Study on main sources of the sulfur in acid rain in Jiangxi province, China

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The main sources of sulfur in rain water include bio-organic sulfur and anthropogenic sulfur in Jiangxi province, China.

We analyzed the sulfur isotopic composition of rain water from Nanchang City in this paper. The results indicated that the sulfur isotopic composition possesses a seasonal variation trend. It is discussed individually that the different sulfur sources of rain water with the principle of mass balance, the relative contribution of the biogenic and the anthropogenic to sulfur source of acid rain in Nanchang each can be calculated quantitatively. In summer and autumn, the sulfur in rain water comes mainly from bio-organic sulfur, In winter and spring,the sulfur in rain water dominantly originates from anthropogenic sulfur (Fig.1). The sulfur in rain water from the sea may be very small in percentage.

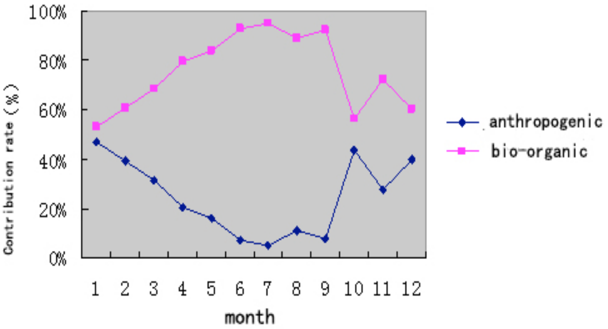

Figure 1: Two main sulfur sources' relative contribution to the precipitation in Jiangxi province

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Multistage growth of garnet in UHP metagranite in the Dabie orogen

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Garnet is a common mineral in subduction-zone metamorphic rocks, and its growth and reworking can be linked to metamorphic P-T conditions. We performed a combined study of major and trace elements by means of EMP and LA-ICPMS analyses on garnet from UHP metagranite in the Dabie orogen. Three stages of garnet growth are deduced from the major element zonation based on the assumption that Ca contents and Fe/Mg ratios in metamorphic garnet are indicative of metamorphic pressure and temperature, respectively. The first stage of growth (Grt-I) occurs in the core of skeletal garnets, which is characterized by the homogeneously low X_{Grs} values and Fe/Mg ratios, indicative of the highest temperature but the lowest pressure. It is a residue of magmatic garnet that most likely nucleates in the stage of protolith granite formation. The second stage of growth (Grt-II) occurs in the mantle and core of garnets, which is indicated by the increased X_{Grs} values and Fe/Mg ratios, corresponding to continuous increase in temperature and pressure till peak pressure and thus garnet growth during the prograde subduction. The third stage of growth (Grt-III) occurs in the rims of all garnets, which is suggested by slightly decreased X_{Grs} values and Fe/Mg ratios in response to a pressure decrease but a temperature increase till peak temperature. These rims overgrew subsequent to the peak pressure with continuous heating during the initial exhumation. REE distributions in the three stages of garnets are also different from each other. Both Grt-I and Grt-II exhibit steep MREE-HREE patterns with high HREE contents, with obvious negative Eu anomalies and high REE contents for Grt-I. Grt-III displays obviously lowered REE contents compared to those for Grt-I and Grt-II, with two subtypes of MREE-HREE patterns: steep (IIIa) and plat MREE-HREE patterns (IIIb). Therefore, the garnet from low-T/UHP metagranites displays obvious multiple stages of growth during continental collision. Nevertheless, the highest pressure occurs in the cores or mantles whereas the maximum temperature occurs in the rims, suggesting that the peak pressure did not occur at the peak temperature during the continental collision. Thus the "hot" exhumation is recorded in the garnets from the low-T/UHP granitic gneiss. This provides a thermal condition for dehydration melting of the deeply subducted continental crust.