

profile can form in 10^5 years; and an ancient planation surface with a grassy cover can survive intermittent earthquakes for millions of years. The Western Ghat of India is a clear illustration of this dynamic but stable situation; so are the many laterite-capped terrains in the Philippines and the West Indies.

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Quaternary volcanic activity in Deccan Plateau

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Occurrences of volcanic ash of Quaternary age reported recently from Narmada-Son valleys corroborate volcanic activity in the Quaternary period, as evident from the occurrence of flows of basalt and volcanic breccia on eroded slopes of the Deccan Trap and as discernible in the Mula Dam Project area, Baragav Nandur, Khandala, Neral and Satara.

Introduction

OCCURRENCES of volcanic ash from widely separated localities such as Bori¹ in Pune District and Narmada^{2,3} and Son⁴ valleys indicate Quaternary volcanism. The evidence of post-Deccan Trap volcanic activity first reported by Gupte *et al.*⁵ acquires renewed significance.

The evidence of post-Trap volcanic activity is afforded by flows of some basalts and volcanic breccias unconformably overlying the sequence of Deccan Trap flows, among which they occur. A common feature of all these younger flows is that they cover the present-day carved slopes of the Deccan Trap rocks. In the normal sequence of the Deccan Trap flows, the flow junctions are essentially horizontal and do not change disposition with surface relief. In contrast, the bottoms of the younger flows follow the present-day topography, rising and falling with topographic ups and downs.

Mula Dam project area

The most extensive of the post-Deccan Trap flows is the volcanic breccia on the right bank of the reservoir behind the Mula Dam in Ahmadnagar District ($19^{\circ}20'N$, $74^{\circ}36'E$). For about 5 km upstream from the Dam there are extensive patches of volcanic breccia on the slope at all levels, with their bottoms following the slope carved out of the Deccan Trap. The volcanic breccia was obviously emplaced after the river had excavated its valley.

The Deccan Trap sequence is made up entirely of thin irregular amygdaloidal basalts, and no volcanic breccia. The volcanic breccia occurs only on the surface, covering the Deccan Trap. It is inferred that the volcanic breccia came after the slopes had been carved out of the Deccan Trap sequence in the present cycle of erosion.

This is further confirmed by two exploratory holes drilled south of the balancing tank of the Ahmadnagar Water Supply Scheme, where patches of volcanic breccia quite different from the Deccan Trap basalts occur between RL 1890 feet and RL 1850 feet (Figure 1). This relationship between the Deccan Trap flows and the volcanic breccia is clearly seen also in a quarry-face in the same area (Figure 2).

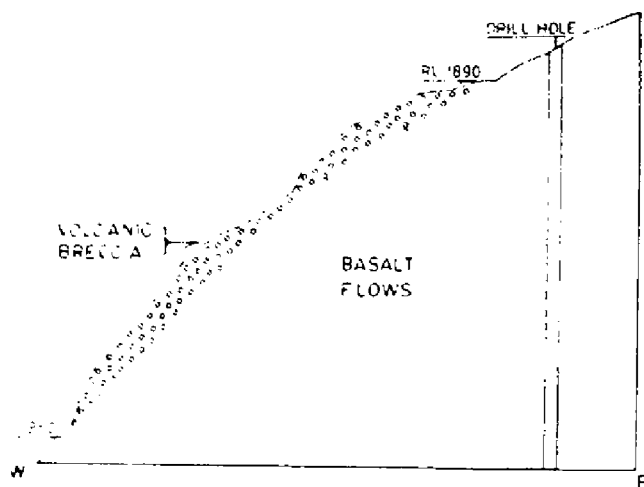


Figure 1. Diagrammatic section of the westward slope covered with younger breccia. The exploratory drill hole near the observatory at Ahmadnagar cuts through amygdaloidal basalts, but no volcanic breccia.

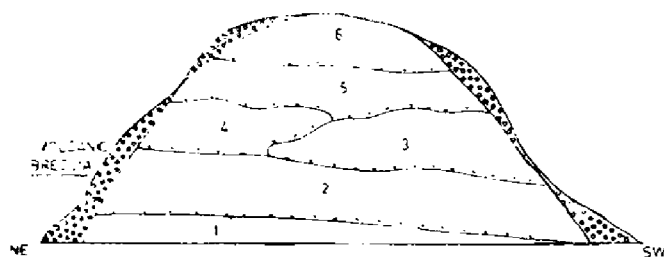


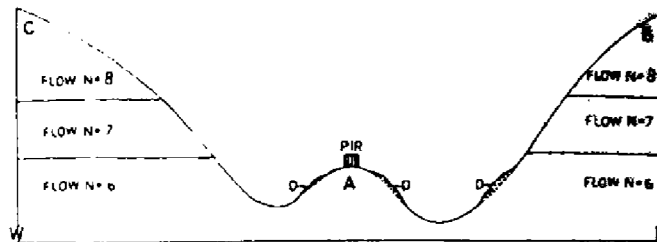
Figure 2. Diagrammatic sketch of section, SE face of quarry near Ahmadnagar Water Supply Scheme, Amygdaloidal basalt flows 1 to 6 (V. B.: Volcanic breccia).

Baragav Nandur

Near Baragav Nandur ($19^{\circ}21'N:74^{\circ}40'E$), in a small tributary stream that meets the Mula about 2 km downstream of the Mula Dam, a lava flow is seen to have emanated from a crack in the left bank and flowed on the bed of a stream which is obviously of Recent age.

Satara

A flow of volcanic breccia⁶ occurs on the Ajinkya Tara Fort Hill (1008 m) and the Power House Hill (825 m) south of Satara ($17^{\circ}40'N:73^{\circ}59'E$). On the slopes carved out on compact basalt flow no. 6 (Figures 3,4) occur patches of volcanic breccia⁶. The flow junction between Flow nos. 6 and 7 is occupied by a band of red tachylytic basalt (Figure 3). It occurs at a level higher than the highest level at which the volcanic breccia occurs⁶. Obviously, the junction between Flow no. 6 and volcanic breccia is not the top of Flow no. 6, and



GEOLOGICAL SECTION OF HILLS TO THE SOUTH OF SATARA

A - POWER HOUSE HILL
B - AJINKYA TARA HILL
C - FLINCHLEY HILL
D - VOLCANIC BRECCIA

Figure 3. Diagrammatic sketch of the hills south of Satara. Deccan Trap flows Nos. 6, 7, 8.

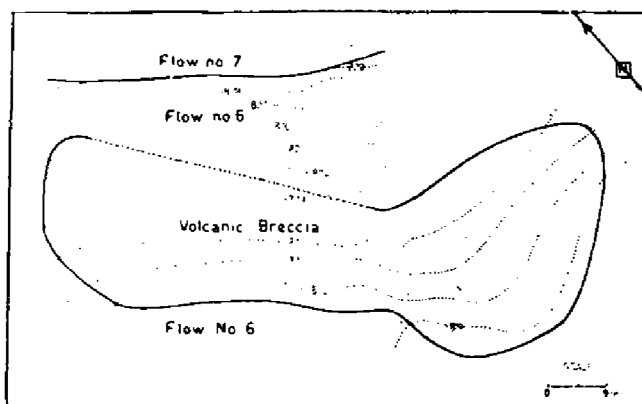


Figure 4. Outcrop of the post-Deccan Traps volcanic breccia overlying the Deccan Trap Basalt Flow No. 6 on south western slope of Ajinkya Tara Hill, Satara. (V. B.: Volcanic Breccia; Contour interval 1 m.)

volcanic breccia is not a part of the Deccan Trap sequence. Since the breccia covers the slopes carved out of the middle portions of Flow no. 6 it must have been emplaced quite after the present-day topography was fashioned.

The mode of occurrence of the volcanic breccia is an indication of the fact that it does not belong to the Deccan Trap sequence. As the Deccan Trap flows are essentially horizontal their flow junctions conform to one contour line without cutting. In contrast, the bottom of the volcanic breccia follows the slopes and cuts across contours (Figures 4,5). This shows that after the Deccan Trap activity came to an end there was a long period of erosion, producing the present-day topography and the volcanic breccia was outpoured on the slopes.

Khandala

On the Flinchley Hill ($18^{\circ}45'N:73^{\circ}23'E$) near Khandala, CURRENT SCIENCE, VOL. 64, NOS. 11 & 12, 10 & 25 JUNE 1993

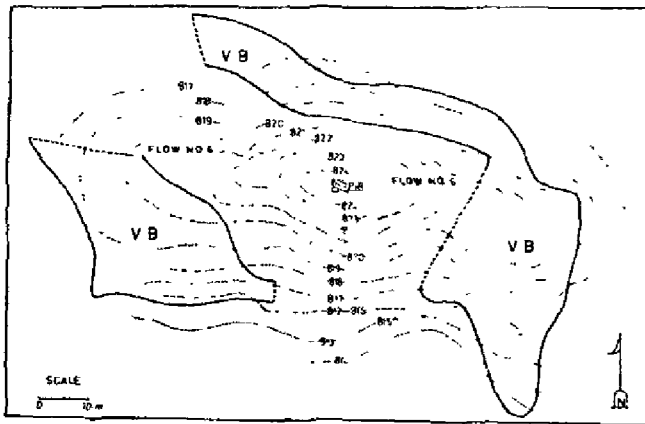


Figure 5. Outcrop of the post-Deccan Trap volcanic breccia overlying the Deccan Trap basalt Flow No. 6 on the Power House Hill, Satara. (V. B.: Volcanic breccia. Contour interval 1 m).

isolated patches of basalt flow occur upto 3 m in thickness. The bottom of this flow follows the present topography, the attitude changing with the present-day slopes. The flow filled the bottom of a small valley, and its patches occur on both flanks and the bottom of another valley. As the valleys have undoubtedly been excavated by the present-day streams, the flow must have obviously come after the establishment of the present-day drainage pattern.

An interesting feature is that it covers pot-holes drilled by a present-day stream in the Deccan Trap. At many places pot holes upto 60 cm in diameter and upto a metre in depth occur in clusters. Where a patch of younger flow is surrounded by pot holes in the underlying Deccan basalt, there are no pot holes in this younger (covering) flow. This indicated that the pot holes were already in existence when this younger flow was emplaced. To verify this, the flow was excavated where pot holes occurred close to it in the underlying Deccan trap basalt. Four pot holes buried under the flow were exposed, showing that the flow has indeed covered pot holes drilled in the underlying Deccan

Trap basalt. This confirms that the present-day drainage pattern had already been established when the eruption of this flow took place.

The Ropy lava of Neral

A rather different kind of manifestation of post-Trap activity is seen near Neral ($19^{\circ} 1' N$; $73^{\circ} 19' E$), on the Bombay-Pune line. In the bed of the stream that crosses the railway tracks a little to the north of the Railway Station, there are a number of small flows of basalt. All of these flows of ropy lava clearly emanated from small cracks in the banks and flowed from both banks towards the middle of the stream bed.

The valley of the stream had already acquired its present-day form when the eruption of the ropy lavas took place.

It may be emphasized that the mode of occurrence of the post-Deccan Traps lavas indicates that they are of geologically very recent origin. However, there is no clue as to their exact stratigraphic position or the absolute age.

The volcanic ashes recently reported from Bori (Pune) and Narmada Son valleys are acidic, in contrast to basic composition of the Deccan Trap volcanics and younger breccias and lavas. Thus the two seem to belong to two different volcanic episodes.

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