Tectonothermal evolution of Helanshan Complex, westernmost part of the Khondalite belt in the Western Block of North China Craton

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New data show that the Western Block of the North China Craton formed by the amalgamation of the Yinshan Terrane in the north and the Ordos Terrane in the south along a Paleoproterozoic collisional belt, named the Khondalite Belt[1-6]. However, the timing and tectonic nature of this collisional event remains unclear. More and more studies show that the metamorphic P-T evolution can be successfully used to constrain the tectonic nature and processes of orogenic belts. In this study, we present petrological and thermobarometric data for the Helanshan Complex at the westernmost segment of the Khondalite Belt, which provide important insights into the tectonic history of the belt.

The Helanshan Complex consists mainly of Al-rich gneisses, quartzites, marbles and calc-silicate rocks, called khondalite series in the Chinese literature, and S-type granites. Microstructrual analysis and metamorphic reaction relations show that the Al-rich gneisses underwent four major metamorphic stages. The M1 assemblage is represented by inclusions found in the garnet poikiloblast, which includes quartz, plagioclase, biotite and kyanite. The M2 stage is defined by growths of matrix minerals quartz, plagioclase, K-feldspar, biotite, cordierite and sillimanite and garnet porphyroblasts. M3 is represented by the reaction rim of cordierite formed around the garnet porphyroblast. The final stage, M4, is represented by muscovite and sericite, and occasionally, andalusite, overprinting the major foliation in the rock.

These mineral assemblages and their P-T estimates define a clockwise P-T path involving decompression, which indicates that the Helanshan Complex underwent initial crustal thickening and subsequent exhumation, accommodating a collisional environment, supporting the recently-proposed model that the Khondalite Belt represents a collisional belt along which the Yinshan and Ordos Terranes amalgamated to form the Western Block in the Paleoproterozoic.

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References

[1] Santosh M., *et al*. (2007), *Gondwana Res*, **11**, 263-285.
[2] Xia X.P., *et al.* (2006), *Precambrian Res.* **144**, 199-212.
[3] Zhao G.C., *et al.* (1999), *Tectonophysics* **310**, 37–53.
[4] Zhao G.C., *et al.* (2001), *Precambrian Res.* **107**, 45–73.
[5] Zhao G.C., *et al.* (2003), *Sci. China (Series D)* **46,** 23-38.
[6] Zhao G.C., *et al.* (2005), *Precambrian Res.* **136**, 177–202.

Role of natural nanoparticles (imogolite and allophane) on the mobility of trace metals in soils from La Reunion island

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This research adresses the sensitive field of waste management in an insular context. The case of the Reunion Island bears some aggravating factors making the waste management an even more sensitive subject: 1) it is a small island with a fast growing population and associated activities 2) the agricultural soils (mostly andosols) have an elevated natural concentration of trace metals. An inexpensive form of waste management is to reuse agricultural- waste (especially pig manure) as fertilizer. However, reuse of waste, may modify physico-chemical conditions and trace elements can be released from the soils. The accuracy of the prediction of metal fluxes in soils will be greatly enhanced by a detailed knowledge of the pollutants' speciation, which controls their mobility, toxicity and ultimately their bioavailability. Although the trace metals Cu, Ni, Zn selected for this study because of their occurrence in the soils and wastes, may bind to numerous components of the soils (clays, Fe and Al oxides, organics), we chose to focus on 2 types of nanosized alumino-silicates: the tubular imogolites (2nm diameter) and the spherical allophane (3-5nm). The choice of these phases is justified by their high abundance in the andosols of the Reunion, and their suspected high reactivity arising from the presence of -SiOH and -AlOH at the surface of structures whose specific surface area can reach 700m^2/g. Here we detail using a molecular approach the types of the binding mechanisms between pollutants and natural occurring nanoparticles.