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*, *Lockeia*, *Lophoctenium*, *Monomorphichnus*, *Oravaichnium*, *Olivellites*, *Palaeophycus*, *Parundichna*, *Planolites*, *Protovirgularia*, *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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