

Interactive comment on “Understanding the transport of Patagonian dust and its influence on marine biological activity in the South Atlantic Ocean” by M. S. Johnson et al.

Anonymous Referee #2

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Review of Johnson et al., “ Understanding the transport of patagonian dust and its influence on marine biological activity in the south Atlantic Ocean”

The paper is a solid paper looking at two dust deposition events and relating them to ocean responses. The paper is clearly written and makes a contribution to the literature.

“Based on a significant positive correlation between the atmospheric delivery of mineral dust and phytoplankton growth in the surface waters of the SO, downwind from the Patagonian and Southern Australian regions (Gabric et al., 2002; Erickson et al., 2003) it was proposed that phytoplankton productivity in the South Atlantic Ocean

C13056

(SAO) is controlled by Patagonian dust deposition (Erickson et al., 2003).” Both of these studies are fatally flawed, so I don’t think anybody actually believed them. Gabric used seaweeds atmospheric correction, which is known to have biases correlated with chlorophyll. And Erickson just correlated seasonal cycle, which just means that in the summer there is dust and there is chlorophyll: no causation should be attributed.

“Recent modeling studies have shown that due to the pristine nature of this region, the water soluble (or bioavailable) fluxes of Fe (sol-Fe) in mineral dust over the SO could be much lower compared to Northern Hemispheric dust (Meskhidze et al., 2007; Johnson et al., 2010).” But what about the observations which suggest that the dust is highly soluble from Baker et al.? that should be mentioned here, and emphasized more than model results.

“Roughly 40% of this mineral dust got deposited to the proposed” replace “got” with ‘was’

Figure 3 “GEOS-Chem-predicted dust burden (gm^{-2}) with overlaid (a) CALIPSO retrievals of dust aerosol layers, (b) model-predicted vertical cross-section of dust concentration ($\mu\text{g m}^{-3}$) along the CALIPSO orbit track and (c) CALIPSO dust layer AOD at 532nm on 23 January 2009. Model cross-section calculations are conducted along the CALIPSO orbital track beginning at 4:28:59 UTC (V3-01.2009-01-23T04-28-59Z).” All three panels appear to be the same thing, but the figure caption doesn’t tell us the difference?

Figure 9: how does figure 9 deal with the problem that atmospheric dust can be misinterpreted as chlorophyll in the seaweeds data?

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