Recognition of the Archean high-grade terrain in the South Qinglin orogen and its conection with the South China Block tectonics

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The South- and North China blocks were welded by the late Paleozoic to early Mesozoic Qinling-Dabie-Sulu orogen. However, timing of some isolated Precambrian terrains within the South Qinling unit and their correlation with the South China Block (SCB) are still poorly understood. The Yudongzi terrain in western South Qinling comprises crystalline basement gneisses and cover layers of banded iron formations (BIF). The basement rocks are dominated by trondhjemite with subordinate tonalite and granodiorite and show upper amphibolite- to granulite facies metamorphism. High precision zircon dating by the present work reveals that the gneisses were formed at 2650-2680Ma, whereas the BIF inherited zircons give an age cluster at 2.1-2.0 Ga with scattered Neoarchean grains, suggesting an early-mid Paleoproterozoic dominated provenance.

In the SCB, the Kongling area is the only terrain where the 2.9-2.7 Ga Archean high grade basement is well proved, whereas the unique early-mid Paleoproterozoic arc-related igneous suites (2150-2120 Ma), the Houhe intrusive rocks, occur at the northwestern SCB. Integrating with our documented works, we suggest that Yudongzi and Kongling terrains were two independent subordinate continents, which likely were welded during 2.0-1.9 Ga along the northwestern Yangtze margin, and were re-separated at ~755 Ma during the break-up of Rodinia.

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Plant uptake of metals of economic importance: Laboratory studies

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Biogeochemistry for mineral exploration has been undergoing a renaissance in recent years particularly in Australia. However, fundamental research into uptake of metals of economic importance by plants that are sampled for mineral exploration purposes has been lacking. Previous studies have taken place on crops of agricultural interest or for those pertaining to animal health or environmental monitoring. In this study we examine the uptake of several metals (Au, Cu, Ni, Pb and Zn) at variable concentrations in a series of trials using a sand-based, ebb and flow hydroponic system. Metal concentrations are analysed and the siting of these metals is investigated to understand if, how and where metals are located in biogeochemical sampling media..

Several trays containing several hundred plants were tested during each trial to quantify natural variability. Initially a large selection of Australian native plants were used but this was later reduced to two principal species, both of which are frequently used in mineral exploration, namely Mulga *Acacia aneura* (F.Muell. ex Benth.) and River Red Gum *Eucalyptus camuldulensis* (Dehnh.). In our experiments plant uptake of metal concentrations over three orders of magnitude were examined to test whether there were any barrier mechanisms to uptake at or near concentrations commonly observed in natural ecosystems. Competitive and enhanced interactions between metal uptake were also investigated to see whether certain metals were restricted or enhanced by the presence of others. The effect of pH and salinity variability was examined to emulate the range of natural groundwater conditions on which these plants grow. We used SEM, PIXE and SXRF to determine the location of metals in plant tissues (collected during sampling and from the hydroponic experiments) and establish if dust or anthropogenic contamination had occurred or whether the metals are truly absorbed in the plants. This is important when mineral exploration sampling is done in polluted mining environments.

We will discuss our results and show that they are encouraging for those using biogeochemistry for mineral exploration purposes as well as phytoremediation and phytomining.