Geochemical, Sr-Nd and zircon U-Pb-Hf isotopic studies of Late Carboniferous magmatism in the West Junggar, Xinjiang: Implications for ridge subduction

H.Y. GENG[1]*, M. SUN[1], C. YUAN[2], W.S. XIAN[1], G.C. ZHAO[1] AND K. WONG[1]

[1]Department of Earth Sciences, the University of Hong Kong, Pokfulam Road, Hong Kong, China (*correspondence: hygeng@hkusua.hku.hk)

[2]Key Laboratory of Isotope Geochronology and Geochemistry, Guangzhou Institute of Geochemistry, Chinese Academy of Sciences, Guangzhou 510640, China

Three rock groups: the dioritic rocks, charnockite, and alkali-feldspar granite, are identified based on our petrological and geochemical studies on the voluminous granitic batholiths in the West Junggar. The dioritic rocks are calc-alkaline, Mg enriched, and show high Sr/Y ratios, with weak negative Eu and pronounced negative Nb-Ta anomalies. Their depleted Sr-Nd and zircon Hf isotopic compositions are compatible with those of adakites derived from partial melting of subducted oceanic crust and interacted with mantle materials. Charnockites show transitional geochemical characteristics from calc-alkaline to alkaline, with weak negative Eu but pronounced negative Nb-Ta anomalies. Their Sr-Nd and zircon Hf isotopic compositions also indicate a depleted feature, suggesting a hot juvenile lower crust origin. Alkali-feldspar granite are alkali and Fe enriched, and have distinct negative Eu and Nb-Ta anomalies, low Sr/Y ratios, and depleted Sr-Nd and zircon Hf isotopic compositions. These characteristics are comparable with those of rocks derived from juvenile lower crust. Despite of different petrology, geochemistry, and possibly different origins, zircon U-Pb analyes indicate that these three rock groups were coevally emplaced at ~305 Ma.

A ridge subduction model is proposed to account for the geochemical characteristics of these granitoids and coeval mafic rocks. As the “slab window” opened, the upwelling asthenosphere provided enhanced heat flux, and triggered the magnificent magmatisms: partial melting of the subducting slab formed the dioritic rocks; partial melting of the hot juvenile lower crust produced charnockite and alkali-feldspar granite, and partial melting of the mantle wedge generated mafic rocks. This study suggests that subduction was still under processing in the late Carboniferous, and supports that the final collisional termination of the Central Asian Orogenic Belt took place in North Xinjiang not earlier than 305 Ma, possibly in the Permian.

The Miocene ocean $^{187}Os/^{188}Os$ curve: Driven by continental weathering

R.B. GEORG[1], A.J. WEST[1], A. GANNOUN[1,2], K.W. BURTON[1] AND A.N. HALLIDAY[1]

[1]University of Oxford, Dept. Earth Sciences, Parks Road, OX1 3PR, Oxford, United Kingdom (bastian.georg@earth.ox.ac.uk)

[2]OPGC, Universite Blaise Pascal UMR 6524, 5 Rue Kessler, 63083 Clermont Ferrand cedex, France

A rise in seawater $^{187}Os/^{188}Os$ has been inferred from sedimentary data for the past ~17Ma [1-6]. However, recent Os data obtained from Fe-Mn crusts ([7] & Burton, unpublished data) indicate that the increase set in around 11Ma ago, consistent with the timing inferred from paleo-river data [8]. Although this rise may be associated with uplift in the Andes and Himalayas, leading to enhanced weathering, quantitatively attributing the global isotopic shift to specific events has been a tricky puzzle [9, 10]. Model calculations based on simple changes to fluxes or isotope ratios within the range observed for modern sources cannot explain the rise in seawater $^{187}Os/^{188}Os$ [9, 10].

We present the results of a new model that reproduces the marine Os record based on changing riverine inputs. The approach we use assumes that changes of global extent would change both the size and isotopic composition of the riverine Os flux into the ocean [11]. Our model allows both parameters to be varied by independent gradients, and the results demonstrate that the increase in seawater $^{187}Os/^{188}Os$ can indeed be attributed to enhanced Os fluxes from the Andean and Himalayan Mountains. We will examine if the enhanced continental Os flux could reflect changes in total silicate weathering fluxes, which could be attributed to decreasing atmospheric CO_2 levels [12].

[1] Oxburgh (1998) *EPSL* **159**, 183-191. [2] Oxburgh *et al.* (2007) *EPSL* **263**, 246-258. [3] Pegram *et al.* (1992) *EPSL* **113**, 569-576. [4] Peucker-Ehrenbrink *et al.* (1995) *EPSL* **130**, 155-167. [5] Ravizza (1993) *EPSL* **118**, 335-348. [6] Reusch *et al.* (1998) *EPSL* **160**, 163-178. [7] Klemm *et al.* (2005) *EPSL* **238**, 42-48. [8] Chesley *et al.* (2000) *EPSL* **179**, 115-124. [9] Chen *et al.* (2006) *EPSL* **252**, 138-151. [10] Sharma *et al.* (1999) *GCA* **63**, 4005-4012. [11] Singh *et al.* (1999) *GCA* **63**, 2381-2392. [12] Berner *et al.* (1983) *Am. J. Sci.* **283**, 641-683.