PGE distribution in base-metal sulfides from the Merensky Reef of the Bushveld Complex, South Africa

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Introduction

Several studies were undertaken to elucidate the distribution of PGE between various sulfides such as pentlandite, pyrrhotite or chalcopyrite [1, 2]. This present study concentrates on the PGE distribution in BMS in profiles of the Merensky Reef of the Bushveld Complex using whloe-rock, electron microprobe and LA-ICP-MS analysis.

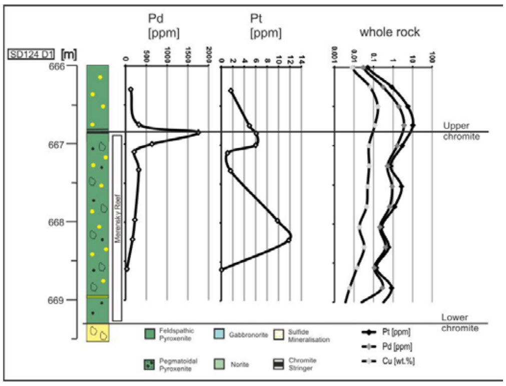

Figure 1: Pd and Pt distribution in pentlandite and whole-rock.

Results

Pentlandite is a principal host of Pd (and Rh) whereas Pt is mainly hosted by PGM. The distribution of Pt and Pd in two profiles from the western Bushveld reveals a top-loaded mineralization – max. concentrations of Pd and Pt occur in the area of the upper chromite stringer in the whole-rock, coinciding with max. concentrations of Pd in pentlandite (Fig. 1). Two profiles from the eastern Bushveld reveal 'offset patterns' – max. concentration of Pd in pentlandite is displaced ny 0.5 – 1 m below the max. concentration of whole-rock Pd and Pt. Downward percolation of sulfides or post-magmatic processes such as selective diffusion may be responsible for the observed offset feature.

[1] Godel *et al*. (2007) *J. Petrol* **248**, 272–294. [2] Barnes *et al*. (2006) *Contrib Mineral Petrol* **152**, 187–200.

The evolution of surface, intermediate and deep water connections during the closure of the Central American Seaway

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The progressive closure of the Central American Seaway and the associated reorganisation of deep-ocean circulation have been controversially reported as contributing to a warming and a cooling of global climate, as well as increasing moisture supply to the northern hemisphere and hence preconditioning the inception of Northern Hemisphere Glaciation. Here we use radiogenic isotopes of Nd and Pb to reconstruct the history of shallow, intermediate and deep water connections between the Caribbean Sea and the eastern Equatorial Pacific Ocean from 5.0 to 2.0 million years ago. Surface water exchange and mixing is characterised using the Nd isotope composition of planktonic foraminiferal calcite. The Nd and Pb isotope compositions of early diagenetic ferromanganese coatings of the same sediment samples are employed to determine intermediate and deep water exchange.

A core-top survey compares ε_{Nd} in surface sediments, with the expected water mass signature. Leaches of core-top sediments taken from intermediate water depths (~1000m) in the central Caribbean Sea give values between ε_{Nd} = -7.5 and -10.2. Planktic foraminifera from the same samples have ε_{Nd} between -8 and -10.8. Around a deeper central Caribbean site (~3000m), leaches give between -5.9 and -8.2 in ε_{Nd}, which is 2 to 6 ε_{Nd} units more radiogenic than published data from ferromanganese crusts in the Lesser Antilles[1, 2], but still significantly less radiogenic than core-top leaches from the Eastern Equatorial Pacific (EEP), which have ε_{Nd} between 2 and 0. These latter measurements are broadly consistent with data from an EEP ferromanganese crust [3]. These findings form the basis for the down-core survey and the reconstruction of the exact timing of the closure of the seaway and corresponding water mass exchange at different water depths.

[1] Reynolds *et al*. (1999) *EPSL* **173**, 381–396. [2] Frank *et al*. (2006) *G³* **7**, doi, 10.1029/2005GC001140. [3] Frank *et al*. (1999) *Geology* **27**, 1147–1150.