Long Term Geomagnetic Data Series in the Indian Longitude Chain

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History of Geomagnetism in India

The Indian Institute of Geomagnetism (IIG) is a premier research Institute actively engaged in basic and applied research in Geomagnetism and allied fields, is the successor to COLABA-ALIBAG observatories.

The Colaba observatory was built at one of the original islands of Mumbai, to support British navigation and shipping interest at its thriving port. The Observatory was set up in 1826; though the regular Geomagnetism and Meteorological measurements were started here in 1841. The Colaba-Alibag observatory has the distinction of having an uninterrupted record of magnetic data since 1841, and the only such observatory in the world.

During (1846-1872) only eye observations were taken and recorded at Colaba whereas photographic recordings of the variations in magnetic elements and absolute observations started between 1872 -1906.
The World Data Centre for Geomagnetism (WDCG), Mumbai was the first World Data Centre in India during 1971 as WDC-C2 (India and Japan) in Asian region as part of World Data Centre system (WDC System) by ICSU.

It got re-recognised as WDC for geomagnetism, Bombay (Mumbai), INDIA in 1991.
Organization Chart of the Centre in IIG
It is currently located at the historic Colaba Geomagnetic Observatory. Now 12 magnetic observatories operated by IIG, ranging from the dip equator to the latitude of Sq focus in the Indian longitudinal chain.

WDCG has a long series of geomagnetic records from Indian, as well as international geomagnetic observatories, and is providing its vast magnetic data to the scientific community with the help of WDC–Geomagnetism, Kyoto.

Recently WDC-Mumbai is inducted into the new ICSU World Data System(WDS) as a Regular Member since April 2014.
Activities of WDC-Mumbai

- The WDC Center is the national data depository for geomagnetic data sets in Indian region for international scientific community.
- The data center is responsible for maintaining the data catalog and provide the adequate data storage facility to handle the large geomagnetic datasets (Analog and Digital datasets).
- Institute has taken major steps to improve the data quality by incorporating international standards like Intermagnet standards. The Development of various customize data processing and analysis softwares are also taken care, data center also carryout final data checks/mining before converting into final internal data formats like WDC exchange, Intermagnet, IAGA 2000 and IAGA 2002.
- The centre has responsible for preserving data in all forms to ensure they remain usable over time. Also responsible for the Metadata Extraction & preservation from Old Data Volumes.
CENTRE’S INFRASTRUCTURE

- Server Room
- Record Room
- Visitor Section
- Data Library
Present state of Data at the centre

- ASCII data files
  - Hourly, 1 Minute
  - and 1Second data from
    - India and
    - International
    Stations

- Magnetograms
  - (Digital image)

- Geomagnetic
  - Indices
  - (Courtsey WDCs)

- Microfilm / Microfiches
  - Indian and international observatories

- Geomagnetic Data volumes / Publications

WDC, Mumbai

Centre is receiving the real-time data from Indian observatories and the real-time plots are displayed on the website (http://wdciig.res.in)

The center has upgraded its web portal with more online data services like Quick look plots, Real-Time variation plots, magnetogram images, etc
## Preservation of Historic Data

<table>
<thead>
<tr>
<th>Digitization (Magnetograms)</th>
<th>Imaging</th>
<th>Curative Conservation</th>
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- Digitization of magnetogram software is in the process.
- All old data is available on request to wdc@iigs.iigm.res.in
After processing, Center receives the files in WDC Format for quality assurance check before ingestion into WDC for Geomagnetism, Mumbai Database.

- WDC website hosted on windows 2003 soon it will be upgraded to Windows 2008 / 2010 Server
- Front end is asp. net and Backend is SQL Server 2005
DIGITAL MAGNETOMETER NETWORK FOR GEOMAGNETIC ACTIVITY INFORMATION

Alibag, Jaipur, Nagpur, Pondicherry, Tirunelveli, Visakhapatnam

MPLS / BSNL LINK

IIG NAVI MUMBAI

Rajkot, Silchar, Allahabad

Gulmarg, Port Blair, Shillong

Near Real Time Magnetic Indices

Server / Processor

Geomagnetic Activity Information

DATA CENTER (Storage)
Key Targets of WDC for Geomagnetism, Mumbai

- To develop the digitization software which will digitize the old analog data in the form of magnetograms prior to year 1900.
- To make available these old valuable geomagnetic datasets for National and International scientific and research community.
- Improve data sharing and exchange policies to match with WDS standards.
- Collaborate with other WDS members to implement new technologies to fast data handling. To standardize and Implement data storage facilities at the data center.
Thank you
Network of Digital Magnetometer

Digital Magnetometer Network for Geomagnetic Activity Information

- Alibag
- Jaipur
- Nagpur
- Pondicherry
- Tirunelveli
- Visakhapatnam
- Rajkot
- Silchar
- Allahabad
- Guimarg
- Port Blair
- Shillong
- IIG NAVI MUMBAI

Near Real Time Magnetic Indices

Server / Processor

Geomagnetic Activity Information

DATA CENTER (Storage)

Website showing real time Graph

Network of Indian Geomagnetic Observatories

- IIG Headquarters
- Regional centres
- Observatories
- Proposed observatories
- Observatories discontinued
- Observatories operated by other Institutions (NGRI, IIA, SOI)

- Colmarg (1977--)
- Ujjain (1975-2003)
- Allahabad (ESRGEL) (2007--)
- Alibag (1904--)
- Nagpur (1991--)
- Allahabad (ESRGEL) (1904--)
- Trivandrum (1957-1999)
- Navi Mumbai (1980--)
- Andaman & Nicobar Islands

The World Data Centre for Geomagnetism, Mumbai, is part of the Indian Institute of Geomagnetism, an autonomous research institute under the Department of Science and Technology, Govt. of India. The Centre is situated in the campus of old Colaba Magnetic Observatory, Bombay (Geographic Lat: 19° 59' 28" N long 72° 53' 77" E, Geoidal Lat 19° 58' 34" N long 72° 52' 46" E, Elevation 32.0 ft above MSL) which was operational from 1863 to 1906.

180 years of Geomagnetic Observation is maintained with the commissioning of Alibag magnetic observatory. Colaba - Alibag combined series makes the magnetic data for a period of more than 150 years. This Centre has collected a comprehensive set of analog and digital geomagnetic data as well as...
Present state of Data at the centre

- **Geomagnetic Indices** (Courtsey WDCs)
- **Microfilm / Microfiches** Indian and international observatories
- **ASCII data files** Hourly, 1 Minute and 1Second data from India and International Stations
- **Magnetograms** (Digital image)
- **Geomagnetic Data volumes / Publications**

WDC, Mumbai
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| Observatory Name | IAGA Code | Geographic | | Geomagnetic | | Dip Longitude |
|------------------|-----------|------------|---|-------------|---|
|                  |           | Latitude (°N) | Longitude (°E) | Latitude (°N) | Longitude (°E) | |
| Alibag           | ABG       | 18.62      | 72.87          | 10.36        | 146.54        | 14.27        |
| Allahabad        | ALH       | 25.47      | 81.90          | 16.43        | 155.74        | 22.13        |
| Gulmarg          | GUL       | 34.08      | 74.40          | 25.60        | 149.65        | 30.80        |
| Jaipur           | JAI       | 26.92      | 75.80          | 18.35        | 150.16        | 23.55        |
| Nagpur           | NGP       | 21.15      | 79.08          | 12.33        | 152.71        | 16.26        |
| Pondicherry      | PND       | 11.92      | 79.92          | 3.07         | 152.75        | 5.36         |
| Port Blair       | PBR       | 11.68      | 92.72          | 2.03         | 165.25        | 4.76         |
| Rajkot           | RKT       | 22.30      | 70.93          | 14.21        | 145.08        | 18.23        |
| Shillong         | SHL       | 25.57      | 91.88          | 15.95        | 165.11        | 21.99        |
| Silchar          | SIL       | 24.93      | 92.82          | 15.27        | 165.96        | 20.99        |
| Tirunelveli      | TIR       | 8.70       | 77.80          | 0.03         | 150.40        | 0.97         |
| Visakhapatnam    | VSK       | 17.68      | 83.32          | 8.56         | 156.49        | 12.42        |