

**THE PALEOENVIRONMENTAL ANALYSIS AND DIAGENETIC STUDY OF
CALLOVIAN BATHONIAN SAMANA SUK FORMATION, TRANS INDUS RANGES,
PUNJAB, PAKISTAN**

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Abstract

The Samana Suk Formation is recognized as the most prominent stratigraphic unit in the Upper Indus Basin of Pakistan. The Sequence is extensively exposed in the Hazara Kashmir basin and southward extended to Lower Indus Basin with different nomenclature. It is an integral part of the Mesozoic era. For present comprehensive examination, the Chichali Nala section of the Surghar Range is chosen. Based on field, petrography and geochemical analysis it is concluded that the Formation possesses two decent lithologies i.e. limestone and dolomites. The dolomites are secondary in nature therefore only limestone unit is examined for the paleoenvironmental analysis. For the first time in the Indus Basin, the petrographic results are integrated with geochemical results for paleoenvironmental analysis. Based on the petrographic observation various microfacies are developed and interpreted. The Grainstone microfacies represent the near shore, high energy, shallow water bar, beaches and shoals environments. The Wackestone microfacies characterizes inner shelf environment below fair-weather wave base. The high bioclasts fragments of Grainstone and Wackestone microfacies signify stormy influence in the environment of deposition. Based on flora and fauna and physical factors, overall environment of deposition is professed to be inner to middle shelf environment. The trace element geochemistry is performed to find out the relation between the sea level fluctuation trace element content. The trace element shows a good response to the sea level fluctuations. The Sr values show the salinity level which increases and decrease with sea level. Likewise, the Fe and Mn values indicating the detrital influx which display a positive response to the sea level fall and rise. The Mg and CaCO_3 curves also show a positive correlation in diagenetically unaltered unites. The diagenetic fabrics are deeply studied by linking field, petrographic and geochemical observations. The above-mentioned signatures reveal that the dolomitization is only restricted to the faulted zone. It is assumed that the fluid moves along the weak faulted horizon from the below clastic succession. The X-Ray diffraction peaks results show that the crystals of the dolomites are not well developed. Overall, the diagenetic fabrics and geochemistry show that the stratigraphic unit is subjected to shallow marine fresh diagenetic phase to deep burial diagenetic phase.

Keywords: Samana Suk Formation, Paleoenvironment, Diagenesis, Geochemistry