Melt percolation in Songshugou ultramafic massif

J.F. LIU[1], W.D. SUN[2] AND Y. SUN[1]

[1]The State Key Lab of Continental Dynamics, Department of Geology, Northwest University, Xi'an, 710069, China (ljfnwu2002@163.com)

[2]Guangzhou Institute of Geochemistry, Chinese Academy of Science, 510640, China (weidongsun@gig.ac.cn)

The Songshugou ultrmafic massif is located to the north of the Shang-Dan fault, intruding into the Proterozoic Qinling Group in the eastern Qinling Mountains, central China. It is the largest Alpine-type ultramafic body in China, covering an area of ~20 km^2. Remarkably, this massif consists mainly of dunite (~80%) with minor harzburgite, and olivine diopsidite etc. Harzburgite occured as lens in the dunite, while olivine diopsidite occurred as vein in the margin of the body.

The formation and textonic affinity of the Songshugou ultramafic massif is very important for understanding the formation and evolution of the Qinling orogenic belt. Published results however, do not agree with each other [1-3], leading to different models for the early history of the Qinling orogenic belt and the interaction between the North and South China blocks.

Here we show LA-ICP-MS for olivine grains of a transition from dunite to harzburgite in the Songshugou ultramafic massif, show compositional variations. Ni and P are lower, whereas Sc, and incompatible elements, Ti, V, Cr, Rb, Sr, Y, Zr, Nb, Pb and REE, are higher in olivine grains in dunite than those in harzburgite. These observations can be plausibly interpreted by reaction of lherzolite and/or harzburgite with melt through porous percolation flow at high melt/rock ratios, similar to the melt percolation model proposed for dunite in other places [4,5].

The north Qinling orogenic belt is believed to be the result of backarc collision [6]. We propose that the Songshugou massif was part of the depleted mantle wedge peridotite during the early subduction along the Shan-Dan fault, which was intensively recasted through melt percolation. These results provide more constraints on the evolution of the Qinling orogenic belt.

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The Paleoclimatic records of stalagmite traced by stable isotopes from Liangfeng cave in Southwest, China

Q.M. LIU[1] AND S.J. WANG[2]

[1]School of Biotechnology Engineering, Jimei University, Xiamen, China (qmliu@xmu.edu.cn)

[2]Institute of Geochemistry, Chinese Academy of Sciences, Guiyang, China. (sjwang@ms.gyig.ac.cn)

Speleothems especially stalagmite are important repositories of Paleoclimatic and Paleoecological-Paleoenvironmental data. Based on the systematical studies of the sedimentary characteristics and the stable carbon (oxygen) isotopes, the Paleoclimatic Records of stalagmite from Liangfeng cave (E108°02′29″, N25°16′21″) in Southwest, China, have been made, which gives records from 14220 to 1570 aBP as follows:

14220-10500 aBP, Among Last Glaciation to Holocene, theδ^{13}C values of stalagmite varies from –9.314‰ to –7.290‰, average -8.552‰. Theδ^{18}O values of stalagmite varies from –5.651‰ to –6.942‰.

10500-9300 aBP, The temperature increased after the end of Younger Dryas, the δ^{13}C values of stalagmite varies from –10.377‰ to –9.267‰, average –9.910‰, the vegetation above Liangfeng cave be dominated by C_3 plants. The δ^{18}O values of stalagmite decreased obviously, varies from –7.420‰ to –6.077‰, average –6.854‰, rainwater increased and Southwest monsoon was strong.

9300-8300 aBP, the temperature fluctuates obviously along with the changes of δ^{13}C values (varies from –10.155‰ to –9.096‰, average –9.712‰) of stalagmite, and the proportion of C_4 plants of vegetation above Liangfeng cave was unsteady. The δ^{18}O values of stalagmite varies from –6.796‰ to –6.260‰, average –6.490‰, the affect of East-Asian monsoon increased.

8300-3100 aBP, the temperature increased obviously, theδ^{13}C values of stalagmite is much low (average –9.910‰), the vegetation above Liangfeng cave be dominated by C_3 plants. Theδ^{18}O values of stalagmite changes greatly, varies from –7.373‰ to –5.047‰, average –6.261‰, indicted that the climatic of monsoon is unsteady.

3100-1570 aBP, Theδ^{13}C values andδ^{18}O values of stalagmite increased greatly, theδ^{13}C values varies from –12.097‰ to –6.495‰, average –10.275‰, theδ^{18}O values varies from –8.650‰ to –4.677‰, average –6.184‰, the vegetation above Liangfeng cave be dominated by C_3 plants mainly, the climatic of monsoon is unsteady.

Reference

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