Biomarker study of depositional environment during the formation of organic rich source rocks of Nenjiang Formation, Songliao Basin of China

JIANGTAO GUO[1,2], ZHIGUANG SONG[1] AND LI WANG[1,2]

[1]SKLOG, Guangzhou Institute of Geochemistry, Chinese Academy of Science, Guangzhou, 510640 China (*correspondence: guojt@gig.ac.cn)

[2]Graduate University of Chinese Academy of Science, Beijing, 100049

Depositional enviroment study of the organic rich petroleum source rocks in Songliao Basin of China has long been a major concern for the understanding of the massive lacustrine petroleum source rock formation. The previous understanding of the organic rich source rocks were deposited under fresh to brackish water condition has been challenged as there were suggestion that marine incursions may have significant influence on the formation of massive lacustrine source rock in Songliao Basin. This study aimed to use the source and environmental specific biomarkers as major approaches and to reconstruct detailed depositional condition in the duration of the massive lacustrine source rocks formation. By careful analyses of biomarkers in the core sedimentary samples from the continuous drilling hole in the Songliao Basin, a number of source and environmental specific biomarkers were detected. hese source and environmental specific biomarkers include gammacerane, pristane, phytane, 4-methyl steranes, dinosteranes, benzohopanes and a number of aryl isoprenoids as well as isorenieratane. The occurrence and distributions of these biomarkers on the profile strongly suggest that a stratified water column were permanently existed during the deposition of organic rich source rocks. This water stratification was characterized by both oxygen depletion in the bottom water which even extended into the photo zone of upper water column and a higher salinity of bottom water column than that of upper layer water.

This study is supported by State '973' Project (2006CB701404).

Multiple growth of titanite in response to lower crustal thickening and recycling

J.L. GUO[1], S. GAO[1,2]*, W.L. XU[3], Z.C. HU[1], H.L. YUAN[2], Y.S. LIU[1] AND K.Q. ZONG[1]

[1]State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Wuhan 430074, China (*correspondence: sgao@263.net)

[2]State Key Laboratory of Continental Dynamics, Department of Geology, Northwest University, Xi'an 710069, China

[3]School of Earth Sciences, Jilin University, Changchun 130061, China

Titanites from eclogitic xenoliths in the Xu-Huai region of the North China craton were determined *in situ* for U-Pb age using LA-ICP-MS. They can be divided into primary and secondary, exsolution-free and -rich types. They are depleted in HREE, indicative of equilibrium with garnet. In an amphibole-bearing garnetite, eight large primary titanites give three major concordant age peaks at 230 Ma, 214 Ma and 203 Ma, which correspond to the core-to-rim age variations. In a garnet clinopyroxenite, small titanites yield one major concordant age peak at 157 Ma and two minor peaks at 203 Ma and 134 Ma. In another garnet clinopyroxenite, exsolution-free and -rich titanites yield indistinguishable lower intercept ages of ~160 Ma.

Previous studies show that Triassic collision of the Yangtze craton beneath the North China craton formed the Dabie-Sulu ultrahigh-pressure metamorphic belt and the Xu-Huai eclogitic xenoliths, which foundered in Jurassic [1, 2]. The above core-to-rim age zonation well corresponds to the ages of peak eclogite-facies metamorphism and exhumation of the Dabie-Sulu belt. The ~160 Ma and ~134 Ma ages agree with the thermal-magmatic activities caused by the proposed Jurassic delamination [1] and the magmatic zircon age of the host porphyry [3], respectively. Thus, the titanites record a complete history of eclogitic xenoliths from formation to destruction and later entrapment. This cannot be resolved by zircons from the same suite of xenoliths, which are small and rare and have very low U-Th concentrations with large analytical uncertainties in age dating.

[1] Gao *et al*. (2004) *Nature* **342**, 892–897. [2] Xu *et al*. (2006) *Geology* **34**, 721–724. [3] Xu *et al*. (2004) *Acta Geol. Sinica* **78**, 96–106.