

Neotectonic Activity from Karewa Sediments, Kashmir Himalaya, India¹

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Abstract—Intermontane basin sedimentation occurred during Pliocene-Pleistocene in the Karewa Basin which formed after the continent-continent collision resulting in the formation of Himalayan orogenic belt around Eocene. These are elongated, narrow, thrust bounded basins which have formed during the late stages of orogeny. Situated at a height of 1700–1800 m above sea level, the Karewa basin received sediments because of ponding of a pre-existing river system and the tectonic movements along the Great Himalayan Ranges in the north and the Pir-Panjal ranges in the south along active faults. About 1300 m thick sediments of largely fluvio-lacustrine, glacio-fluvio-lacustrine and eolian origin are exposed having evidences of neotectonically formed structural features such as folds and faults. Folds are more prominent in the Lower Karewa formation (Hirpur Formation) while faults (mostly normal faults) are abundant in the Upper Karewas (Nagum Formation). Drainage in the area varies from dendritic to anastomosing to parallel. Anastomosing drainage suggests sudden decrease in gradient while presence of linear features such as faults and ridges is evident by parallel drainage. Study of morphometric parameters such as stream length (Lsm) and stream length ratios (RL), bifurcation ratio (Rb), drainage density (D), form factor (Rf), circularity ratio (Rc), and elongation ratio (Re) also indicate intense tectonic activity in the recent past.

Keywords: neotectonics, morphometry, sediment deformation, Karewa deposits, Kashmir Valley

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INTRODUCTION

Karewa Intermontane basin was formed because of ponding and shifting of a pre-existing river system which was a result of intensified extensional tectonics along the Pir-Panjal Range. This further impounded the drainage, thereby eroding large amount of sediments from orographic barriers, which were then deposited in these basins. Sedimentation in the Karewa basin began at about 4 Ma, depositing 1300 m thick succession of sediments at a rate of 16 cm/1000 year to 64 cm/1000 year [12, 13]. The late stage tectonic readjustments are still continuing in the basin thereby giving rise to a number of neotectonic features.

Sediments of largely fluvio-lacustrine, glacio-fluvio-lacustrine and eolian origin are exposed having evidences of neotectonically formed structural features [10, 46]. Sedimentation in the Karewa basin has taken place episodically and two phases; in the first phase, the Lower Karewa (Hirpur Formation) was deposited, followed by a second phase of sedimentation leading to the deposition of the Upper Karewas (Nagum Formation) [39]. The Lower Karewa Group (Hirpur Formation) consists of plastic-grey to bluish

grey clay, light-grey sandy clay, green to purple sand, conglomerate, lignite and clay. The Upper Karewas (Nagum Formation) consists of fine to coarse greenish to purple sand, grey to ochre sandy clay, ochre and cream colored marl and gravel (Fig. 1).

A number of neotectonic features such as folds, faults, sand dikes, etc. are well preserved in the Pliocene-Quaternary sediments of Karewa basin. Folds are more prominent in the Lower Karewa formation (Hirpur Formation) while faults (mostly normal faults) are abundant in the Upper Karewas (Nagum Formation). The morphometric analysis of the Ningli and Dudhganga watershed reveals a very prominent structural control over the drainage in the area. The present work focuses on the study of the morphometric parameters and neotectonic signatures in the area, in order to determine the seismo-tectonic setting and the current tectonic scenario of the basin.

GEOLOGICAL SETTING

This area is a part of the Kashmir Nappe [50] and consists of Precambrian basement, over which lies a thick succession of fossiliferous Paleozoic and Triassic rocks (Fig. 2).

¹ The article is published in the original.