Preface

—Jurassic of China and Environs: Stratigraphy, Basin History, and Paleoenvironment

The Jurassic is a geologically very complicated period in Earth history, spanning from 200 to 145 Ma. The Pangean supercontinent and even the Gondwana-land broke up, and the violent circum Paleo-Pacific (Yanshan) orogeny and the collisions between Paleo-Pacific margins took place, both accompanied by extensive volcanism that may have been the cause of major environmental and biotic changes. With the rifting of the Pangea, North America drifted northwestward, narrowing the Pacific, and the North Atlantic opened, resulting in the formation of the Hispanic epicontinental seaway along the rifting area between North America, South America, and Africa and providing a corridor (Hispanic Corridor) for migration and exchange of biota between the Tethys and Paleo-Pacific. Sea-level was undergoing eustatic oscillations superimposed upon an overall significant sea-level rise from the Hettangian to the Tithonian in Europe and America. However, great regressions, especially during the Middle-Late Jurassic, occurred in middle and East Asia, and parts of North America, where the Jurassic terrestrial ecosystems were established. Atmospheric CO₂ concentration during the Jurassic was high, and the climate got warm and humid, which resulted in the formation of large quantities of coal and oil, even in the high latitude areas. In particular, latitudinal temperature gradients were increased during the Jurassic, and by the Late Jurassic the latitudinal influences became so pronounced that the animal world was segregated into the Tethyan, Boreal, and other faunal realms during the Late Jurassic. Such a separation of the world into different realms and the regressions in Asia on a large scale have caused the difficulties in establishing the GSSPs for Upper Jurassic stages and the base of Cretaceous, and also the problems in correlating the non-marine to marine Jurassic, including dating of non-marine Jurassic strata and geological events. In addition to major environmental changes, there were great biotic changes during the Jurassic including the major biodiversity variation represented by mass extinctions during the end-Triassic, Pliensbachian-Toarcian and end-Tithonian as well as the subsequent recovery of life in both marine and terrestrial ecosystems.

In order to highlight the importance of marine and non-marine Jurassic for understanding of the evolutionary trends of both life and Earth history, to provide a forum for enhancing international cooperation on Jurassic research, and to promote and produce the multidisciplinary research results on the Jurassic System, the IGCP project 506 (Marine and Non-marine Jurassic: Global Correlation and Major Geological Events) was approved in 2005. In connection with the project, eight international symposia have been held in Asia, Europe, and Africa, and numerous articles and two monographs have appeared in various international journals and presses, discussing marine and non-marine Jurassic stratigraphic correlation, marine and non-marine Jurassic boundary definitions, and major Jurassic events and their stratigraphic records, patterns and causes. Of particular note are two special issues that are devoted to the project: *Marine and Non-marine Jurassic: Boundary Events and Correlation* (edited by Jingeng Sha, Yongdong Wang and Susan Turner, 2006. *Progress in Natural Science* 16 (Special Issue)) and *The Jurassic: Climate and Biodiversity* (edited by Vivi Vajda and Susan Turner, 2009. *GFF* 131 (1 and 2)).

From the Late Triassic onward, an extensive regression took place in Asia, mainly caused by the Indo-China movement. During the Jurassic, most parts of China became land, and rivers and lakes formed, these being usually very large in the west but small in eastern China. The Tethys was limited to what is now the Qinghai-Tibet Plateau, southwestern China, which includes Tibet, southern Qinghai, and western Yunnan provinces. On the east of the Chinese continent there were three Jurassic embayments opening into the northwestern Paleo-Pacific Ocean: an Early Jurassic lingual embayment in Guangdong-Jiangxi, extending northwards from Hong Kong and Guangzhou to southwestern Hunan and western Fujian, and two small and narrow Late Jurassic-Early Creta-

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ceous Suibin and Dong'an embayments in the northeastern corner of eastern Heilongjiang, northeastern China. The Nadanhada terrane in eastern Heilongjiang, and probably Taiwan Island, were inundated by the Paleo-Pacific Ocean during the Early-Middle Jurassic. All marine Jurassic stages, including the strata spanning the Triassic-Jurassic and Jurassic-Cretaceous boundaries, are recorded on the Qinghai-Tibet Plateau, though the facies varies from abyssal to marginal marine depending on geographic locations and ages.

The terrestrial Jurassic sediments contain abundant fossils such as plant mega- and micro-fossils (including spores and pollen grains, charophytes, and dinoflagellate cysts), gastropods, bivalves, conchostracans, ostracods, insects, and vertebrates (including dinosaurs). It is composed mainly of fluvial and lacustrine clastic rocks, which bear thick coal beds in the north but only thin coal seams in southern China. The Jurassic volcanic rocks are common in eastern China but they are rare or even absent in the west. Furthermore, the marine Jurassic rocks (e.g., in the Tanggula Mountains and Hohxil, northern Qinghai-Tibet Plateau) are intercalated with non-marine beds with freshwater fossils such as the unionids (*Bivalvia*), and the terrestrial Jurassic deposits are associated with brackish-water or even marine fossil-bearing intercalations in some cases (e.g., in the Junggar Basin of northern Xinjiang, northwestern China).

Japan was attached to a part of eastern China located on the northwestern Paleo-Pacific margin, suffering the transgressions from the ocean during the Jurassic. Thailand, a neighbor of southern China, was located at the northeastern margin of the Tethys, linking the northeastern Tethys with the northwestern Paleo-Pacific. India is a neighbor of southwestern China today, but was situated in the southwestern Tethys in the Southern Hemisphere, connecting with Gondwana during the Jurassic. Russia spanned the boreal and subboreal areas, and it extended westwards from the northwestern Paleo-Pacific margin to Europe during the Jurassic, resembling the present conditions. The Far East of Russia was part of the northwestern Paleo-Pacific margin and connecting with China in the southern part.

Consequently, China and its neighbors mentioned above are the critical areas to investigate the global Jurassic marine and non-marine correlation and geological history of life, tectonics, paleogeography, and paleoclimate.

Fourteen articles are gathered in this special issue *Jurassic of China and Environs: Stratigraphy, Basin History and Paleoenvironment*. Seven papers are mainly on the stratigraphy, including the correlation of non-marine and marine deposits crossing the Jurassic-Cretaceous boundary of Sanjiang-Middle Amur basin; correlation of Upper Jurassic Volgian (containing Jurassic-Cretaceous boundary) of Northern Hemisphere on the basis of ammonites and belemnites; Late Jurassic radiolarian stratigraphy of southwestern Japan; Jurassic interbasinal correlation of western India; Late Paleozoic and Mesozoic (including the Late Jurassic) palynofloral stratigraphy of western Bengal, eastern India; Jurassic insect evolution and its stratigraphic significance of northeastern China; and Middle Jurassic conchostracan ontogeny and stratigraphy of Sichuan, southwestern China. Two articles, "Jurassic sedimentary features and tectonic settings of southeastern China" and "A synsedimentary structure formation model for the Far East Jurassic-Early Cretaceous basins and uplifts, Russia", figure the basin history of southeastern China and the Far East of Russia. Five papers discuss paleoenvironment, including mollusks dispersal events and paleoenvironment in the course of the end-Triassic mass extinction in the Tibetan Himalaya; Jurassic faunal associations, paleoecology, and paleoenvironment of western Thailand; Late Jurassic ammonite evolution and paleoenvironment of the Russian Platform; and Middle Jurassic Paleo-CO₂ concentration and paleoelevation based on morphology, stomatal analysis and carbon isotope discrimination of plants (including *Ginkgo* and *Solenites*) from northwestern China.

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