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SIXTEENTH INDIAN EXPEDITION  
TO ANTARCTICA

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INDIA

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*Prepared by:* Dr. A. L. Koppar  
Meteorological Centre  
India Meteorological Department  
Palace Road,  
Bangalore-560 001  
and  
National Centre for  
Antarctic and Ocean Research  
Department of Ocean Development  
Headland sada  
Vasco-da-Gama  
Goa - 403 804

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DR. A.E. MUTHUNAYAGAM  
Secretary



GOVERNMENT OF INDIA  
DEPARTMENT OF OCEAN DEVELOPMENT  
'MAHASAGAR BHAVAN', BLOCK-12, C.G.O. COMPLEX,  
LODHI ROAD, NEW DELHI-110 003

### FOREWORD

There are significant advances in the understanding of Antarctica continent by man since the late 1950s, however the process is far from complete. Likewise, science and technology may have made living in this frozen continent more comfortable, but the risks and challenges still galore. These factors prompt us to continue our sustained participation in the global effort to understand this desolate yet vital continent, better.

The XVI Indian Scientific Antarctic Expedition (1996-1998) was a step further in this direction. A salient feature of this expedition was the installation of bust size bronze statue of Mahatma Gandhi in Maitri station, to mark the golden jubilee of country's independence. The inaugural (video) pictures of installation of the statue were transmitted in near real-time to the Prime Minister of India by establishing the first ever digital picture transmission link between Antarctica and India via INMARSAT satellite. This was a commendable achievement. Other highlights of this expedition are the initiation of studies in new areas viz, Seismic activity; Hydro-geochemistry, Thermal structure and Sedimentology of lakes; Electrical conductivity and Aerosol particle distribution in the atmosphere; Taxonomical survey of Bryophyte vegetation and Wind energy utilisation. These are in addition to other ongoing studies.

In this report the findings and results of investigation of various scientists from different organisations who participated in the expedition have been documented. Dr. A.L. Koppa, leader of the expedition deserves appreciation for his efforts in bringing out this scientific report.

(A.E.Muthunayagam)

राष्ट्रीय अंटार्कटिक एवं  
समुद्री अनुसंधान केन्द्र  
(महासागर विकास विभाग, भारत सरकार)  
हेड लैंड सडा, वास्को-डा-गामा  
गोवा-403 004 भारत



NATIONAL CENTRE FOR  
ANTARCTIC & OCEAN RESEARCH  
Department of Ocean Development  
(Government of India)  
Headland Sada, Vasco-Da-Gama,  
Goa - 403 804, India

### PREFACE

Department of Ocean Development customarily publishes a scientific report on each of its scientific expeditions to Antarctica in order to document the results of studies conducted by scientists of various organisations. This report of XVI Indian Scientific Expedition to Antarctica is a record of experiments/investigations conducted during the expedition and the results obtained.

In its endeavour to broaden the spectrum of scientific enquiry about this relatively less known continent, the Department initiated some new studies in the XVI Expedition. Notable among these is the setting up of a seismograph to monitor seismic activity round-the-year thus forming an integral component of the international programme, near real-time digital picture transmission between Antarctica and India, via satellite, was successfully done and was a technological feat. It is a matter of satisfaction that a large number of scientific institutions in the country have shown sustained interest in pursuing science in Antarctica which forms the backbone of the expeditions.

In the hostile environment of Antarctica, logistics of the expedition, such as maintenance of the station, becomes as important as the pursuit of science. Likewise, considering the ecological fragility of this continent, environmental protection is a serious concern. In both these areas, the efforts put in by the 60 member team of this expedition, under the leadership of Dr. A.L.Koppar, deserves fullest appreciation.

P.C.PANDEY

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## THE TEAM

| Sl.No.   | Name                                     | Organisation  |
|--|--|---|
| <b>Winter Component (December 1996-April 1998)</b> |  |   |
| 1.   | Dr. A.L.Koppar                           | India Meteorological Department<br>Leader & Station Commander |
| 2.   | Shri. S. Venkateswarlu                   | India Meteorological Department                               |
| 3.   | Shri. U. P. Singh                        | India Meteorological Department                               |
| 4.   | Shri. P. Elango                          | Indian Institute of Geomagnetism                              |
| 5.   | Shri. O.P.Tripathi                       | National Physical Laboratory                                  |
| 6.   | Dr. V.D. Mishra                          | Snow & Avalanche Study Establishment                          |
| 7.   | Shri Piyush Kumar                        | Research & Development Establishment<br>(Engrs)               |
| 8.   | Shri. R.N.Waghmare                       | Research & Development Establishment<br>(Engrs)               |
| 9.   | Shri. Kali Ram                           | Defence Electronic Application Laboratory                     |
| 10.  | Shri. Jagdish Kumar                      | Defence Electronic Application Laboratory                     |
| 11.  | Dr. A. Mondal                            | All India Institute of Medical Sciences                       |
| 12.  | Major K. Srinivas                        | Indian Army   |
| 13.  | Capt. L. Shri Harsha                     | Indian Army   |
| 14.  | Nb Sub Sudagar Singh                     | Indian Army   |
| 15.  | Nk. Elect. Kuldip Singh                  | Indian Army   |
| 16.  | L/Nk/DEM Shaik Mastan                    | Indian Army   |
| 17.  | Spr/CAJ Soban Lal                        | Indian Army   |
| 18.  | Nb/Sub. Tech 'B' Veh<br>Vilas Shinde     | Indian Army   |
| 19.  | HMT'B'Veh D.K. Pal                       | Indian Army   |
| 20.  | NK.VM(MV) Rajender Singh                 | Indian Army   |
| 21.  | Sub. Tech Elect Azad Singh               | Indian Army   |
| 22.  | Nb.Sub. Tech. 'C' Veh<br>Govinda Rasu PM | Indian Army   |
| 23.  | Hav. Ele(MV)<br>Krishna Murthy K         | Indian Army   |
| 24.  | NK. EE. Mech. Tarsem Masiw               | Indian Army   |
| 25.  | Sep/M/Cook Mohar Pal                     | Indian Army   |
| 26.  | Major Dr. S.Balani                       | Armed Forces Medical Service                                  |



| Sl. No.                                     | Name                   | Organisation   |
|---|------------------------|--|
| Summer Component (December 1996-March 1997) |                        |  |
| 27.   | Shri. Rasik Ravindra   | Geological Survey of India                           |
| 28.   | Shri A.L Gudade        | Indian Institute of Geomagnetism                     |
| 29.   | Shri C.G. Deshpande    | Indian Institute of Tropical Meteorology             |
| 30.   | Dr. S.L Jain           | National Physical Laboratory                         |
| 31.   | Shri Fahimudin         | National Physical Laboratory                         |
| 32.   | B. Bhattacharya        | All India Institute of Medical Sciences              |
| 33.   | Shri. N.K. Satija      | Defence Institute of Physiology and Applied Sciences |
| 34.   | Shri. D. Jayapaul      | Geological Survey of India                           |
| 35.   | Shri. R. Ravikant      | Geological Survey of India                           |
| 36.   | Shri. R. Asthana       | Geological Survey of India                           |
| 37.   | Dr. S. Hazra           | Jadhavapur University                                |
| 38.   | Shri. S. Bose          | Jadhavapur University                                |
| 39.   | Shri. S. S. Rawat      | Survey of India                                      |
| 40.   | Shri. S.K.Mehta        | Survey of India                                      |
| 41.   | Dr. Rajeev Sinha       | Indian Institute of Technology                       |
| 42.   | Shri. L. Prem Kishore  | National Geophysical Reserach Institute              |
| 43.   | Shri. Ajay Saxena      | Wildlife Institute of India                          |
| 44.   | Shri. B.A. Hussain     | Wildlife Institute of India                          |
| 45.   | Shri K.C Tamta         | Defence Agricultural Research Laboratory             |
| 46.   | Dr. D.K.Singh          | Botanical Survey of India                            |
| 47.   | Shri. A.B.Molak        | Research & Development Estt. (Engrs)                 |
| 48.   | Shri P. Sen            | Defence Electronic Application Laboratory            |
| 49.   | Shri M.P. Ramesh       | National Aerospace Laboratories                      |
| 50.   | Shri K.C. Wadhwa       | Defence Institute of Fire Research                   |
| 51.   | Shri. A.Sreedharan     | National Hydrography Organisation                    |
| 52.   | Shri S. Chandrashekhar | National Hydrography Organisation                    |
| 53.   | Shri K. A. Kumar       | National Hydrography Organisation                    |

54. Capt Vinayaka Saini Indian Army
  55. L/Hav. Darshan Singh Indian Army
  56. Spr. Umesh Kumar Singh Indian Army
  57. Hav. Suresh Singh Indian Army
  58. Nb/Sub/Elect Dalwinder Singh Indian Army
  59. Hav/E. Ftr Mohd. Nasim Khan Indian Army
  60. Nk/Dpmt Aghar Baburam Bhau Indian Army
  61. L/Nk/M/Cook EMB Chefri Indian Army
-

## ADDRESS OF PARTICIPATING ORGANISATIONS

1. India Meteorological Department, Mausam Bhavan, Lodhi Road, New Delhi- 110 003
2. Indian Institute of Geomagnetism, Nanabhoy Moos Road, Colaba, Mumbai - 400 005
3. National Physical Laboratory, Dr. K.S. Krishnan Marg, New Delhi - 110 012
4. Show & Avalanche Study Establishment, Manali (HP)
5. Defence Electronics Applications Laboratory, Post Box 54, Dehradun - 248 001
6. All India Institute of Medical Sciences, Department of Physiology, Sri Aurobindo Marg, Ansari Nagar, New Delhi - 110 029
7. Research and Development Establishment (Engineers)DRDO Dighi, Pune- 411 005
8. Geological Survey of India, Antarctica Division, NH-5 P, N.I.T, Faridabad -121 001
9. Indian Institute of Tropical Meteorology, Dr. Homi Bhabha road, Pashan, Pune-411 008
10. Indian Institute of Technology, Kanpur-208 016
11. Jadhavpur University, Calcutta-700 032
12. Survey of India, Post Box No.77. Dehradun-248 001
13. Defence Institute of Physiology and Allied Sciences, Lucknow Road, Timarpur, Delhi - 110 054
14. National Geophysical Research Institute, Uppal Road, Hyderabad-500 007
15. Defence Agricultural Reserach Laboratory, Pithoragarh
16. Botanical Survery of India, Northern Circle, 192, Kaulagarh Road, Dehradun-248 195
17. National Aerospace Laboratories, Post Box No. 1779, Bangalore-560 017
18. Defence Institute of Fire Research, Brig. S.K.Majumdar Road, Timarpur, Delhi-110 054
19. Naval Hydrogaph Organisation, Vishakhapatnam - 530 014
20. Wildlife Institute of India, P.O.B. 18. Dehradun-248 001
21. Directorate of Military Operations (MO II), Army Head Quarters Sena Bhavan, New Delhi.
22. Armed Forces Medical Service, New Delhi