Mobility of trace elements in ombrotrophic peat bogs

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The geochemical cycles of many trace elements have been altered by human activity. Peat bogs are often used as an archives of past pollution. Concentration patterns of individual elements downcore can be recalculated into rates of historical atmospheric deposition. However, vertical mobility of trace elements in the petlands could "smear out" the historical record. We performed a peat transplant experiment to test the mobility/immobility of six trace elements (Mn, Fe, Pb, Zn, Cu and Ti), buried in organic soil. Three replicated cores from a peat bog situated in a heavily polluted area in northern Czech Republic were transplanted into a peat bog situated in unpolluted southern Czech Republic, and vice-versa. After 18-months, peat cores were excavated, taken to the laboratory and analyzed. Two different patterns were observed. The first group of elements (Fe, Mn) was characterized by convergence of concentration patterns to their host site, regardless of whether the host site was originally richer or more deficient in these elements. The second group of elements (Pb, Zn, Cu, Ti) was resistant to change during the transplant experiment, with concentration patterns unchanged. Our transplant experiment showed that not just lead but also copper and zinc could be used in retrospective peat pollution studies because there was no evidence of post-depositional mobility.

Concurrence of Mid-Miocene high Sr/Y granite and leucogranite in the Yardoi gneiss dome, Tethyan Himalaya, Southern Tibet

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We report a new suite of porphyric granite and leucogranite in the Yardoi gneiss dome (YGD) in the easternmost of the Northern Himalayan Gneiss Domes (NHGD), south of the Yarlung-Tsangpo suture. SHRIMP and LA-ICP-MS zircon U/Pb dating show that the porphyric granite dikes (PGD) and garnet-bearing leucogranites (LG) formed at ~17.7 Ma to ~20.0 Ma and at ~17.1 Ma, respectively. Both suites of granite have high Na/K (>1.30) ratios. The PGDs are characterized by (1) high Sr (>450 ppm), low Rb (<95 ppm) and Y (<6 ppm), and high Sr/Y (>86) ratios; (2) no Eu anomalies; and (3) low initial $^{87}Sr/^{86}Sr$ ratios (<0.7098) and higher ε_{Nd} (>-8.5) values. In contrast, the LGs have (1) lower Sr (<130 ppm) and higher Rb (92-130 ppm); (2) pronounced negative Eu anomalies with Eu/Eu*<0.55; and (3) relatively higher Sr ($^{87}Sr/^{86}Sr(t)$=0.7136-0.7148) and unradiogenic Nd ($\varepsilon_{Nd}(t)$=-7.7~-11.1). These data demonstrate that these Mid-Miocene granites have major and trace element and radiogenic isotope compositions similar to those of >35 Ma granites[1,2], but significantly different from those granites of similar ages in the High Himalya as well as in the NHGD[3]. High Sr/Y and relatively unadiogenic Sr isotope compositions in the PGDs could be derived from partial melting of mafic materials formed during previous compressional thickening event which was triggered by the input of juvenile heat and material associated with the Miocene E-W extension. An AFC process (plagioclase fractional crystallization and comtamination by crustal materials) could be a primary factor leading to the formation of these LGs. Concurrence of high Sr/Y granites and leucogranites in NHGD indicates that the Miocene rifting could have played an important but previously unrecognized role in producing the Himalayan leucogranite.

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