Ages of carbonatite and syenite from the Mianning-Dechang REE belt in the eastern Indo-Asian collision zone, SW China and their geological significance

SHIHONG TIAN1,2, ZENGQIAN HOU3, TIPING DING1,2, ZHUSEN YANG1, ZHIMING YANG1, ZHONGXIN YUAN1, YULING XIE4, YINGCHAO LIU1 AND ZHENG LI4
1Institute of Mineral Resources, CAGS, Beijing 100037, P.R. China (s.h.tian@163.com)
2Key Laboratory on Isotope Geology, Ministry of Land and Resources, Beijing 100037, P.R. China
3Institute of Geology, CAGS, Beijing 100037, P.R. China
4Civil & Environmental Engineering School, Beijing University of Science and Technology, Beijing 100083

Himalayan magmatic activity in southwestern China forms a semi-continuous potassic igneous province in the eastern Indo-Asian collision zone, a high topographic relief area bounded by a series of Cenozoic strike-slip faults. The western Sichuan carbonatites (WSC) are associated with contemporaneous syenites, and form a 270-km long belt of Cenozoic carbonatite-alkalic complexes in the EIACZ. Unlike most known carbonatite plutons with anorogenic processes (e.g. rifting), the WSC occur in a continental collision zone, formed by the Indo-Asian continental collision since the Paleocene period.

From north section to south section (see Fig. 1), the analytical results are as follows: at Maoniuping, K-Ar dating on the bulk-rock and igneous minerals yields an age of 31.7±0.7 Ma for carbonatite, and an age of 40.8±0.7 Ma for syenites. At Muluozhai, the K-feldspar separates from the syenite yielded a 40Ar/39Ar plateau age of 31.2 ± 0.56 Ma. At Lizhuang, the K-feldspar separates from the syenite yielded a 40Ar/39Ar plateau age of 27.1 Ma. At Dalucao, SHRIMP dating on the zircons of the carbonatite and syenite yields an age of 12.99 ± 0.94 Ma and 14.53 ± 0.31 Ma, respectively.

In summary, formation ages decrease systematically from north to south, and their age sequence can be plausibly explained by assuming that a region of melting in the south plate moved north along the Yalongjiang fault relative to the left plate.

This work was supported by grants (Contract No. 40603012, 40425014, 2002CG412610, 13-7-5, 40573035 and KL05-9).

Ca isotope ratios in the largest rivers in the world: Implications for the global Ca budget and weathering processes

EDWARD T. TIPPER1,2, JÉRÔME GAILLARDET2, ALBERT GALY3 AND PASCALE LOUVAT2
1IGMR, ETH Zurich, Clausiusstrasse 25, NW 8092 Zürich, Switzerland (tipper@erdw.ethz.ch)
2IPGP-Université Paris 7, Paris, France
3Dept of Earth Sciences, University of Cambridge, UK

The oceanic Ca budget is balanced between the inputs of Ca (mainly riverine) and the outputs of Ca (biogenic carbonate). Initial measurements of Ca isotope ratios in several large rivers and marine carbonates (e.g. [1]) led these workers to conclude that the modern oceanic Ca isotope budget was in steady state. However, marine records of Ca isotope ratios show small but significant variations, implying that the oceanic Ca budget must deviate from steady state over long time-scales, due to effects related either to the inputs or outputs of Ca from the oceans. Recent measurements of Ca isotope ratios in Himalayan rivers and soil profiles (e.g. [3, 4]) have revealed that Ca isotope ratios are fractionated during the weathering process. In particular solute Ca from small rivers draining limestone were shown to have a different 44Ca/42Ca ratio (expressed as δ44/42Ca) than the Ca in the limestone they were draining. Given that at a global scale, 67% of riverine Ca is derived from carbonate weathering, this small offset could have significant implications for the δ44/42Ca of large rivers and the oceanic Ca balance.

To resolve whether this discrepancy in Ca isotope ratios between limestone and river water was significant at a global scale, we have measured δ44/42Ca in 22 of the largest rivers in the world. These include samples from different water stages, and a time-series for the Salween and Irrawaddy Rivers. δ44/42Ca in the largest rivers in the world is remarkably homogeneous, with a flux weighted mean δ44/42Ca of 0.39‰ relative to SRM915a. The implications of the homogeneity of the data, given the apparent fractionations observed in weathering systems at small spatial scales will be discussed. The implications for the global Ca cycle will also be considered.