



## Magnetostratigraphic perspectives and palaeoenvironmental implications of Deccan volcano-sedimentary succession within the Malwa subprovince, Central India

Sarvendra Pratap Singh<sup>a,c</sup>, Mohammad Arif<sup>a,b,\*</sup>, Arvind Kumar Singh<sup>a,b,\*\*</sup>, Shreya Mishra<sup>a</sup>, Vivesh Vir Kapur<sup>a,b,\*\*\*</sup>, Vandana Prasad<sup>a</sup>, Mamilla Venkateshwarlu<sup>d</sup>, Amiya Shankar Naik<sup>c</sup>

<sup>a</sup> Birbal Sahni Institute of Palaeosciences, Lucknow, 226007, India

<sup>b</sup> Academy of Scientific and Innovative Research, Ghaziabad, 201002, India

<sup>c</sup> Banaras Hindu University, Varanasi, 221005, India

<sup>d</sup> CSIR-National Geophysical Research Institute, Hyderabad, 500007, India

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### ABSTRACT

The present study examines a composite section representing four basaltic and three intertrappean successions at Gujri locality, Malwa subprovince, Central India. An integrated palaeomagnetic, sedimentological, mineralogical, and palaeontological approach has been utilized to understand the palaeoenvironmental changes in a stratigraphic context. The palaeomagnetic results reveal the presence of C30n/C29r and C29r/C29n magnetic reversals providing the C30n-C29r-C29n magnetostratigraphy for the region that spans almost the entire eruption history of the Deccan volcanism. As the Malwa lava flows contain C30n magnetochron, it represents the earliest basalt flows of Deccan volcanism compared to the Western Ghats sequences. Additionally, the record of the younger C29n magnetochron suggests that the Malwa and Mandla lava flows are magnetostratigraphically correlatable and experienced synchronous volcanic activity with the Western Ghats sequences during the main (C29r) and late (C29n) phases of Deccan volcanic eruption. Sedimentological and palaeontological data support that the intertrappean sediments at the Gujri locality were deposited in a dominantly low to moderate-energy freshwater palustrine-lacustrine environment under tropical to sub-tropical humid conditions with seasonal precipitation. However, data from the topmost intertrappean unit at Gujri possibly hints at 'Mock' aridity across the C29r/C29n transition.

### 1. Introduction

The Deccan Volcanic Province (DVP) with a present area of ~500,000 km<sup>2</sup> is one of the largest and youngest among the five volcanic provinces on Earth (Renaut and Owen, 1988 and references therein). As presently understood, the Deccan volcanic eruptions were episodic (in three phases; Chenet et al., 2007), and bestrode the Cretaceous-Paleogene (K-Pg) boundary encompassing the three magnetochrons: C30n, C29r, and C29n (Vandamme et al., 1991; Chenet et al., 2007, 2009; Keller et al., 2016 and references therein). Generally, the DVP has been categorized into four subprovinces namely: Main Central, Saurashtra, Mandla and Malwa (Kale et al., 2020a). However,

most studies have emphasized on the Main Central Subprovince owing to the availability of detailed records on the chemical composition and absolute chronological data on a variety of Deccan basalts that have been crucial to providing a chemostratigraphic framework (Kale et al., 2020a and references therein). Additionally, this aspect gains significance as it provides a temporal and spatial proximity of Deccan volcanism to the K-Pg mass extinction event (e.g., Courtillot and Renne, 2003). However, due to a general scarcity of indirect and/or absolute chronologies from other subprovinces, the published literature conveniently extends the chronostratigraphy of the Main Central Subprovince to other subprovinces. This approach is most likely untenable given that each subprovince has its unique geological structure and eruption

\* Corresponding author. Birbal Sahni Institute of Palaeosciences, Lucknow, 226007, India.

\*\* Corresponding author. Birbal Sahni Institute of Palaeosciences, Lucknow, 226007, India.

\*\*\* Corresponding author. Birbal Sahni Institute of Palaeosciences, Lucknow, 226007, India.

E-mail addresses: [arif@bsip.res.in](mailto:arif@bsip.res.in) (M. Arif), [arvindsingh@bsip.res.in](mailto:arvindsingh@bsip.res.in) (A.K. Singh), [viveshvir\\_kapur@bsip.res.in](mailto:viveshvir_kapur@bsip.res.in) (V.V. Kapur).

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