World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

Magnetic polarity & stratigraphy of the Bundelkund area Amravati, Maharashtra

Pravin Sheshrao Ingle *

Department of Geology, G.S. Tompe College, Chandur Bazar, Amravati, Maharashtra, India.

World Journal of Advanced Research and Reviews, 2023, 20(03), 1794–1802

Publication history: Received on 20 November 2023; revised on 27 December 2023; accepted on 29 December 2023

Article DOI: https://doi.org/10.30574/wjarr.2023.20.3.2674

Abstract

Magnetic Polarity and Stratigraphic studies of the Bundelkund area Amravati districts (Lat. $21^0 00'$-$21^0 15'$N; Long. 77^0–$77^0 15'$E) are carried out. Total thousands of oriented samples from fresh basalts were collected at close intervals. Detailed palaeomagnetic investigation where carried on 250 samples collected from 20 lava flows belonging to 03 selected traverses were subjected to progressive thermal demagnetizer at 15 different steps of temperatures from 50˚C to 600˚C. Traverse attaining a total thickness of 800m in the study area. Some rocks may fail to retain the magnetic record due to the modification subsequence to their formations by a number of natural phenomena like geotectonic disturbance, metamorphism and alteration, which can produce various degrees of secondary magnetisation in the rock. The secondary magnetisation acquired by the rock is unstable as compared to naturally remain magnetism which can be removed by cleaning techniques like stepwise Alternating field demagnetisation (AFD) and Thermal demagnetisation (TD). The palaeomagnetic results indicate that the most of the flows showed irregular natural remnant directions while a few specimen even from other flows for which a meaningful NRM could be deciphered also showed inconsistent directions. Only 35% of the samples showing irregular directions initially improved on alternating field and stepwise thermal demagnetization. High degree of alteration of the flows appears to have affected the stability of the palaeomagnetic directions. The mean palaeomagnetic directions indicate the presence of lower transitional directions at the bottom part of the sequence and upper reversed polarity in remaining part of the sequence with a few samples showing scattered behavior. The polarity transition has take place in the study area. Ancient latitude calculated for the study area is 30^o S and that of Nagpur is 31^o S indicating that India has drifted by 51^o due N which is more than 5000 Kms. since the formation of this lavas.

Keywords: N-R-N sequence; Magneto-Stratigraphy; Polarity; Alternating field demagnetisation (AFD); Thermal demagnetisation (TD).

1. Introduction

Palaeomagnetic investigations of Deccan Traps were carried out by Irving (1956), Clegg et al., (1956), Deutsch et al., (1959), Sahastrabudhe (1963, 1965), Bhimashankaram and Pal (1968), McEihinny (1968), Athavale (1970) Athavale and Anjaneyulu (1971), Ramana (1973), Verma and Mittal (1974), Radhakrishnamurthy (1983), Sreenivasa Rao et al., (1985), and Klootwijk (1976). These studies indicate N-R sequence at Narmada river and R-N sequence at Sagar. Radhakrishnamurthy (1985) has described the identification of titanomagnetites by simple magnetic technique and their application to basalt studies. Lowrie and Alwarez (1981) indicated that according to any polarity time scale short reversals during the period of Deccan Trap formation was unlikely. However, Pal et al., (1971) have reported such indications which were later considered by Dhandapani (1988) as either spurious or due to step faulting. Khadri et al., (1988) identified remagnetization in a thick sequence of lava flows in Kalsubai Hills. Recent palaeomagnetic investigation carried out by Khadri et al., (1994) have also indicated N-R sequence for Malwa Traps at Mandu region. Recent investigations carried out by Ramanan and Subbarao (1994) have indicated rare element partial melting model and its petrogenetic significance in Deccan Traps. Shukla et al., (2001) have reported the results of geochemistry and

* Corresponding author: Pravin S. Ingle.

magnetostratigraphy of Deccan flows at Anjar, Kutch. Zhong Zheng et al., (2001) have studied basalt platforms Inner Mongolia and Hebei province, north-eastern China by utilizing new K-Ar ages, geochemistry and revision of palaeomagnetic results. Secular variation was observed in both the incompatible element concentration and the normative compositions. The secular variations occurred in a similar trend before and after have volcanic hiastus of 10-25 Ma. It is suggested that the observed secular variation in chemical composition could be caused by differences both in degrees of partial melting and depths of magma segregation. A review of radiometric and palaeomagnetic data from the Deccan Flood Basalt Province (DFBP) suggests that the Volcanism was episodic in nature and probably continued over an extended duration from 69 Ma to 63 Ma between 31 R and 28 N. It is likely that the most intense pulse of volcanic at 66.9 ± 0.2 Ma. Preceded the Cretaceous Tertiary Boundary (KTB, 65.2 ± 0.2 Ma) events by ~1.7Ma. The magnetostratigraphic record in the Deccan Lava pile is incomplete and it is therefore possible that the lava flows constituting the reverse polarity sequence were erupted in more than one reversed magnetic chron.

2. Details of sampling and laboratory measurements

All the oriented block samples at different stratigraphic levels were collected by marking geographic coordinates (North and two Horizontal directions) on each sample by Brunton compass so as to facilitate its reorientation in the laboratory. Oriented block samples were properly numbered following the scheme of sampling given by Irving (1964).

The samples collected in the field were carefully brought to the laboratory without losing their orientation marks during transport. All the oriented block samples were reoriented in the laboratory on the cement base and drilled with the help of AIMIL-256 core drilling machine. The core were cut by core cutting machine to obtain two or more specimens of about 2.3 cm length on which the orientation marks were transferred. Each sample and core number was denoted by Arabic number also followed by specimen number in alphabets in such a way that the site, sample and specimen relationship is easily understood. About 1200 such cylinders were cored from 400 oriented samples.

The Natural Remanent Magnetic directions were (NRM), intensity (Jn), magnetic susceptibility (K), induced magnetic intensity (Ji) and Koenigsberger ratio (Jn/Ji) were measured at NGRI, Hyderabad for each specimen. The stability of NRM was checked by both alternating field demagnetization up to 100 mT and stepwise thermal demagnetization up to 600^0C. About thirty five specimens were demagnetized progressively in successive steps of 5mT, 7.5 mT, 10 mT, 12.5 mT, 15 mT, 17.5 mT, 20 mT, 25 mT, 30 mT, 40 mT, 60 mT, 80 mT, 100 mT and the results were tested for relative directions and intensity changes during demagnetization. Two hundred specimens were demagnetized by stepwise thermal demagnetization progressively in successive steps of 50^0C, 100^0C, 200^0C, 300^0C, 400^0C, 500^0C, 600^0C. About eleven specimens were treated for IRM progressively in successive steps of 0 mT, 15 mT, 20 mT, 30 mT, 40 mT, 50 mT, 60 mT, 80 mT, 100 mT, 120 mT, 140 mT, 160 mT, 180 mT, 200 mT, 250 mT, 300 mT, 350 mT, 400 mT, 500 mT.

2.1. Stepwise Thermal Demagnetization (TD)

Stepwise thermal demagnetization has been carried out to understand the stability of NRM direction of 35 specimens and to remove the secondary components. The samples were heated stepwise 100^0C to 600^0C and cooled in the field free space which was later measured for their stability. The results indicate mixed behaviour of the magnetic Grains. The behaviour of vector directions and change of intensity during stepwise thermal demagnetization have been plotted to understand the behaviour of magnetization with temperature. The results indicate three types of variations with increasing temperatures.

- Majority of the samples show change in the intensity during demagnetization with a gradual fall throughout. This behaviour is exhibited by specimens with more or less reversed directions and maintains the same.
- Some samples show an initial increase in the intensity followed by a gradual decrease resulting in the improvement of magnetic directions. The unstable component is removed by thermal demagnetisation and characteristic direction is obtained.

A few samples show a steep fall in the intensity in the initial stages indicating a strong isothermal remnant magnetization. This specimen showed no improvement in the remnance direction evens after demagnetization due to the complete loss of primary directions.

In general, the results of both the demagnetisation techniques utilized for cleaning the secondary components in the study area suggests that both the methods are equally effective or ineffective in removing the secondary components. Certain samples show both "Normal" and "Reversed" polarity directions even after demagnetization within a single flow shows "Normal" polarity whereas belonging to the same to the same flow showed "Reversed" polarity. This can be explained on the assumption that some zones of the flow got remagnetised after the polarity of the geomagnetic field has changed or by local action of self reversed mechanism in the magnetic minerals.

2.2. Statistical analysis of palaeomagnetic data

The mean directions of declination (D) and inclination (I) were computed by utilizing the total number of samples showing stable and consistent directions along with the precision parameter (K) using the Fisherian statistics for different sets of declination and inclination values obtained after demagnetization. Kono et al., (1972) has indicated that the secular variation of geomagnetic field at the time of Deccan Volcanism might have been much greater than the present trend. However, it is not clear that all such scatter could be linked to geomagnetic secular variations and not to some change in magnetic mineralogy. The mean directions of "Reversed" and "Normal" flows representing N-R-N sequence exposed in the study area have been computed using a personnel computer on Fisherian statistics. The mean declination (D) and inclination (I) of all the samples from a flow was calculated by taking the average directions of magnetization. The precision of the calculated mean directions are represented by the precession parameter (K = (N-I/N-R) where, N is the number of individual magnetization directions and R is the vector sum of individual magnetic vector circle of 95% confidence. Some flows show low values K which means that the data points are randomly scattered all over the stereo plot with higher K values indicating greater precision reflecting the clustering of data points about a mean direction.

3. Palaeo-latitude and Pole Position of the study area and the reversal Plate Movement

The mean palaeomagnetic directions were computed along with the ancient latitudes and pole position for the study area together with those available for other region of the Deccan Traps. The pole position and palaeo-latitude for the study area are calculated from the mean inclination following the treatment of NRM data using the statistical methods. The ancient pole position computed for the lower transition and upper reversal the Chikhaldara region, the ancient pole position lies 34˚North and 81˚W of North America which falls more less near the estimated values from other part of the Deccan Traps (34.3˚N and 88.6˚W, Wensink, 1973). It is remarkable to note that excluding minor variations with other part of the Chikhaldara regions, the pole position obtained for the study area fall more or less near the same position in the polar wandering curve for the India.

The polarity transition has take place in the study area. Ancient latitude calculated for the study area is 30˚S and that of Nagpur is 31˚S indicating that India has drifted by 51˚ due N which is more than 5000 km. since the formation of this lavas. The result obtained in the study area indicate very good correlation with other part of the Deccan traps and the pole position fall more or less the polar wandering curve for India.

The Palaeomagnetic and rock magnetic data obtained for various flows exposed near Bundelkund region and adjoining areas are not as good as those from other areas of the Deccan Traps Volcanic Province probably due the alteration and remagnetisation of many of the flows exposed in the study area. Hence, it is suggested that extreme caution have to be exercised in the interpretation of rock magnetic and palaeomagnetic data by deleting all the samples showing irregular directions in order to arrive at proper comparison of results.

4. Correlation of Palaeomagnetic data with the surrounding areas and Western Ghats

The Palaeomagnetic results obtained in the study area have been correlated and compared with the similar rocks belonging to adjoining areas and Western Ghats. Wensink (1971) and Klootwijk (1973) have compiled the Palaeomagnetic results from various parts of Deccan Traps indicating reversed polarity in 80% of the samples. The present investigation also confirms the above observation with the presence of the lower Chikhaldara mixed polarities and upper Chikhaldara reversed polarity.

Clegg et al., (1956), Deutsch et al (1955) and Sahastrabudhe (1963) have reported the rocks exposed towards the southern part of the Western Ghats lava pile occurring about 600 to +/ - 60m above MSL and normally magnetized and rocks occurring below are reversal magnetized.

In the present study an attempted has been made to compile the so far available palaeomagnetic data to understand the nature of polarity transition in Deccan traps. A critical observation of existing palaeomagnetic data on Deccan Traps indicated the presence of reversal with N-R sequence. It has been noticed that in most of the areas, one reversal is exposed. However, Sreenivasa Rao et al., (1984) and Sreenivasa Rao (1985) have reported the presence of N-R-N sequence towards the south of Narmada River. The present study area, which lies towards north of Narmada River are, characterized the lower N-R sequence with the absence of upper Normal polarity. This might be due to either removal of upper Normal flows because of erosion or might be due to non-eruption.

The remnant magnetic intensity (Jn), magnetic susceptibility (K), Koenigsberger ratio (Qn), Declination (D), Inclination (I) and relative and peak susceptibility for each flow are plotted as a function of its stratigraphic position. Most of the flows exposed in the study area exhibits Lower "Normal" and Upper "Reversed" polarity with a few samples showing scattered behaviour. Repeated random sampling for the scattered flows did not show any improvement in the NRM directions. Due to this reason, it can be concluded that more systematic studies of these individual lava flows showing polarity is yet to be undertaken. In the mean while there seems to be adequate justification for leaving out one specimen in a flow showing near "Normal" or "Normal" polarity when they occur in a thick pile of "Reversed" polarity.

In view of the above points, it is understood that the presence of one doubtful "Normal" flow within a pile of "Reversed" flow may not be represent a geomagnetic field reversal. Though a few specimens in Bundelkund traverse (Bun 1, 2, 6) are either showing scattered or unstable directions, they are treated as "Reversed" considering the polarity of the flows lying above and below. The high precision parameters obtained for the samples of both usual (expected of Deccan Traps) and odd directions suggests that there might be a total remagnetization in case of samples showing odd and stable directions or some zones of the flow got remagnetized after the geomagnetic field has changed (Tab.1).

The variation in the declination and inclination of certain flows compared to the average directions of the Bundelkund region can be describe to the secular variation of the ambient geomagnetic field and the strongly deviating directions in some are considered to be the result of polarity excursion of the ambient geomagnetic field. The above mentioned flows can be utilized as distinct marker horizons, Flow No. (BUN 30a2) D=141 and I= -13 (Fig. 2). This shallow negative inclination with "Reversed" azimuth gives a clue to be an excursion. Anomalous palaeomagnetic directions have been reported in different regions which are not due to excursion but rather formed as result of deformation of rocks (Verosub and Banerjee, 1977). This indicates that the odd and unusual directions can be attributed to the process of alteration.

4.1. Practical Implications

Palaeomagnetism has the ability to unravel the variations of the geomagnetic field with time, even on timescales of millions to billions of years, continental to supercontinental scale and to deep interior from crustal level, through mantle down to the core. The instrumental and analytical techniques over the times have witnessed many refinements improving the sensitivity, precision, reliability and speed of measurements enabling to address many outstanding problems very effectively. This paper is intended to portray briefly the developments, significance, chief contributions and current array of Indian studies and future scope, applying palaeomagnetism and rock magnetism to a variety of geodynamic processes, and to stimulate further research in this exciting science.

With the help of this study large geological, geochemical and palaeomagnetic data will be collected and interpreted which will aid in establishing the flow startigraphy, geochemical behaviour, petrogenetic significance and palaeomagnetic polarity reversals. With the help of this study detailed geological map giving the lateral extent of individual flows will be prepared. This study will also give rise to the various petrogenetic models in understanding the genetic significance of the Deccan Volcanism.

4.2. Social Implications

This study will certainly aid in possibly recognising the depositional vs tectonic nature of the large scale anticlinal structure, which is rather fundamental to the over all evolution of the Deccan traps. These studies can be of great use in tracing the ground water movements, locating the potential water bearing horizons with the help of field geology, flow by flow stratigraphy and trace element behaviour of the individual lava flows. Overall this will certainly helps in better way of understanding, prospecting and exploration of the valuable natural resources.

These studies will form the basis for any future research activities. These studies will certainly aid in overall evolution of Deccan Traps and also in locating the potential water bearing horizons by tracing the ground water movements. Overall, this study will helps in better way of understanding, propecting and exploration of valuable understanding, prospecting and exploration of valuable natural resources like groundwater potential horizons and various zeolitized zones. This will also help in the management of the environmental regime of the region.

4.3. Originality

The Palaeomagnetic and rock magnetic data obtained for various flows exposed near Bundelkund region and adjoining areas are not as good as those from other areas of the Deccan Traps Volcanic Province probably due the alteration and remagnetisation of many of the flows exposed in the study area. Hence, it is suggested that extreme caution have to be exercised in the interpretation of rock magnetic and palaeomagnetic data by deleting all the samples showing irregular directions in order to arrive at proper comparison of results. The palaeomagnetic results indicate that the most of the flows showed irregular natural remnant directions while a few specimen even from other flows for which a meaningful NRM could be deciphered also showed inconsistent directions. Only 30% of the samples showing irregular directions initially improved on alternating field and stepwise thermal demagnetization. High degree of alteration of the flows appears to have affected the stability of the palaeomagnetic direction.

5. Discussion

Earlier work (Sreenivasa Rao et al, 1985) has established the stratigraphy of the Narmada region into Narmada, Manpur, Mhow and Satpura formations based on geochemical and palaeomagnetic investigations. However, no attempt has been made either to classify the lava flows near Singarchori region or to correlate the Malwa traps with the western Deccan Basalt Province. In this study, an attempt has been made to understand the extension of Western Ghat lava sequence into the Bundelkund region by utilizing the field, petrographic geochemical and palaeomagnetic techniques. The results indicate the presence of Kalsubai, Lonavala and Wai subgroups with variable thickness. The nature and aerial extent of the lava pile has been examined and the stratigraphic sequence has been correlated with the surrounding areas in terms of formations and chemical types.

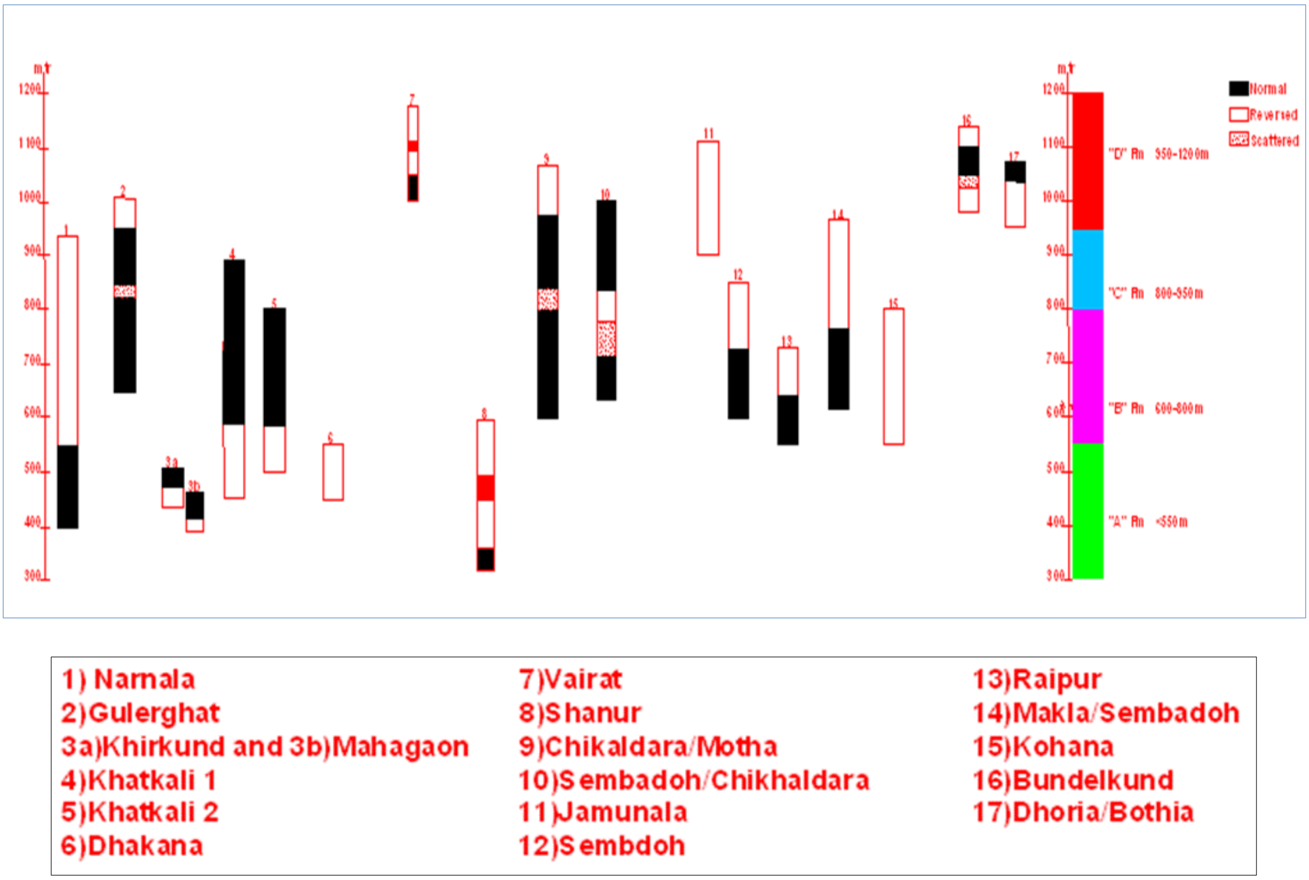
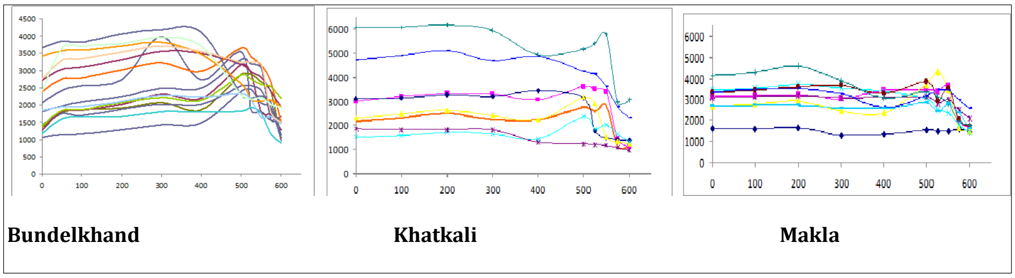


Figure 1 Gist of palaeomagnetic polarity for various traverses exposed in the study area

Rock magnetic investigations indicate the presence of mixed behaviour of the domain states showing their stability conditions along with the presence of mixed behaviours multi domain magnetic contamination in certain flows. The palaeomagnetic results indicate that the most of the flows showed irregular natural remnant directions while a few specimen even from other flows for which a meaningful NRM could be deciphered also showed inconsistent directions. Only 30% of the samples showing irregular directions initially improved on alternating field and stepwise thermal demagnetization. High degree of alteration of the flows appears to have affected the stability of the palaeomagnetic direction. The mean palaeomagnetic directions indicate the presence of Lower transitional directions at the bottom part of the sequence (flow I) and upper reversed polarity in remaining part of the sequence with a few samples showing scattered behaviour. The polarity transition has take place in the study area is 30^0 S and that of Nagpur is 31^0 S indicating that India has drifted by 51^0 due N which is more than 5000 km. since the formation of this lavas. Study area is characterized by 803m thick lava pile, which can be grouped into four formations namely A, B, C and D consisting of twenty four lava flows grouped into five chemical types (Fig. 3).

Table 1 Results of magnetic suspectability with progressive step wise thermal demagnetization

Bundelkund Traverse											
Sample No.	0°C	50°C	100°C	200°C	300°C	400°C	500°C	525°C	550°C	575°C	600°C
BUN1a1	2067	2424	2566	2746	3979	2737	3532	1872	1821	1564	1669
BUN8 a1	2728	3043	3103	3318	3550	3499	3170	2918	1798	1731	1291
BUN9 a1	1361	1779	1863	1924	2072	1873	2904	2891	2670	2397	1040
BUN13 a1	1808	1978	2085	2248	2491	2494	3331	3191	3062	1588	1529
BUN16	1424	1763	1705	1886	2022	2026	2562	2563	2429	1855	1492
BUN18	2394	2748	2782	3025	3234	2990	3656	3397	3151	2675	1481
BUN25	3655	3849	3823	4071	4193	4116	2293	2197	2271	2074	1128
BUN28	1277	1820	1841	2027	2322	2201	3173	2968	2809	2411	1954
BUN30	1399	1849	1860	2070	2207	2148	2883	2748	2602	2554	2194
BUN32	1071	1155	1161	1285	1429	1477	2411	2466	2033	1936	979
BUN35	1171	1611	1656	1666	1811	1821	1827	1937	1761	1174	900
BUN38	3412	3575	3594	3710	3825	3470	2622	2144	2132	2147	1945
BUN40	1850	1960	1953	2112	2282	2234	2336	2169	1633	1682	1469
BUN43	2763	3300	3344	3548	3707	3554	3244	3263	3167	1803	1498
BUN45	2404	3651	3717	3792	3964	3709	2286	2187	2212	2026	1938
BUN 18a2	2863	2953	3352	3453	3294	2856	2167	1339	1507	1140	
BUN 32 a2	1133	1210	1480	1573	1588	2475	2286	1523	1358	1037	
BUN 8 a2	3321	3319	3787	3937	3802	3797	2235	1135	1392	1196	
BUN 9 a2	1775	1824	1881	2087	2006	2974	2099	1821	1013	935	
BUN 16 a2	1669	1631	1956	2016	2069	2519	2291	1727	1403	1377	
BUN 28 a2	1837	1869	2290	2345	2349	3075	2178	1432	1372	1249	
BUN 45 a2	3789	3855	4275	4051	3635	2454	2597	1989	2128	1882	
BUN 30 a2	1948	1968	2324	2347	2317	2922	2689	2070	1622	1315	
BUN 43 a2	2900	2913	2973	3076	3014	3141	3160	1934	1683	1534	
BUN 1 a2	2404	2608	2843	2851	2488	3521	1809	1267	1351	1541	
BUN 13 a2	2033	2165	2552	2652	2679	3237	2006	1819	1700	1308	
BUN 40 a2	1794	1839	2069	2273	2353	2006	2053	1276	1585	1024	
BUN 25 a2	3767	3815	4130	3989	3675	3098	1931	1671	1184	1191	
BUN 38 a2	3440	3468	3574	3445	3055	2512	1860	1620	1695	1600	
BUN 35 a2	1537	1650	1804	1824	1948	1705	1190	884	1032	990	
MAK 18 a2	3238	3377	3602	3397	3462	3705	3353	2006	1652	1388	
MAK 20 a2	3583	3775	3783	3906	3247	2788	2052	2006	1874	1545	
MAK 1 a2	1550	1564	1776	1793	1766	1541	1468	1064	1132	914	
MAK 5 a2	3403	3535	3916	3731	3647	2935	2299	1953	1892	1543	
MAK 30 a2	2602	2627	2714	3030	2924	3001	2653	2557	2434	1338	
MAK 14 a2	3088	3180	3543	3484	3586	3004	2569	2384	2150	1887	
MAK 10 a2	3494	3806	3883	3695	3261	3324	1898	1611	1239	1179	
MAK 25 a2	3480	3410	4027	3725	3795	3635	3458	3404	2679	2507	
MAK 8 a2	2509	2991	3275	3042	2804	4040	1813	1840	1448	1097	
KB 3 a1	2170	2325	2532	2241	2257	2774	2580	2832	1141	1151	
KB 5 a1	3621	3847	4145	3781	3704	BROKEN					
KB 6 a1	3005	3216	3357	3324	3080	3622	3517	3440	1465	1121	
KB 8 a1	6091	6309	6603	5391	4579	4452	BROKEN				
KB 9 a1	3109	3150	3269	3216	3468	3131	1805	1499	1412	1398	
KB 10 a1	5661	5690	5961	5968	4304	BROKEN					
KB 13 a1	2301	2501	2619	2423	2238	3180	2893	1523	1359	1261	
KB 15 a1	1526	1580	1736	1669	1444	2376	1860	2024	1659	1304	
KB 20 a1	1856	1835	1825	1838	1326	1237	1219	1168	1075	974	
KB 23 a1	6087	6102	6172	5962	4945	5181	5434	5803	2990	3091	
KB 25 a1	4732	4902	5120	4716	4865	4256	4152	3629	2756	2318	
MAK 1 a1	1601	1635	1670	1309	1340	1540	1490	1520	1612	1448	
MAK 5 a1	3148	3190	3209	3036	3408	3491	3387	3647	1993	1639	
MAK 8 a1	2665	2780	2939	2486	2357	3739	4311	3469	1686	1501	
MAK 10 a1	3487	3506	3705	3535	3382	3039	2527	2354	1822	1457	
MAK 14 a1	3055	3099	3150	3053	3110	3099	2833	2989	2501	2093	
MAK 18 a1	3336	3416	3593	3690	3287	3818	2906	3540	2052	1729	
MAK 20 a1	4149	4306	4579	3873	3060	3392	3121	2816	1980	1740	
MAK 25 a1	3307	3456	3538	3277	2643	3172	3486	3440	2973	2556	
MAK 30 a1	2656	2698	2708	2550	2573	2829	2394	2790	2353	1607	



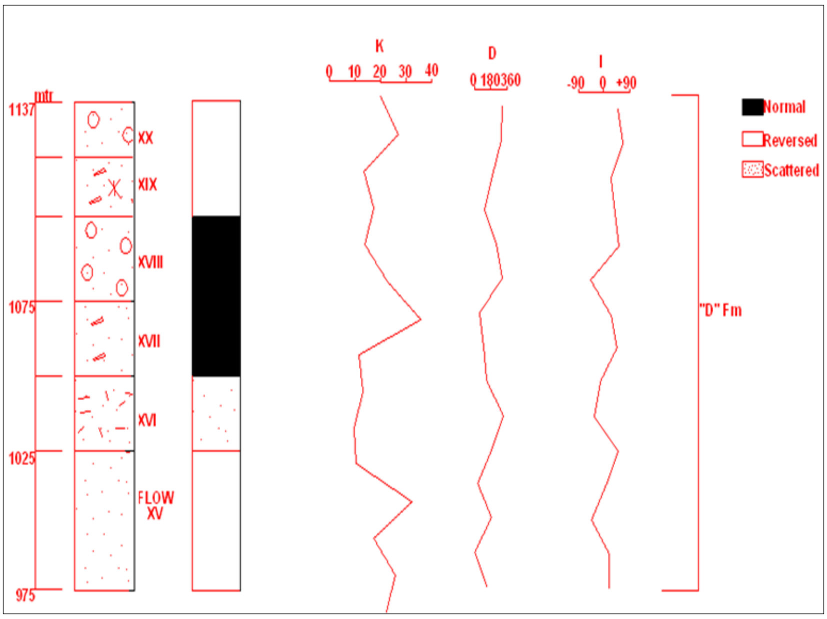


Figure 2 Magnetostratigraphy of the Bundelkund traverse

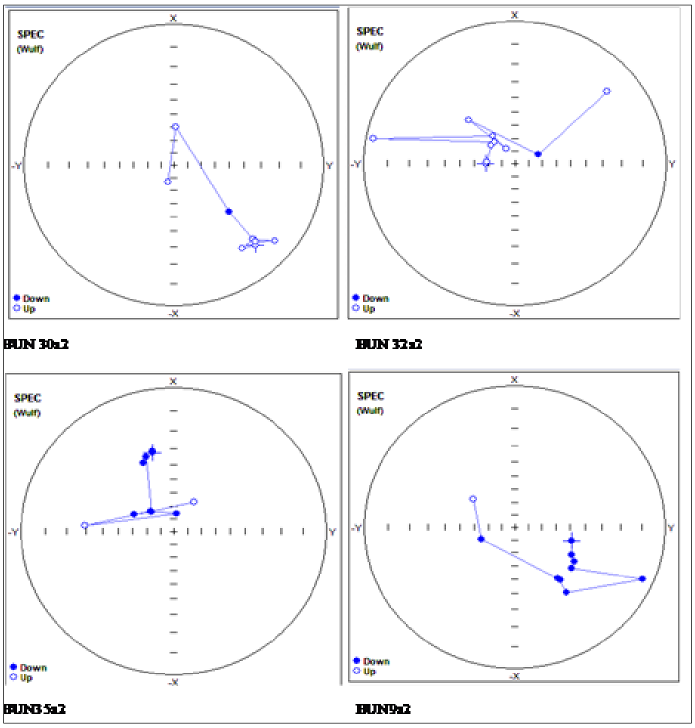


Figure 3 Behaviour of vector directions in representative specimens during thermal demagnetisation, Inclinations positive (+ve) downward, negative (-ve) upward, arrow indicates increased demagnetization

6. Conclusion

In the present study an attempted has been made to compile the so far available palaeomagnetic data to understand the nature of polarity transition in Deccan traps. A critical observation of existing palaeomagnetic data on Deccan Traps indicated the presence of reversal with N-R sequence. It has been noticed that in most of the areas, one reversal is exposed. Bundelkund region and adjoining areas are not as good as those from other areas of the Deccan Traps Volcanic Province probably due the alteration and remagnetisation of many of the flows exposed in the study area. Hence, it is suggested that extreme caution have to be exercised in the interpretation of rock magnetic and palaeomagnetic data by deleting all the samples showing irregular directions in order to arrive at proper comparison of results. This study will certainly aid in possibly recognising the depositional vs tectonic nature of the large scale anticlinal structure, which is rather fundamental to the over all evolution of the Deccan traps. These studies can be of great use in tracing the ground water movements, locating the potential water bearing horizons with the help of field geology, flow by flow stratigraphy and trace element behaviour of the individual lava flows. Overall this will certainly helps in better way of understanding, prospecting and exploration of the valuable natural resources.

References

[1] Athavale, R. N., Paleomagnetism and tectonics of a Deccan trap lava sequence at Amarkantak, India., Journalof Geophysical Research., Vol. no., 75., issues 20., pg., 4000-4006.

[2] Athavale, R. N, and Anjaneyulu, G.R., 1971., Paleomagnetic results on Deccan trap lavas of Aurangabad and their tectonic significance, Tectonophysics,14, pg., 88-103.

[3] Bhimasankaram,V.L.S.,and Pal,P.C.,1968.Palacomagnetic Polarity transitions(?) During Deccan Traps Vol..canism. J. Osm. Univ.(Sci.) Gold. Jubl. Vol..., 12: pp.43-46.

[4] Clegg, J. A., Deutsch, E. R., and Griffiths, D.H., 1956. Rock Magnetism in India. Phil. Mag., Vol.1, pp.419-431.

[5] Deutsch, E. R., Radhakrishnamurty, C. and Sahasrabudhe, P.W., 1959. Palacomagnetism of the Deccan Traps, Annual. Geophy., Vol.. :15,no,1,pp.39-59.

[6] Deutsch, E. R., Murthy, G. S., and Radhakrishnamurty, C., 1981. A comparative magnetic Study of the Deccan Traps, Rajmahal traps and Columbia River basalts, mem. Geol. Soc. India, Vol. 3, pp. 177-127.

[7] Dhandapani, R., 1988. Flow stratigraphy and palaeomagnetism of the Bhavangajaramjani Hill sections of the Narmada region, Deccan vol.canic province.Ph.D. Thesis (Unpublished). IIT, Bombay.

[8] Dhandapani,R.and Subbarao,K.V.,1992.Magneto stratigraphy of the Deccan Lavas, South of the Narmada River, Geol. Soc. India, Mem. 24, pp. 63-79.

[9] Irving, E., 1956. The magnetization of the mezozoic dolerites of Tasmania. Proc. R. Soc, Tasmania, Vol. 90, pp.157-168.

[10] Khadri, S. F. R., Subbarao, K. V. and Bodas, M. S., 1988(a). Magnetic studies on a thick pile of Deccan Trap flows at kalsubai. Mem. No. 10. Jour, Geol. Soc. India. pp. 163-180.

[11] Khadri, S. F. R., Subbarao, K. V. Hooper, P. R. and Walsh, J. N., 1988. Stratigraphy of Thakurvadi Formation, Western Deccan Basalt Province, India, Mem. No.10, J. Geol. Soc. India, pp. 281-304.

[12] Khadri, S. F. R., 1989. Flow stratigraphy, Geochemistry and Palaeomagnetism of a Parof the Western Deccan Basalt Province, Maharashtra, India, Ph.D.-Thesis (Unpublished). I. I. T., Bombay, 418p.

[13] Khadri, S. F. R. Subbarao, K. V. and Nagar, R.G., 1993. Palacometric studies of Malwa Traps near Mandu region, Dhar district M. P. Jour. Soc. India.

[14] Khadri, S. F. R. and Nagar, R. G., 1994. Morphometric analysis of Khuj river Basin near Burimandaw region, Dhar District, M. P .Bull. Pure.app.Sci.Vol. 13.

[15] Khadri, S. F. R., Nagar, R. G. and Singh, G.B., 1994. Geology and Priliminary flow Stratigraphy of Malwa Traps near burimandaw region Dist, M. P., Jour. Sci. Phy. Sci. Vol. 6(1).

[16] Khadri, S. F. R. and Nagar, R.G., 1994. Magnetostratigraphy of Malwa Deccan Traps Near Mandu region, M. P., India, Magnetism Rocks to Superconductors Radhakrishnamurthy Jour, Geo. Soc. Ind. Mem. vol. 29, pp. 199-209.

[17] Klootwijk., C.T., 1975., Palaeomagnetism of upper permian red beds in the Wardha Valley, Central India., Jour. Tectonophysics., vol., 25., issues I-2., pg., 115-137.

[18] Lowrie and Alwarez., 1981., 100 millian years of geomagnetic polarity history., Geology 9., pg 392-397.

[19] McElhinny, M. W., 1968. Northeard drift of India-Examination of recent Palaeomagnetic results. Nature.Vol. 217, pp. 342-344.

[20] Mcelhinny, M.W. and Burek, P.J., 1971., Mesozoic Paleomagnetic Stratigraphy, Nature, 232, 98-102.

[21] Pal, P.C., Bindu Madhav U. and Bhimasankaram, V.L.S., 1971., Early Tertiary geomagnetic polarity reversals in India, Nature Physical Science, 230, 133-135.

[22] Ramana, C. V., 1973. Palaeomagnetism of a vertical sequence of Deccan traps from Kalsubai, Maharashtra, India, C. E. G. Bull., pp.226-248.

[23] Ramanan, S. and Subbarao, K. V., 1994. Rare earth element partial melting modal and its Petrogenetic significance in Deccan Traps. Volcanism (Radhakrishna murthy volume), Wiley Eastern Limited, Bombay, pp. 295-319.

[24] Radhkrishnamurthy, C., 1983 Identification of titanomagnetites by simple magnetic technique and application to basalt studies. IUGGXVIII general Assembly IAVCEI Abstracts, Hamburg, FRG. pp.105. Radhakrishnamurthy., 1985., Identification of titanomagnetites by simple magnetic techniques and application to basalt studies., Journ. Geol.soc. India., 26., pg., 640-651.

[25] Sahasrabudhe, P. W., 1963. Palaeomagnetsm and the Geology of the Deccan Traps, Semin. Geophys. Invest. Peninsular shield Osmania University., Hyderabad, pp.226-243.

[26] Sahasrabudhe, P. W., 1965. Palaeomagnetic secular variations in the remote past Jour. Ind. Geophys. Unio, Vol. pp.17-27.

[27] Sreenivasa Rao, M., Ramasubba Reddy, N., Subbarao, K. V., Prasad, C.V. R. K and Radhakrishnamurty, C., 1985, Chemical and magnetic stratigraphy of parts of Narmada region, Deccan Basalt province. Jour. Geol. Soc. Ind., Vol. 26, pp.617-639.

[28] Shukla, A. D., Bhandari, N., Kusumgar, S., Shukla, P. N., Ghevariya, Z. G., Gopalan, K., and Balaram, V., 2001. Geochemistry and magnetostratigraphy of Deccan flows at Anjar, Kutch. Proc. Indian Acad. Sci., Earth Planet. Sci., v.110, pp:111–132.

[29] Verma , R. K. and Mittal, G. S., 1974. Palacomagnetism of vertical sequence of Traps from Mount Pavagarh, Gujarat, India, Phys. Earth Planet. Int., Vol. 8, pp. 63-74.