Jurassic Sedimentary System Transition in Western Sichuan Foreland Basin and Its Evolution Model

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ABSTRACT

During Jurassic sedimentary period, the climate of Western Sichuan Foreland Basin was hot and arid. Influenced by differential squeezing of the plates, surrounding mountains uplifted successively, and foredeep depression migrated continuously. Tectonism was able to control the migration of provenance area, further determining the distribution of sedimentary system in different periods. Based on a large number of field outcrop, logging, core and assay data, this study illustrates the provenance characteristics and sedimentary system transition of Western Sichuan Foreland Basin. Meanwhile, the sedimentary evolution model of Western Sichuan Foreland Basin is established by gaining enlightenment from the modern sedimentation on the northern margin of Tarim Basin. The results show that: (1) in this period, two types of sedimentary systems were primarily developed in the study area, i.e., Early Jurassic alluvial fan-fluvio-normal delta-lake sedimentary system and Mid-Late Jurassic alluvial fan-fluvio-shallow delta-lake sedimentary system. (2) In the Early Jurassic, the foredeep depression of Foreland Basin was located in front of Micang Mountain, where Longmen Mountain massif in the short axis acted as the main provenance area; in the Middle Jurassic, the foredeep depression of Foreland Basin migrated to the front of Daba Mountain, where Daba Mountain in the long axis and Longmen Mountain massif in the short axis were major provenance areas of the study area; in the Late Jurassic, the foredeep depression of Foreland Basin migrated to the front of the northern segment of Longmen Mountain again, where the northern segment of Longmen Mountain in the long axis and Longmen Mountain massif in the short axis were major provenance areas of the study area. (3) The provenance distribution characteristics, i.e., “coexistence of long axis and short axis, sand convergence of near source and far source”, were confirmed. On this basis, this study establishes two Jurassic sedimentary evolution models of Western Sichuan Foreland Basin, i.e., large basin-deep lake model in the Early Jurassic rejuvenated foreland basin and large basin-small lake model in the Mid-Late Jurassic rejuvenated foreland basin.