

## Late Ordovician-early Silurian carbon cycle and response of black shale deposition

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Late Ordovician-early Silurian is one of the geological turning points of earth history, including the Gondwanan “Snowball Earth” and extinction event. And also The Wufeng-Lungmachi black shale formed in Yangtze platform during this period is the main target for shale gas exploration and production in south China. The link between the shale characteristics namely TOC, mineral component or  $\delta^{13}\text{C}_{\text{org}}$  with the global  $\text{CO}_2$  cycle may provide us another way of seeing the global climate change during the “Snowball Earth” event.

The TOC,  $\delta^{13}\text{C}_{\text{org}}$  and trace element datas are used to analyze the co-evolution of the palaeoenvironment, the atmosphere  $\text{CO}_2$  content, and the ocean carbon storage. Negative drift of  $\delta^{13}\text{C}_{\text{org}}$  is found both in the lower Wufeng and lower Lungmachi black shales and obvious positive drift in the Guanyinqiao member argillaceous limestone with Hirnantia fauna in the end of Ordovician. The  $\delta^{13}\text{C}_{\text{org}}$  drift is consistent with the evolution of glacial event. The positive drift occurred when the glacier reach its maximum and negative drift in the interglacial period. The consistence indicate that the atmosphere carbon storage was increased (presumably caused by volcanic activity ) during interglacial period leading to the greenhouse effect, glacier melting and then the sea level rise which contribute to the deposition of the black shale in the Yangzi platform.

TOC data of the shale with the most negative  $\delta^{13}\text{C}_{\text{org}}$  drift is apparently higher than the shale with lower or positive drift. The  $\delta^{13}\text{C}_{\text{org}}$  drift show that the atmosphere carbon storage in interglacial period was higher than glacial period. When the  $\text{CO}_2$  concentration in the atmosphere increases, the temperature will rise and will causes a large number of microorganisms to bloom. Also the high  $\text{CO}_2$  concentration will lead to acidification of the oceans which corporately lead to the major ocean carbon storage in this period is organic rather than carbonate pools.