Changes in Neogene Himalayan erosion regime: Input of Pb and Nd isotopes into the Indian Ocean

J.C. GATTACCECA[1]*, A. GALY[1], A. M. PIOTROWSKI[1] AND M. FRANK[2]

[1]Dept. of Earth Sciences, University of Cambridge, CB2 EEQ Cambridge, UK (*correspondence: jcg54@cam.ac.uk)
[2]Leibniz Institute of Marine Sciences (IFM-GEOMAR), Wischhofstraße 1-3, 24148 Kiel, Germany

Pb- and Nd- isotopic time-series from the authigenic fraction of Central Indian Ocean sediments have been interpreted as responding to changes in the relative amount of Himalayan erosion during the Cenozoic [1,2]. Detrital records of Nd- and Sr- isotopes from the Bengal deep-sea fan suggest a source of sediment dominated by the High Himalaya Series (HHS) for the last 20 Ma [3,4]. Associated variations of Pb-isotopes are not known, and a more precise reconstruction is hampered by the lack of information about temporal changes in the isotopic composition of detrital Pb and Nd carried by rivers draining the Himalayas.

We present new Pb- and Nd-isotope time series, together with rare earth elements, from the bulk detrital and silt-sized fractions as well as the authigenic fraction of deep-sea sediment over the last 20 Ma from Ocean Drilling Program Sites 717 and 718 on the Bengal fan, along with Pb- and Nd-isotopic compositions of the bedloads of Himalayan rivers.

The oldest bulk detrital and silt-sized fraction samples (7-17 Ma) show similar and relatively uniform Pb- and Nd-isotopic compositions characteristic of a stable input from the HHS. The youngest samples (<1Ma) show the same uniformity with a shift towards more radiogenic values, implying a greater contribution of the Lesser Himalaya Series. However, over the Pliocene (1-7 Ma), strongly marked shifts in both isotopes are observed, along with a decoupling between the bulk detrital and silt-sized fractions.

These results imply a strong variability in the erosion and weathering regime of the Himalaya over the Neogene, and we will discuss them in the context of tectonic and climatic changes. We will discuss as well the implications of these changes for the interpretation of the deep water evolution of these isotope systems in the Central Indian Ocean.

[1] Frank et O'Nions (1998) *EPSL* **158**, 121-130 [2] Gourlan *et al*. (2010) *Quaternary Sci*. **29**, 2484-2498 [3] Derry and France-Lanord (1996) *EPSL* **142**, 59-74 [4] Galy *et al*. (2010) *EPSL* **290**, 474-480

Black Reef and Witwatersrand Gold fingerprint, South Africa

C GAUERT[1]*, D BATCHELOR[2], S FUCHS[1,3] AND G KLOESS[3]

[1]Univ. of the Free State, RSA (*correspondence: Gauertcdk@ufs.ac.za)
[2]Karlsruhe Inst. f. Technologie, Inst. f. Synchrotronstrahlung
[3]Inst f. Mat Sc. & Crystal, University of Leipzig, Germany

The origin of the gold, the Uranium and the PGEs in the basal conglomerate of the palaeoproterozoic Black Reef Formation (BR) of the Transvaal Supergroup in South Africa is debated because of the economic significance of this gold ore body. The geochemical trace element fingerprint of the Gold is used to unravel the origin of the Black Reef Gold. Based on EMP, LA-ICP-MS and SR-µ-XRF measurements Black Reef and Witwatersrand (WR) gold can be distinguished by means of their different degree of true fineness, and the Hg, Cu, Fe, S, Ti and Ni trace element content. Among the elements which are correlatible with gold, Sn, Sb, Pd, and Pt, possibly in combination with Mn, Se, Pb, and Ir appear to be the most effective element distinction of gold sources due to their moderate iterative variation.

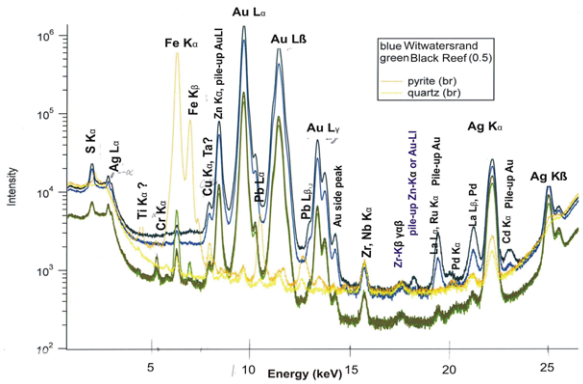

Figure 1: Synchrotron micro-XRF spectrum of BR and WR Gold, and pyrite and quartz at 30 keV energy.

The very similar heavy mineral content argues in favour of a reworked WR gold origin of the BR gold. Against a WR origin argues concretionary pyrite as major component and the less frequently occurring Ni-Co-Fe-sulpharsenides in the Witwatersrand reefs, however its frequent appearance in BR.

The Gold in the BR at Consolidated Modderfontein Au Mine on the East Rand has a lower fineness, lower Hg and Cu content compared to WR gold, whereas Fe, S, Ti and Ni concentrations are higher. Compositions of WR gold from different localities, as well as greenstone-hosted gold will be used in the debate of an alternative source area for the BR gold from the East and West Rand areas.