

LATE PERMIAN AND EARLY TRIASSIC SEQUENCE STRATIGRAPHY OF THE NORTHERN INDIAN MARGIN

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Abstract

The Northern part of Great-India has been subject to an early rifting phase in the late Paleozoic, just at the end of the large scale Gondwanian glaciation. The beginning of the rifting processes is marked by large hiatus and discontinuities (paraconformities) between the early or middle Paleozoic sedimentary succession and the discontinuous middle-late Permian Traps and transgressive sediments. The N. Indian passive margin consists of the present High and Lower - Himalaya and small part of the Indian craton and their sedimentary cover (from Zanskar, Chamba, and Kashmir synclinoria to the Salt Range) and belong to an upper plate separated from a lower plate (Ladakh and Karakoram continental crust with their former sedimentary cover) at the end of the Permian time ¹). The Permian rift shoulder is to located in the N Lahaul - Kashmir Himalaya, and part of it in the underthrust Lower Himalaya. The rim basin (landward of the shoulder) is developed in the Pottawar - Salt Range area.

From rifting to early drifting stages (early late Permian to early Triassic time), the sedimentary evolution is characterised by three transgressive-regressive (T-R) second order cycles. These overlie the Panjal Traps plateau basalts which were deposited during the Murgabian time on the broad rift shoulder.

The first T-R cycle (upper Murgabian to lower Dzhulfian) is fully developed on the rim basin and consists of the transgression and the growth of the Wargal shallow carbonate platform. On the rift shoulder, this T-R cycle is present only in Kashmir with the sandy limestone of the Member A and B of the Zewan Formation. In Central Nepal, this cycle is recorded in the terrigenous Thini Chu Formation.

The second T-R cycle (Dzhulfian-Lower Changhsingian) corresponds to a sudden terrigenous influx occurring both on the rift side and on the land side. A shallow water clastic ramp is developed in the rim basin (Chhidru Formation) and overlies the Wargal shallow carbonate platform. To the North, the submerged part of the shoulder develops an offshore mixed clastic carbonate deltaic complex, -the upper Zewan Formation (Member C and D). On the emerged part of the shoulder, the marine Kuling sandstone and shales are transgressing on older sediments. This T-R cycle, with the marine submersion of the shoulder, indicates the beginning of the thermal subsidence and the transition to the drifting stage.

The regressive phase of this second cycle is due to an important sea level drop at the end of the Permian. Continental alteration with ferrigenous deposits are recorded in some areas (Salt Range, Spiti).

The third T-R cycle belongs to the Lower Triassic and is characterized by an important change in sedimentation. The first transgressive sediments consist of high energy dolomitic grainstones with glauconite and reworked quartzarenite (Lower Kathwai Membre) in the Salt Range area, of thin bedded Claraia limestones and shales with "Permian Brachiopods" overlain by black shale with ammonoid limestone lenses in Kashmir (Member E1 and E2 of the Khunamuh Formation) and of highly condensed nodular limestone (Otoceras beds) in the Tethys Himalaya (basal Tamba Kurkur Formation). A generalisation of the pelagic limestone deposition corresponding to the maximum flooding surface is realised 2MY later at the beginning of the Late Induan time with the Lower Ceratite limestone in the proximal part of the margin (Salt Range) and thin, condensed limestone in the distal part.

¹)Baud, A., Marcoux, J. & Stampfli, G. (1989). Late Permian-Early Triassic Tethyan margin of India: Evolution from rifting to drifting (Salt Range, Kashmir, Zanskar traverse). 28th Int. Geol. Congress. Washington., Abstract 1, 103.