Earliest Devonian marine environments and ecosystems of northeastern Gondwana: insights from lithofacies and trace fossils of the Lower Devonian Xiaxishancun Formation of Yunnan, China

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Abstract

Strata deposited during the Silurian-Devonian transitional interval in the Qujing area, Yunnan, China, were assigned to the Yulongsi and Xiaxishancun formations. Unlike the underlying Yulongsi Formation, the Xiaxishancun Formation contains a large number of sandstones, indicating a significant increase in terrestrial input. Six sections of the Xiaxishancun Formation were studied, leading to the identification of three facies associations: mudstone-dominated facies association, heterolithic facies association and sandstone-dominated facies association. Storm deposits are common, indicating a shallow marine delta to shelf environment that was frequently affected by storm events. Sediments that were deposited with decreasing hydrodynamic energy after storm events and under the influence of fair-weather waves contain abundant trace fossils, including Bergaueria, Chagrinichnites, Chondrites, Conichnus, Conostichus, Cruziana, Dactyloidites, Didymaulichnus, Diplichnites, Kouphichnium, Lockcia, Lophoctenium, Monomorphichnus, Oravaichnium, Olivellites, Palaeophycus, Parundichna, Planolites, Protowirgularia, Ptychoplasma, Rusophycus, and Selenichnites. Our findings reveal a more flourishing benthic community than previously appreciated during the earliest Devonian, when storm deposits were common in low-latitudes of northeastern Gondwana.

Keywords: South China, Gondwana, Lower Devonian, Xiaxishancun Formation, trace fossils, storm deposits

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