70 ka of dust deposition and elemental composition in the subtropical Mid-Atlantic

J.L. MIDDLETON[1,2*], S. MUKHOPADHYAY[2], C.H. LANGMUIR[1], AND J.F. MCMANUS[3,4]

[1]Dept. of EPS, Harvard Univ., Cambridge, MA 02138, USA ([*]correspondence: jmiddlet@fas.harvard.edu)
[2]Dept. of EPS, UC Davis, Davis, CA 95616, USA
[3]Lamont-Doherty Earth Obs., Palisades, NY 10964, USA
[4]Dept. of EES, Columbia Univ., New York, NY 10025, USA

Sedimentary records of trace element deposition constrain dust input to the open ocean and the interplay between wind patterns, ocean circulation, and paleoproductivity across changing climates. However, such records extending beyond the Last Glacial Maximum (LGM) in the Atlantic are few and far between. We present new records of extraterrestrial ^{3}He-normalized dust and elemental fluxes (e.g., Al, Fe, Th, REEs, and ^{4}He) for the past 70 ka from two gravity cores recovered from the Mid-Atlantic Ridge at 26ºN and 29ºN.

The Th and ^{4}He dust proxies [e.g., 1-2] and REE fluxes at 29ºN show a general increase in dust deposition from 70 to 10 ka, followed by a sharp decrease during the African Humid Period (AHP) between 10 to 5 ka, and a rapid rise from 5 ka to the core top (1 ka). Th and ^{4}He fluxes at 70 ka fall within 10% of modern flux values. LGM dust fluxes are comparible to pre- and post-LGM values, although there are dust flux peaks at 14 and 10 ka that are ~150% of modern flux values. Minimum Th and ^{4}He fluxes during the AHP equal 55% and 40% of modern deposition, respectively. Fe fluxes at 29ºN follow the dust proxy pattern for the past 70 ka and vary from 2.7 to 5.5 mg cm^{-2} ka^{-1}. Core-top sediments reveal modern Fe fluxes of 4 mg cm^{-2} ka^{-1}. In comparision, models of aeolian Fe deposition to this region today predict slightly higher values of 10 to 20 mg cm^{-2} ka^{-1} [3].

The 50 ka dust flux record observed at 26ºN closely matches that of 29ºN for the past 16 ka. However, the proxy record suggest that dust fluxes at 26ºN are generally lower than at 29ºN prior to 16 ka. Further, while the AHP dust flux minumum is not observed elsewhere within the 70 ka sedimentary record from 29ºN, the dust proxy fluxes reveal a second minimum in dust deposition to 26ºN, comparable to the AHP, at 40 ka. Future work will examine variations in the elemental composition of these sediments to explore the relationship between total dust flux and dust provenance.

[1] Patterson et al. (1999) *GCA* **63**, 615-625. [2] Adkins et al. (2006) *Paleoceanography* **21**, PA4203. [3] Mahowald et al. (2009), *Annu. Rev. Marine Sci.* **1**, 245-278.