



National Centre for Antarctic & Ocean Research
XXXV Indian Scientific Expedition to Antarctica (2015-16)

BHARATI – Indian Research Station at Larsemann Hills, Antarctica

Bharati research base, located between Thala Fjord and Quilty bay at North Grovnes Island (coordinates -69.40680 , 76.19525, elevation ~35 m), is operational since March 2012. The station is equipped with modern facilities and provides opportunity for year-round scientific research at and around Bharati. The station can support 47 personnel on twin sharing basis in the main building during summer as well as winter with an additional 25 in emergency shelters / summer camps during summers and thus making the total capacity as 72. The station consists of one main building, fuel farm, fuel station, sea water pump house, a summer camp and a number of smaller containerized modules.



The main building offers regulated power supply, automated heat and air conditioning with hot and cold running water, flush toilets, sauna, cold storage, PA system, aesthetically designed living, dining, lounge and laboratory space, etc.



Bharati during austral summers



Bharati during austral winters

Bharati is approachable by sea route between November and March of the succeeding calendar year (Austral Summer season) and can be reached from Cape Town in about 10 to 16 days time depending upon sea-ice conditions. The voyage plan varies annually depending on the operational requirement. Alternately, Bharati is also approachable by chartered flights under the aegis of Dronning Maud Land Air Network (DROMLAN) between November and February of the succeeding calendar year. Approaching Bharati by air is a tedious journey as there is no direct flight from Cape Town. All flights (IL-76 aircrafts) are operated via Novolazarevskaya (Novo) air strip (near Maitri). Flight from Cape Town to Novo takes about 5.5 hours and from Novo to Progress airstrip (near Bharati) through Baslar aircraft (feeder flight) in about 10-12 hours. Flights from Cape Town to Novo and Feeder flights between Novo and Progress require intricate planning and are not available as a matter of choice, but based on operational requirements.

1. MODES OF TRANSPORT AROUND BHARATI

To provide logistical support and smooth transportation for carrying out field work and for collecting samples from far off locations, transport / earth movers /load hauling vehicles are available at the station. These can be used with the prior permission from the Leader at the station. Two helicopters remain onboard ship and provide a convenient and quick way for field work.

S. No.	Vehicles	Number	Remark
1.1.	Pisten Bully	4	
1.2.	Snow Scooter	4	
1.3.	Tata Xenon – XT	1	
1.4.	Excavator (BE-71)	1	
1.5.	Bulldozer (BD-50)	1	Off-road
1.6.	Mantis Crane 50 MT	1	

2. DISTRIBUTION OF AREA IN AND AROUND BHARATI

Inside the main building there are four designated Laboratories with appropriate storage space:

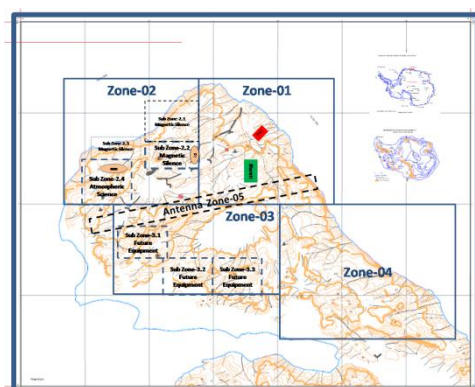
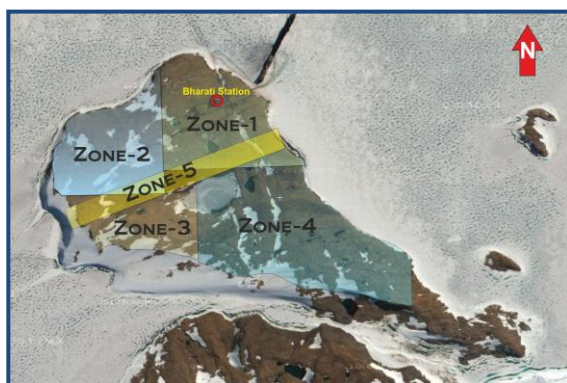
2.1. Laboratories within the main building

- 2.1.1. Electrical & Electronics Lab,
- 2.1.2. Life Sciences Lab,
- 2.1.3. Chemical Sciences,
- 2.1.4. Earth Sciences Lab.

2.2. Bharati Master Plan (BMP) – 2012

For deployment of instruments and experimental set up, area around Bharati station is being developed in a systematic way through an approved master plan. The North Grovnes Island is divided into five major zones:

- 2.2.1. Zone – 1 for infrastructural development,
- 2.2.2. Zone – 2 Magnetic silence zone for atmospheric and upper atmospheric sciences,
- 2.2.3. Zone – 3 reserved for future development,
- 2.2.4. Zone – 4 Pristine zone,
- 2.2.5. Zone – 5 Antenna zone.



3. OPERATIONAL EXPERIMENTS

Apart from experiments conducted in earlier expeditions, current list of experiments/equipments running at Bharati are as follows:

3.1. Ground stations for Earth Observation Satellites and Communication

Electronics Corporation of India Limited (ECIL), Hyderabad designed, developed and commissioned a Data Reception Station operating in X and S bands for multi-mission remote sensing satellites and Data Communication Station operating in C band linking Bharti station and NRSC, Shadnagar, Hyderabad. The link also provides a two way communication service between NCAOR and Bharati.

3.2. Magnetometers

Digital Fluxgate magnetometer (DFM) and Proton Precision magnetometer (PPM) are continuously monitoring terrestrial magnetic field. Magnetic observations are vital for understanding the electromagnetic changes in the near-Earth environment due to internal or external origin.

[P. I. - Prof. S. Gurubaran; E-mail - gurubara@iigs.iigm.res.in]

3.3. Global Atmospheric Electricity:

Extremely weak return current is observed in the fair-weather regions, which is driven by thunderclouds in the troposphere. Long-wire antenna and electric field mill monitor atmospheric current and electric field, which in turn provides global pattern of thunderclouds.

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3.4. Ionospheric Scintillation and TEC Monitoring:

For the ionospheric scintillation and total electron content monitoring GSV-4004B GISTM receiver is operational. It is a dual-frequency 12 channel GPS receiver and specifically configured to measure amplitude and phase scintillation from L1 frequency along with Ionospheric Total Electron Content (ITEC) from the L1 & L2 frequencies.

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4. UTILITY EQUIPMENTS, INSTRUMENTS AND CONSUMABLES

Sr. no.	Item	Details	Qty	Make/Model	Location
1	Deep freezer (-30 Degree)	Gross capacity - 326 lt	1	Thermo Fisher Scientific (model no FFGL1230V-23)	Electrical and Electronics Laboratory
2	Weighing balance	Max - 220 g, Min 0.02 g	1	Kern & Sohn (Model KERN EW)	
3	Hot air Oven	230V, 50/60 Hz	1	Heratherm OMH 400	
4	Milli-Q integral 15 system	-	1	Millipore (Cat No. ZRXQ015T0)	Chemical Sciences Laboratory
5	Surepro prefiltration unit	-	1	Millipore (Cat. No. SUREPROIN)	

6	Ultrasonic cleaner	230V, 50 Hz	1	Rivotek (Cat No. 19000055)	
7	Hot plate	Max temperature - 400C, AC - 230V/50 Hz, Power - 900 W	2	Stuart, Model CP300	
8	Vibratory sieve shaker	200-240 V, 50-60 Hz, Power 50 W	1	Fritsch, Model Analysette 3 PRO	
9	Remi Centrifuge		1	R-303	Chemical & Life Sciences Laboratory
10	UV-Visible Spectrophotometers		1	840-210700	
11	pH/conductivity meter	9V, 1 amp Accessories - 1) Thermo Orion Ross Ultra epoxy body triode 3-in-1 refillable combination pH electrode with built in ATC probe & BNC connector (cat no. 8157BNUMD), 2) conductivity/cell Epoxy & graphite (cat no. 013005MD), 3) Ross solution kit (475 ml each of 4, 7 & 10 buffer storage solution, cleaning solution & pH electrode storage solution), 4) Electrode arm with redesigned holder 5) universal power adapter 6) Orion conductivity standard 1413 uS/cm, 5x60 ml (cat no:011007), 7)USB cable - 1 no, 8)PC/Printer cable - 1 no, 9) Orion star A200 & Star A300 series literature CD - 1 no.	2	ThermoScientific (Model ORION STAR A215)	
12	Autoclave SX-700	SX-700	1	Tomy (Model No. SX-700)	Earth Science Laboratory Laboratory
13	Centrifuge	230V, 50/60 Hz, Power - 600 W	1	MPW, Model MPW-352	
14	Nikon stereoscopic zoom microscope	Sm2745/Sm2 745 T	1		
15	Nikon Polarizing Microscope	ECLIPSE LV100N POC	1	400821	
16	Nikon Digital Apparatus	NMB-003(with Digital sight DS-U3 and accessories	1	TI-PS100 W/A	
17	Petro Thin Tm thin		1		

	Sectioning System				
18	Cast N Vac 1000 (Castable Vacuum system)	WITH Vacuum hose and Vacuum pump(0513002437)	1	20-1384-220	
19	PETROVUE(Thin Section Viewer)		2	30-8050-20	
20	Covington Engineering	with motor	1	6 x1-181BA	
21	PETROBOND TM (Thin Section Bonding Fixture)		1		
22	Duetless Fume Hood	-	1	ADC-4B1-PP	Life science Laboratory
23	HORIZONTAL AND VERTICAL LAMINAR-Flow clean Benches	-	1	AVC-2D1	
24	Muffle furnace	200-240 V, 50-60 Hz, Power 5500 W	1	Thermo Fisher Scientific (model - Thermolyne, model no - F30420C)	
25	Piston Coring Platform	Accessories - 1) Four Aluminium platforms & side bars, 2) three stands for tripod (Piston cable, hammer cable, Kevlar cable), 3) Three rope wheels, 4) three rope wheels (extra rope for anchoring - blue color), 5) Two core barrels of 2 m length, 6) Four anchors, 7) Two head weights for hammering, 8) Ten steel boxes containing core liners to store sediment cores, 9) Three wooden planks for the tripod stand, 10) Ten pontoon holders, 11) two crates containing other accessories, 12) One support bar for the motor engine, 13) Four Pontoons, 14) Toolbox, 15) Pump to inflate the pontoons	1	UWITEC	Container No. NCAU 3100056 (Piston coring platform and accessories 1 to 12). Lab 4 (Accessories 13 to 15)
26	Vacuum pressure pump, 4 Bar	Voltage 220 V AC, 50 Hz	1	Millipore (Cat No. X10422050)	Box No. 8 labelled as 'Millipore pump & Filtration unit' placed in Lab store
27	Vacuum pressure pump, 4 Bar	Voltage 220 V AC, 50 Hz	1	Millipore (Cat No. X10422050)	
28	Vacuum flask, 1 lt	-	1	Millipore	

29	Vacuum filtering flask, 1 lt	-	2	Millipore	
30	Glass filtration assembly	Silicone hose 1.4 mtr (2 No), glass tube for vacuum trap (2 No), Silicone stopper (2 No), Millex 0.2 um vacuum trap (1 No), funnel - 300 ml with ground glass seal (1 No), Glass base (1 No), 47 mm aluminium spring clamp (1 No)	-	Millipore	

Chemicals

	Sodium hydroxide (NaOH)	2 bottles X 2.5litres	5 litres	Merck	Box 1 in Laboratory Store
	Methanol (CH ₃ OH)	1 bottle X 2.5litres	2.5 litres	Merck	
	Orthophosphoric acid	1 bottle X 1 litres	1 litre	Merck	
	Glycerol	2 bottle X 0.5 litre	1 litre	Merck	
	Ethanol (C ₂ H ₅ OH)	2 bottle X 0.5 litre	1 litre	Merck	
	Sodium Flouride (NaF)	2 bottles X 250 gm	500 gm	Merck	
	Sodium carbonate (Na ₂ CO ₃)	1 bottle X 500gm	500 gm	Merck	
	Activated Charcoal powder	1 bottle X 250 gm	250 gm	Merck	

Plastic wares & tubes

	Conical flask	250 ml	2	Tarson	Box 2 in Laboratory Store
	Conical flask	100 ml	2	Tarson	
	Conical flask	50 ml	1	Tarson	
	Funnel	-	2	Tarson	
	Beaker	250 ml	1	Tarson	
	Bottles	250ml	10	Tarson	
	Petriplates	90mm dia	100	Tarson	
	Measuring cylinder	25ml	1	Tarson	
	Measuring cylinder	50ml	1	Tarson	
	Glass tubes denuder		16	URG	
	Condensor		1	borosil	Box 3 in

	Round bottom Flask		1	borosil	Laboratory Store
	Spiral arm		1	borosil	
	tygon tubing		1	borosil	
	Desicator		1	Tarson	
	Plastic tray		1	Tarson	
	Petriplates		6	Tarson	

Glass ware

	Regent Bottle Wide Mouth with Screw Cap and Pouring Ring	250 ml	50	Borosil	Cupboard in Chemical Sciences Laboratory
	Bottles Reagent Amber with Stopper	500 ml	50	Borosil	
	Bottles Reagent Amber with Screw Cap	500 ml	50	Borosil	
	Beakers	250 ml	20	Borosil	
	Beakers	500 ml	10	Borosil	
	Bottles Regent Amber	1000 ml	50	Borosil	
	Bottles BOD Stopper	125 ml	50	Borosil	
	Beaker Tall Form with Spout	100 ml	19	Borosil	
	Beaker Tall Form with Spout	250 ml	80	Borosil	
	Beaker Tall Form with Spout	50 ml	200	Borosil	
	Beaker Tall Form with Spout	500 ml	40	Borosil	
	Beaker Tall Form with Spout	125 ml	100	Borosil	
	Flask Screw Cap	1000 ml	10	Actira	
	Flask Screw Cap	250 ml	30	Actira	
	Bottle Media Storage	500 ml	20	Actira	
	Bottle Media Storage	100 ml	20	Actira	
	Cylinder Graduated with Spout Class B	1000 ml	4	Actira	

	Cylinder Graduated with Spout Class B	250 ml	1	Actira	
	Pipette	25 ml	5	Actira	
	Funnel	100 mm dia	2	Actira	
Reagents					
	Ethanol (C2H5OH)	500 ml	4	Merck	Cupboard in Chemical Sciences Laboratory
	Methanol (CH3OH)	2.5 l	2	Merck	
	Suprapur HCl	1 l	2	Merck	
	Suprapur HNO3	1 l	2	Merck	
	Hydrochloride acid	8bottles X 2.5litres	20 litres		Chemical & Life Sciences Laboratory
	Methanol (CH3OH)	4 bottle X 2.5litres	10 litres		
	Sodium Reagents set(Mono test)	50 x 1ml	1 Box		
	Hydrochloride acid(N/10)	2 bottle			
	Methanol A456-4 Optima Lc/Ms 99.9 %	4 litres	4 litre		
	Conical flask	500 ml	20	Actira	
	Beaker	100 ml	100	Borosil	
	Bottles	250ml	10		
	Bososil Glass(Test tube)	12 x75	100		
	Test Tubes(Without Rim)r	12 x100	100		
	Para films	5	5		
	Lab pure (BYTAC VF-81 1X36YD)	1(D-9860002) C-604	1		
Accessories and other items					
	Epothin Epoxy resin		4		Earth Science Laboratory Lab
	Epothin epoxy Hardener		4		
	Drietite(Desiccant Anhydrous)		3		

	Thermolastic cement		5		
	Vaccum Pump Oil	12 x100	2 (1 gal)		
	Samplek UPS		5		
	Petrographic Slides)		10 Gross		
	Slides Micro		10 Gross		
	Vaccum Table liners		1 box)		
	Continous Rim diamond Blade fpr Petro thin		1 box)		
	Diamond Cup Grinding Wheel		1 box)		

.- Please feel free to get in touch for clarifications with our team,

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