

Geochronology, geochemistry and ore-forming fluid characteristics of the Shijinpo gold deposit in Beishan belt, NW China

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The Shijinpo gold deposit is one of numerous lode gold deposits in the Beishan orogenic belt, southern margin of the Altaids, northwestern China. Gold mineralization is hosted in the early Devonian granite and consists primarily of auriferous quartz veins that confined to the EW-trending faults. Ore-related hydrothermal alteration is dominated by sericite + quartz + sulfide assemblages in close proximity of gold veins. Pyrite is the predominant sulfide mineral, variably coexisting with minor amounts of chalcopyrite, sphalerite, and galena. Gold occurs mostly as free gold enclosed in or filling microfractures of pyrite and quartz. Native gold is present coexisting with Au-bearing tellurides consisting mainly of petzite.

Measured $\delta^{34}\text{S}$ values for sulfide minerals range from 8.32‰ to 10.33‰, indicating a deep-seated sulfur source most likely of magmatic origin. Calculated $\delta^{18}\text{O}$ values for the ore fluid range from +2.7‰ to +3.3‰ and the corresponding δD values range from -95‰ to -99‰, compatible with mixing of magmatic and meteoric components. Fluid inclusion studies suggest that gold veins were deposited at intermediate temperature conditions (150 to 320°C) from aqueous or aqueous-carbonic fluids with moderate salinity (4.65 to 12.16 wt% NaCl equiv). The ore-forming fluid is assumed to undergo boiling at high temperature triggered by fracturing and then mixed with the ground water. Laser incremental heating $^{40}\text{Ar}/^{39}\text{Ar}$ analysis of hydrothermal sericite yield an plateau age at 364.6 ± 3 Ma (2σ), suggesting that the gold veining took place in the late Devonian.

Combining these observations with the regional geology we propose that the Shijinpo gold deposit was formed during compressional to transpressional processes in a subduction-related setting.

Mechanisms of nitrogen dissipation in an N-saturated subtropical forest in Southwest China

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Published N budgets for N-saturated watersheds in subtropical SW China suggest significant N retention, despite low forest growth, P deficiency and high soil acidity [1]. To characterize mechanisms of N dissipation in these systems, we applied state-of-the-art field and laboratory methodologies to a headwater catchment at Tieshanping (TSP), SW China, ($4.04 \text{ g N m}^{-2} \text{ a}^{-1}$ atmogenic deposition, 61% of which in form of NH_4^+ and $0.57 \text{ g N m}^{-2} \text{ a}^{-1}$ effusion in stream water mostly as NO_3^-). We explored spatiotemporal patterns of N_2O emission and ^{15}N and ^{18}O natural abundances of NO_3^- *in situ* and characterized nitrification and denitrification and their gaseous product stoichiometries by laboratory incubation.

Highest N cycling rates and N_2O emissions were found during the wet season (summer), with marked variations between wet and dry years. N_2O emissions during summer were driven mainly by rain episodes. Soils on the hillslopes showed higher denitrification and N_2O emission rates than a perturbed groundwater discharge zone (GDZ) which had less organic carbon. The spatial pattern of denitrification was consistent with NO_3^- concentration profiles and natural abundance signatures. Laboratory experiments confirmed that organic carbon is the limiting factor for N-removal by denitrification in this ecosystem and that the different landscape elements harbour denitrifier communities with distinct N_2O product stoichiometries, explaining part of the variation in observed N_2O emissions. Nitrification in the hillslopes was found to be unbalanced, producing significant amounts of nitrite which decomposed rapidly to NO and N_2O at low native pH (4.0), indicating chemodenitrification from incomplete NH_4^+ oxidation as a potentially important additional source for N_2O . Estimated annual N_2O emission for 2009 and 2010 was 0.29 g N m^{-2} , equivalent to appr. 8.5% of the annual N input. To close the N budget of the watershed, a field ^{15}N labelling experiment was conducted to assess total gaseous losses including N_2 .

[1] Chen XY and Mulder J. (2007). *Science of the Total Environment* **378**: 317-330