Understanding the contrasting geochemical features of the crust in the Jiangnan orogen

XIAO-LEI WANG [1*], GUO-CHUN ZHAO [2], JIN-CHENG., ZHOU [1], JIN-HAI. YU [1]

[1] State Key Laboratory for Mineral Deposits Research, Department of Earth Sciences, Nanjing University, Nanjing 210093, PR China, wxl@nju.edu.cn (* presenting author)

[2] Department of Earth Sciences, The University of Hong Kong, Pokfulam Road, Hong Kong, gzhao@hkucc.hku.hk

The primary uniform South China Block (SCB) was formed due to the Neoproterozoic amalgamation between the Yangtze Block to the northwest and the Cathaysia Block to the southeast, as recorded by the Jiangnan orogen (JO) in the interior of the SCB [1]. A significant crustal heterogeneity is confirmed here by the zircon Hf and whole-rock Nd isotopes for the rocks from the western and eastern segments of the JO. The Neoproterozoic granitoids of the eastern segment have positive zircon $\varepsilon_{Hf}(t)$ and neutral whole-rock $\varepsilon_{Nd}(t)$, obviously contrasting to the rocks from the western segment that show moderate negative epsilon values. This is also consistent with the whole-rock $\varepsilon_{Nd}(t)$ results for the low-greenschist-facies metamorphosed basement sequences in the JO. U–Pb dating results for detrital zircons constrain the duration of these sequences at ca. 0.86–0.82 Ga, obviously later than the timing of arc-continent collision in the area. Hf isotopes of the detrital zircons imply consistent crustal growths at 1.00–0.85 Ga and 2.60–2.45 Ga for both segments. However, another crustal growth at 1.75–1.50 Ga is significant for detrital zircons from the western segment. This growth period is absent in the Yangtze Block, but appears in the southern part of the Cathaysia Block. These U-Pb dating and Hf isotopic results suggest that the arc-continent collisional belt may have been the dominant source for the sequences in both segments but there exists an additional source from the Cathaysia Block and its adjacent continents (India and Antarctic?) for the western segment of the JO. Moreover, the 1.9–1.7 Ga and 2.6–2.4 Ga age peaks of the JO are consistent with those of the Cathaysia Block, while the age peaks of 3.0–2.7 Ga and 2.1–1.9 Ga that are characterized for the Yangtze Block are unmatched in the JO. Therefore, the basement sequences in the JO have close affinities with the crust of (1) the arc-continent collisional belt and (2) the Cathaysia Block and its adjacent continents during early to middle Neoproterozoic. More incorporation of old recycled crusts from the Cathaysia Block led to the more unradiogenic isotopic features of the basement sequences in the western JO.

[1] Wang et al. (2007) *Precambrian Res.* **159**, 117-131.

Changes in fire regimes on Chinese Loess Plateau since the last glacial maximum and implications for linkages to paleoclimate and past human activity

XU WANG [1*], ZHONGLI DING [1], AND PING'AN PENG [2]

[1] Key Laboratory of Cenozoic Geology and Environment, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China, xuking@mail.iggcas.ac.cn (* presenting author)

[2] Guangzhou Institute of Geochemistry, Chinese Academy of Sciences, Guangzhou 510640, China

A high-resolution black carbon (BC) record from 27.5 kyr BP to present was reconstructed using a chemical oxidation method on loess and paleosol samples from the Lijiayuan section of the Chinese Loess Plateau. The black carbon mass sedimentation rates (BCMSR) and carbon isotopic record reveal a paleofire history and its relationship with climate and vegetation changes at the study site. The BCMSR record was decomposed into two components: background BCMSR and the BCMSR peaks. The background BCMSR represents regional fires and shows high fire activities occurred contemporaneous with the Younger Dryas, Older Dryas, Heinrich events and Greenland stadials as registered in the loess grain size record. This suggests a rapid response of regional fires on the Loess Plateau to abrupt climate changes. Spectral analysis of background BCMSR showed two meaningful periodicities of 1620 and 1040 years, close to the cyclicity of the East Asian monsoon as recorded in the stalagmite $\delta^{18}O$ record in Central China. This indicates a tight control of millennial scale wet–dry changes in the monsoonal climate on regional fires on the Loess Plateau. By contrast, the BCMSR peaks are considered to reflect local fire episodes. The occurrences of local fires were more frequent during the last glacial period, with a maximum frequency of ~6 episodes/1000 years during the Last Glacial Maximum (LGM) (22.3 to 14.6 kyr BP), when the climate was drier and more continuous grassy fuels existed on the landscape. During the last glacial–interglacial transition (LGIT) period (14.6 to 11.0 kyr BP), fire frequency was largely reduced due to an increase in precipitation and more woody vegetation. If the LGIT period is taken as an analog for the projected near future, then future global warming alone may not produce large wildfires in northwestern China. Wildfires remained infrequent during the early-to-middle Holocene. Biomass burning increased after 4.0 kyr BP, when the climate became drier and land-use was more intensive. BC carbon isotope ratios may well reflect changes in the vegetation being burnt (i.e., grasses versus trees), yielding results consistent with the associated pollen data in the region.

This work is finnacially suported by National Basic Research Program of China (973 Program) (No: 2010CB950204) and National Science Foundation of China (grant 40502019).