

The physical and magnetic polarity stratigraphy of the Skardu Basin,
Baltistan, northern Pakistan*

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Abstract

The Skardu Basin is a 250 km² intermontane basin in the Indus Valley, located in the Karakoram-Himalaya 75 km west of Nanga Parbat. Skardu Basin lies between the Main Karakoram and the Main Mantle Thrust Faults on terrain which has been attributed to an island arc caught between the colliding Indo-Pakistani and Eurasian Plates. The orientation of the combined Skardu-Shigar Basin System parallels the structural grain of the Karakoram Mountains. Basin evolution at Skardu was probably related to uplift downstream of the Nanga Parbat-Haramosh Massif.

The Bunthang sequence constitutes the sedimentary basin-fill record of the Skardu Basin and includes a basal till overlain in turn by 100 m of fluvial, 400 m of lacustrine, and 400 m of intertonguing fluvial and alluvial sediments. During the Pleistocene, these strata were almost entirely removed by fluvial and glacial erosion to below the present-day level of the basin floor. A Late Glacial moraine led to ponding of the Indus and consequent deposition of lacustrine sand and mud. More recent glaciation resulted in the deposition of other moraines and in the deformation of the lakebeds, which are currently being incised by the Indus.

Sampling to establish the magnetic stratigraphy was conducted using forty-four sites of from three to twelve samples per site. The sites were established in three separate stratigraphic sections, two of which are in undeformed sediments of the lower Bunthang sequence while the third section is in Skardu's youngest glacial lakebeds. All samples have been partially demagnetized: two thirds of the samples were magnetically cleaned in alternating fields of 200 Oe, and the remaining third were thermally demagnetized to 400°C. Neither fossils nor radiometrically dateable volcanic ash beds were found which would have allowed positive correlation between the magnetic polarity stratigraphy of the Skardu sediments and the magnetic polarity time scale. The magnetic polarity stratigraphy of the lower Bunthang sequence features a large (≥ 128 m) normally-magnetized interval overlying a similarly large (≥ 105 m) reversely-magnetized interval, in addition to several equivocal single-point reversals in the section. The age of the lower Bunthang sequence is bracketed between 8.2 ± 1.7 Myr, the fission-track annealing age of a plutonic rock within 2 km of the sampled locality, and the most recent reversed epoch of significant duration, which closes the Matuyama chron 0.72 Myr ago. The Bunthang sediments had begun to be deposited before the end of the Matuyama chron, implying that they are in part temporally equivalent to the Karewa Group of the Kashmir Basin 150 km southwest of Skardu.

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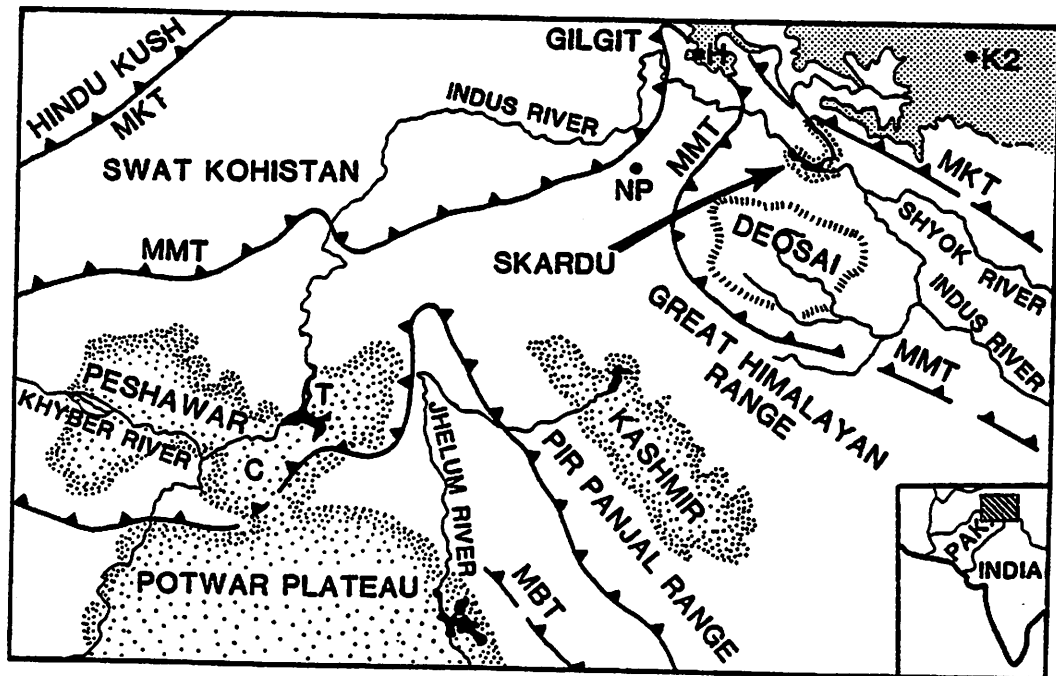


Figure 1. Location map of several major intermontane basins in northern Pakistan and India (scale 1:4,000,000). Identity of symbols is as follows: H = Haramosh (7397 m); K2 = Mt. K2 (8612 m); NP = Nanga Parbat (8126 m); T = Tarbella Reservoir; C = Campbellpore Basin; MKT = Main Karakoram Thrust; MMT = Main Mantle Thrust; MBT = Main Boundary Thrust; gray area in upper right corner is the Karakoram glacier system. After Lawrence (1981), Burbank (1982), and Zeitler and others (1982b).