Geochemical effects of deep subduction on the continental custal materials

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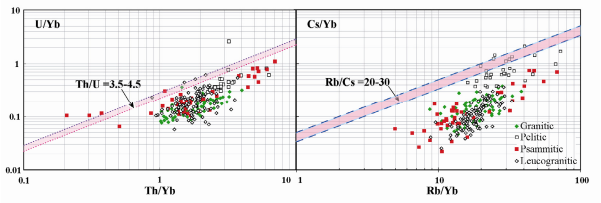
Subduction of continental crustal materials to depths >100 km is well documented worldwide. However, how subduction affects the geochemistry of subducted continental materials is poorly understood. Deeply subducted (>100 km) sedimentary and granitic rocks from the Chinese Continental Scientific Drilling (CCSD) project are used to address such a critical question. Geochemical data on fresh pelitic, psammitic, and granitic rocks from 2800-3000 m and 4300-5000 m of CCSD main borehole show that (1) at similar SiO_2, Al_2O_3 and CaO, leucogranitic gneisses have the highest magnitude of variations in Rb/Sr and Rb/Cs ratios; (2) degrees of variation in Rb/Sr and Rb/Cs ratios appears to depend on K_2O; and (3) strong fractionation of Cs from Rb, and U from Th, resulting in highly elevated Rb/Cs (up to 400), and Th/U (up to 32) (Fig.). This can be explained by hydration induced K-feldspar to phengite transformation [1] which preferential retain Rb over Sr and Cs that preferentially partition into a fluid. Pre-HP dehydration or HP-UHP hydration of continental materials also fractionates Th over U, which greatly increased the Th/U ratio of the hydrated continental materials, leaving lower Th/U ratios in the residue fluids. Zircons grown from such a fluid could have lower Th/U ratios, which is common in UHP metamorphic zircons [2].



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Environmental vanadium distribution in soil in a V-Ti-Fe magnetite ore area, Panzhihua, south-west of China

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Vanadium (V) is a widely distributed trace element in the earth's crust. It had been confirmed that vanadium is an essential element for human and animals by the end of 1970's (Cantly, 1978) and has high or middle poisonous to animals when its bioaccumulation reaches to a certain degree. The transfer ability and bioaccumulation of V in surface environment depends on its concentration, as well as its speciation.

Panzhihua, located at the upstream of Yangtze River, P. R. China, has a world famous V-Ti-Fe magnetite ore. It is the biggest V-Ti-Fe ore in China, which occupies 64% of the total vanadium in China. The investigated soil is of Xigeda type.

In this paper, the distribution of total vanadium and its speciation in soil got from different depths (4 layers, 0-5 cm, 15-25 cm, 30-50 cm and 50-75 cm) in this famous V-Ti-Fe magnetite ore area has been studied. The contents of total vanadium and vanadium speciation were determined by sensitive catalytic oscillopolarography.

The result show that the average content of vanadium in soil is 102 $\mu g \cdot g^{-1}$, which is much higher than the average value 86 $\mu g \cdot g^{-1}$ in China; the vanadium contents in soil samples came from mining area and smelting area are obviously higher than that from agricultural area and non-mining area. At the same sampling site, the content of vanadium is decreased by the increasing of sampling depth.

The sequential extraction analysis procedure of Tessier *et al* (1979) for heavy metals was used for the vanadium speciation separation. Although the main existing form of vanadium is residual form, the biological effect of vanadium in this area can be ignored. The summation content of exchangeable V and carbonate bound V, which can be directly bioaccumulated in natural conditions, is over 2 $\mu g \cdot g^{-1}$, while in most other research area is usually less than 1 $\mu g \cdot g^{-1}$. So the vanadium in this area has high transfer ability and high biological effect.

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