

Triassic-Jurassic boundary: Evidences from the Tethyan Salt Range, Pakistan and correlation with Europe

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Abstract

The Early Jurassic Datta Formation, Salt Range, Pakistan, represents dominantly siliciclastics with some carbonate accumulations. The lower contact of the formation is disconformable throughout its extent, with various older rocks (Precambrian to Triassic in age) and in the Salt and Trans Indus ranges, it disconformably overlies the Triassic Kingriali Formation. The geological evidences from western Salt Range display abrupt emergence and associated facies dislocation, along a type 1 sequence boundary, from dominantly marine succession of the Kingriali Formation (dolomite) to pure fluvial/continental succession of the lower part of the Datta Formation. The basal part of the formation contains conglomerates and pebbly sandstones with channel fill features and erosive bases and contains angular, poorly sorted clasts of dolomites derived from the underlying Kingriali Formation. The presence of a thick laterite bed, having bohemite, kaolinite and similar minerals further indicates weathering under continental and tropical conditions (i.e. emergence). This interface represents the Triassic-Jurassic boundary, an event of global significance and well-established in Europe, represented by erosion, karstification, channels with erosive bases and reworked clasts of the underlying Triassic sediments. In England, the marine Hettangian Blue Lias Formation rests on an eroded top of the Rhaetian Penarth Group, with the upper Lilstock Formation being partly or wholly missing and reworked limestone clasts at the base of the Blue Lias have been discovered. In northern Frankonia (Bavaria) of Germany, fluvial Hettangian occurs in marine channels cut into Rhaetian sandstones and clays and is overlain by marine Hettangian of the planorbis Zone. An end-Triassic regressive pulse is recognised in the Danish Basin; in southern Sweden and north-west Poland, the Upper Rhaetian is missing and an unconformity exists at the base of the Jurassic. In the Northern Calcareous Alps of Austria, widespread emergence at the end of the Triassic is also recognised with the creation of karst surfaces on emergent reef complexes and erosion and channeling is present. The Triassic-Jurassic boundary (Hettangian) GSSP in Austria includes a regressive marine red shale interval on top of the Rhaetian (Schattwald Formation) terminating in a sea-level lowstand, followed by transgressive Hettangian strata. This stratigraphically significant sea-level event coincides closely with one of the five biggest mass extinction events in the Phanerozoic. However, the event has been overlooked by Haq et al. (1987), who recorded no significant sea-level change across the system boundary. The presence of sedimentological evidences for the globally present Jurassic-Triassic boundary, invites a robust biostratigraphic (i.e. palynostratigraphic) study of the Datta Formation to establish the chronostatigraphic order of the unit with respect to the European time-equivalent successions.