Zeitschrift: Eclogae Geologicae Helvetiae
Herausgeber: Schweizerische Geologische Gesellschaft
Band: 96 (2003)
Heft: 2

Artikel: Geology of the NW Indian Himalaya
Autor: Steck, Albrecht
Kapitel: 1: Introduction
DOI: https://doi.org/10.5169/seals-169014

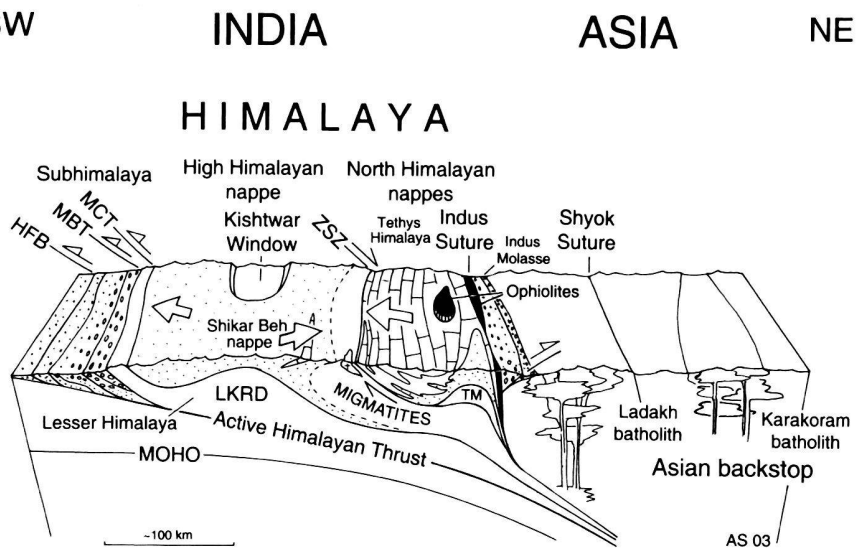

Fig. 1. The main tectonic units of the NW Indian Himalaya
HFB = Himalayan Frontal Boundary
LKRD = Larji-Kullu-Rampur dome
MBT = Main Boundary Thrust
MCT = Main Central Thrust
ZSZ = Zanskar Shear Zone

1. Introduction

In 1964, Gansser based his compilation, in form of a geological map, updated by Fuchs in 1981, at a scale of 1:2'000'000 and his famous monography on the Geology of the Himalaya, on the classical geological work produced by the Geological Survey of India and various international expeditions (Fig. 1). Tourism development during the seventies opened the still poorly known NW Indian Himalayan regions of Himachal Pradesh and Ladakh to new geological studies by American, Austrian, Australian, English, French, Indian, Italian and Swiss researchers.

Since 1979, geologists of the University of Lausanne have carried out a complete and continuous traverse across the Himalayan range between Leh, north of the Indus-Tsangpo suture, and Mandi at the southern border of the frontal thrusts of the High and Lesser Himalayan nappes (Fig. 2), using a multidisciplinary approach combining classical methods, such as geological mapping, stratigraphy, structural geology, petrography, with modern techniques, such as geochemistry, geochronology and thermo-barometry. The new geological data from the NW Indian Himalaya limited by the Ladakh batholith to the N, the Srinagar basin in Kashmir to the W, the Indus-Ganges molasse to the S and Tibet to the E, have been compiled on a geological map at a scale of 1:677'000 (Plate 1). The French Spot satellite images and the 1:250'000 U.S. Army map of India and Pakistan have been used as the topographical base and for toponyms.

The first part of this study describes the stratigraphy and magmatism of the Protolith of the Himalayan range in a chronological order and separately for the main tectonic units (Chapter 2, Fig. 3). The second part deals with the tectonic units, their emplacement and the related metamorphism, magmatism and synorogenic sedimentation. A tectonic model is presented in a concluding chapter.

2. Pre-Himalayan tectonics, sedimentation and magmatism

The Lesser Himalaya

The Lesser Himalayan units, the Lower Crystalline nappe, the Kishtwar, Larji-Kullu-Rampur units and their equivalent, the Chail nappes, the Jaunsar nappe and the Simla-Runkum nappe are composed of a Proterozoic sedimentary sequence deposited on the northern margin of Gondwana and are associated with, or intruded by 1'870-1'900 Ma S-type granites (Frank et al. 1995, Valdiya, 1995). The Ordovician granites, widespread intrusives in the High Himalayan Haimanta or Phe formation, are lacking. In Fig. 3 and 4, the author proposes a synthetic stratigraphic column ranging from early Proterozoic to an Eocambrian age, mainly based on review papers by Brookfield (1993), Frank et al. (1995, 2001), Miller et al. (2000), Srikantia & Bhargava (1998). This sedimentary sequence belongs to the northern part of the North and Central Indian Purana basin. No elements of its basement, the Archean Indian shield, has been observed in the Himalaya (Valdiya, 1995).

The Rampur Formation (Jhingran et al. 1952)
(Proterozoic)

The Rampur Formation is considered to be the basal and probably also oldest formation in the Himalaya. It consists of massive beds of white quartz-arenites alternating with thin layers of sericite and chlorite schists, locally associated with metarhyolites and metabasaltic dikes and lava flows (Rampur basic volcanics, 1'800 ± 13 Ma, U-Pb ages on single zircon, Miller et al. 2000). For Miller et al. (2000), it is not clear whether the Rampur formation quartzites are unconformably overlying the Bandal granitoid complex (Srikantia and Bhargava 1998, Sharma, K.K. & Rashid 2001) or whether the granitoids intrude these Quartzites (Sharma, V.P. 1977, Guntli 1993). The emplacement of silicic volcanites and of S-type per-