Iron isotope composition of iron ore and iron-based Nasca pigments, Peru.

GRY HOFFMANN BARFOD[1], JELMER EERKENS[2], KEVIN VAUGHN[3], RYAN WILLIAMS[4], CHARLES LESHER[1] AND JUSTIN GLESSNER[5]

[1]Depart. Gescience, Aarhus Uni, and Depart. Earth Planet. Sciences, UCDavis, and Interdisciplinary Center for Plasma Mass Spect. UC Davis (ghbarfod@ucdavis.edu)
[2]Department of Anthropology, UC Davis
[3]Department of Anthropology, Purdue University
[4]Department of Anthropology, The Field Museum, Chicago
[5]Interdisciplinary Center for Plasma Mass Spect, UC Davis

The Nasca culture developed during the first millinium AD and is known for its decorated polychrome pots. The vivid red and black colors result from firing of iron oxides presumably mined from local ores. Very little is known about the details of Nasca pigment production, but iron oxide mining is known to have occurred regionally on a fairly large scale. We present three complementary Fe isotope studies on; 1. Red and black pigments from Nasca pottery, 2. Local iron ore samples and 3. fired hematite applied to a clay substrate with known pre-fired Fe isotope compositions. The iron was seperated by ion chromatography and analyzed by MC-ICPMS in high-resolution mode using sample-std bracketing. The red and black pigments are characterized by distinct but *different* ranges in iron isotope compositions (δ^{56}Fe 0.15 – 0.55‰ and δ^{56}Fe -0.3 – -0.05‰, respectively). Firing hematite in oxidizing and reducing atmospheres on a clay substrate with significantly lower δ^{56}Fe resulted in no changes for δ^{56}Fe of the hematite. We therefore relate the δ^{56}Fe difference for the red and black pigments to mineralogical differences in the fired iron oxide material (e.g. two black pigments contained magnetite) or to a different hematite source. Relative to samples collected in the ancient mine at Mina Primavera, the red and in particular the black pigments have distinctly lighter δ^{56}Fe. The Mina Primavera samples are therefore not likely candidates for the Nasca red and black pigments, but have δ^{56}Fe corresponding to a hematite powder (~'paint') found in an ancient grave in the civic-ceremonial center Cahuachi. More sampling is needed to characterize intra-ore variations, but if large isotopic ranges exist for all iron ores on a small scale such as those reported by e.g. Makl *et al*. (2006) for iron ore minerals in the Schwartzwald region, SW Germany, it remains a mystery how potters came to select narrow (and different) suites for their red and black pigment production.