Cadmium anomalies in oolitic carbonates of Bajocian and Oxfordian/Kimmeridgian age in the Swiss and French Jura Mountains

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Positive anomalies in cadmium concentration of up to 8.15 ppm were discovered in oolitic carbonates of Bajocian and Oxfordian/Kimmeridgian age, in the Swiss and French Jura (Benitez-Vasquez, 1999, Veuve, 2000). The cadmium enrichment is restricted to the cortex of the ooids, or to entire ooids in the case they are micritized (Veuve, 2000).

These elevated cadmium contents in the rock substratum lead to cadmium enrichments in the soils, which reach values of up to 10.4 ppm. These concentrations largely exceed the official guideline values in Switzerland (0.8 ppm) and France (2 ppm).

Our topic is to characterize, map and date more precisely these anomalies, by studying complete sections in Bajocian and Oxfordian carbonates (Swiss Jura; Bourgogne/Lorraine - France) and by analysing selected samples for cadmium content (by ICP-MS), mineralogy (by XRD), and facies (by thin sections). Another part of our research consists in the analysis of carbonates of similar facies but of different ages in the Jura Mountains and northern Alps, and the analysis of the types of rock substratum underneath soils with established cadmium enrichments (Bourgogne/Charente - France).

With this research we hope to elaborate the sedimentary and paleoenvironmental conditions and changes that led to cadmium enrichment in carbonate oolites, as well as to develop predictive tools for other facies types.

References

Benitez-Vasquez N., (1999), *Unpublished Ph.D. Thesis*, EPF, Lausanne, 132 p.

Veuve P., (2000), *Unpublished diploma thesis*, Univ. Neuchâtel, 56 p.

Mantle Sources Generating Recent Volcanism Along the Perimeter of the Colorado Plateau

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Continental basalts erupted along the transition zone between the Colorado Plateau and the Basin and Range Province retain variable isotopic and trace element signatures that range between those expected for mantle asthenosphere and mantle lithosphere. We have analyzed a suite of these basalts (whole-rocks) for (^{230}Th)/(^{232}Th) by TIMS and will present comparable results obtained using the ThermoFinnigan Neptune® MC-ICP-MS at the GeoAnalytical Lab at Washington State University.

Continental basalts erupted along the southern and western edges of the Colorado Plateau during the Pleistocene and Holocene have variable Th-enriched signatures with ^{230}Th excesses that rival those observed in oceanic basalts. These basalts define a broad range of isotope and trace element characteristics that differ from oceanic basalts and that must originate from lithospheric mantle sources. In addition, only a limited number of these basalts reflect geochemical characteristics consistent with either silicic or mafic crustal contamination. It is, however, difficult to justify how ^{230}Th "ingrowth" during mantle upwelling (similar to models that account for ^{230}Th enrichments in oceanic basalts) can be responsible for ^{230}Th excesses in these basalts as a result of the presence of variably thickened lithosphere underlying this portion of the western US which would act to impede mantle upwelling. If ^{230}Th excesses were indeed the result of "ingrowth" during mantle upwelling, mantle lithosphere in this region would need to be dramatically thinner than current geophysical estimates and resulting melts would have to obtain their respective isotope and trace element signatures during transit through intervening mantle lithosphere. In contrast, ^{230}Th enrichments in these basalts can be reasonably modeled as the result of small degree partial melts of a garnet lherzolite source containing variable amounts of clinopyroxene. Notable exceptions require higher source garnet contents, over-estimated eruption ages, or additional, although limited, "ingrown" Th inputs.