

METAMORPHISM OF THE INVERTED SEQUENCE IN HIMACHAL HIMALAYA: A STUDY FROM THE KULLU-ROHTANG PASS-KHOKSAR SECTION by D. Rameshwar Rao and N.S. Gururajan. *Jour. Geol. Soc. India*, v.56, 2000, pp.633-649.

J. Swami Nath, 15B, Oceania Apts., Thiruvalluvar Nagar, Chennai - 600 041 comments:

While the paper, backed by laboratory data, is interesting, it makes no reference to the book "Geology of Himachal Pradesh" by S.V. Srikantia and O.N. Bhargava (*Geol. Soc. India*, 1998, pp.271-280) wherein the metamorphic aspects of the same area were discussed. Perhaps, this book was about to be published and the authors had no access to it as their paper was originally received by the Society on 11th Nov. 1998. However, when being revised and finally accepted for publication on 14th July 2000, the authors of the paper might have availed of the opportunity of discussing the views expressed in the book also, which they can do now, to enlighten those interested on this aspect of Himalayan geology.

D.S. Rameshwar Rao and N.S. Gururajan, Wadia Institute of Himalayan Geology, Dehra Dun 248 001 reply:

With reference to the comments of Shri J. Swami Nath on our paper we would like to state that when our paper was communicated to the Journal, the publication of *Geology of Himachal Pradesh* by S.V. Srikantia and O.N. Bhargava (1998) was not available. Subsequently when our paper was sent for revision, we revised the paper on the basis of the comments and suggestions given by the referees. So we did not have an opportunity to refer to the views expressed by S.V. Srikantia and O.N. Bhargava on reverse metamorphism in their book.

As per the suggestion of J. Swami Nath, we discuss the following points on reverse metamorphism in reference to the views expressed by S.V. Srikantia and O.N. Bhargava (1998). These authors have classified the allochthonous crystalline rocks of Himachal Pradesh into four crystalline nappes. According to them, the Kullu, Salkhala and Jutogh nappes have emerged from beneath the high grade Vaikrita crystalline unit of Central Crystalline Zone that represents

the root zone of the crystalline nappes, occupying the main orthographic axis displaying high-grade metamorphism. The Vaikrita unit is well exposed in Kullu-Rohtang-Kohksar section and all the evidences point to a progressive Himalayan (Tertiary) metamorphism of the metasedimentary rocks. Srikantia and Bhargava (1998) are of the opinion that during the post-collision period, the Cenozoic Barrovian metamorphic sequence of the Central Crystalline Zone started moving southwest. Due to the differential movement of the lithostratigraphic units, the basal part moved faster over the Lesser Himalayan tectogen and brought about rapid cooling and retrogression while the higher units lagged behind, thereby exhibiting the reverse metamorphism.

In the study area, we have grouped the crystalline rocks into one single unit, namely the Higher Himalayan Crystalline unit, since we did not perceive any break in metamorphism across the crystalline units described by Srikantia and Bhargava (1998). Our P-T data, indicating decrease of P-T conditions away from the metamorphic core, substantiate the observations made by Thoni (1977) and Srikantia and Bhargava (1998, p.271). We have described the various models proposed by different workers to explain the reverse metamorphism in our paper (pp.645-646) and the viable model according to us is syn- to post-metamorphic folding and thrusting.

We would like to add that though the commentator's view on the reverse metamorphism based on the work of Srikantia and Bhargava (1998) is reasonable, we feel that it will be too lengthy to discuss the various models published in recent literature.

References

- SRIKANTIA, S.V. and BHARGAVA, O.N. (1998) *Geology of Himachal Pradesh*. Geol. Soc. India, Bangalore, 406p.
 THONI, M. (1977) *Geology, structural evolution and metamorphic zoning in the Kullu valley (Himachal Himalaya, India)* with special reference to the reversed metamorphism. *Mitt. Ges. Geol. Bergabustud, Osterr.*, v.24, pp.125-187.