

## **Multiscale Stratigraphic Analysis of the Lower Wufeng-Longmaxi Formation in the Sichuan Basin**

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### **Abstract**

The lower Wufeng-Longmaxi formation is currently one of the major unconventional resource targets in China. The deeper burial depth and structural complexity of the formation increase the difficulties of producing hydrocarbons from the formation. This research studies the stratigraphic variations of the outcrop of the formation which is exposed in the Sichuan Basin.

A number of methods are employed which include outcrop Gamma-ray spectrometry measurement, petrographic analysis, X-ray Diffraction analysis, X-ray Fluorescence analysis and organic geochemical studies. Based on the data, the outcrop comprises several lithofacies, which is dominated by clay- to silt-size particles. The general lithofacies are documented on the basis of mineralogy, fabrics, paleontology, and texture: 1) muddy limestone; 2) wavy-laminated siliceous siltstone; 3) discontinuously-lenticular mudstone; 4) relatively planar-laminated muddy shale; 5) massive siliceous mudstone; 6) black, organic-rich mudstone. Pyrite laminae and graptolite with pyritization are present in the formation, especially in the lenticular and massive mudrock facies while the upper member also contains a few carbonate concretions and calcite-mineralized fractures. The lower Wufeng-Longmaxi formation is interpreted to be deposited in an outer shelf to deeper water slope setting with water shallowing-upward through time. Hyperpycnal flow, debris flow, suspension fall-out, and pelagic rain-out of carbonate with reworking currents resulted in the different facies.

With integration of all the data, a depositional model with sequence stratigraphy analysis is to be generated for illustrating the stratigraphic evolution of the formation, allowing for better understanding the formation and predicting the stratigraphic variations within the areas with less well data control.