

# Pliocene cold seep carbonates from western foothills, southwestern Taiwan

L. GE<sup>1\*</sup> AND S. Y. JIANG<sup>23</sup>

<sup>1</sup>Institute of Isotope Hydrology, School of Earth Sciences and Engineering, Hohai University, Nanjing 210098, China (\*correspondence: gelu211@163.com)

<sup>2</sup>State Key Laboratory of Geological Processes and Mineral Resources, Faculty of Earth Resources, China University of Geosciences, Wuhan 430074, China

<sup>3</sup>State Key Laboratory for Mineral Deposits Research, Department of Earth Sciences, Nanjing University, Nanjing 210093, China

Methane-derived carbonate precipitation is a striking phenomenon at hydrocarbon seeps on active and passive continental margins worldwide, which indicates a particular geological history involving discharge of geofluids. Different types of cold seep carbonates occurred in the Pliocene shallow marine succession (the Yanshuikeng Formation) exposed in Chiasian, Western Foothills in the southwestern Taiwan. Petrology and geochemistry of these carbonates were studied, including petrology, mineralogy, C and O stable isotopes.

The carbonates are classified into two types based on morphology: (1) small isolate chimneys developing in perpendicular to beddings, and (2) Large carbonate mounds consisted of stacked carbonates crusts. Carbonate samples are mainly composed of carbonate minerals, clay minerals and terrigenous quartz and feldspar. Crusts are mostly consisted of dolomite, showing that they were formed in source fluids with low sulfate concentrations and high Mg/Ca ratios. Crusts have strongly depleted  $\delta^{13}\text{C}$  values (-50‰~ -40‰), indicating a biogenic-methane carbon source. The main minerals of small isolate chimneys vary from inner (mostly calcite) to outer (mostly dolomite). The  $\delta^{13}\text{C}$  values of small chimneys vary from -30‰ to -20‰, revealing the possible mixture of biogenic methane and organic carbon. Variations of oxygen isotopic compositions (-2.0‰~ 3.6‰) of all samples possibly reflect a <sup>18</sup>O-depleted fluid source.

From our data, it is obvious that Chiasian carbonates which are induced by anaerobic oxidation of methane, can be used to indicate the seepage of a cold seep system in Western Foothills, the southwestern Taiwan.

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