Stratigraphic and Paleogeographic Evolution of the Carnian–Norian Succession in the Spiti Region (Tethys Himalaya, India)

POSTER

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During the 1992 expedition to Spiti Valley we studied in detail the Carnian- Norian units (Tropites Beds, Alaror Group) in Pin, Parahio and Spiti (Kiato) valleys. Here we present the preliminary results of the facies analisys.

Stratigraphic distribution of lithofacies allowed recognition 45 carbonatic, terrigenous and ironstone sedimentary events, correlated through in the area between Kiato and Muth.

"Tropites Beds". The unit is subdivided into three members. The lower one (maximum thickness 165 m) shows high-frequency pelites- carbonates cycles (2/20 m thick) arranged in two possibly third- order shallowing upward cycles (70-95 m thick) with oolites and oncolites carbonates at the top are present. The middle member (maximum thickness 207 m.) is characterized by a mainly terrigenous central part. It consists of terrigerous-shallow water carbonate cycles better developed in the lower and upper portion. A phosphate horizon divides the succession in two third-order shallowing-upward cycles. The upper member is almost exclusively carbonatic with mainly low to high energy subtidal platform environments with common oolitic-calcarenitic bodies (maximum thickness of 158 m at Kiato). In the lower part bryozoan debris and dolomitic stromatolitic limestones occur, whereas open platform oolitic grainstones are predominant in the upper part. The upper member displays transgressive-regressive evolution.

The "Tropites Beds" is characterized by more proximal environments in Pin Valley (Muth). Thickness and terrigenous detritus increase in the Parahio Valley, whereas more external and relatively deeper facies have been recognized toward the NW (Kiato).

Preliminary foraminifera and conodont biostratigraphic results confirm (Bhargava, 1987) a mid to late Carnian age for the two lower members (Epigondolella echinata) and a Norian age for the third member, (Metapolygnatus nodosus at the top the middle member).

Alaror Group (Srikandia et al.,1981). This group (Quartzite s.l. of Jadoul et al.,1990) includes the "Juvavites Beds", "Coral Limestone" ,"Monotis Shales" and the "Quartzite Series" of Fuchs (1982). The lower boundary is paraconformable to disconformable and marked by breccias (Hal village). The lower part ("Juvavites Beds" and "Coral Lst.") reaches a maximum thickness in the Kiato area (150-160 m). Hybrid arenites and siltites contain major limestone intercalations in the middle part and at the top (Coral Lst.). One minor and one major ironstone layers are well developed in the Pin Valley. This marker is less evident in Parahio Valley, and it disappears northward where it passes to pelites with phosphatic nodules (Kiato). This transgressive layers are followed by pelitic interval locally containing calcareous beds full of vertebrate ribs or bioclastic calcarenites with ammonoids. Two shallowing-upward cycles are recognized: the first is comprised from the top of "Tropites Beds" to the base of the major ironstone/phosphatic material. The second cycle, reaching up to the "Coral Limestone", mostly consists of bioturbated marls and siltstones.

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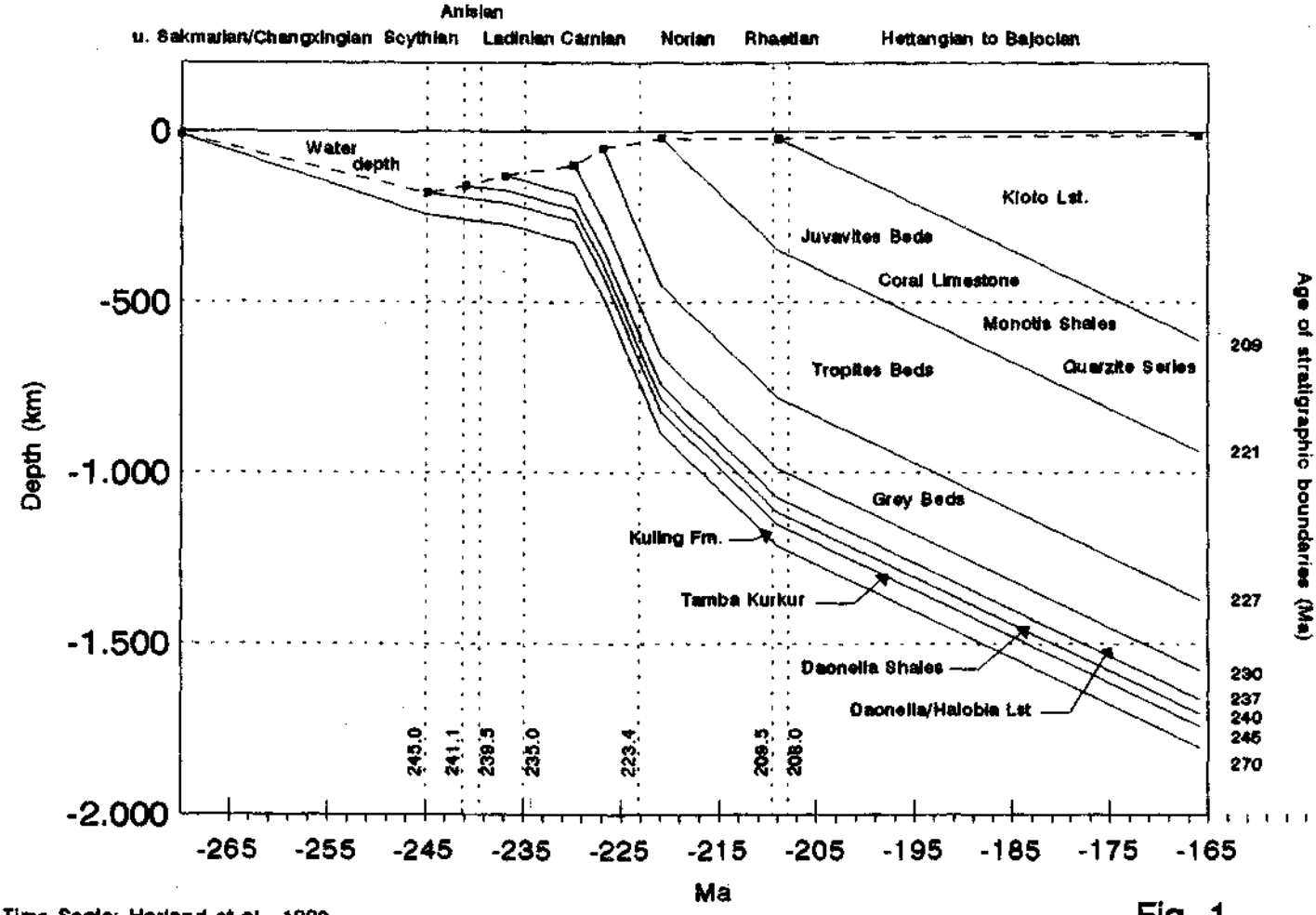
The "Coral Limestone" is discontinous in the Pin Valley where it is commonly replaced by bioclastic calcarenites-rudites; in the Kiato section it is represented by bioturbated dark limestones.
Facies analisys testifies the transition from shelfal and hybrid deposits to offshore pelitic sediments towards the N whith deposition in deeper environments.
The upper part of the Alaror Group is an overall shallowing- upward cycle, passing from pelites to increasingly sandstones layers and finally to about 50 m hybrid quartzarenites, locally containing Megalodons ("Quartzite Series s.s."). Sedimentary evolution from the upper member of the "Tropites Beds" to the top of the Alaror Group compares closely with the western Zanskar succession (Zozar Fm. and "Quartzite Series s.l".).
The Late Triassic succession of Spiti points out to high subsidence rates (fig.1) documenting a stage of tectonic extention affecting the Indian passive continental margin: this episode appears to be a geodynamic marker all along the Tethys Himalaya from Zanskar to Nepal (Garzanti et al.,1992).



Time Scale: Harland et al., 1990

Fig. 1

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