

## Supplemental Data #1 :

### Geochemical data of Deccan Volcanic Province

#### 1.1 GEOCHEMICAL DATABASE

The compiled geochemical data in the attached MS Excel Workbook (attached as “**Data Repository File DR2.xlsx**”) covers published data on the chemical analyses of the Deccan Trap basaltic flows from 1986 to 2014. The bibliography appended includes citations of the publications listed with the index number of the database listing appended to it. Each spreadsheet in this file covers one individual publication with the metadata given in SD#1 Table 1. The Formation or chemical type name is listed as assigned by the authors.

**SD#1 Table 1 (a):** Metadata of chemical analyses from each publication compiled in the database.

Full Citation	Gives the complete citation of the publication from which the data has been taken.
Location of the sampling	Subprovince of the DVP (with added details)
Analysis done at	Laboratory / Laboratories in which the analyses were carried out.
Variation diagrams plotted	Listed as in publication
Formation Name	Where classified / assigned by the author(s)
Chemical Types	Where classified / assigned by the author(s)
Sample No	As listed by the author(s)
Altitude of Sample	Where given by the author(s)
Inferred Altitude of Sample	As determined from the publication or by plotting the sample location
Data base no of analysis	Only given in Compiled data sheet

**SD#1 Table 1 (b):** Listing of analytical components included in the database.

Major Oxides		Trace Elements				Computed Ratios	
SiO <sub>2</sub>	In Weight percentage.	Ba	In PPM.	Rb	In PPM.	Ba\Zr	If and as given by the author(s). We have not computed these ratios in the database.
TiO <sub>2</sub>		Co		V		Ba\Sr	
Al <sub>2</sub> O <sub>3</sub>		Cr		Y		Ba\Y	
Fe <sub>2</sub> O <sub>3</sub>		Cu		Zn		Zr\Nb	
MgO		Li		Zr		TiO <sub>2</sub> \P <sub>2</sub> O <sub>5</sub>	
CaO		Nb		Ce		MgO\Ti	
Na <sub>2</sub> O		Ni		Dy		Mg Number	
K <sub>2</sub> O		Sc		Sm		Ba*100	
P <sub>2</sub> O <sub>5</sub>		Sr		Nd		Sr*100	
MnO							
FeO	If and as given by the author(s); in Weight percentage.					<sup>143</sup> Nd/ <sup>144</sup> Nd	
LOI						<sup>87</sup> Sr/86Sr	
TOTAL							

The analytical data (SD #1 Table 2) of major oxides is given in wt% and the trace element concentration is measured in ppm. FeO and LOI are listed in the database only if the authors have given it. The computed and isotopic ratios have also been incorporated as and if published by the authors. This compilation consists of more than 800 chemical analyses and represents sampling locations across the DVP. Blank data cells indicate that the authors have not given the relevant data in their publications. SD#1 Table 2 below lists the counts, maximum – minimum and average values of various components of the database. Statistically, it represents a large population, covering all the geographic areas of the DVP as well as all the chemo-stratigraphic units of the province.

**SD#1 Table 2:** Basic statistics of the database.

	No of entries	Max	Min	Average		No of entries	Max	Min	Average
Major oxide wt %					Trace Element (in ppm)				
<b>SiO<sub>2</sub></b>	784	76.62	45.80	50.16	<b>Ba</b>	764	685.0	-	143.7
<b>TiO<sub>2</sub></b>	784	3.88	0.73	2.23	<b>Co</b>	495	513.0	4.0	58.7
<b>Al<sub>2</sub>O<sub>3</sub></b>	784	18.90	6.30	13.60	<b>Cr</b>	645	1,981.0	10.0	166.4
<b>Fe<sub>2</sub>O<sub>3</sub> / Fe total</b>	817	17.87	0.99	11.06	<b>Cu</b>	649	1,076.0	45.0	196.0
<b>MgO</b>	784	15.63	2.68	6.14	<b>Li</b>	222	366.0	4.0	40.9
<b>CaO</b>	784	15.98	1.45	10.25	<b>Nb</b>	654	40.0	4.0	12.3
<b>Na<sub>2</sub>O</b>	784	5.29	0.14	2.28	<b>Ni</b>	713	548.0	18.0	87.7
<b>K<sub>2</sub>O</b>	784	5.76	0.01	0.59	<b>Sc</b>	671	376.0	3.0	42.1
<b>P<sub>2</sub>O<sub>5</sub></b>	784	1.35	0.00	0.23	<b>Sr</b>	801	789.0	3.4	214.5
<b>MnO</b>	784	19.00	0.01	0.23	<b>Rb</b>	595	439.0		57.9
<b>FeO (if given)</b>	446	17.87	4.98	9.82	<b>V</b>	626	600.0	7.0	361.5
<b>LOI (if given)</b>	182	7.77	0.01	1.47	<b>Y</b>	757	440.0	16.0	52.7
<b>TOTAL (if given)</b>	238	102.99	95.95	99.21	<b>Zn</b>	629	381.0	16.0	111.1
					<b>Zr</b>	805	577.0	20.0	149.2
					<b>Ce</b>	351	255.0	12.0	48.4
					<b>Dy</b>	248	304.0	2.5	6.5
					<b>Sm</b>	227	56.0	2.1	12.0
					<b>Nd</b>	220	37.1	3.0	18.3

Subsequent workers used this data in support of their respective correlations and derivative models / theses. We therefore avoid any critique on this data, standards used and comparability in this compilation. The ‘chemical type/ chemostratigraphic unit’ tag assigned to individual analysis listed as given by the author(s) in the source publication. We have not re-assigned any of these names. A fairly large number of ‘unassigned’ analyses are present in this compilation, since the authors did not assign them to any of the established formation / chemical type as defined along the Western Ghats.

## 1.2 CHEMICAL STRATIGRAPHY OF DVP – A RECAP

Washington (1922) had commented that there is very little variation in the tholeiitic flows from the Deccan in terms of their chemical compositions. Najafi et al. (1981) demonstrated that successive lava flows display a systematic variation in their chemical composition; interpreted by them as of a progressive variation in the magmatic fractionation. They suggested that packets of lavas stacked one above the other show diverse crustal contamination and fractionation indices, enabling their grouping based on chemistry.

Cox and Hawkesworth (1985) and Sreenivasa Rao et al. (1985) were the earliest attempt to classify and name the flow-packets in the Deccan Traps based on their chemical composition. Beane et al. (1986) proposed the division of the basaltic stack of the Western Ghats into 10 “formations” from 3 “subgroups” based on the field mapping, petrochemical and isotopic studies. Geochemical characters and stratigraphic height were the primary criteria defining the formations (Devey and Lightfoot, 1986). These observations and the data (compiled in the edited volume – Subbarao, 1988) were followed in the subsequent studies across the DVP. The presence of GPB horizons at multiple levels within this sequence in the Western DVP helped map and extrapolate the chemostratigraphic units with greater confidence, wherever present.

A common observation from studies of chemical typing of the basalts in the Western DVP is that the major oxides (barring the MgO number to some extent) do not provide any clear demarcation of the proposed chemo-stratigraphic units. The boundaries defined by trace elements are commonly transitional and/or overlapping. Only the initial Sr isotopic ratios display breaks and can be used as principle criterion for identifying Formation boundaries (Mitchell and Widdowson, 1991). Peng et al. (1994) opined that the isotopic data falling in or near the common signature region, where several Western Ghats arrays converge, reflects low crustal contamination process operating in a large-scale open system during emplacement of the lower Western Ghats lava pile. They suggested that alteration, crystal accumulation and intra-flow differentiation of some elements can explain the observed (a) overlap of the fields of the formations to the petrogenetically transitional nature of some formations (like the Poladpur) and (b) presence of some members in several formations with similar chemical composition. Their studies indicate that the oxide compositions of the Chikhaldara and Jabalpur region (in the eastern parts of the province) fall within or close to the fields of the Ambenali, Poladpur, Bushe and Khandala Formations (from western and southern parts of the province), however, isotopic ratios of some of the samples do not always fall in the same fields. They concluded that many of the northeastern Deccan lavas may not be correlatable with the southwestern lavas, suggesting a polycentric model of eruption for the Deccan basalts.

Subbarao and Hooper (1988) compiled the first regional chemostratigraphic map of the DVP. Mitchell and Widdowson (1991), Bilgrami (1999), Khadri et al (1999) and Jay et al (2008) have expanded the coverage of this chemostratigraphic classification to areas not covered in the first compilation. Subsequent workers have refined and further characterized the chemical parameters for distinguishing between the various units of the Deccan Traps (SD#1 Table 3) that is currently in vogue.

**SD#1 Table 3:** Chemical characters of Chemostratigraphic units from the Western DVP (after Vanderkluyzen et al, 2011; Sheth, 2016).

Formation	Member / Chemical type	( <sup>87</sup> Sr/ <sup>86</sup> Sr) <sub>t</sub>	Average Mg-no.	TiO <sub>2</sub> wt%	Average Zr/Nb	Magnetic Polarity
<b>Wai Subgroup</b>						
Panhala	Desur	0.7072 – 0.7080	48	1.6 – 1.9	11.4	N
	Panhala	0.7046 – 0.7055	52	1.6 – 2.3	14.8	N
Mahabaleshwar		0.7040 – 0.7055	47	2.5 – 4.3	11.4	N
Ambenali	Ambenali	0.7038 – 0.7044	49	1.9 – 3.1	14.4	R
Poladpur	Upper	0.7061 – 0.7088	52	1.8 – 2.3	12.7	R
	Lower	0.7053 – 0.7110	56	1.5 – 2.0	14.0	R
<b>Lonavala Subgroup</b>						
Bushe	Bushe	0.713 – 0.720	55	1.0 – 1.3	15.3	R
	Shingi Hill	0.718 – 0.7181	49	1.3 – 1.4	16.2	R
	Harishchandragad	0.712 – 0.7164	58	2.0 – 2.1	12.9	R
	Karla Caves	0.7147 – 0.7150	68	1.1 – 1.2	19.7	R
	Bhaja	0.7040 – 0.7055	47	1.3 – 1.5	18.2	R
Khadala	Rajmachi	0.7093 – 0.7102	44	2.1 – 2.5	14.6	R
	Khadala Phyrice	0.7077 – 0.7085	41	2.4 – 2.8	13.6	R
	Dhak Dongar	0.7071 – 0.7072	40	2.9 – 3.1	13.1	R
<b>Kalsubai Subgroup</b>						
Bhimashankar	Monkey Hill GPB	0.7073 – 0.7075	41	3.1 – 3.4	12.2	R
	Giravali GPB	0.7068 – 0.7074	45	2.8 – 3.1	12.1	R
	Bhimashankar	0.7067 – 0.7077	47	1.9 – 2.6	11.7	R
Thakurvadi	Manchar GPB	0.7075 – 0.7077	42	2.9 – 3.1	13.2	R
	Thakurvadi	0.7067 – 0.7088	58	1.8 – 2.2	12.0	R
	Water Pipe	0.7099 – 0.7112	59	1.4 – 1.6	12.3	R
	Jammu Patti	0.7066 – 0.7077	34-56	1.7 – 2.7	8.4 – 11.2	R
Neral	Tunnel Five GPB	0.7082 – 0.7083	36	3.3 – 3.5	10.8	R
	Neral	0.7062 – 0.7073	62	1.5 – 1.7	12.3	R
	Ambivli Picrite	0.7104	67	1.4 – 1.5	18.6	R
Igatpuri	Kashele GPB	0.7102 – 0.7122	40	2.6 – 3.1	11.5	R
	Igatpuri Phyrice	0.7107 – 0.7124	49	1.9 – 2.2	14.3	R
Jawahar	Thal Ghat GPB	0.7108	36	3.6	10.7	R
	Jawahar	0.7085 – 0.7128	38 - 59	1.3 – 3.0	10.8 – 13.0	R

The Kalsubai Subgroup, which hosts the oldest 5 formations are characterized by amygdaloidal ‘compound’ flows. They have picritic basalts (MgO > 10%) at the base and are capped by evolved plagioclase-phyric flows (GPBs). The succeeding Lonavala Subgroup, characterized by lower MgO contents, lower concentration of incompatible

trace elements and  $\text{TiO}_2$  (Cox and Hawkesworth, 1985), is subdivided into Khandala and Bushe Formations, comprising of dominantly 'simple' flows and coarse grained, aphyric 'compound' flows respectively.

The youngest Wai Subgroup consists of Poladpur, Ambenali and Mahabaleshwar Formations. This Subgroup has thick 'simple' flows that are easily traceable across long distances. They flows are more chemically evolved than those from the Kalsubai Subgroup. GPB horizons are lacking while rare picritic basalt are reported from the base of the Formations of this Subgroup. It is significant that none of the descriptions of this Subgroup (and its postulated extensions across the other parts of the DVP) mention the presence or relevance of a regional GPB horizon ('Purandar GPB': Karmarkar et al., 1971 / 'M4' in GSI, 2001) occurring at the top of the Ambenali Formation. Even the recent review of the GPBs (Sheth, 2016) has missed out on its stratigraphic significance. The Panhala Formation (informally named as Kolhapur flows) was added atop the Mahabaleshwar Formation based on the exposures of flows in the southernmost part of the Deccan Plateau with distinctly differing chemical characters (Lightfoot et al., 1990; Jay et al., 2008).

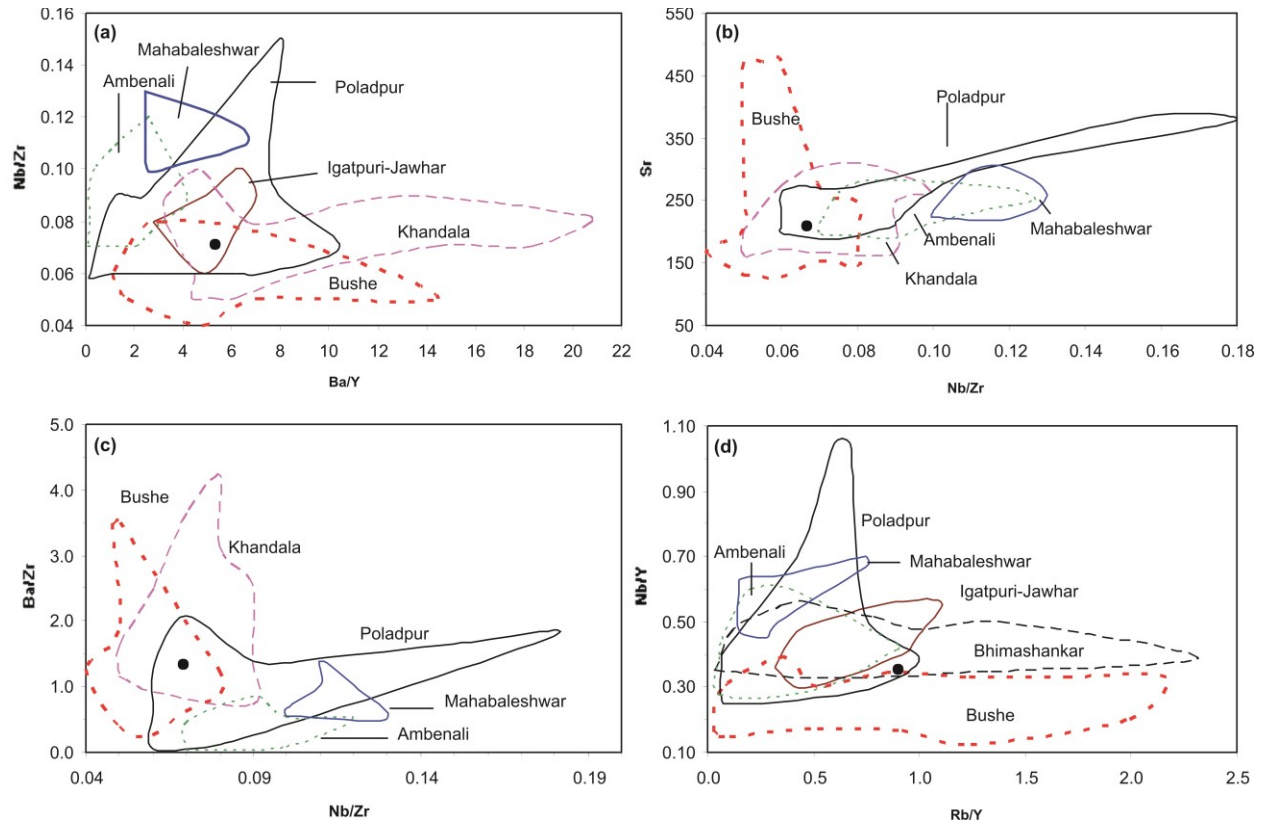
Several recent works (eg: Mitchel and Widdowson, 1991; Khadri, et al, 1999; Jay and Widdowson, 2008; Self et al., 2008; Vanderkluyzen et al., 2011; Peng et al., 2014; Shrivastava et al., 2014; Richards et al., 2015; Sheth et al., 2018) appear to have accepted this premise. The chemical stratigraphy established in the western DVP by multiple authors with several rounds of resampling is assumed by them to provide a robust foundation for expanding the correlation to other parts of the DVP.

The notional bounds of variations recognized by earlier authors (plotted in the variation diagrams as 'fields' of Formations serve as references for 'identifying the Formation' in these works) have been used for establishing these correlation. SD#1 Fig.1 is an example of such 'discriminant' bounds for the various fields. For example, the trace element ratios of dykes from the Sangmaner area (Bondre, et al., 2006) fall in diverse chemostratigraphic Formations. Yet, they interpreted them to belong to the Poladpur Formation on the basis of the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio versus  $\epsilon\text{Nd}$  plots alone. It is evident that there is a significant 'overlap' in the 'fields' so defined, leaving serious questions as to what formation an unknown analysis may be assigned to if it plots in such 'composite' fields. This problem is best exemplified by the arguments used in Bondre et al. (2006), Jay et al. (2008) and Duraiswami, et al. (2014). The interpretations of Shrivastava et al. (2014) and assignments to chemostratigraphic units from Western DVP illustrate the resulting confusion.

### 1.3 BINARY VARIATION PLOTS

To examine the validity of these classifications based on chemical data, we used the compiled data across the DVP to plot the most commonly used variation diagrams using

primary data or computed ratios to assess their efficacy in discriminating between stratigraphic units.



**SD#1 Fig.1:** Trace element variation diagrams for the DVP showing bounds of the fields of various constituent chemostratigraphic formations. (after Sheth et al., 2004) . Note the overlaps in the fields and the plots generated from the compiled database. There appears to be no diagnostic characters that will enable assignment of an unknown sample (black dot) to any specific Formation, but will only 'indicate a statistical probability.

So as to also examine if there is a regional pattern in the distribution of the chemical compositions of the basalts from the DVP, we have used the geographic subdivisions / subprovinces (see Fig.1 of the main paper) of the province to tag them to the region. The analyses tagged as 'Kutch' include those from Saurashtra and Kutch. We have used the Formation names assigned by the author(s) to plot the variation diagrams to assess how sharp the distinction between the recognized chemical types actually is (SD#1 Figures 2 - 14). As mentioned earlier, there are a fairly large number of analyses, where the author(s) have not tagged any specific formation name to the flow sampled. They are included as 'unassigned' samples. Chemical data available for the Kutch region is devoid of trace element data and hence not reflected in the relevant plots. The raw data for these plots is given in **Data Repository File DR2.xlsx**.

This compilation reaffirms the consistency in the chemical compositions of the Deccan flows across the entire province, with relatively minor variations. The variations relate to samples of either differentiates or specific variants of the tholeiitic lavas; but do not provide a discriminant distribution that may justify a stratigraphic or temporal connotation.

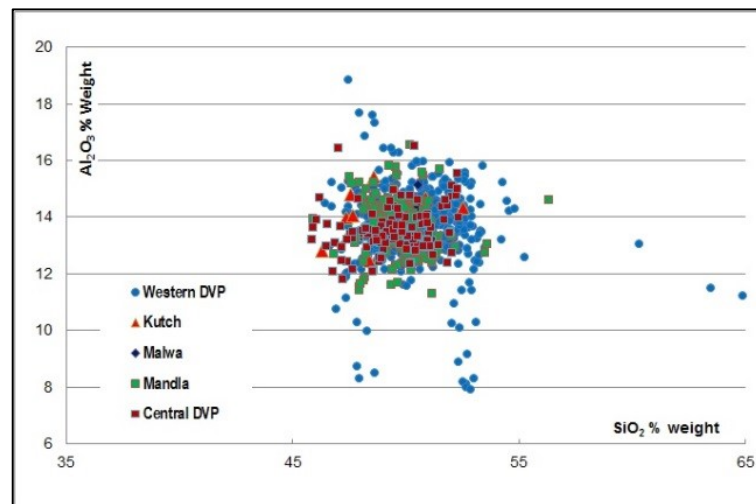
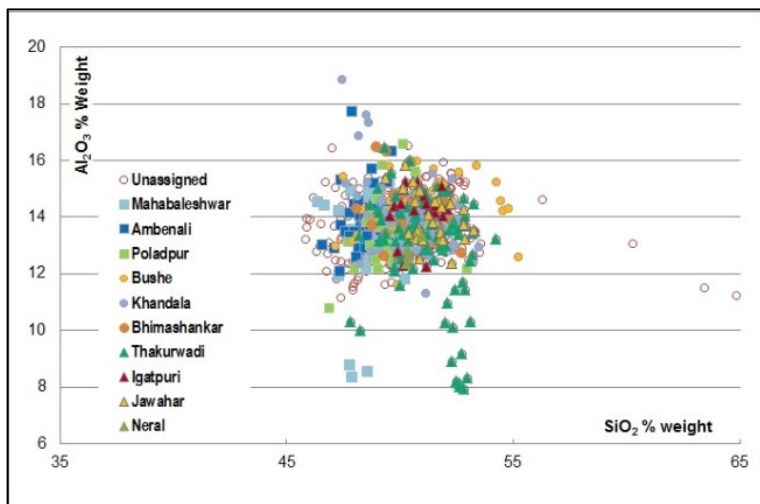
It will be evident from all these plots that although there is a range of variation of the primary composition as well as the various ratios (that may contribute to determination of the petrogenetic characters of the lava and their differentiation and maturation) across the DVP, the plots essentially cluster in a statistically coherent value range. It demonstrates very clearly that the chemical compositional variation across this large province is statistically uniform and suggests that there is a consistency in the magma source and venting systems throughout its vast expanse. No significant variance is observed between various sectors of the province.

Nor do these plots display a 'significant' discrimination between the chemical formations of the DVP. The discriminant plots used in earlier publications (eg: SD#1 Fig.1) show 'range of compositional variations' plotted based on studies in one / two sections in the Western DVP. They have a significantly large overlap and any composition plotting in the overlapping area may only be assigned to a formation at the author(s)' discretion, and not based on 'diagnostic' characters.

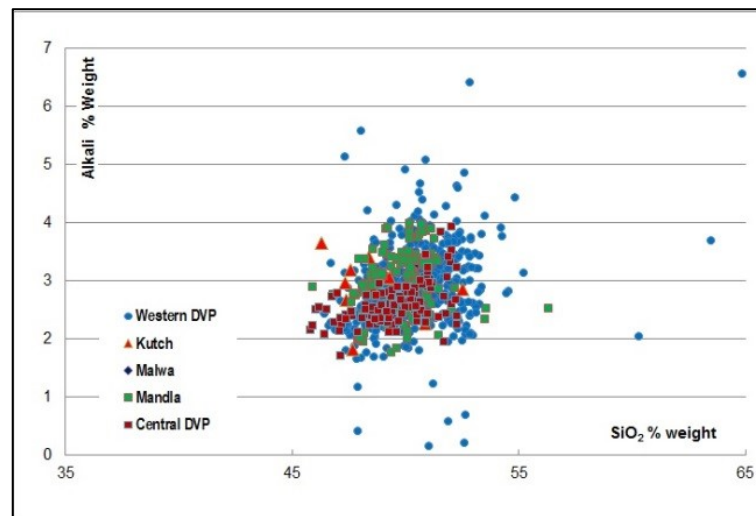
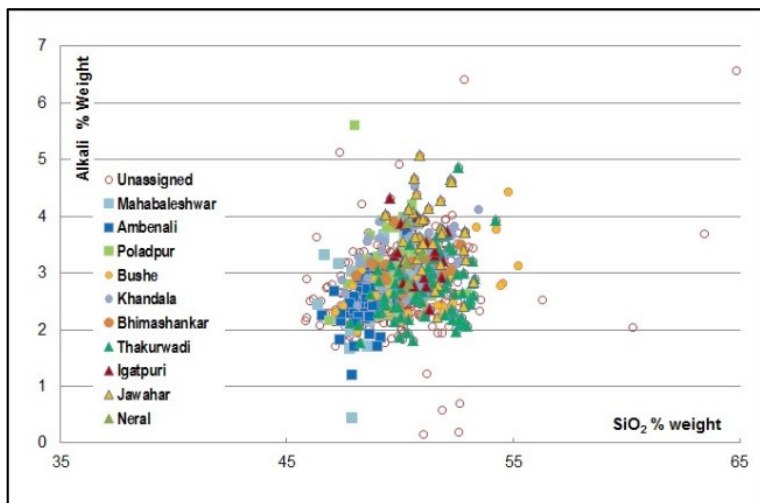
#### **1.4 DISCRIMINANT FUNCTIONS**

Given the overall similarity in compositions, statistical computations were proposed to discriminate between various formations (e.g. Beane et al, 1986; 1988; Subbarao, et al, 1994). Mahoney et al (2000) proposed a Discriminant Function Analysis (DFA). It is a multivariate statistical technique (Davis, 2002) to calculate the discriminant functions [Function 1= (  $-0.446\text{SiO}_2 - 0.129\text{Al}_2\text{O}_3 + 1.312\text{TiO}_2 + 0.124\text{CaO} + 1.398\text{P}_2\text{O}_5 + 0.503\text{Ba} + 0.302\text{Sr} - 1.699\text{Zr} - 0.727\text{Y} - 0.022\text{Nb}$  ); Function 2= (  $-0.203\text{SiO}_2 + 0.078\text{Al}_2\text{O}_3 - 0.257\text{TiO}_2 - 0.125\text{CaO} + 0.453\text{P}_2\text{O}_5 + 0.866\text{Ba} - 0.251\text{Sr} + 0.941\text{Zr} - 0.050\text{Y} - 1.221\text{Nb}$  ); Sheth et al., 2004] and compute the affinity of an unknown sample to a standard set of known samples. The oxide and elemental abundances in the equations of the two functions are Z-score standardized values.

While calculating the values for Functions the trace element data was converted to percentage weight and then all the data (major and trace) was normalized to 100. The recalculated and normalized values of major and trace elements used for the Function calculation are plotted on scatter plot of Function 1 versus Function 2. They were used (with or without modifications) by subsequent workers (Sheth et al., 2014, Vanderkluyzen, et al., 2011; Peng et al., 2014; Duraiswami, et al., 2014).

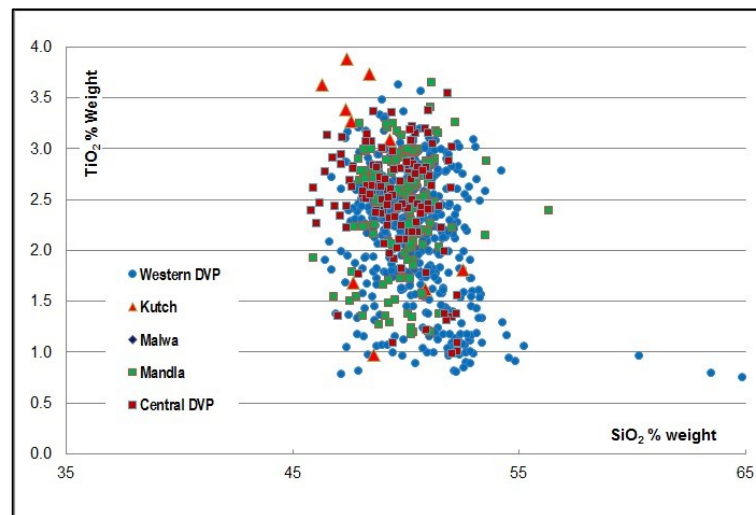
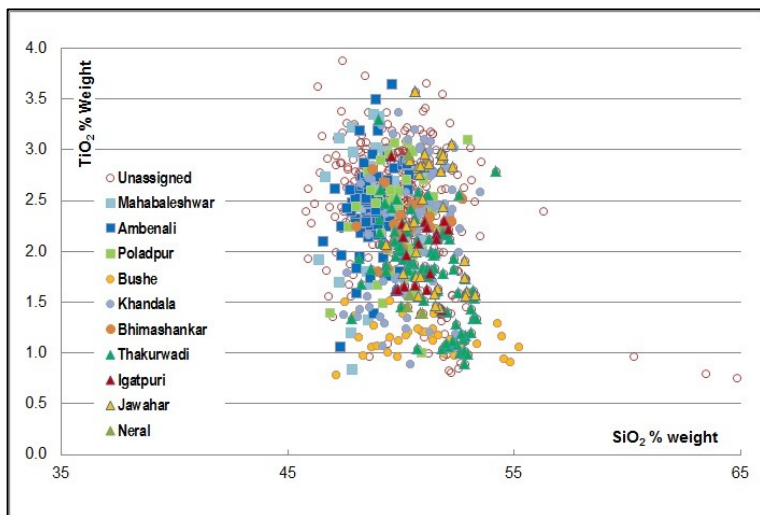


**SD#1 Fig.2:** Distribution of  $\text{Al}_2\text{O}_3$  v/s  $\text{SiO}_2$  in the DVP, with formation names (where assigned by respective authors) tagged to the data points in the left plot and region-wise classification in the right plot.

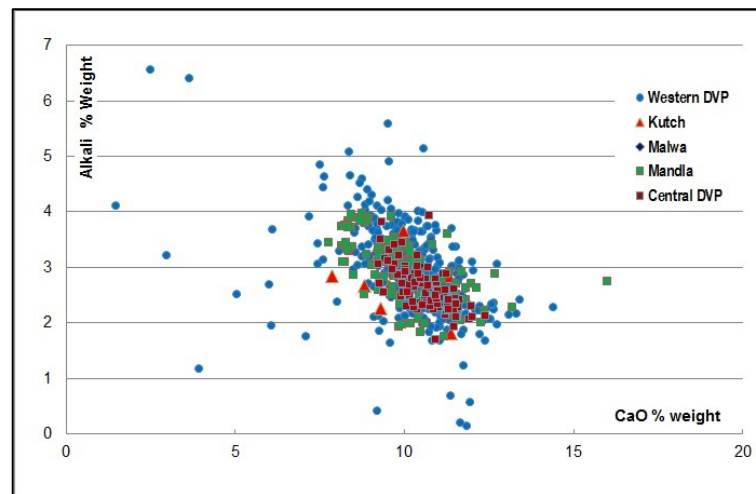
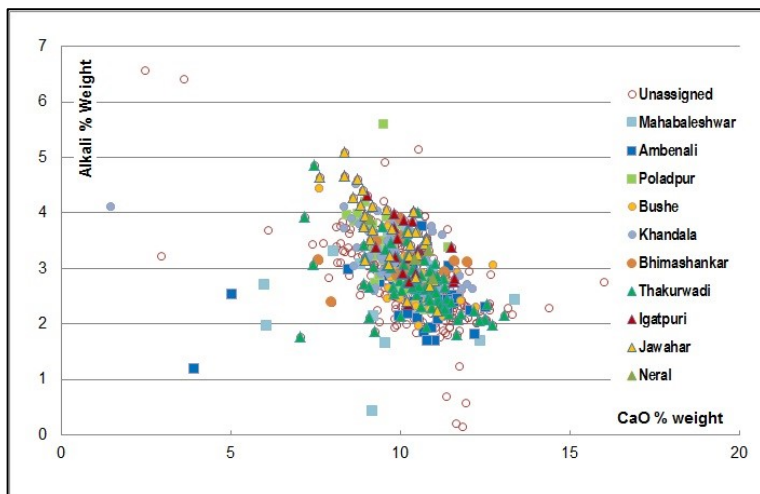


**SD#1 Fig.3:** Distribution of Alkali ( $\text{K}_2\text{O}+\text{Na}_2\text{O}$ ) v/s  $\text{SiO}_2$  in the DVP, with formation names (where assigned by respective authors) tagged to the data points in the left plot and region-wise classification in the right plot.

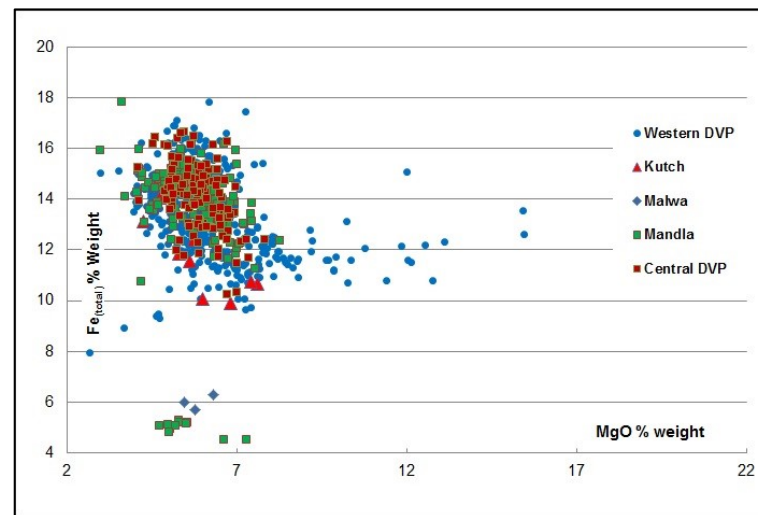
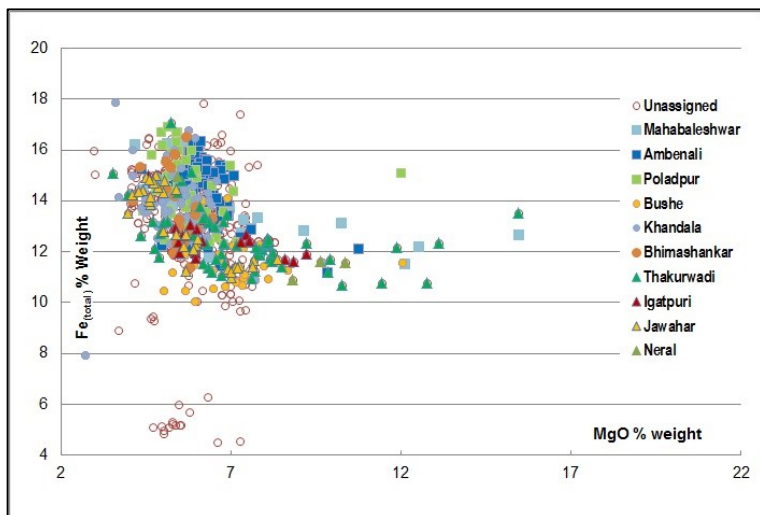




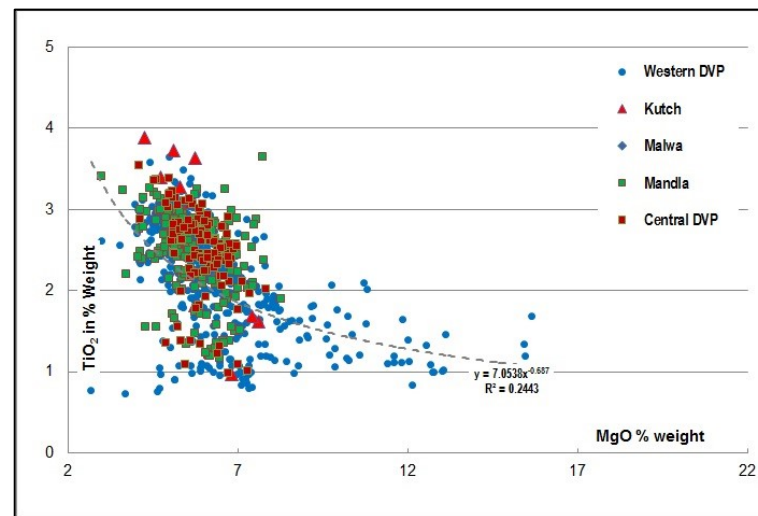
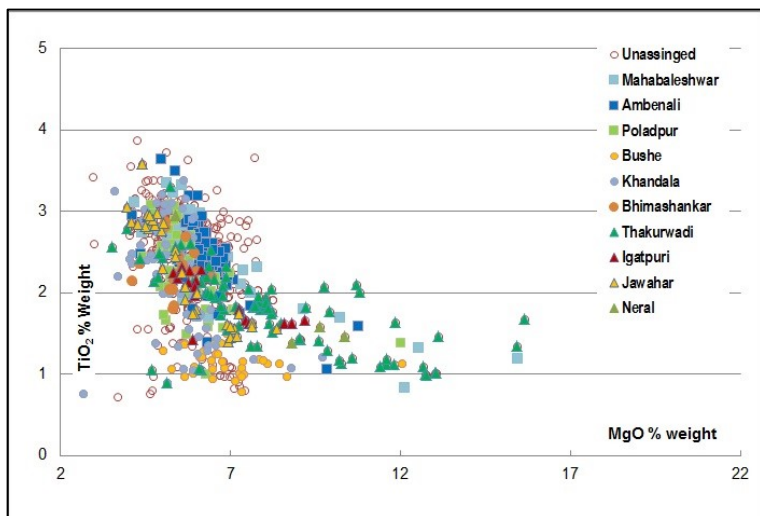
**SD#1 Fig.4:** Distribution of  $\text{TiO}_2$  v/s  $\text{SiO}_2$  in the DVP, with formation names (where assigned by respective authors) tagged to the data points in the left plot and region-wise classification in the right plot.



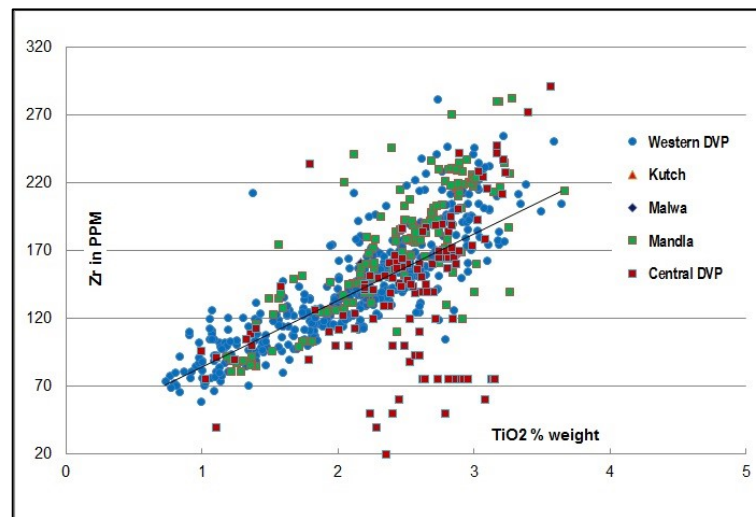
**SD#1 Fig.5:** Distribution of Alkali ( $\text{K}_2\text{O}+\text{Na}_2\text{O}$ ) v/s  $\text{CaO}$  in the DVP, with formation names (where assigned by respective authors) tagged to the data points in the left plot and region-wise classification in the right plot.



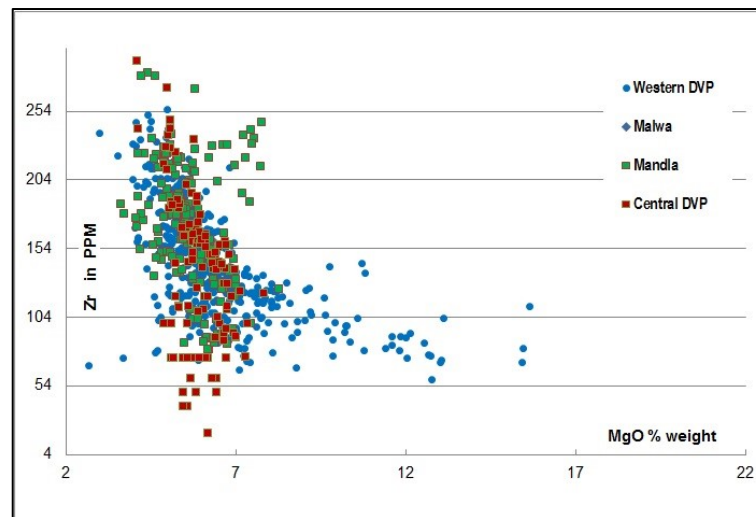
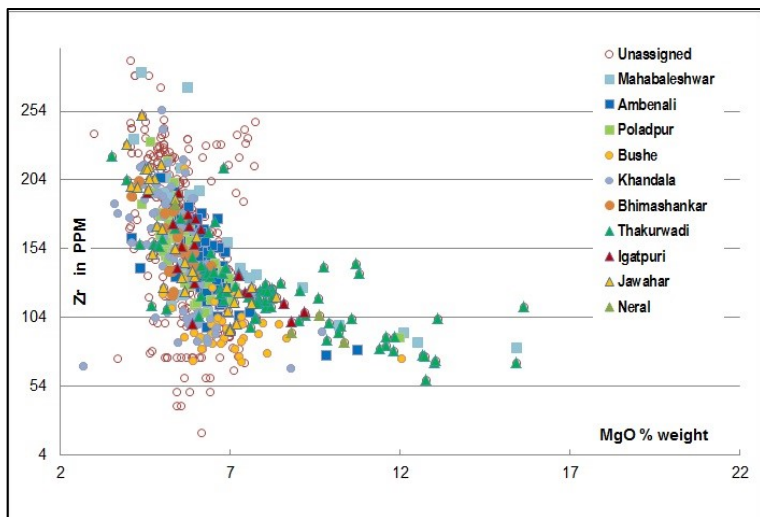
**SD#1 Fig.6:** Distribution of Iron oxides ( $\text{FeO}_{\text{tot}}$ ) v/s MgO in the DVP, with formation names (where assigned by respective authors) tagged to the data points in the left plot and region-wise classification in the right plot.



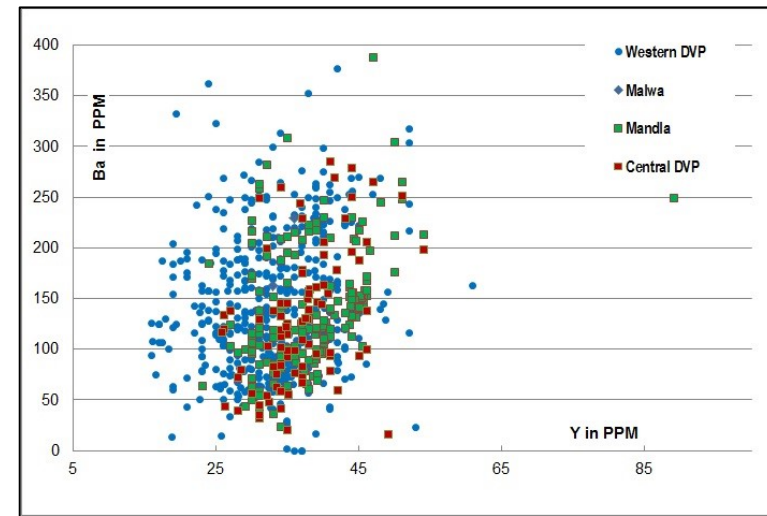
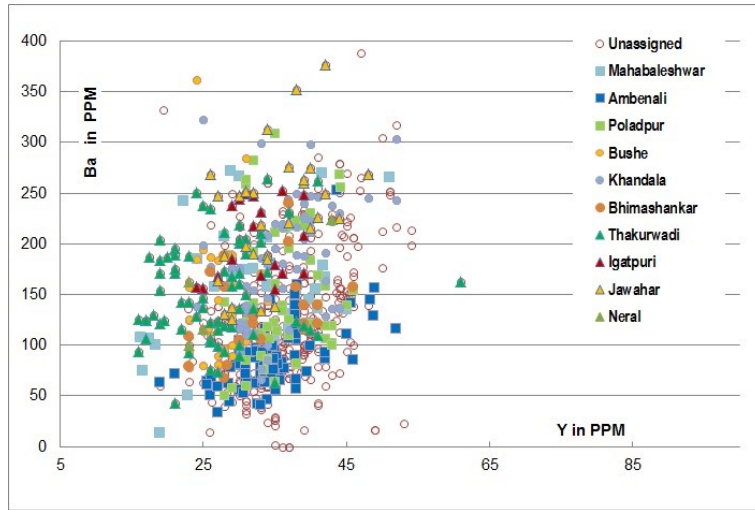
**SD#1 Fig.7:** Distribution of  $\text{TiO}_2$  v/s MgO in the DVP, with formation names (where assigned by respective authors) tagged to the data points in the left plot and region-wise classification in the right plot.



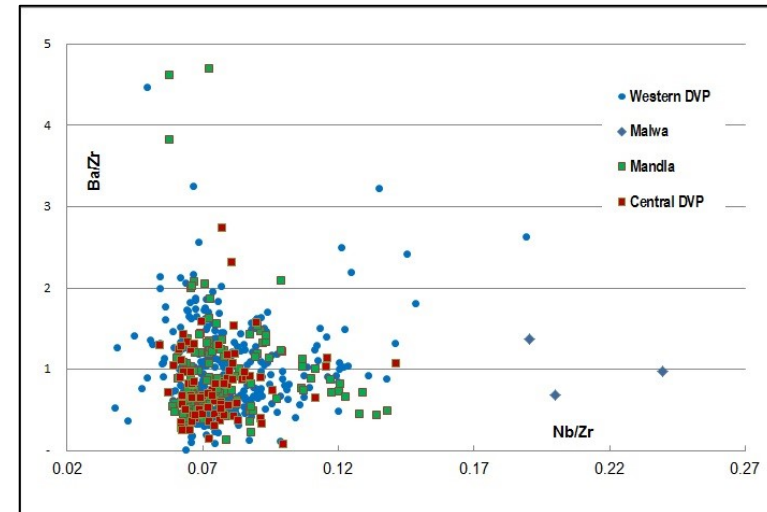
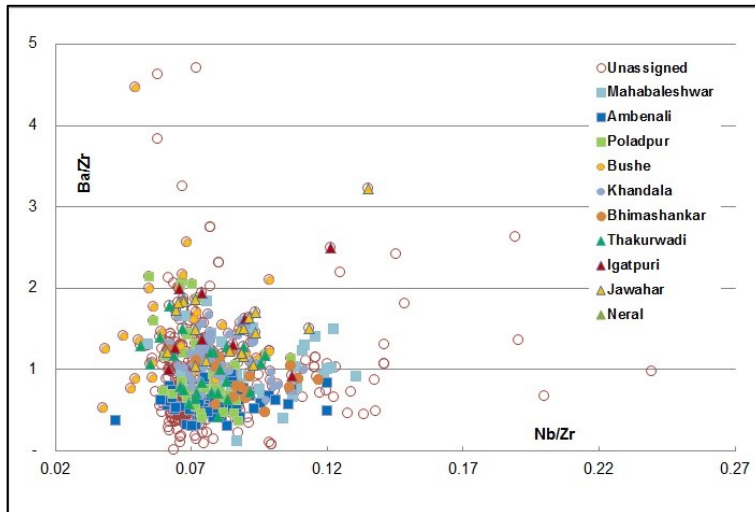
**SD#1 Fig.8:** Distribution of Zr v/s TiO<sub>2</sub> in the DVP, with formation names (where assigned by respective authors) tagged to the data points in the left plot and region-wise classification in the right plot. Symbols same as in Fig. 8 and 10.



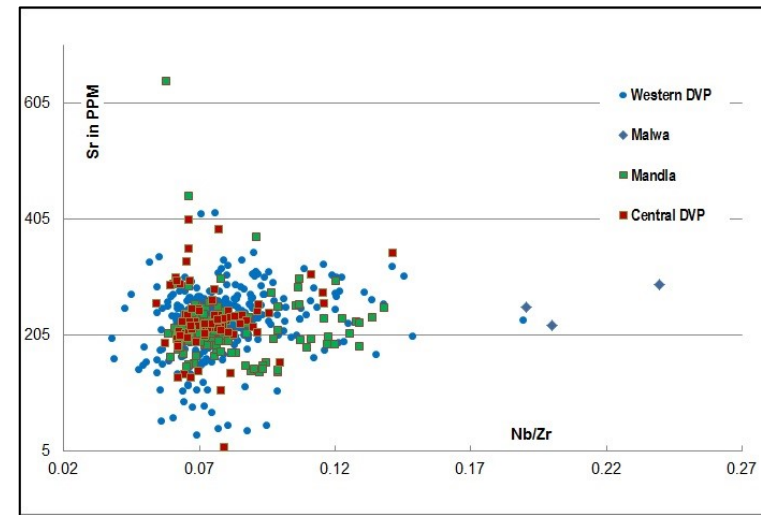
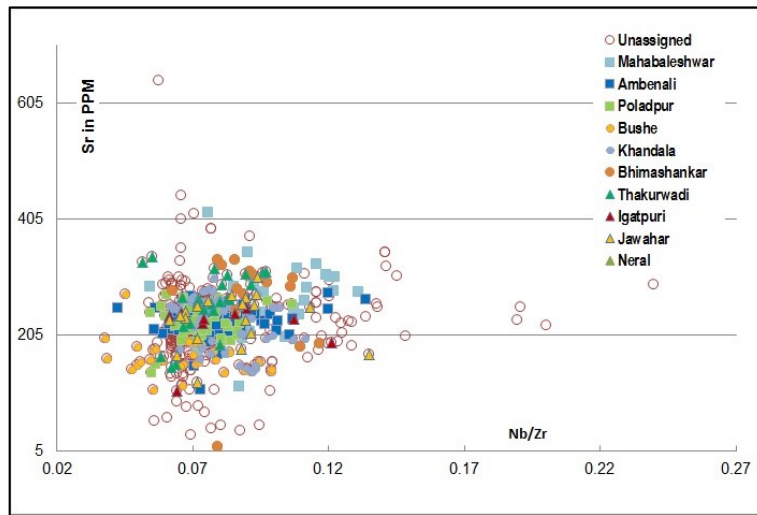
**SD#1 Fig.9:** Distribution of Zr v/s MgO in the DVP, with formation names (where assigned by respective authors) tagged to the data points in the left plot and region-wise classification in the right plot.



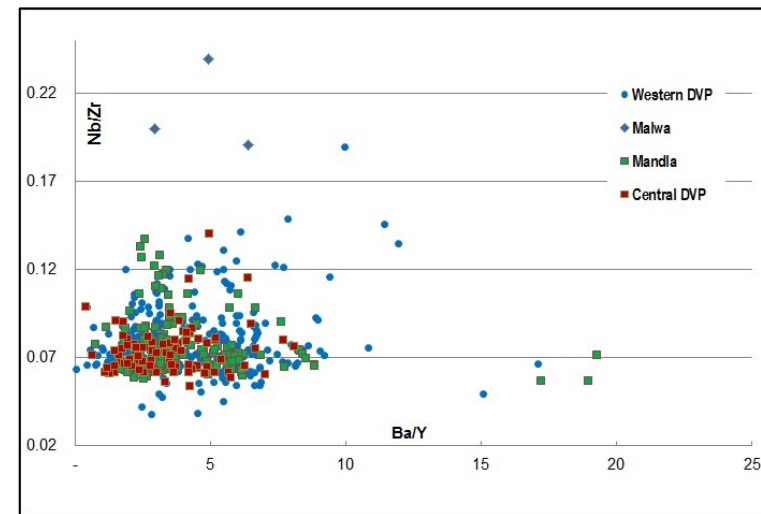
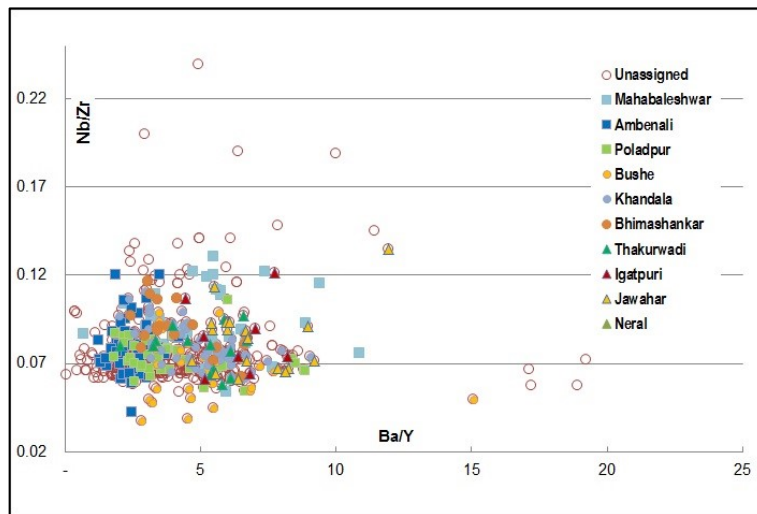
**SD#1 Fig.10:** Distribution of Ba v/s Y in the DVP, with formation names (where assigned by respective authors) tagged to the data points in the left plot and region-wise classification in the right plot.



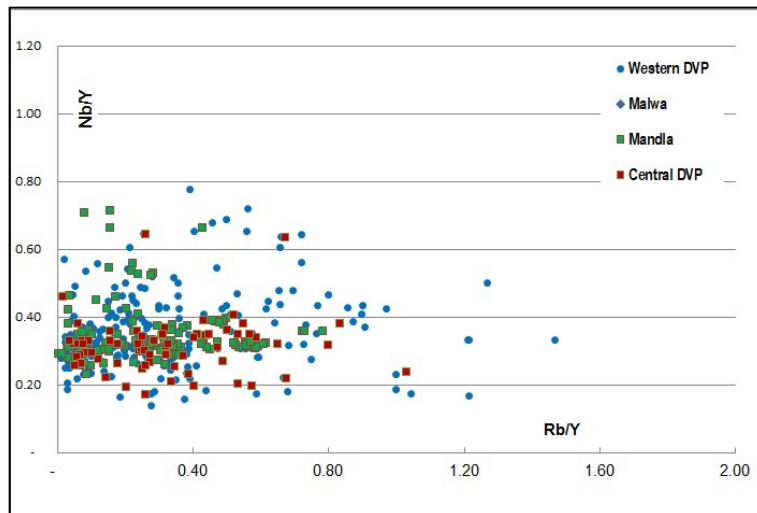
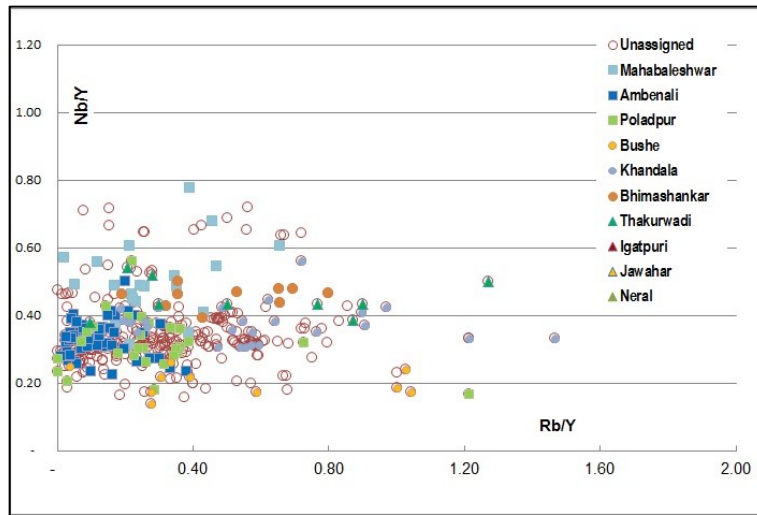
**SD#1 Fig.11:** Distribution of Ba/Zr v/s Nb/Zr in the DVP, with formation names (where assigned by respective authors) tagged to the data points in the left plot and region-wise classification in the right plot.



**SD#1 Fig.12:** Distribution of Sr v/s Nb/Zr in the DVP, with formation names (where assigned by respective authors) tagged to the data points in the left plot and region-wise classification in the right plot.



**SD#1 Fig.13:** Distribution of Nb/Zr v/s Ba/Y in the DVP, with formation names (where assigned by respective authors) tagged to the data points in the left plot and region-wise classification in the right plot.



**SD#1 Fig.14:** Distribution of Sr v/s Nb/Zr in the DVP, with formation names (where assigned by respective authors) tagged to the data points in the upper plot and region-wise classification in the lower plot.



We have undertaken the same analyses using the data from the 'unassigned' samples (with known locations which should plot in a specific field) to examine its validity. They lead to results that may at best be qualified as 'indicative' and non-exclusive. Under these circumstances, the utility of even such complex statistical functions is limited to being 'indicative' rather than diagnostic.

Although most proponents of the methodology mention the limitations of the parameters of chemical affinities for tagging and classifying flows, models of the Deccan volcanism and correlations of flow fields across long distances rely on them significantly. We caution that none of the parameters gives a unique unambiguous result, and at best provide a statistical probability.

## **1.6 CONCLUDING REMARKS:**

From the above discussion, it is evident that discriminant analyses and chemical parameters fail to sustain the test of long-distance correlations. They are at best probabilistic suggestion. In absence of supporting arguments and data, they cannot stand on their own.

Our critique on the results of 'chemical discrimination' obtained by various authors is that a significant degree of author(s) bias determines the affiliation of the unknown sample to a specific formation. This may have resulted from the 'sampling being based on earlier published regional maps' where the location was already assigned to a particular formation' or an assumption that at particular altitudes a specific formation is present using the existing overstepping models of eruptive history described in the western parts of the DVP. These discriminant analyses fail to sustain the test of long-distance correlations. As has been noted earlier by other workers (eg: Deshmukh, 1988; Godbole et al., 1996, Kale et al., 1992), correlation or mapping of "Formations" purely based on chemistry is shown by our exercise and compilation to be inherently doubtful. It is evident that while chemistry of the DVP flows may yield excellent petrogenetic information, its utility in defining stratigraphic boundaries and assigning unknown samples to a specific stratigraphic unit may not stand the test of rigorous scrutiny.

The geometric unevenness of the individual flows themselves (see Gupte, et al., 1973; Kale and Kulkarni, 1992; Kale, et al., 1992; Jay, et al., 2008) further augments this limitation. The physical volcanological nature of the lava flows (compiled in SD#2) adds to this complication in no uncertain terms. The fragmented basement on which the flows were emplaced, and dislocations that may have occurred during the volcanic eruptions in the substrate (eg: Peshwa and Kale, 1997) on which the lava spread is an additional factor that suggests that lateral correlation of flows / flow-fields based on elevational controls (with or without corrections for the 'regional dips' as suggested by Cox and Hawkesworth, 1985; Khadri, et al, 1999; Jay, et al., 2008) may be at best indicative, not conclusive. In light of these uncertainties, the long distance correlations of flows based purely on chemistry has obvious limitations that cannot be denied. Several authors who have attempted chemistry-based

extrapolations and correlations admit this factor; but have apparently let it remain unqualified in their conclusions.

While conceding that the chemical data has provided a framework for classifying the thickest succession (in Western DVP) of the Deccan Traps, its application for correlation remains equivocal. The obvious conclusion is that chemistry alone cannot provide the foundation of stratigraphic correlations across the DVP. Supplementary Data on Lithostratigraphy (SD#2) and Chronological and Paleomagnetic (SD#3) further elaborate the ambiguities in using the chemical correlations across the province.

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