demanding as the aircrew were familiar with the terrain and helicopters did not open out to vast distances. The present expedition was tasked with flying over unknown, treacherous and unmapped area, demanding opening out to vast distances, in exploring the areas as far south as possible, from the ship's anchorage.

Two *Chetak* helicopters with four pilots and a maintenance team of five, formed the backbone of the team. The helicopters were fitted with special equipment like Decca Doppler, Gyro Gimp CG 512, TANS Computer, HF 618 and Emergency Flotation Gear. During the sea journey the helicopters were embarked into the tight fit hold along with two containers of associated spares. To facilitate ship's movement through pack ice south of 76°S, the helicopters were utilized to carry out ice recce of the area till the ship finally berthed about 40 NM east of Berkner island near 78°10'S:39°W along the Filchner ice shelf. From then onwards the helicopters were, most of the times ranged on deck for the purpose of flying irrespective of the weather conditions.

Filchner Shelf Operations (2-11 January, 1990)

Flying operations on regular basis, involving transporting of hut material, fuel and snow scooters, besides of course the team members, were initiated almost simultaneously with the berthing of the ship. With the frequent requirement of stores removal from the hold, one helicopter was made to operate temporarily from the shelf; stores were disembarked on the shelf and then flown to the field camp. Latter was about 10 minutes flying time, at a height of 70m, with the Polynya in between. All stores including snow scooters (Fig.1) were flown under slung and also inside the cabin and at times, as in the case of sledges, protruding out with cabin doors open. Once the camp was established, most of the sorties, whenever the



Fig. 1. Snow scooter being flown underslung to fuel dump at India-II, $79^{\circ} 18' S.43^{\circ}W$. Weddell Sea



Fig.2. Chetak helicopter on a reconnaissance low level flight over Filchner Shelf, Weddell Sea. Transverse crevasses exposed from under the drift ice are visible.

weather permitted, were flown towards the transfer of personnel. White-out conditions and heavy snow-falls, which were almost regular, disrupted flying operations often days on end. Normally 3 to 4 hrs warning was available prior to the weather totally clamping down. Weather on the other days was similar to the statistical data available in the 'British Admiralty Antarctic Pilot'. On clear weather days occasional sorties were flown southward opening out to 40 NM along the Filchner Shelf or towards Berkner Island for recce purposes (Fig.2). Longer distances were avoided as only one helo was serviceable.

On 9 January, 1990, one of the expedition members was to be flown to a German Ship for immediate medical aid. Normally these single engined helos do not operate longer distances over the sea, more so as we had only one helo serviceable. The situation was compounded by the fact that the German Ship, Polar Stern was 115 NM away and the two ships could not close in due to thick pack (sea) ice conditions. Looking at the urgency of the situation it was decided to fly to the German ship, in the company of their twin engined MBB BO 105, with four members on board i.e. Leader, Doctor and two pilots. Sick member was flown in German helo which had the stretcher facility.

Return journey was, however, made singly. Subsequently yet another sortie was undertaken to convey life saving drugs; by that time, of course, the distance between the two ships had been reduced to 95 NM. Weather enroute on both days was unbelievably threatening and scary and the sorties had to be made by flying at as low as 50-70m, in near 'white-out' conditions almost throughout, except near the shelf front which was having better weather. The safe accomplishment of the sorties in unfamiliar and treacherous terrain was due to the excellent performance of aircraft Doppler, Autopilot and the assurance of our Meteorologists whose forecast proved to be accurate and, of course not to forget the sixth sense of the pilots. The leader and doctor were of great help in assisting the pilots to navigate to and from on both days.

Berkner Island Operations (14-22 January)

The ship Polarbjorn navigated closer to Berkner Island with the help of Ice reconnaissance sorties by 2nd week of January, 1990 but due to severe sea ice conditions could gain only about 6 NM. After the completion of reconnaissance of Filchner ice shelf, the main aim of the team was to select a suitable site on the Berkner Island for camping and probe the terrain towards Dufek Massif further south. The operation was planned to be achieved by creating fuel dumps at 40 NM intervals, enroute; the barrels to be transported by the field parties on sledges drawn by snow cat/skidoos. Due to the heavily crevassed shelf, northeast of the island, ground operations had to be abandoned and shifting, instead, had to be carried out by helicopters. It was decided to establish the first dump at a distance of 75 NM from ship, just south of Roberts inlet, with a total of 40 barrels — the minimum requirement for the probe upto Dufek Massif, a distance of about 250 NM.

The weather, terrain and the safety of the field parties at such a distance from the ship ruled out much support from the ground parties. Logistic cover to the ground parties, while they were ashore, was entirely based on the air element. Conveying bulky equipment and stores underslung was, however, taxing on the air crew since the oscillatory movement of stores necessitated disengagement of the autopilot system frequently. Also stores could not be carried underslung for vast distances as they interfered with transmissions from the

Doppler and the Radio altimeter, rendering both unreliable. The only alternative left was to air-lift the fuel barrels inside the cabin. Drums were off-loaded on the pack ice adjacent to the ship and shifted closer to the helo with the help of skidoos. Each barrel weighing over 200 kg was then rolled into the cabin by the team members using locally improvised planks. With two barrels, the all up weight and space barely gave scope for any additional person or store. For off-loading, the pilots had to stop rotors, go out to push the drums off the cabin, set them upright at a distance, away for the safe take off. More than a dozen sorties had to be flown before the first fuel dump/camp could be set up 75 NM from the ship at 79°24'S : 45°W. As and when the weather seemed favourable the helos flew non-stop and the team was able to establish a second fuel dump 154 NM from ship at 80°30'S : 45°W. The helicopters used to take off with 2 barrels each, land at 1st dump, top up by landing between the uprighted barrels and take off again to open out further for off-loading the fuel. The return journey to ship was made by refuelling at the first dump enroute. Due to continuous bad weather towards the middle of January, 1990 and deteriorating sea conditions establishment of third dump enroute of Dufek Massif, which was 250 NM away, got very much hindered and delayed.

With improvement in weather on 19 January, 1990 both helos were preparing for the final go with the Leader on board, when just at the take off point, one of the helos went unserviceable. Efforts to bring it on line continued with even an engine change but there was no progress. With only one helo serviceable and no back up facility, and weather packing up, flying upto Dufek was considered unsafe and the probe was abandoned. Weather was no doubt the constant limiting factor, even the winding up was delayed due to low stratified clouds and frequent "white outs". During this period the aircrew flew continuously upto their limits of fatigue with only a break of refuelling (5-7 minutes). In three days alone a total of 60:30 hrs were flown; generally flying started at 18.30 local time and it was only around 07.00 of the next morning when the team would call it a day. Weather, by and large, was found to be relatively better during the night. Due to 24 hours Sun, light was no problem.

Operations Nunataks (25-28 January)

The ship headed eastwards, along the ice shelf, in the last week of January for the proposed examination of the Nunataks at the head of Vahsel Bay. At the first operation the leader instructed that three scientists would have to be lowered onto the steep slopes off the Polar ice for the examination of and sample collection at Moltke Nunataks. The gradient and terrain ruled out all the possibilities for them to be disembarked conventionally by helo landing. The rescue winches were unserviceable but, looking at the importance of the mission, the fellow scientists volunteered to jump off the helo at a low hover. While the team was busy in geological work the weather packed up at an alarming pace. Leaving the scientists ashore, without adequate survival equipment, could have had disastrous consequences. Thus braving the weather these men were recovered utilizing the ship's rope ladder at low hover. The excellent trust and team work between the scientists and aircrew and the overall guidance and confidence of the leader, was the mainstay in the successful completion of this hazardous task. Subsequently the teams were ferried to other rock outcrops in the area for study and sample collection without much problem.

During this period contact was established with the Argentinian station Belgrano-II which was later visited by our team. The Argentinians are carrying out cargo off-loading operations with the help of two super Pumas of the Army. During discussions with their pilots it was found that they never opened out more than 60 NM and that too under positive radar hold. Approach was made to them with the request, to provide the air rescue cover for our scientists visit to the Theron Mountains, in the case of any emergency as we had only one helo. They declined such a cover due to the distance involved and in fact were shocked when our Leader informed them of our single engined helos having operated 154 NM away from the ship.

Halley Bay Operation (30 December - 3 January)

In the course of the recce of 'Brunt Ice Shelf' by the team, the single available helo was extensively used. Team exchanged visits with the British Station of Halley Bay (Fig.3) including a mutual trip to each other's ships. Incidentally the British have stopped all helo operations in the Weddell Sea area ever since they lost two aircrafts in early eighties.

On 2 February, 1990 a photo recce, which finally turned out to be the last sortie of our trip, was planned off the Riiser Larsen ice shelf. The expedition Leader himself was to do the photography. While opening out to 20-25 NM, at approximately 15 NM outbound the helo instruments started showing the indications of engine oil having leaked out. The situation warranted an immediate landing since the engine could run dry and fail at any time. Panic struck on board the ship also who had been given an SOS call, as they were aware of the fact that they would not be of much assistance for the shelf was too high to negotiate for

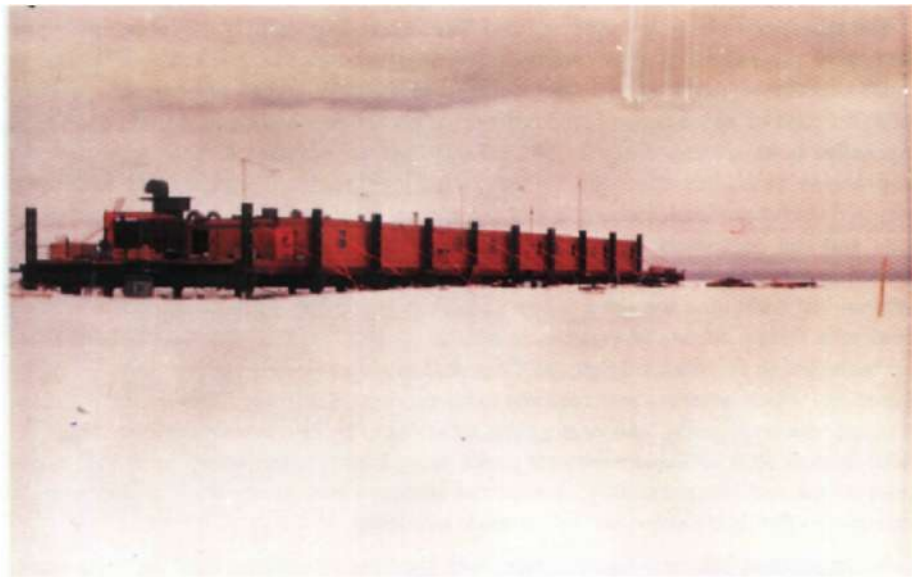


Fig.3. Halley-V, British Antarctic Station based on jack up platform system, in Weddell Sea.

off-loading snow scooters/rescue team and the second helo was non-operational. Decision, right or wrong, was made to head for the ship; the latter was advised to head full speed towards the shelf with ship's boat ready to be lowered if the aircraft was forced to ditch in the icy waters. Cool and collected, the Leader and the pilots climbed up hoping to autorotate the helo in the case of engine failure. As it turned out, the luck stood by the team and they made it on board with oil smeared all over the tail boom, but safe. This incident brought an end to hectic flying in the Weddell Sea for the current expedition. A total of 182.25 hrs were flown within a month, of which only 9 days could be termed clear weather days. Both helos were available only for 10 days. The breakdown of flying achieved was as indicated below:

Mission	Sorties	Hrs
Embarkation	02	1:15
Ice Recce/Recce	23	25:30
Cargo Ops	14	24:40
Personnel Transfer	51	69:20
Load Transfer	24	49:20
Check Flights	08	6:05
Casualty Evacuation	04	6:00
	126	182:25

Conclusion

The policy of operating single engined helicopters, especially for exploratory missions, needs to be reviewed. All other countries have stopped use of such aircrafts in polar regions. In this expedition, to achieve a cause, quite a risk was taken with only one helo serviceable, but in the case of an emergency, the retrieval of passengers and crew would have been near impossible in most areas. *Chetaks*, all said and done, are not suited for the type of work they are put to in Antarctica due to the limited navigational back up, poor weather capability and marginal useful payload. Helicopters could and do form the backbone of Antarctic expeditions and the organisers must insist on taking only the twin engined helos in future. Operating *Chetaks* in DG/Maitri areas, which involves flying to not far off regions, may continue till such time we get a better aircraft as the flying in these areas has become an easier task with a decade of experience behind us. But an expedition, the type of which was launched in the Weddell Sea, the *Chetaks* are no go. Another aspect concerning flying operations which deserves and requires to be tackled on a firm footing is the procurement of proper survival packs and emergency ration kits. In this expedition operations had to make do with shift arrangements with packs being locally improvised. To make survival in Antarctica a realistic possibility, specialised standard kits, as are made available by other countries to the flying crew, should be made available.

No expedition can be a success even with the best of equipment if the team work and leadership falters. With pride I can say that with the able matured guidance of the Leader and the excellent rapport between team members, our expedition was a success.

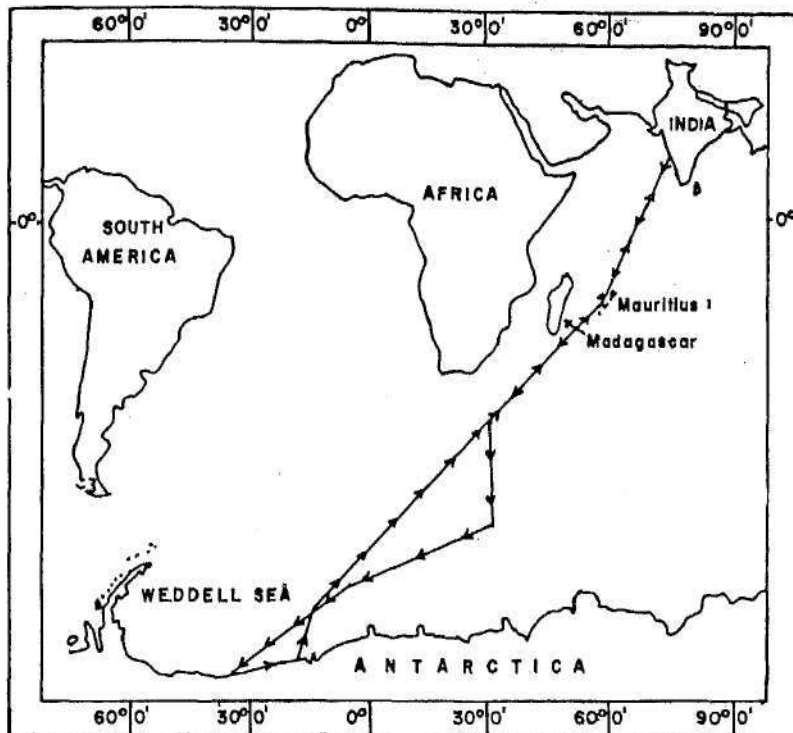


Fig.2. Route taken by the First Indian Expedition to the Weddell Sea Area of Antarctica.



Fig.3. India-1, Field Station established at Filchner ice shelf-78° 15' S: 40° W, Weddell Sea.