

Response of East Asian Late Mesozoic lake systems to the destruction of the North China Craton

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The destruction of the North China Craton during the Late Mesozoic, has been seen as paradigm of the destruction of an ancient craton of the world. There are numerous different-sized Late Mesozoic terrestrial basins, almost completely preserved and oriented subparallel to NE- to NNE-trending fault zones (the Tan-Lu fault system) in NE China, SE Korea, SW Japan, and even in the northeastern part of southeastern Far East of Russia. In these basins, the strata consist of cyclic lacustrine deposits, intercalated with numerous volcanic and volcanoclastic rocks, yielding various fossils, including the famous Jehol Biota. These deposits also yield very significant coal and oil reserves. By means of research into the corresponding relations of biological, geologic, environmental, and coal and oil accumulation events recorded in the basins, the relationship of response of Late Mesozoic lake systems to the destruction of the North China Craton were revealed.

The main phase of the destruction of the North China Craton occurred during the Hauterivian–Barremian. Such destruction created the Tan-Lu fault system and a series of basins as well as violent volcanism, and marine transgressions along or subparallel to the fault system. During the late Early Cretaceous, the successive marine transgressions and flooding along the Tan–Lu fault system in northeast China led to a humid climate across all northeastern China. These transgressions and climatic conditions produced a number of extensive and long-lasting swamps and marsh lands, in both paralic and limnic environments, allowing the animals and plants to thrive, and controlling the distribution of the biota. New taxa originated in, or migrated into these settings. Angiosperms appeared and the flowers attracted numerous insects. The seeds, fruits and nuts produced, together with the insects and adjacent forest, were attractive to vertebrate animals including birds and dinosaurs. Large molluscs, ostracods, fishes and reptiles thrived in the lakes and swamps. Luxuriant plant and thriving animal growth led to the accumulation of abundant organic matter in the respective deposits. As a result, a number of late Early Cretaceous coal basins and oil fields formed in northeast China. Volcanism and sea-level changes modified environmental parameters of the basins and even changed the overall ecosystem causing some taxa to become extinct and others to adapt and evolve. The ashes and peak transgressions during sea-level highstands caused the anoxia in the basins which were very advantageous to fossil preservation.