Early Triassic sedimentary evolution, carbonate carbon isotope changes and ammonoid recovery: records from Southern China block and the Northern Indian margin

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The Early Triassic sedimentary evolution of ammonoid-rich, outer platform settings shows striking similarities between the Northern Indian Margin (NIM) and the South China Block (SCB). As indicated by paleomagnetic reconstructions the latitudinal position of the NIM was about 30°S and that of SCB was near the equator during Early Triassic times. An average distance of about 5000 km can be assumed between the two areas (*e.g.* Smith *et al.*, 1994 and Golonka & Ford, 2000).

In our study we illustrate, with lithological, paleontological and chemostrati-graphical tools the resemblance between these two distant sedimentary basins.

The studied sections are situated in the Triassic marine sedimentary units of Spiti (Losar section, Himashal Pradesh, India (NIM)) and in the Guangxi Province (Jinya section, South China (SCB)), respectively. The Early Triassic deposits in Losar overlie transgressively the Late Permian. They comprise the Griesbachian "*Otoceras* beds" limestone, early Smithian "*Flemingites* beds" limestone, and a succession of dark shales alternating with thin-bedded, thickening upward micritic limestone. The Spathian consists of medium-bedded, nodular micritic limestone overlained by ammonoid-rich hard-grounds of Anisian age (Himalayan Muschelkalk). The Losar carbon isotope profile illustrates 3 main positive excursions: the first one is located near the base of the *Flemigites* beds, the second one is close to the Smithian/Spathian boundary and the third one is located in the lower part of the Anisian (Atudorei 1999).

The Early Triassic sedimentary sequence in Jinya (SCB) is represented by a succession of dolomitized limestone of Dienerian age, transgressively overlying the Permian-shallow water strata. The Smithian is largely composed of dark shales alternating with thin-bedded micritic limestones. This series is interrupted by an interval of proeminent shale-free, thin-bedded limestone ("*Flemingites* beds"). The Spathian is characterised by medium-bedded, highly bioturbated ammonoid-rich limestone containing several volcaniclastic layers. Finally the transition to the mudstones of Anisian stage is marked by a siliceous-nodular facies ("Transition beds"). The carbon isotope trend of Jinya displays a striking similarity with that of Losar with (1): a well defined, sharp positive excursion near the Smithian/Spathian boundary and (2): a low amplitude positive excursion within the "Transition beds". Unfortunately the $\delta^{13}C_{carb}$ values from the "*Flemingites* beds" in Jinya are highly variable and without any consistent stratigraphic trend.

Consequently, we presume that changes in the sedimentary record of the two widely separated basins are most probably controlled by synchronous large scale factors. A common tectonic control over the two sedimentary records can be reasonably excluded during Early Triassic times.

Our tentative explanation for these similarities involves (1): a uniform, humid and hot climate on the tethyan realm controlling the predominantly clastic sedimentation during the Griesbachian/Late Smithian interval. Ideally this hypothesis should be corroborated by palynological data which are still wanted; (2): the interruption of the clastic input documented during the Spathian may conceivably result from reduced run-off from the hinterland, thus entailing a decreasing of atmospheric precipitations; (3): a reorganization of spatial distribution of ammonoids, with a marked increase toward latitudinally restricted distributions from the Smithian-Spathian boundary on. This drastic change in biogeographic pattern also entails a steepening of the gradient of the sea surface temperatures; (4): a synchronous variation in the global chemistry of seawater (*i.e.* biological productivity) and a disruption of stratified waters through the reactivation of oceanic currents (*i.e.* end of anoxic conditions); (5): a synchronous sea level rise coupled with a probable progradation of the carbonate platforms during the Spathian.

References

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