An Approach to the differential erosion at the upper contact of the Jhelum Group across the Salt Range and Trans-Indus ranges and a comparative study of the Post-Cambrian Rocks between Upper Indus Basin and Peshawar Basin

Hameed ur Rehman; Muhammad Hanif; Muhammad Ishaq and Mukhtiar Ghani
National Center of Excellence in Geology, University of Peshawar
h.rehman@skz.co.jp

Abstract

The time span from Eocambrian to Cambrian let Peninsular India the part of East Gondwanaland to deposit a thick expanse of sedimentary rocks. These deposits covering the entire lesser Himalayan and Vindhyan Basin of India covering the Aravalli regions. The whole extant of these deposits is known as Purana cycle of sedimentation. The deposits of Salt Range Formation and Jhelum Group belong to the Purana system. During the end of early Cambrian, the Purana cycle stopped its sedimentation due to the global recession and tectonism. The emplacement of Cambrian-Ordovician Granites forms the Pan-African orogeny which cover almost 10,000 square km of area including the region of Pakistani Himalayas. Pan-African orogeny caused the uplifting of most of the Indian Peninsular above the sea level and the sea was limited to the northern part only where the Pre-Permian deposition of Peshawar Basin and Kashmir Basin occurred.

In Salt Range and adjoining areas the denudation of Jhelum Group started since they exposed to the surface conditions. This denudation of Jhelum Group prevailed until the Carboniferous when the whole assembly of the Gondwanaland drifted to the South Pole and embraced the glacial environment. This glaciation deposited the Early Permian Tobra Formation in Pakistan and Talchir Boulder in India. The unconformable erosional contact between the Jhelum Group and overlying Tobra Formation in the Salt Range and Trans- Indus ranges is not regular and continuous. In Khisore Range the Tobra Formation overlies the Khisore Formation (an upper part of Jhelum Group) and in Surghar Range it directly overlies the Salt Range Formation of Pre-Cambrian age. In Western Salt Range Tobra Formation overlies the lower Cambrian Khewra Sandstone and in Central and Eastern Salt Range it overlies the Jutana and Baghanwala formations respectively.

The irregularity of the Cambrian-Permian boundary in Salt Range and Trans- Indus ranges arise due to two reasons i.e. the denudation period during the uplifting of Pan-African orogeny caused the irregular extensive erosions of the Jhelum Group in most of the western salt range and Surghar Range and bequeath the soft sediments of Khisore Formation in Khisore Range and soft Baghanwala Formation in Eastern Salt Range. Thus it is deduced that a river system may had been evolved due to Pan-African orogeny which was locally limited to the western Salt Range flowing through the area of Surghar Range and finally found its way to northern Tethys. The second possibility arise due to the late Carboniferous Glaciation which may have eroded away the Central Salt Range more than Eastern and Western Salt Range. This can be evident from the thick deposit of Tobra Formation in Western Salt Range and thin deposit in Eastern and Trans Indus ranges. Bore hole data suggested that the glacial body during Carboniferous was extended from south to north in Peninsular-India from Aravalli Range to Salt Range. Across the whole Salt Range, the glacial body attained its maximum thickness in western part and tapering to both sides of Salt Range.

During the Early-Permian an incursion of the sea happened and found its way along a narrow depression extended from north to south-west and a second depression from south to north-east and thus established a sagging of the Peninsular-India including Salt Range and a thick succession of Permian carbonate deposited. In Peshawar Basin and lesser Himalayas this was the time of rifting and Panjal Volcanism which was continued across the Peninsular-India until Cretaceous. Due to this

volcanism the Permian succession was not developed in Peshawar Basin and present in Salt Range and Trans-Indus ranges. The gape of missing sedimentary rocks from late Cambrian to Early Permian is present in Salt Range while the missing package of Post-Permian sedimentary succession in Peshawar Basin is present in Salt Range and Trans- Indus ranges.