Paleoenvironment Research of Quaterary Period using fluid inclusion in Puding stalactite of karst cave, Guizhou Province, China

N.Q. ZHOU[1,2], Y.Q. TANG[3] AND B. LIU[3]

[1]Dept. of Hydraulic Engineering, Tongji University, Shanghai 200092 China (nq.zhou@tongji.edu.cn)
[2] Institute of Geotechnical Engineering, University of Stuttgart, Pfaffenwaldring 35, 70569 Stuttgart, Germany
[3]Dept. of Geotechnical Engineering, Tongji University, Shanghai 200092 China (tangyiqun2@tongji.edu.cn, liubinbgt@126.com)

Fluid inclusions are widely spread throughout the chemical sediments of karst caves. These fluid inclusions, formed during the course of chemical sedimentation, contain a great deal of important information about paleoenvironmental evolution and climatic transition. The stalactite samples of Puding karst cave in Guizhou Province, formed during the Quaternary epoch, were collected to study the characteristics of fluid inclusions found inside different laminas. Using the thermodynamic method, the constitutional equilibrium constants of fluid inclusions, the fluid density ratio, the component content ratio, and the different solubility are used to determine whether the fluid component in the inclusion of the karst cave sediments leaks or not. The homogeneous characteristic of gas-liquid inclusion inside the karst cave sediments is analyzed and the uniform temperature of the inclusion captured in the single phase is used to calculate the thermodynamic parameters, including temperature and pressure values that were in place when the fluid inclusion had been captured. This process provides a way to obtain information about the climate and hydrographic environment – the air temperature, pressure, concentrations of CO_2 and pH value, concentrations of HCO_3 and CO_2 of the underground water solution, and saturation of $CaCO_3$ and $MgCO_3$ – in Pleistocene Period. It presents the relationship between the hydrographic environment among crystal movements and climatic changes, paleoenvironmental changes, luxuriance and degeneration of vegetation, and the underground water property, which is of great scientific value and theoretical significance. This allows for the reconstruction of the Paleoenvironment of the Quaternary Period.

This study was supported by the National Basic Research Program of China (No.2006CB403203). The authors gratefully acknowledge the scientific and technical department of the People' Republic of China for funding this project.

Organic geochemistry of oils from the Junggar Basin of Northwestern China

S.X. ZHOU[1]*, B.Z. WANG[1,2], Z.X SONG[1,2] AND J. LI[1,2]

[1]Key Laboratory of Gas Geochemistry, Institute of Geology and Geophysics, CAS, Lanzhou, 730000 (*correspondence:sxzhou@lzb.ac.cn)
[2]Graduate University of CAS, Beijing, 1000049

The Junggar basin of northwestern China contains abundant petroleum resources, whose oil and gas are generated from source rocks of Carboniferous, Permian, Jurassic and Tertiary age. Analyses of 96 oil samples from more than 16 fields mainly located in western, central, southern and eastern part of the Junggar basin revealed that carbon isotopic compositions of crude oils from the Junggar basin are in the range of -27–-33‰, most values are -29–-30‰. Combined with biomarker compositions of oils, four genetic oil types could be divided. Main type oils generated from three Permian source rocks (Jiamuhe, Fengcheng and Wuerhe Formation) occurred in oilfields of western margin and central area of basin. Another important types of oils with heavier carbon isotopic values (-26–-28 ‰) and higher Pr/Ph (>2) are present in eastern Fukang sag, Dushanzi oilfield, Dongdaohaizi sag and Qigu oilfield, which are derived from Jurassic coaly organic matter.

Thermal maturity sequences of oils from a single source rock can be used to estimate pathways of oil migration, oils formed in the late stage are more mature than oils formed in the early stage. Based on the stable carbon isotope signatures and Ro values calculated from methylphenanthrene indicator of oils, the directions of oil migration have also been obtained in the central area of the Junggar basin. The oils from Shixi, Shinan, and Mobei oilfields mainly migrated from west of Pen-1 sag. However, Moshuwan oilfield are more complex, petroleum migrated and mixed from several directions inluding west of Pen-1 sag, Changji sag and possible dongdaohaizi sag.

This work was supported by partly by the Chinese National Major Fundamental Research Developing Project (2006CB202305), the Important Direction Projects of Knowledge Innovation, the Chinese Academy of Sciences (KZCX2-YW-Q05-03-05) and the Chinese National Natural Science Foundation (40572088).