Chronology of Tectonic Movement of Cratonic Basin: Insight from New Evidences from Ordos Basin, North China

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Craton is the stable unit of the lithosphere. The cratonic basin is thus the sedimentary basin developed upon craton. It has long been recognized as a kind of basin characterized by minor tectonic deformation and stable architecture. With the increasing evidences in the recent years, it is noticed that it has much more mobility, and is controlled not only by the lithospheric plate movements but also by the deep mantle activation. To explore the mobile behaviour of cratonic basin is an important window to address the intra-continental deformation mechanism. Taking the Ordos basin as an example, based on the new deep boreholes, the high-resolution seismic reflection profiles, cores, and the outcrops around the basin, the paper establishes the chronology of tectonic movement around the Ordos basin utilizing the integrated method of the isotopic dating, the bio-stratigraphy, and the sequence stratigraphy. It shows that, the basin developed the ten regional unconformities, underwent multi-period volcanic activities during the Middle Proterozoic, the late Early Paleozoic, the Late Triassic, and the Early Cretaceous. It was subjected to multi-stage compression, such as the Late Ordovician to Devonian, the Late Triassic, the Late Jurassic to Early Cretaceous, and the Neogene to Quaternary. Upon the crystalline basement of the Archaean and the Lower Proterozoic, the basin underwent five distinct extension-compression cycles, such as the extension in middle Proterozoic and compression in late Proterozoic, the extension in Cambrian to early Ordovician and compression in late Ordovician to Devonian, the extension in Carboniferous to middle Triassic and compression in late Triassic, the extension in early to middle Triassic and compression in late Jurassic to Cretaceous, and the extension in Paleogene and compression in Neogene to Quaternary, with a charter of a much longer period of the earlier cycle and a shorter period of the later cycle, and a longer period of extension and a shorter period of contraction in each cycle. The extension-compression cycle controlled the formation and evolution of the Ordos oil and gas super basin.