Impacts of the Early Jurassic Toarcian Anoxic Event (T-OAE) on the Floras in Northern China

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Abstract

The Early Jurassic Toarcian Anoxic Event (T-OAE) has been well-documented in the Tethys, Boreal, Panthalassa and the South Hemisphere. However, the impacts of this event to the terrestrial ecosystem has been poorly known. The North China Plate was uplifted in the Middle-Late Permian and it was dominated by typical land ecosystem through the whole Mesozoic. The terrestrial Jurassic strata are extremely developed and well exposed in this region. During the past two decades, the authors carried out a series of investigations on the Jurassic stratigraphy, palaeontology and palaeoenvironment of Northern China and have revealed that the T-OAE had markedly impacted on the terrestrial ecosystem in the region, and particularly the vegetation evolution.

1. Markedly decrease in specific diversity of the floras

The Lower Jurassic (Liassic) in Northern China is dominated by coal-bearing deposits, which is extremely rich in plant fossils. The Liassic floras were greatly abundant and highly diverse. They usually consisted of more than one hundred species, including mosses, lycopods, horsetails, ferns, ginkgoes, cycads, conifers and seed ferns. In contrast, the Toarcian floras greatly declined in diversity, which usually comprised less than two or three dozens of species, much lower than that of the Liassic floras. However, after the Toarcian event, the floras in Northern China recovered and reached their maximum abundance and diversity by the Bajocian age of the Middle Jurassic. They usually comprised more than 100 species and even 200 species.

2. Sharply increase of thermophilous or arid-tolerant (xerophilous) elements

The Liassic floras in Northern China were dominated by ferns and ginkgoes, with a fewer or even totally absence of thermophilous or arid-tolerant (xerophilous) taxa, usually less than two or three percentages of the total species of the floras. In contrast, the Toarcian floras greatly declined in diversity, which usually comprised less than two or three dozens of species, much lower than that of the Liassic floras. However, after the Toarcian event, the floras in Northern China recovered and reached their maximum abundance and diversity by the Bajocian age of the Middle Jurassic. They usually comprised more than 100 species and even 200 species.

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by small leaves, thick cuticles and markedly sunk stomata. After the Toarcian crisis the thermophilous or xerophilous plant mostly disappeared from Northern China and the floras were again dominated by ferns and ginkgoes. The vegetation evolution in Northern China through the Early Jurassic was coursed by the ecosystem changings, particularly the climate, which were inked with the T-OAE in ocean.

**Keywords:** Toarcian of Early Jurassic, Oceanic Anoxic Event, Vegetation evolution, Impacts, Northern China