Biogeosciences Discuss., 12, C9555–C9556, 2016
www.biogeosciences-discuss.net/12/C9555/2016/

Biogeosciences Discussions
Open Access
EGU

Interactive comment on "Bathypelagic particle flux signatures from a suboxic eddy in the oligotrophic tropical North Atlantic: production, sedimentation and preservation" *by* G. Fischer et al.

D. Archer (Referee)

d-archer@uchicago.edu

Received and published: 2 February 2016

This is a thorough paper describing an extremely interesting and well-done data set, from a sediment trap mooring that was crossed by an anticyclonic modewater eddy, which has high chlorophyll in the surface ocean and low oxygen in its interior due to sustained upwelling. The life history of the eddy is known, to have originated in the coastal Atlantic off Africa, but the oxygen depletion, and the biota, reflect biological activity that has happened within the eddy since it left the shore. A perfect data set!

The sediment trap data here is interpreted vertically, but I wonder if that's appropriate. The authors argue that given a sinking velocity of 100 meters per day and some typical

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

horizontal flow velocities, particles wouldn't travel very far in the horizontal. The problems with a vertical explanation for the fluxes found here are (1) the deep trap received more material than the shallower one. (2) The fluxes of dust also spiked during the eddy's passage, although there is no strong evidence for a particular focusing of dust deposition fluxes at the sea surface associated with the eddy.

The oxygen depletion grew in place, and there are higher concentrations of chlorophyll in surface waters than outside of the eddy, so some component of the excess organic carbon fluxes measured must have been grown locally. But the dust fluxes imply that there must be some horizontal focusing mechanism, or a buildup in time of depositional fluxes, in addition to any biological signals in the sediment trap. In fact, the unusually tight correlation between the dust and the organic carbon makes me think that the focusing mechanism must dominate over the local biological fluxes.

Could the upwelling jet in the eddy be acting as a particle trap, actually inhibiting sinking by carrying small particles upward? Particles would build up in the water column like snowflakes in a blizzard. When it passes by the sediment trap mooring, material settles into the traps and is recorded. It would explain the dust, the synchroneity of the spike between the two depths, and the higher fluxes in the deeper trap.

Interactive comment on Biogeosciences Discuss., 12, 18253, 2015.