

Phytoavailability and bioaccumulation of vanadium in the soil in Panzhihua Region, S.W. China

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Vanadium is a ubiquitous trace metal in the environment, which is an essential trace element for living organisms, but the excessive content is harmful to human beings, animals and plants. A biogeochemical investigation of vanadium in the soil was carried out in Panzhihua region, SW China.

The content of vanadium was detected in different land-use districts soil. The total content of vanadium in different land-use districts characterized that: smelting area (range 208.1-938.4 mg/kg, average 532.1 mg/kg) > mining area (range 111.6-591.2 mg/kg, average 312.7 mg/kg) > urban park (range 94.0-183.6 mg/kg, average 119.8 mg/kg) ≈ agricultural area (range 71.7-227.2 mg/kg, average 113.0 mg/kg).

Based on improved BCR sequential extraction, the chemical speciation of vanadium (acid-soluble, reducible, oxidisable and residual) were determined. In the soil from four different land-use districts, the fraction of vanadium in each sequential extraction characterized that residual > oxidisable ≥ reducible > acid-soluble.

The phytoavailable content of vanadium was characterized that: the polluted areas (mining area 18.8-83.6 mg/kg, smelting area 41.7-132.1 mg/kg and the unpolluted area (agricultural area 9.8-26.4 mg/kg, urban park 9.9-25.2 mg/kg); while the phytoavailable proportion of vanadium was characterized that: the polluted areas (mining area 6.50-24.30%, smelting area 6.89-24.54%) and the unpolluted area (agricultural area 8.39-21.15%, urban park 8.20-23.72%).

In study area, The concentrations of vanadium in beet leaf samples were in the range of 6.5-42.8 mg/kg, and in mongo leaf samples were in the range of 3.0-22.7 mg/kg. In addition, the content of vanadium in samples in urban park was slightly lower than that of other three areas. The biological adsorption coefficient (BAC) of vanadium in study area showed that vanadium was weak or intermediate accumulated by plants. A pot experiment showed that alfalfa had strong metal adaptability and high accumulation of vanadium.

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Megacryst compositional heterogeneities in plagioclase ultraphyric basalts (PUBs)

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Plagioclase ultraphyric basalts (PUBs) are common in many oceanic tectonic settings particularly along slow to intermediate spreading ridges; however, the nature of their petrogenesis remains unclear. We have examined samples from the South West Indian Ridge (SWIR; ultraslow), Juan de Fuca Ridge (JdF; slow to moderate) and the Blanco Transform (pull apart), and more generally the global distribution of PUBs and their chemistries. Our work focuses on measuring major- and trace-element compositions and *in situ* Sr-isotopic compositions of plagioclase, and hosted melt inclusions, with the goal of documenting the extent to which the phenocrysts represent a coherent suite of genetically related material, and of understanding the dynamics of magma storage, transport and evolution within the oceanic crust.

Analyses of plagioclase and their hosted melt inclusions from all three study sites demonstrate both unchanging intra-grain compositions and considerable inter- and intra-grain variability in major- and trace-element compositions. Preliminary *in situ* Sr-isotopic data shows minimal differences between crystal and host glass. For those exhibiting compositional variability, each plagioclase megacryst analyzed appears to have a distinct history representing a complex crystal cargo, each crystal of which may have experienced a different petrogenetic history.

Globally, the distribution of PUBs is limited to ridges with ultraslow to moderate rates of spreading. Accumulated data suggest that PUB host glasses show a similar range in composition as global MORB glasses. For example, a plot of K₂O/TiO₂ versus MgO shows that there is no preferred liquid composition for PUB as compared to worldwide MORB glasses.

We believe that the compositional heterogeneities exhibited in PUB megacrysts are a result of complex crystallization histories involving melts of varying composition, changes in the physical conditions of crystal growth, and complex crystal exchange mechanisms.