

# Vertical weathering characteristics of surface samples of shale gas reservoirs-A case study of Longmaxi Formation shale, in Xishui, Guizhou Province, China

YU Zhong-bin<sup>1-2</sup>, GU Yuan-tao<sup>1,2</sup>, NIE Xin<sup>1</sup>, QIN Zong-hua<sup>1</sup>, YU Wen-bin<sup>1</sup>, WAN Quan<sup>1\*</sup>

(1. *Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550081, China;*

2. *University of the Chinese Academy of Sciences, Beijing 100049, China*)

**Abstract:** Weathering of shale is known to be a very complicated process. Because of the significant alteration in organic matter and mineral composition, etc., surface samples do not fit the purpose of resource evaluation directly. While most previous studies focused on the impact of shale weathering on environment by using outcrop samples, its influence on the assessment of shale gas resource was much less investigated. Considering lower Silurian Longmaxi Formation black shale is a promising shale gas reservoir, we have collected 5 meters of core samples of such shale from Xishui County, Guizhou Province, China and systematically examined the vertical weathering characteristics of superficial shale samples using major and trace element analysis, XRD, TOC, thermal analysis, SEM, and etc. We found that samples from the survey site at different depths including 0m (surface), 0.5~1.5m and 2~5m exhibited varying degree of weathering, i. e., severely weathered, moderately weathered and arguably unweathered, respectively. Therefore, in the early assessment of shale gas resource, sampling of fresh shale below 2m is highly recommended. This work has revealed the vertical weathering pattern of the Longmaxi Formation shale in Xishui, Guizhou, which will provide a scientific basis for the practices of preliminary assessment of shale gas resource as well as associated field sampling.