

Preface

In 1986 the first IAGA Observatory Workshop was held in Ottawa; since then the biennial Workshops have guided and witnessed the progress in quality of data acquisition through improvements in instrumentation as well as observation and analyses practices by bringing together on a regular basis observers, researchers, and developers on the same platform for meaningful exchange of information and ideas. During 7-17 October 2014, the sixteenth International Association of Geomagnetism and Aeronomy (IAGA) Workshop on Geomagnetic Observatory Instruments, Data Acquisition and Processing was held in India for the first time jointly organized by the National Geophysical Research Institute (CSIR-NGRI), Hyderabad and the Indian Institute of Geomagnetism (IIG), Mumbai. It was of special importance to the organisers as the Golden Jubilee (1964-2014) of the Hyderabad Magnetic Observatory (HYB) was commemorated during this Workshop. With continuous recording and reporting of reliable and quality data over the last fifty years, HYB has emerged as an ideal, inland, low-latitude, international Key Magnetic Observatory, acknowledged by the International Association of Geomagnetism and Aeronomy (IAGA). The long data series has been used as input to main field model computations along with data from observatories all over the world. Significant contributions to studies of low-latitude geomagnetic phenomena have been made from these datasets, as well as magnetic pulsations and earth current measurements.

About sixty observers from thirty one countries participated in the measurement sessions, of which ten were trainee/novice observers. Thirty instruments were brought in for inter-comparison from respective observatories. Thirty more scientists arrived for the scientific sessions in the latter half of the Workshop. Germany, USA, Belgium, UK, S Korea, Hungary, Japan, Russia, Kazakhstan, Sri Lanka, Austria, Australia, Czech Republic, and South Africa were represented significantly. There were delegates from Ireland, Canada, Denmark, Israel, France, Spain, Ukraine, W Samoa, Maldives, Syria, Romania, Slovenia, Poland and Ukraine. There were thirty delegates from India: 10

from the IIG, 9 from NGRI, 3 from Survey of India (SOI) and 5 from different universities.

Participants create the flavour of a Workshop. The close knit geomagnetic observatory community is well known for its interactive and cooperative nature, which made this Workshop vibrant and fruitful. The organisers are grateful to all those who came to Hyderabad for this event and actively participated in all aspects.

After registration and ice-breaker on Monday, 6th October at CSIR-NGRI, the measurement sessions started on 7th October in the newly setup observatory of Choutuppal (CPL). There were a total of 9 pillars at CPL of which 6 were kept vacant for absolute measurements by participants. One pillar was used to install Autodiff or continuous comparison on all 5 days of the measurement sessions. The azimuths of these pillars had been pre-determined by teams from SOI and IIG. Calibration of PPM-s was also carried out during the session in a dedicated room in the Main Building. As a first, the measurement sessions included six lectures on basics of magnetic observatory practice and data processing. Three afternoon sessions of practical training and demonstrations were also held. For regular absolute observations and new experiments, observers occupied sixty slots of 90 minutes each. A special session on low-latitude azimuth observations was conducted with demonstration by expert team from the Survey of India, followed by animated discussions. The scientific efforts by the large international community were covered in detail by the local media.

Prof. Harsh Gupta, President IUGG and Chief Guest, inaugurated the scientific session of the Workshop on 13th October 2014. Acting Director CSIR-NGRI, Dr. Y.J. Bhaskar Rao, Director's nominee from IIG, Dr. S. Gurubaran, IAGA council member Dr. Archana Bhattacharyya, IAGA Div V co-Chair, Dr. Pavel Hejda, Chief Scientist from the MoES, Dr. B.K. Bansal, Head of Observatories, GFZ, Dr. Juergen Matzka spoke on the occasion. The past and present staff of the HYB Magnetic Observatory received commendations on their efforts to preserve high standards of data quality from Prof. Harsh Gupta to mark the golden jubilee of

HYB Observatory during the Inaugural session. Some of the Golden Jubilee invitees shared their memories of the early days at the observatory.

Six scientific sessions were held during three days with 45 oral and 35 poster presentations. The major topics covered were: the Golden Jubilee of HYB & Long data series, Observatory Instruments and Techniques, Observatory Data Acquisition and Processing, Scientific Applications of Observatory data and Repeat Stations, Results of Measurement sessions. A special session was held on the ongoing ICSU-sponsored initiative for new efforts for regional cooperation among data observers and users in the northern Indian Ocean region, 'Uniting and Networking the magnetic community in the northern Indian Ocean region (MAGNIO)'. The seventh and concluding session on the last day was organised as a panel discussion on 'Magnetic observatories of the future and Observatory networks and IAGA's supporting role'. Details of the different aspects of Workshop activities have been published in the Report 2014 by the organisers.

The success of this Workshop is due to the support given by IUGG, IAGA and ICSU. Agencies of the Government of India: MoES, DST, CSIR, INCOIS, and INSA, have provided critical financial support to the Workshop, which enabled its success, in particular, the Measurement Sessions which required specialized infrastructure. The organisers are indebted to these agencies and to the Directors and management of the host institutes, whose support made it possible to successfully host this prestigious event. For this Workshop the new CPL Observatory was established in record time! Gratitude is due to the many volunteers and support teams as well as colleagues from HYB, who have put in months of efforts before the Workshop and full days without sleep during the event.

This special volume of the Journal of the Indian Geophysical Union entitled 'Geomagnetic measurements, Observatories and applications of data from IAGA Workshop, 2014' consists of eighteen

scientific articles contributed by participants, on three distinct thrust areas of geomagnetic observatory research, which formed the main themes of the Workshop. The articles are categorised into three sub-disciplines: Magnetometers and Measurements, Observatory Data and Practice and Applications.

In the first section on Magnetometers and Measurements, contributions are about design and improvements in performance with improved accuracy and stability of measurements. Details of a new theodolite WiDIF for repeat surveys, mechanical stability of suspended dIdD sensor, hardware developments to monitor characteristics of fluxgate for stable 1 sec values, determination of variometer alignment, temperature stability of LEMI-025 are presented.

The second section concentrates on Observatory Data and Practice, i.e. methods of processing and analyses of data at different observatories to monitor data quality and extract the maximum information. Contributions include articles on historical archives and their importance, experiments to determine performance of classical magnetometers, new software of enhanced data processing tools implemented at different observatories with complete visualisation, real time transmission, remote controlled trouble shooting, data quality of new observatory, assessment of temperature effects.

The last section on Applications has a very large scope. Contributions include articles on atmospheric tides and electrojet, dynamic aspects of solar flare effects, long term external field contributions in repeat station data, repeat surveys in India, secular variations in Indian region, ionospheric behaviour during seismic event.

The editors of this special volume thank all the authors, and reviewers for their prompt response and painstaking efforts and patience over the past year that have made this volume possible. We thank the editorial board of JIGU for agreeing to publish this special volume and specially, Dr P.R. Reddy, Chief Editor, JIGU, for his guidance and encouragement throughout this process.

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