The Cenomanian-Turonian boundary event in southern Tibet

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In southern Tibet, macrofossils can not be used to define the Cenomanian/Turonian boundary due to their rare preservation. The present study has identified three planktonic foraminiferal zones around the boundary. The C/T boundary has been placed within the W. archaeocretacea Zone. It is indicated by the first occurrence of Helvetoglobotruncana praehelvetica and the changes of both diversity and abundance of faunas.

Global mass extinction and bio-recovery occurred during the Cenomanian-Turonian transition and its affects have been documented in the Tethys Himalayan region. This event is recorded in the Lengqingre and Xiawuchubo Formations of southern Tibet. The former, characterized by its high organic carbon content, is a group of dark shale with marl intercalations, and the latter shows a series of rhythms of greenish gray shale and marl. This transition section contains the *R. cushmani, W. archaeocretacea* and *H. helvetica* Zones. The Cenomanian/Turonian boundary is in the *W. archaeocretacea* Zone at the uppermost part of the Lengqingre Formation..

Foraminiferal fossils are well preserved in the strata and are dominated by planktonic taxa. The mass extinction in the region occurred stepwise in the upper *R. cushmani* Zone and lower *W. archaeocretacea* Zone. Bio-recovery happened in the upper *W. archaeocretacea* and *H. helvetica* Zones of the base Turonian, where the abundance of foraminifera fluctuates in 11 rhythms. The recorded changes of foraminifera represent stressful environmental conditions. Increasing oxygen depletion caused stepped extinction or temporary disappearance at the top of Cenomanian. Contraction and weakening of the oxygen-minimum zone from early Turonian allowed the recolonisation of new fauna. Abundance fluctuations of foraminifera are sensitive palaeoceanographic indicators responding to changing palaeotemperature, salinity, nutrient and oxygen conditions. The 11 abundance fluctuations in the recovery interval of Turonian may reflect the Milankovitch cycles.

The characteristics of Geochemistry in those strata show that tremendous changes occur in mid-Cretaceous ocean. The carbon, oxygen, strontium and U, Th, K isotope composition of marine rocks are mainly controlled by global events, such as relative amount of organic accumulation, changes in seafloor spreading rate and palaeoclimate variation. ^{13}C curves of Gamba and Tingri are characterized by low-high-low cycle change. The positive excursion of ^{13}C coincides with sea-level rises, accumulation of organic carbon and oceanic anoxic event. The curves of U, Th, K indicate that their contents are higher during oceanic anoxic period because of increase of organic materials and clay minerals. Low $^{87}Sr/^{86}Sr$ ratio in mid-Cretaceous coincides with the tectonic activity. Mid-Cretaceous in southern Tibet is a period of short time expansion of the Tethyan Ocean, and related to the global sea level rising. Consequently, large amount of organic carbon was accumulated and oceanic anoxic event occurred.

Temporal and spatial distribution patterns and crust - mantle interaction processes in the Mesozoic magmatic - metallogenic belt along the Yangtz River, Anhui Province

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ABSTRACT

Temporal and spatial distribution patterns of the magmatic rocks and associated ore deposits in the Mesozoic magmatic - metallogenic belt along the Yangtz River, Anhui Province are used to determine and discuss the crust - mantle interaction processes. The magmatic rocks are Cu - Au mineralized high - K calc - alkalic intermediate - acidic (CAK) and Fe - Cu mineralized high - Na alkalic - calc intermediate - basic intrusive rocks (FCN) in the central part of the belt and grade to Cu - Mo - Pb - Zn - Ag mineralized calc - alkalic granitoids (CMG) and A - type granites (AG) in the southern and northern parts of the belt. Samples from the CAK and CMG yield Rb - Sr isochron ages of 137 ~ 140Ma with $(^{87}Sr/^{86}Sr)_0$ = 0.7060 ~ 0.7101, while those from the FCN and AG yield the ages of 120 ~ 129Ma with $(^{87}Sr/^{86}Sr)_0$ = 0.7047 ~ 0.7077.

The Sr isotope ratios, Cr/Th ratios (1.4 ~ 3.1), Eu/Eu* ratios (0.79 ~ 1.05) and initial epsilon (Nd) values (-16.6 ~ -6.3) for the CAK and CMG are consistent with magma derivation from old metamorphic basement rocks rich in metallogeric elements through a two - stage process of mantle - derived magma underplating caused by primary lithosphere extension and subsequent partial melting. On the basis of Sr isotope data, Cr/Th ratios (3.4 ~ 13.8), Eu/Eu* ratios (0.86 ~ 1.13) and initial epsilon (Nd) values (-7.7 ~ +1.4), the FCN and AG are considered to be formed through syntexis with material input from the mantle that resulted from further lithosphere extension followed by mantle - derived magma underplating on a large scale.