

Lithostratigraphy of Lava Flows at Tumjai Hill, Kolhapur District, Maharashtra, India.

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Abstract-

Deccan Traps are made up of basaltic lava flows of Upper Cretaceous to Lower Eocene age. These flows have been formed by fissure type of volcanoes. They form a part of plateau basalts of the Peninsular India. The flows are of 'aa' type.

The study area Tumjai Hill falls in Kumbhi River Basin. The altitude ranges from 539 meters to 889 meters. The total thickness of Tumjai Hill lava flows is 350 meters. The lava flow mapping has been carried out in the study area and various flows are marked. There are seven lava flows in Tumjai Hill area. Each flow is composed of several sub units. The sub units are made up of jointed basalt, compact basalt, vesicular and amygdaloidal basalt, red bole and volcanic breccia. Rosette structure and spheroidal weathering are also seen. Columnar joints are present in the upper part of the hill.

The volcanic breccia is formed at the top of the lava flows at some places. In which the angular rock fragments are mingled with lava. The patches of red bole mark the boundary of the successive lava flows at many places. The compact basalt is generally devoid of vesicles. In the study area the compact columnar jointing is found restricted to only some parts of the lava flows. In the study area the commonly observed feature of the flows is spheroidal weathering. The general trend of the flows is horizontal.

Key words - Lava flows, 'aa', Tumjai Hill, Columnar joints, jointed basalt, compact basalt, vesicular, amygdaloidal basalt, spheroidal weathering

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I. Introduction

The study area is mainly composed of basaltic lava flows. In general, the flows have large areal extent. Flows are mostly horizontal and form flat topped hills with step like terraces produced by differential weathering and erosion. The lava flows in the study area are mostly of 'aa' type.^{1,2,4,7}

This shows irregular piles or blocks of lava. The flows are also categorized as compound when made of several smaller units and simple when uniform over a large area and made of one single unit. Generally, the simple flows show aa lavas characters whereas the compound flows show features of pahoehoe lava.^{5,6,8} The Deccan Trap basalts have been classified into 3 groups as – the Upper Traps, Middle Traps and Lower Traps with infratrappeans at the base.^{9,10,11}. Beane et. al.³, suggested further classification of Deccan basalts.

Table 1- Geochemical Stratigraphy (Beane et. al. 1986)³

Group	Subgroup	Formation
Deccan Basalt	Wai	Mahabaleshwar
		Ambenali
		Poladpur
	Lonavala	Bhushe
		Khandala
		Bhimashankar
	Kalasubai	Thakurwadi-Upper Middle Lower

		Neral
		Igatpuri
		Jawhar

Study Area -

The study area is situated at latitude 16° 28' 20.77"N to 16° 44' 0.35" N and longitude 73° 07' 13.74" E to 74° 49' 31.91" E in Survey of India (SOI) toposheet numbers 47H/14, 15 and 47L/2 on the scale 1:50000. It covers an area of about 354.86 Square kilometer in Kolhapur district of Maharashtra. The Tumjai Hill is situated in the vicinity of the study area.

II. Methodology

Geographical location of the various sites has been determined by a Global Positioning Systems (GPS) at an accuracy of ± 3 m horizontal. Lava flow mapping has been carried out in the Tumjai hill of the area. The basalt samples have been collected randomly from various lava flows present in the area. The lava flow marking has conducted during the field work at Tumjai Hill.

Lithostratigraphy of study area-

Table No.2- Lithostratigraphy of Tumjai Hill

Flow No.	Total units	No of subunits.	Altitude of units.	Thickness of units (in mts)	Characters of unit
T-VII	2	2	870 to 889	19	Hard compact basalt with columnar structure
		1	810 to 870	60	Hard compact basalt with vesicles and voids
T-VI	3	3	808 to 810	2	Red bole and/or brecciated material
		2	802 to 808	6	Zeolitic or amagdaloidal basalt
		1	741 to 802	61	Compact basalt with less joints
T-V	3	3	740 to 741	1	Red bole and/or brecciated material
		2	738 to 740	2	Weathered basalt with spheroidal weathering
		1	710 to 738	28	Compact basalt with joints
T-IV	2	2	709 to 710	1	Red bole and/or brecciated material
		1	645 to 709	64	Compact basalt (fine grained) with less joints
T-III	3	3	644 to 645	1	Red bole and/or brecciated material
		2	638 to 644	6	Amygdaloidal basalt with vesicular structure
		1	616 to 638	22	Compact basalt (fine grained) with less joints
T-II	3	3	610 to 616	6	Vesicular and amygdaloidal basalt with brecciated material
		2	607 to 610	3	Compact basalt with joints have rosette structure
		1	586 to 607	21	Weathered basalt with joints
T-I	3	3	585 to 586	1	Red bole and/or brecciated material
		2	550 to 585	35	Weathered basalt with spheroidal weathering
		1	550 to 539	11	Compact basalt showing more joints /fractures

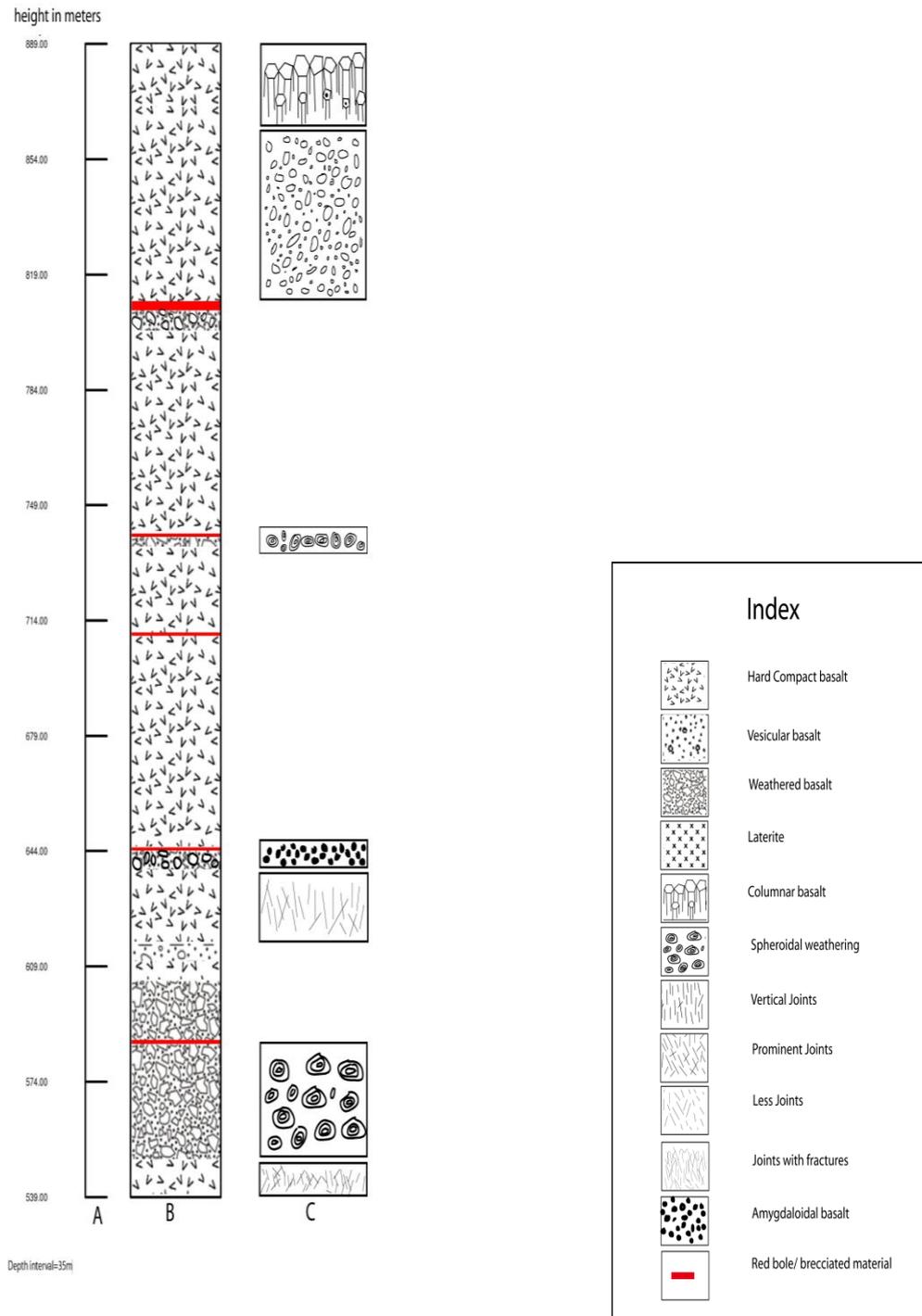


Fig. 1- Diagrammatic Representation of Tumjai Hill Lava Flows

Lithosection of Tumjai Hill A- Elevation of lava flows B- Lithology
C- Structural features

Description of Lava Flows-

The lava flows in the Tumjai area are composed of sub units. The first flow has 3 sub units. The lower one is composed of compact basalt showing fractures, the middle one is composed of weathered basalt showing spheroidal weathering and the upper one is composed of red bole and/ or volcanic breccia. The second flow also possesses 3 sub units. Lower one is having weathered and jointed basalt; middle one is having compact basalt showing rosette structure and the upper one is having vesicular and amygdaloidal basalt with brecciated material. The third flow is made up of 3 sub units having compact basalt, amygdaloidal and vesicular basalt and

red bole and/ or volcanic breccia respectively. The fourth flow has 2 sub units. The lower one is composed of compact basalt and upper one is composed of red bole and / or brecciated material.

The fifth flow is having 3 sub units. The lower one is made up of jointed basalt; the middle one is made up of weathered basalt showing spheroidal weathering and the upper one is having red bole and/ or volcanic breccia. The sixth flow has 3 sub units, having amygdaloidal basalt, compact basalt and red bole and/ or volcanic breccia respectively. The seventh flow is having 2 sub units. Lower one is composed of hard and compact basalt with vesicles and upper one is made up of hard and compact basalt showing columnar structure.

III. Conclusion

There are total seven flows found out in Tumjai Hill area. Each flow is turn composed of several sub units. Various types of basalts are observed to be present in the sub units. In the lower section there is weathered basalt. In the middle section there is massive basalt. The upper section is composed of volcanic breccia, which contains angular fragments of vesicular basalt cemented by zeolites and fine-grained material. Vesicular and amygdaloidal basalt is also observed among the flows. Spheroidal weathering is more common in compact basalts, than in vesicular or amygdaloidal basalt. Spheroids vary in size from few centimeters to about a meter in diameter. The general trend of the flows is horizontal.

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