National Centre for Polar & Ocean Research
Indian Scientific Expedition to Antarctica (ISEA)

BHARATI ï 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. The station consists of one main building, fuel farm, fuel station, sea water pump house and an additional emergency shelter / summer camp.

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 air and sea route between November and March of the succeeding calendar year (Austral Summer season) and can be reached from Cape Town. The direct flight options are extremely limited while the voyagetakes about 10 to16 days depending upon sea-ice conditions. The voyage plan varies annually depending on the operational requirement.

Bharati is also approachable from Novolazarevskaya (Novo) air strip (near Maitri) in austral summer by chartered flights under the aegis of Dronning Maud Land Air Network (DROMLAN). 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
1.1.	Pisten Bully	06
1.2.	Snow Scooter	04
1.3.	Telehandler	01
1.4.	Excavator (BE-71)/H340L	02
1.5.	Bulldozer (BD-50)	01
1.6.	Mantis Crane 50 MT/27 MT	02

2. DISTRIBUTION OF AREA IN AND AROUND BHARATI

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

Laboratories within the main building

2.1. Electrical & Electronics Lab,

2.2. Life Sciences Lab,

2.3. Chemical Sciences,

2.4. Earth Sciences Lab.

3. Bharati Master Plan (BMP) – 2012

For deployment of instruments and experimental set up, area around Bharati station has been developed in a systematic way through an approved master plan, BMP-2012. The North Grovnes Island is divided into five major zones:

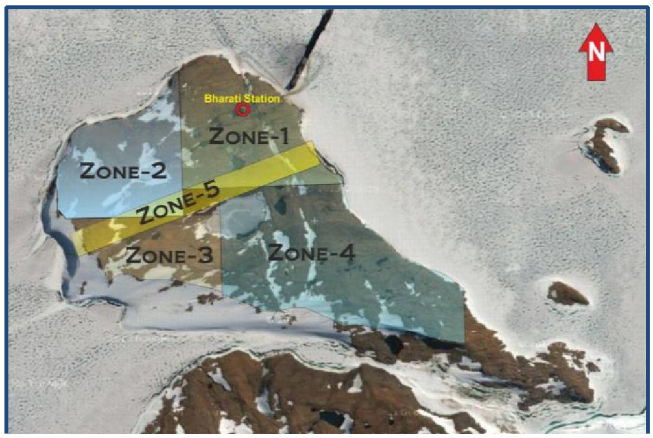
3.1. Zone ï 1 for infrastructural development,

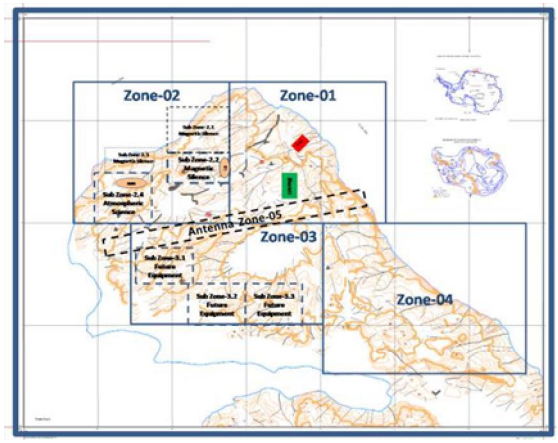
3.2. Zone ï 2 Magnetic silence zone for atmospheric and upper atmospheric sciences,

3.3. Zone ï 3 reserved for future development,

3.4. Zoneï 4 Pristine zone,

3.5. Zone ï 5 Antenna zone





4. OPERATIONAL EXPERIMENTS

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

4.1. Ground stations for Earth Observation Satellites and Communication

ISRO/NRSC operates Data Reception Stations 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 NCPOR and Bharati. [NRSC]

4.2. Automatic Weather Station:

Multi-sensor automatic weather stations (AWSs) continuously monitor the meteorological parameters at the station. [IMD].

4.3. Magnetometers

Digital Fluxgate magnetometer (DFM), Proton Precision magnetometer (PPM), Induction-coil Magnetometer (ICM) 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. [IIG]

4.4. 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. [IITM]

4.5. 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. All-sky camera additionally observed clouds and auroral activity. [NCPOR]

4.6. Atmospheric Aerosol:

A suit of instruments such as aethalometer, nephelometer, aerodynamic particle sizer (APS), sunphotometer regularly monitor the local and long-range transport of anthropogenic emissions. [NCPOR]

4.7. Air-Sea-Ice Interaction:

The PRAISE (PRydz bay Air Ice Sea Exchange) observatory is a coastal observatory to study climatically relevant processes in the region. The observatory includes various advanced instruments for studying sea ice, snow, and ocean conditions.[NCPOR]

4.8. Seismic Activity:

A permanent broadband seismological observatory (BRTI) plays a crucial role in monitoring seismic activity in and around Antarctica, studying the Earth's interior, and contributing to the global seismic network. [NCESS].

UTILITY EQUIPMENTS, INSTRUMENTS AND CONSUMABLES

S. No.	Instrument	Description	Remark
4.1.	Drilling Platform		Available
4.2.	Ice Auger	Upto 2 meter	Available
4.3.	Petrological Microscope	Nikon LV100N Pol Polarizing	Available
4.4.	Thin sectioning Unit	Petro-thin	Available
4.5.	Weighing Precision Balance	Weighing range ï 220 g (max) Readout (d) ï 0.001 g Reproducibility ï 0.001 g	Available
4.6.	Ultrasonic Cleaner (Rivotek)	Tank capacity ï 5.5 lt Tank clear size (mm) ï 250x150x150	Available
4.7.	Millipore filtration unit	Sureproin	Available

4.8.	pH/Conductivity benchtop Multiparameter kit (Thermo Orion)	pH range ï 0 to 14 Temperature range ï 0 to $100^{o}C$	Available
4.9.	Acid resistant hot plate	Heated area (mm) ï 200x200 Maximum temperature ï $400^{o}C$	Available
4.10.	Air stream vertical laminar	Enternal work zone (wxdxh) ï 660 x	Available
	flow cabinet	700 x 720 mm	Available
4.11.	Trim saw	Petrological saw	Available
4.12.	Centrifuge	Speed range ï 100 to 18,000 rmp	Available
4.13.	Oven	Operating temperature ï 50^{o} to $250^{o}C$ Heating area (WxHxD) ï 544x1335x545 mm	Available
4.14.	Deep Freezer	Temperature -30oC Dimension (WxHxD) ï 508x1331x533 mm	Available
4.15.	Table Top Muffle furnace	Temperature range ï 100^{o} to $1093^{o}Cl$ capacity 45L; Dimension (WxHxD) ï 360x360x360 mm	Available
4.16.	UV visible spectrophotometer	Up to 100 Hz data acquisition for single cell kinetics	Available
4.17.	Auto clave	Capacity ï 69 liters, Temperature ï $135^{o}C$	Available

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

Useful Contacts

1. **Ms. Reena Naik**
   (HR/ Team / Travel/ Medical/ Training
   Phone: +91-832-2525 520, 523)
   Email: reena.log@ncpor.res.in
   logistics@ncpor.res.in

2. **Dr. Anand Kumar Singh**
   Scientist-E
   Scientist In-Charge (Space Weather Sciences)
   Phone: +91-832-2525524, 523
   Email: aks@ncpor.res.in

3. **Dr. Ravi Mishra**
   Scientist-E
   Scientist In-Charge (Supply Chain Logistics) & Rajbhasha Officer
   Phone: +91-832-2525 609
   Email: ravimishra@ncpor.res.in

4. **Dr. Yogesh Ray**
   Scientist-E
   Scientist In-Charge (Antarctic Operations & Science Coordination)
   Phone:+91-832-2525 530, 523
   Email: yogesh@ncpor.res.in

5. **Dr. Shailendra Saini**
   Scientist-F
   Group Director (Antarctic Operations)
   Phone: +91-832-2525 568, 523
   Email: shailendra@ncpor.res.in

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